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NUREG-2168, Vol. 3

Environmental Impact Statement for an Early Site Permit (ESP) at the PSEG Site

Final Report

Appendices

U.S. Nuclear Regulatory Commission
Office of New Reactors
Washington, DC 20555-0001

Regulatory Branch
Philadelphia District
U.S. Army Corps of Engineers
Philadelphia, PA 19107

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COVER SHEET

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ABSTRACT

This environmental impact statement (EIS) has been prepared in response to an application submitted on May 25, 2010 to the U.S. Nuclear Regulatory Commission (NRC) by PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), for an early site permit (ESP). The proposed actions requested in the PSEG application are (1) the NRC issuance of an ESP for the PSEG Site located adjacent to the existing Hope Creek Generating Station and Salem Generating Station, Units 1 and 2, in Lower Alloways Creek Township, Salem County, New Jersey, and (2) U.S. Army Corps of Engineers (USACE) permit action on a Department of the Army permit application to perform certain construction activities on the site. The USACE is a cooperating agency with the NRC in preparing this EIS and participates collaboratively on the review team.

This EIS includes the review team's analysis that considers and weighs the environmental impacts of building and operating a new nuclear power plant at the proposed PSEG Site, at alternative sites and mitigation measures available for reducing or avoiding adverse impacts. The EIS also addresses Federally listed species, cultural resources, essential fish habitat issues, and plant cooling system design alternatives.

The EIS includes the evaluation of the proposed action's impacts on waters of the United States pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Appropriation Act of 1899. The USACE will conduct a public interest review in accordance with the guidelines promulgated by the U.S. Environmental Protection Agency under authority of Section 404(b) of the Clean Water Act. The public interest review, which will be addressed in

the USACE permit decision document, will include an alternatives analysis to determine the least environmentally damaging practicable alternative.

After considering the environmental aspects of the proposed NRC action, the NRC staff's recommendation to the Commission is that the ESP be issued as requested.
This recommendation is based on (1) the application submitted by PSEG, including Revision 4 of the Environmental Report (ER), and the PSEG responses to requests for additional information from the NRC and USACE staffs; (2) consultation with Federal, State, Tribal, and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments related to the environmental review that were received during the public scoping process and the public comment period following the publication of the draft EIS; and (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the ER and this EIS. The USACE will issue its Record of Decision based, in part, on this EIS.

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EXECUTIVE SUMMARY

This environmental impact statement (EIS) presents the results of a U.S. Nuclear Regulatory Commission (NRC) environmental review of an application for an early site permit (ESP) at a proposed site in Salem County, New Jersey. In support of its proposed action of issuing a Department of the Army permit, the U.S. Army Corps of Engineers (USACE) participated in the preparation of the EIS as a cooperating agency and as a collaborative member of the review team, which consisted of the NRC staff, its contractor staff, and the USACE staff.

BACKGROUND

On May 25, 2010, PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) submitted an application to the NRC for an ESP at the PSEG Site located adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station (SGS) in Lower Alloways Creek Township, Salem County, New Jersey. On June 5, 2015, PSEG submitted a fourth revised version of its application, which also included an Environmental Report (ER).

Upon acceptance of PSEG's initial application, the NRC review team began the environmental review process as described in Title 10 of the *Code of Federal Regulations* (CFR) Part 52 by publishing in the *Federal Register* on October 15, 2010, a Notice of Intent to prepare an EIS and conduct scoping. As part of the environmental review, the review team did the following:

- considered comments received during the 60-day scoping process that began on October 15, 2010, and conducted related public scoping meetings on November 4, 2010 in Carneys Point, New Jersey;
- conducted site audits from April 17, 2012 through April 19, 2012 and from May 7, 2012 through May 11, 2012;
- conducted public meetings on the draft EIS on October 1, 2014 in Carneys Point, New Jersey and on October 23, 2014 in Middletown, Delaware;
- considered comments received during the 105-day comment period for the draft EIS, which began on August 22, 2014;
- reviewed PSEG's ER and developed requests for additional information using guidance from NUREG–1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan*; and
- consulted with Native American tribes and Federal and State agencies such as the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Advisory Council on Historic Preservation, the New Jersey Department of Environmental Protection, the New Jersey State Historic Preservation Office, and the State of Delaware Office of Historical and Cultural Affairs.

PROPOSED ACTION

The proposed actions related to the PSEG application are (1) the NRC issuance of an ESP for the PSEG Site and (2) the USACE issuance of a Department of the Army permit pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act [CWA]) and Section 10 of the Rivers and Harbors Appropriation Act of 1899, as amended, to perform certain dredge and fill activities on the site.

PURPOSE AND NEED FOR ACTION

The purpose and need for the NRC proposed action—issuance of the ESP—is to provide for early resolution of site safety and environmental issues, which provides stability in the licensing process. Although no reactor will be built at the PSEG Site under this action (the ESP), to resolve environmental issues the staff assumed in this EIS that one or two reactors with the parameters specified in the plant parameter envelope (PPE) would be built and operated. Any new nuclear plant would provide for additional electrical generating capacity to meet the need for up to 2,200 MW(e) of baseload power in the State of New Jersey by 2021.

The objective of the PSEG-requested USACE action is to obtain a Department of the Army individual permit to perform regulated dredge and fill activities that would affect wetlands and other waters of the United States. The basic purpose of obtaining the Department of the Army individual permit is for PSEG to conduct work associated with building a power plant to generate electricity for additional baseload capacity.

PUBLIC INVOLVEMENT

A 60-day scoping period was held from October 15, 2010 through December 14, 2010, and on November 4, 2010, the NRC held public scoping meetings in Carneys Point, New Jersey during which interested parties were invited to provide comments on the applicant's ER. The review team received many oral comments during the public meetings and 12 written statements, 7 letters, and 1 e-mail during the scoping period on topics including surface-water hydrology, ecology, socioeconomics, historic and cultural resources, air quality, uranium fuel cycle, energy alternatives, and benefit-cost balance.

In addition, during the 105-day comment period on the draft EIS, the review team held public meetings in Carneys Point, New Jersey on October 1, 2014 and in Middletown, Delaware on October 23, 2014. A combined total of approximately 75 people attended the public meetings in New Jersey, and approximately 140 people attended the public meetings in Delaware. A number of attendees at each meeting provided oral comments.

AFFECTED ENVIRONMENT

The PSEG Site is located on the southern part of Artificial Island adjacent to the existing HCGS and SGS Units 1 and 2, in Lower Alloways Creek Township, Salem County, New Jersey. The PSEG Site is on the eastern bank of the Delaware River about 18 mi south of Wilmington, Delaware, and 30 mi southwest of Philadelphia, Pennsylvania. The site is about 7 mi east of Middletown, Delaware; 7.5 mi southwest of Salem, New Jersey; and 9 mi south of Pennsville, New Jersey. Figure ES-1 depicts the location of the PSEG Site in relation to nearby counties and cities within the context of the 50-mi region and the 6-mi vicinity.

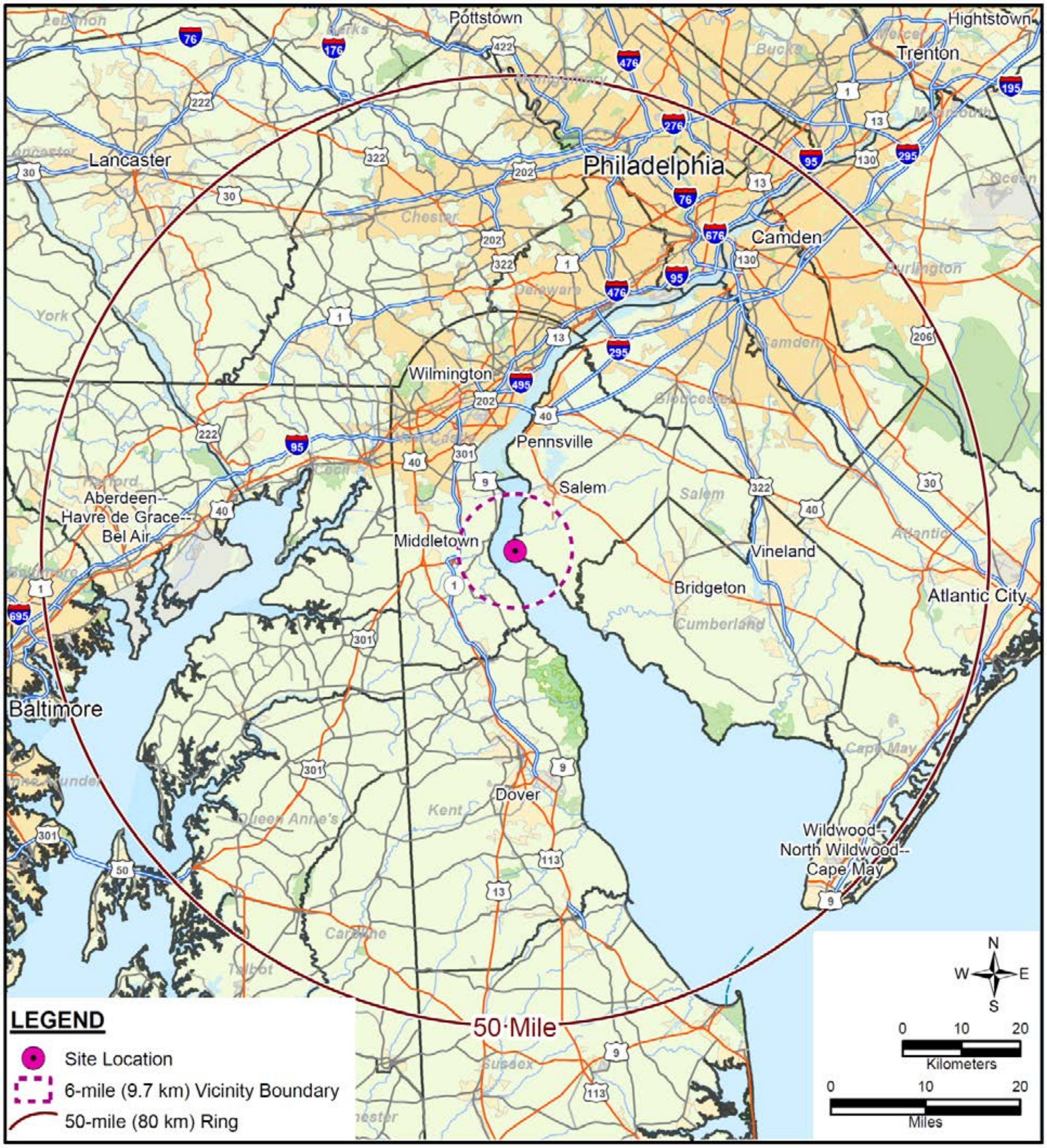

Figure ES-1. PSEG Site Location and Vicinity

Cooling water for any new nuclear units constructed at the PSEG Site would be obtained from the Delaware River. These units would use either mechanical or natural draft cooling towers to transfer waste heat to the atmosphere. A portion of the water obtained from the Delaware River would be returned to the environment via a discharge structure located in the Delaware River on the western side of Artificial Island. The remaining portion of the water would be released to the atmosphere via evaporative cooling.

EVALUATION OF ENVIRONMENTAL IMPACTS

When evaluating the environmental impacts associated with nuclear power plant construction) and operations, the NRC's authority is limited to construction activities related to radiological health and safety or common defense and security; that is, under 10 CFR 51.4, the NRC-authorized activities are related to safety-related structures, systems, or components and may include pile driving; subsurface preparation; placement of backfill, concrete, or permanent retaining walls within an excavation; installation of foundations; or in-place assembly, erection, fabrication, or testing. In this EIS, the NRC review team evaluates the potential environmental impacts of the construction and operation of a new nuclear power plant at the PSEG Site for the following resource areas:

- land use,
- air quality,
- aquatic ecology,
- terrestrial ecology,
- surface water and groundwater,
- waste (radiological and nonradiological),
- human health (radiological and nonradiological),
- socioeconomics and environmental justice, and
- historic and cultural resources.

This EIS also evaluates impacts associated with accidents, the fuel cycle, decommissioning, and transportation of radioactive materials.

The impacts are designated as SMALL, MODERATE, or LARGE. The incremental impacts related to the construction and operations activities requiring the NRC authorization are described and characterized, as are the cumulative impacts resulting from the proposed action when the effects are added to, or interact with, other past, present, and reasonably foreseeable future effects on the same resources.

> **SMALL:** Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
>
> **MODERATE:** Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
>
> **LARGE:** Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Table ES-1 provides a summary of the cumulative impacts for the PSEG Site. The review team found that the cumulative environmental impacts would be SMALL for several resource categories, including demography, nonradiological health, radiological health, severe accidents, waste, fuel cycle, decommissioning, and transportation.

Table ES-1. Cumulative Impacts on Environmental Resources, Including the Impacts of a New Nuclear Power Plant at the PSEG Site

Resource Category	Impact Level
Land Use	MODERATE
Water-Related	
—Surface-Water Use	MODERATE
—Groundwater Use	MODERATE
—Surface-Water Quality	MODERATE
—Groundwater Quality	MODERATE
Ecology	
—Terrestrial Ecosystems	MODERATE
—Aquatic Ecosystems	MODERATE to LARGE
Socioeconomic	
—Physical Impacts	SMALL to MODERATE
—Demography	SMALL
—Taxes and Economic Impacts	SMALL (beneficial for the region) to LARGE (beneficial for Salem County)
—Infrastructure and Community Services	SMALL to MODERATE
Environmental Justice	None[(a)]
Historic and Cultural Resources	MODERATE
Air Quality	SMALL to MODERATE
Nonradiological Health	SMALL
Radiological Health	SMALL
Waste Management	SMALL
Severe Accidents	SMALL
Fuel Cycle, Transportation, and Decommissioning	SMALL

(a) The entry "None" for Environmental Justice does not mean there are no adverse impacts to minority or low-income populations from the proposed action. Rather, "None" means that, while there may be adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

The cumulative socioeconomic impacts for physical impacts, infrastructure and community services, and air quality would be SMALL to MODERATE. The review team found that the cumulative environmental impacts on land use, surface-water use and quality, groundwater use and quality, terrestrial and wetland ecosystems, and historic and cultural resources would be MODERATE. However, the contributions of impacts from the NRC-authorized activities would be SMALL for all of the above-listed resource areas, except for land-use impacts; physical impacts, infrastructure and community services impacts, and historic and cultural resources. The new cooling towers would contribute to MODERATE cumulative physical impacts associated with aesthetics in certain locations, and traffic impacts during the peak periods for building a new nuclear plant would contribute to MODERATE cumulative impacts for infrastructure and community services.

Incremental impacts associated with the development of the causeway and the transmission lines would be the principal contributors to the MODERATE cumulative impacts for land use and for historic and cultural resources. Extensive past and present use of surface water from the Delaware River would be the primary driver for the MODERATE impacts for surface-water use and quality. Similarly, extensive past and present groundwater withdrawals from the local aquifer system would contribute to the MODERATE cumulative impacts to groundwater resources.

Cumulative terrestrial and wetland ecosystem impacts would be MODERATE because of the loss of habitat from development of the causeway and the transmission line corridors. The significant history of the degradation of the Delaware Bay and Delaware River Estuary has had a noticeable and sometimes destabilizing effect on many aquatic species and communities. Building and operating any new nuclear plant at the PSEG Site, in conjunction with the operations of the existing HCGS and SGS nuclear units, would contribute to MODERATE to LARGE cumulative impacts to aquatic ecosystems.

The cumulative impacts to taxes and the economy would be beneficial and would range from SMALL for the State of New Jersey and the region to LARGE for Salem County.

There are few minority or low-income populations near the PSEG Site and the review team identified no pathways for disproportionately high and adverse impacts on minority or low-income populations.

The cumulative impacts on air quality would range from SMALL for criteria pollutants to MODERATE for greenhouse gases, based on both their emissions and associated concentrations in the atmosphere.

NEED FOR POWER AND ALTERNATIVES

The review team assessed the need for the power that would be produced by the proposed project and determined that if the plant were to be built on schedule (i.e., by 2021), there would be a demonstrated need for the capacity of the largest proposed reactor design in the PPE, such that the benefits of the proposed project (i.e., the power it would provide) would be realized.

The review team also considered the environmental impacts associated with alternatives to issuing an ESP for the PSEG Site. These alternatives included a no-action alternative (i.e., not issuing the ESP), as well as alternative energy sources, siting locations, and system designs.

The **no-action alternative** would result in the ESP not being granted or the USACE not issuing its permit. Upon such a denial, construction and operation of a new nuclear plant at the PSEG Site in accordance with the 10 CFR 52 (10 CFR 52-TN251) process referencing an approved ESP would not occur, and the predicted environmental impacts would not take place. If other generating sources were built to meet the need for power, either at another site or using a different energy source, the environmental impacts associated with those other sources would eventually occur. The review team also assessed the need for the power that would be produced by the proposed project and determined that if the plant were to be built on schedule (by 2021), there would be a demonstrated need for the capacity of the largest proposed reactor design in the PPE, such that the benefits of the proposed project (the power it would provide) would be realized.

Based on the review team's review of **energy alternatives**, the review team eliminated several energy sources (e.g., wind, solar, and biomass) from full consideration because those technologies are not currently capable of meeting the baseload electricity need. The review team concluded that, from an environmental perspective, none of the viable baseload alternatives (i.e., natural gas, coal, or a combination of alternatives) is clearly environmentally preferable to building new baseload nuclear power generating units at the PSEG Site. Table ES-2 provides a comparative summary of the environmental impacts of the viable energy alternatives.

The review team compared the cumulative effects of the proposed action at the PSEG Site against those at the **alternative sites**. The following four alternatives sites were selected for review (see Figure ES-2):

- Site 4-1 in Hunterdon County, New Jersey;
- Site 7-1 in Salem County, New Jersey;
- Site 7-2 in Salem County, New Jersey; and
- Site 7-3 in Cumberland County, New Jersey.

Table ES-3 provides a comparative summary of the cumulative impacts for the alternative sites. Although there are differences and distinctions between the cumulative environmental impacts of building and operating a new nuclear power plant at the PSEG Site or at one of the alternative sites, the review team concludes that these differences are not sufficient to determine that any of the alternative sites would be environmentally preferable to the PSEG Site for building and operating a new nuclear power plant. In such a case, the PSEG Site prevails because none of the alternative sites are clearly environmentally preferable.

The review team considered various alternative systems designs, including alternative heat-dissipation systems and multiple alternative intake, discharge, and water-supply systems. The review team identified no alternatives for the PSEG Site that would be environmentally preferable to the systems designs used as the basis for analysis in this EIS. However, if at some time in the future PSEG requests authorization from the NRC (e.g., a combined license) to build and operate a new nuclear power plant, the review team will need to compare the specific heat dissipation design chosen to the other designs that were included in the PPE (Section 9.4.1 provides more detail on this matter).

Table ES-2. Comparison of Environmental Impacts of Energy Alternatives

Resource Areas	PSEG Site (Nuclear)	Energy Alternatives[a]		
		Coal	Natural Gas	Combination
Land Use	SMALL to MODERATE	MODERATE	MODERATE	MODERATE
Surface Water	SMALL	SMALL	SMALL	SMALL
Groundwater	SMALL	SMALL	SMALL	SMALL
Terrestrial Ecosystems	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Aquatic Ecosystems	SMALL	SMALL	SMALL	SMALL
Socioeconomics	LARGE (beneficial) to MODERATE (adverse)	LARGE (beneficial) to MODERATE (adverse)	MODERATE (beneficial) to SMALL (adverse)	MODERATE (beneficial) to MODERATE (adverse)
Environmental Justice	None[b]	None[b]	None[b]	None[b]
Historic and Cultural	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Air Quality	SMALL	MODERATE	SMALL to MODERATE	SMALL to MODERATE
Human Health	SMALL	SMALL	SMALL	SMALL
Waste Management	SMALL	MODERATE	SMALL	SMALL

(a) Impacts taken from Table 9-4 (see Section 9.2.5) in the EIS. The conclusions for the energy alternatives are compared to those for the NRC-authorized activities at the PSEG Site as reflected in Chapters 4 and 5, as well as in Section 6.1. Note that cumulative impacts are not included in the comparison of energy alternatives.

(b) The entry "None" for Environmental Justice does not mean there are no adverse impacts to minority or low-income populations from the proposed action. Rather, "None" means that, while there may be adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population.

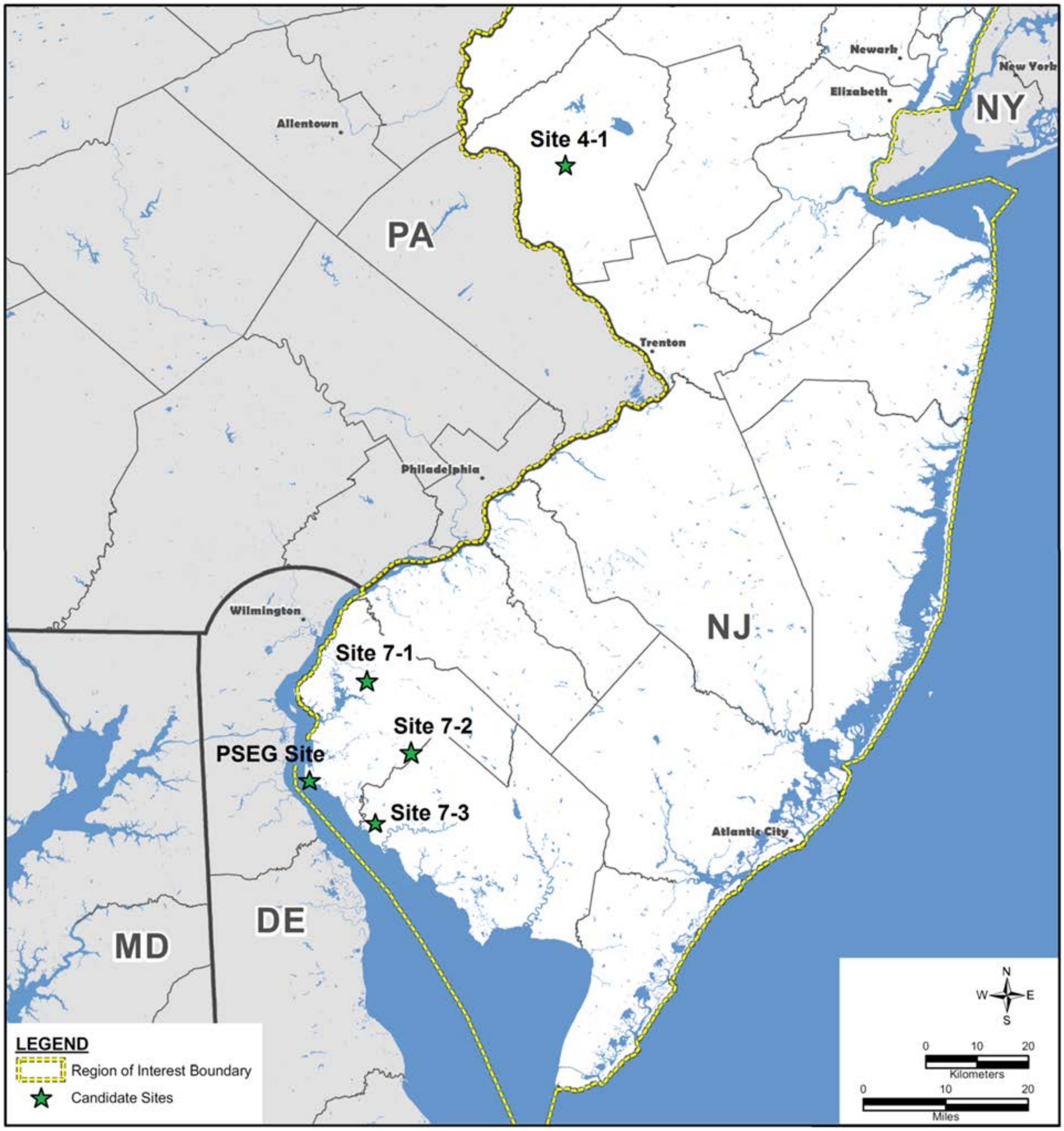

Figure ES-2. Map Showing the Locations of Alternative Sites (note that the PSEG Site is also identified as Site 7-4)

Table ES-3. Comparison of Environmental Impacts at Alternative Sites

Resource Areas	PSEG Site[a] (Site 7-4)	Alternative Sites[b]			
		Site 4-1	Site 7-1	Site 7-2	Site 7-3
Land Use	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Surface Water	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Groundwater	MODERATE	SMALL	MODERATE	MODERATE	MODERATE
Terrestrial Ecosystems	MODERATE	MODERATE	MODERATE	MODERATE	MODERATE
Aquatic Ecosystems	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Socioeconomics	LARGE (beneficial) to MODERATE (adverse)	LARGE (beneficial) to LARGE (adverse)	LARGE (beneficial) to LARGE (adverse)	LARGE (beneficial) to LARGE (adverse)	LARGE (beneficial) to LARGE (adverse)
Environmental Justice	None[c]	None[c]	Potential[c]	None[c]	None[c]
Historic and Cultural	MODERATE	LARGE	MODERATE	MODERATE	MODERATE
Air Quality	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Human Health	SMALL	SMALL	SMALL	SMALL	SMALL
Waste Management	SMALL	SMALL	SMALL	SMALL	SMALL

(a) Cumulative impact determinations taken from Table 7-4 in the EIS (see Section 7.12).
(b) Cumulative impact determinations taken from Table 9-24 in the EIS (see Section 9.3.6).
(c) The entry "None" for Environmental Justice does not mean there are no adverse impacts to minority or low-income populations from the proposed action. Rather, "None" means that, while there may be adverse impacts, those impacts do not affect minority or low-income populations in any disproportionate manner, relative to the general population. Similarly, the entry "Potential" means that the review team has determined the presence of pathways by which a minority or low-income population could be affected disproportionately.

BENEFITS AND COSTS

The review team compiled and compared the pertinent analytical conclusions reached in this EIS. All of the expected impacts from building and operating a new nuclear power plant at the PSEG Site were gathered and aggregated into two final categories: (1) the expected environmental costs and (2) the expected benefits to be derived from approval of the proposed action. Although the analysis in Section 10.6 of this EIS is conceptually similar to a purely economic benefit-cost analysis, which determines the net present dollar value of a given project, the intent of that section is to identify potential societal benefits of the proposed activities and compare them to the potential internal (i.e., private) and external (i.e., societal) costs of the proposed activities. In general, the purpose is to inform the ESP process by gathering and reviewing information that demonstrates the likelihood that the benefits of the proposed activities outweigh the aggregate costs.

On the basis of the assessments in this EIS, the building and operation of a new nuclear power plant at the PSEG Site, with mitigation measures identified by the review team, would accrue benefits (e.g., the electricity produced) that most likely would outweigh the economic, environmental, and social costs. For the NRC-proposed action (i.e., the issuance of the ESP), the accrued future benefits would also outweigh the costs of preconstruction, construction, and operation of a new nuclear power plant at the PSEG Site.

RECOMMENDATION

The NRC staff's recommendation to the Commission related to the environmental aspects of the proposed action is that the ESP should be issued as proposed.

This recommendation is based on the following:

- the application, including the ER and its revisions, submitted by PSEG;
- consultation with Federal, State, Tribal, and local agencies;
- consideration of public comments received during scoping and the public comment period following the publication of the draft EIS; and
- the review team's independent review and assessment as detailed in this EIS.

In making its recommendation, the NRC staff determined that none of the alternative sites is environmentally preferable (and therefore, also not obviously superior) to the PSEG Site. The NRC staff also determined that none of the energy or cooling-system alternatives assessed is environmentally preferable to the proposed action.

The NRC staff's determination is independent of the USACE's determination of whether the PSEG Site is the least environmentally damaging practicable alternative pursuant to CWA Section 404(b)(1) Guidelines. The USACE will conclude its analysis of both offsite and onsite alternatives in its Record of Decision.

ACRONYMS AND ABBREVIATIONS

°C	degree(s) Celsius
°F	degree(s) Fahrenheit
µg	microgram(s)
µm	micrometer(s)
µS/cm	microsievert(s) per centimeter
χ/Q	atmospheric dispersion factor(s)
7Q10	7-day, 10-year low flow (i.e., the lowest flow for 7 consecutive days, expected to occur once per decade)
ABWR	Advanced Boiling Water Reactor
ac	acre(s)
ac-ft	acre-feet
acfm	actual cubic feet per minute
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ACW	Alloway Creek Watershed Wetland Restoration
AD	Anno Domini
ADAMS	Agencywide Documents Access and Management System
AE	Atlantic City Electric
ALARA	as low as reasonably achievable
A.M.E.	African Methodist Episcopal
ANL	Argonne National Laboratory
ANS	American Nuclear Society
AP1000	Advanced Passive 1000 (pressurized water) reactor
APE	area of potential effect
AQCR	Air Quality Control Region
ARRA	American Recovery and Reinvestment Act
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute
ASMFC	Atlantic States Marine Fisheries Commission
ASSRT	Atlantic Sturgeon Status Review Team
ATWS	anticipated transient without scram
BA	biological assessment
BACT	Best Available Control Technology
bbl	barrel(s)
BBS	North American Breeding Bird Survey
BC	Before Christ
BEA	Bureau of Economic Analysis
BEIR	Biological Effects of Ionizing Radiation

BGEPA	Bald and Golden Eagle Protection Act
BGS	basic generation service
BLS	Bureau of Labor Statistics (U.S. Department of Labor)
BMP	best management practice
BNL	Brookhaven National Laboratory
BRAC	Base Realignment and Closure
BTS	Bureau of Technical Services
Btu	British thermal unit(s)
BUD	beneficial use determination
BWA	Bureau of Water Allocation
BWR	boiling water reactor
C&D	Chesapeake and Delaware
CAA	Clean Air Act
CAES	compressed air energy storage
CAFRA	Coastal Area Facility Review Act
CAIR	Clean Air Interstate Rule
CCR	coal combustion residual
CCS	carbon capture and sequestration
CCW	component cooling water
CDC	Centers for Disease Control and Prevention
CDF	Confined Disposal Facility
CEDE	committed effective dose equivalent
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
cfs	cubic feet per second
CH_4	methane
Ci	curie(s)
cm	centimeter(s)
CMP	Coastal Management Program
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
COL	combined construction permit and operating license or combined license
COLA	combined license application
CORMIX	Cornell Mixing Zone Expert System
CP	construction permit
CR	County Route
CSAPR	Cross-State Air Pollution Rule
CSP	concentrating solar power
CWA	Clean Water Act (aka Federal Water Pollution Control Act)

CWIS	circulating water intake structure
CWS	circulating water system
CZM	coastal zone management
CZMA	Coastal Zone Management Act
d	day
D/Q	deposition factor(s)
DA	Department of the Army
DAM	Day-Ahead Market
dB	decibel(s)
dBA	decibel(s) on the A-weighted scale
DBA	design basis accident
DBF	design basis flood
DC	direct current
DBT	dry-bulb temperature
DCD	Design Certification/Control Document
DCR	Deed of Conservation Restriction
DDT	Dichlorodiphenyltrichloroethane
DE	Delaware
DEIS	draft environmental impact statement
DFW	Division of Fish & Wildlife
DNL	day-night average sound levels
DNREC	Delaware Department of Natural Resources and Environmental Control
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DPCC	Discharge Prevention, Containment, and Countermeasure
DPS	distinct population segment
DR	demand response
DRBC	Delaware River Basin Commission
DRN	Delaware Riverkeeper Network
DSM	demand-side management
DWDS	demineralized water distribution system
DWS	drinking water standard
EA	environmental assessment
EAB	exclusion area boundary
ECOS	Environmental Conservation Online System (FWS)
EDC	electric delivery company
EDG	emergency diesel generator
EE	energy efficiency

EEP	Estuary Enhancement Program
EFH	essential fish habitat
EIA	Energy Information Administration
EIF	equivalent impact factor
EIS	environmental impact statement
ELF	extremely low frequency
EMAAC	Eastern Mid-Atlantic Area Council
EMF	electromagnetic field
EMS	emergency medical services
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EPR	Evolutionary Power Reactor
ER	Environmental Report
ESA	Endangered Species Act of 1973, as amended
ESF	engineered safety feature
ESMP	Environmental Surveillance and Monitoring Program
ESP	early site permit
ESPA	early site permit application
ESRP	Environmental Standard Review Plan (NUREG–1555)
ESWS	essential service water system
FEMA	U.S. Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FMP	fishery management plan
FP	fission product
fpm	feet per minute
fps	feet per second
FPS	fire protection system
FR	*Federal Register*
FRN	*Federal Register* Notice
FSAR	Final Safety Analysis Report
ft	foot or feet
ft^2	square foot or feet
ft^3	cubic foot or feet
FWCA	Fish and Wildlife Coordination Act
FWS	U.S. Fish and Wildlife Service
g	gram(s)
gal	gallon(s)
GBq	gigabecquerel

GCRP	U.S. Global Change Research Program
GDP	gross domestic product
GEIS	*Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NUREG–1437)
GEIS-DECOM	GEIS-Decommissioning of Nuclear Facilities (NUREG–0586)
GHG	greenhouse gas
GI-LLI	gastrointestinal lining of lower intestine
GIS	geographic information system
GMP	gross metropolitan product
gpd	gallon(s) per day
gpm	gallon(s) per minute
GSR	geologic survey report
GWh	gigawatt-hour(s)
GWPP	groundwater protection program
Gy	Gray(s)
H1H	high-first-high
H2H	high-second-high
ha	hectare(s)
HAP	hazardous air pollutant
HAPC	Habitat Area of Particular Concern
HCGS	Hope Creek Generating Station
HDA	heat dissipation area
HLW	high-level waste
HPO	historic preservation office
hr	hour(s)
Hz	hertz
I	U.S. Interstate (highway)
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
IGCC	integrated gasification combined cycle
in.	inch(es)
in. Hg	inch(es) of mercury
IPCC	Intergovernmental Panel on Climate Change
IRM	installed reserve margin
ISFSI	independent spent fuel storage installation
JCPL	Jersey Central Power & Light
kg	kilogram(s)

kHz	kilohertz
km	kilometer(s)
km/hr	kilometer(s) per hour
km^2	square kilometer(s)
kV	kilovolt(s)
kW(e)	kilowatt(s) (electrical)
kWh	kilowatt-hour(s)
L	liter(s)
LAER	lowest achievable emission rate
lb	pound(s)
Ldn	day-night average sound level
LEDPA	least environmentally damaging practicable alternative
Leq	equivalent continuous sound level
LFG	landfill gas
LLC	Limited Liability Company
LLW	low-level waste
LMDCT	linear mechanical draft cooling tower
LMP	locational marginal price
LOCA	loss of coolant accident
LOI	letter of interpretation
LOLE	loss of load expectation
LOS	level of service
LPZ	low population zone
LST	local standard time
LULC	land use and land cover
LWA	Limited Work Authorization
LWCF	Land and Water Conservation Fund
LWR	light water reactor
m	meter(s)
m/s	meter(s) per second
m^2	square meter(s)
m^3	cubic meter(s)
m^3/s	cubic meter(s) per second
MACCS2	Melcor Accident Consequence Code System Version 1.12
MAPP	Mid-Atlantic Power Pathway
MCCI	molten corium-to-concrete interaction
MCWB	mean coincident wet-bulb temperature
MDCT	mechanical draft cooling tower
MEI	maximally exposed individual

MERP	Marsh Ecology Research Program
mg	milligram(s)
Mgd	million gallon(s) per day
mGy	milligray(s)
mi	mile(s)
mi^2	square mile(s)
min	minute(s)
mL	milliliter(s)
MLW	mean low water
MM	million
mm	millimeter(s)
mo	month(s)
MOU	Memorandum of Understanding
MOX	mixed oxides
mph	mile(s) per hour
mrad	millirad(s)
mrem	millirem(s)
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSA	Metropolitan Statistical Area
MSDS	material safety data sheets
MSL	mean sea level
mSv	millisievert(s)
MSW	municipal solid waste
MT	metric ton(nes)
MTU	metric ton(nes) uranium
MUA	municipal utilities authority
MW	megawatt(s)
MW(e)	megawatt(s) (electrical)
MW(t)	megawatt(s) (thermal)
MWd	megawatt-day(s)
MWd/MTU	megawatt-day(s) per metric ton of uranium
MWh	megawatt-hour(s)
NA	not applicable
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standard
NAVD	North American Vertical Datum (sea level reference point used in surveying)
NAVD88	North American Vertical Datum of 1988
NCA	Noise Control Act
NCI	National Cancer Institute

NCP	non-coincident peak
NCRP	National Council on Radiation Protection and Measurements
NDCT	natural draft cooling tower
NEFMC	New England Fishery Management Council
NEI	Nuclear Electric Institute
NEPA	National Environmental Policy Act of 1969, as amended
NEPT	Neptune Regional Transmission System
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NGCC	natural gas combined cycle
NGVD29	National Geodetic Vertical Datum of 1929
NHD	National Hydrology Dataset
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NIEHS	National Institute of Environmental Health Sciences
NJ	New Jersey
NJAC	New Jersey Administrative Code
NJBNE	New Jersey Bureau of Nuclear Engineering
NJBPU	New Jersey Board of Public Utilities
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NJEMP	New Jersey Energy Master Plan
NJGS	New Jersey Geological Survey
NJLWD	New Jersey Department of Labor and Workforce Development
NJPDES	New Jersey Pollutant Discharge Elimination System
NJSA	New Jersey Statutes Annotated
NJSM	New Jersey State Museum
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resource Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSF	National Science Foundation
NSLP	Northeast Supply Link Project
NSPS	new source performance standard
NSR	New Source Review

NTU	nephelometric turbidity unit(s)
NUREG	U.S. Nuclear Regulatory Commission technical document
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWS	National Weather Service
NY-NJ-CT	New York–Northern New Jersey–Long Island (nonattainment area)
NYB	New York Bight
O_3	ozone
ODCM	Offsite Dose Calculation Manual
ODST	Office of Dredging and Sediment Technology
OL	operating license
OPA	Office of Planning Advocacy
OPSI	Organization of PJM States, Inc.
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PA-NJ-DE	Philadelphia–Wilmington (nonattainment area)
PA-NJ-MD-DE	Philadelphia–Wilmington–Atlantic City (nonattainment area)
PAM	primary amebic meningoencephalitis
para.	paragraph
Pb	lead
PCB	polychlorinated biphenyl
PECO	PECO Energy
pH	measure of acidity or basicity in solution
PHI	Pepco Holdings Inc.
PIR	public interest review
PIRF	public interest review factor
PJM	PJM Interconnection, LLC
PM	particulate matter
PM_{10}	particulate matter with a mean aerodynamic diameter of 10 μm or less
$PM_{2.5}$	particulate matter with a mean aerodynamic diameter of 2.5 μm or less
PNNL	Pacific Northwest National Laboratory
ppb	part(s) per billion
PPE	plant parameter envelope
ppm	part(s) per million
ppt	part(s) per thousand
PRA	probabilistic risk assessment
PRM	Potomac-Raritan-Magothy (aquifer)
PSD	Prevention of Significant Deterioration
PSE&G	Public Service Electric and Gas Company

PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
psi	pound(s) per square inch
psu	practical salinity unit
PSWS	potable and sanitary water system
PTE	potential to emit
PV	photovoltaic
PWR	pressurized water reactor
rad	radiation absorbed dose
RAI	Request for Additional Information
RCRA	Resource Conservation and Recovery Act of 1976, as amended
REC	renewable energy credit(s)
RECO	Rockland Electric Company
rem	Roentgen equivalent man (a unit of radiation dose)
REMP	radiological environmental monitoring program
RERR	Radioactive Effluent Release Report
RFC	Reliability*First* Corporation
RFI	request for information
RG	Regulatory Guide
RGPP	Radiological Groundwater Protection Program
RKM	River Kilometer
RM	River Mile
ROD	Record of Decision
ROI	region of interest
ROW	right-of-way
RPM	reliability pricing model
RPS	Renewable Portfolio Standard
RSA	relevant service area
RSICC	Radiation Safety Information Computational Center
RTEP	Regional Transmission Expansion Plan
RTM	real-time market
RTO	regional transmission organization
RTP	rated thermal power
RV	recreational vehicle
RWS	raw water service
Ryr	reactor-year(s)
s	second(s)
SA	sanitation authority or sewerage authority
SACTI	Seasonal and Annual Cooling Tower Impact (prediction code)
SAFSTOR	Safe Storage

SAMA	severe accident mitigation alternative
SAV	submerged aquatic vegetation
SBO	station blackout (in reference to a diesel generator)
scf	standard cubic feet
SCR	selective catalytic reduction
SE	southeast
SECA	Solid State Energy Conversion Alliance
SEIA	Socioeconomic Impact Area
SEIS	Supplemental Environmental Impact Statement
SEL_{cum}	cumulative sound exposure level
SER	safety evaluation report
SESC Act	Soil Erosion and Sediment Control Act
SGS	Salem Generating Station, Units 1 and 2
SGTR	steam generator tube rupture
SHPO	State Historic Preservation Office
SIL	significant impact level
SMC	South Macro-Corridor
SMR	small modular reactor
SO_2	sulfur dioxide
SO_x	oxides of sulfur
SOARCA	State-of-the-Art Reactor Consequence Analysis
SPCC	spill prevention, control, and countermeasures
SPCCP	spill prevention, control, and countermeasure plan
SPL_{peak}	sound pressure level (peak)
SPL_{rms}	sound pressure level (root mean square)
SRERP	Susquehanna-Roseland Electric Reliability Project
SSAR	Site Safety Analysis Report
SSC	structure, system, or component
STP	sewage treatment plant
Sv	sievert
SWIS	service water intake system
SWPPP	stormwater pollution prevention plan
SWS	service water system
T	ton(s)
T&E	threatened and endangered
TDS	total dissolved solids
TEDE	total effective dose equivalent
THPO	Tribal Historic Preservation Office
TIA	traffic impact analysis
TLD	thermoluminescent dosimeter

TPS	third party supplier
tpy	ton(s) per year
TRAGIS	Transportation Routing Analysis Geographic Information System
^{235}U	uranium-235
UA	utilities authority
UHS	ultimate heat sink
UMTRI	University of Michigan Transportation Research Institute
U.S.	United States
U.S. EPR	U.S. Evolutionary Power Reactor
US-APWR	U.S. Advanced Pressurized Water Reactor
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCB	U.S. Census Bureau
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
V	volt
VOC	volatile organic compound
WBT	wet-bulb temperature
WHO	World Health Organization
WMA	Wildlife Management Area
WMC	West Macro-Corridor
WRA	Water Resources Association of Delaware River Basin
yd	yard(s)
yd^3	cubic yard(s)
yr	year(s)
yr^{-1}	per year

APPENDIX A

CONTRIBUTORS TO THE ENVIRONMENTAL IMPACT STATEMENT

APPENDIX A

CONTRIBUTORS TO THE ENVIRONMENTAL IMPACT STATEMENT

The overall responsibility for the preparation of this environmental impact statement (EIS) was assigned to the Office of New Reactors, U.S. Nuclear Regulatory Commission (NRC). The U.S. Army Corps of Engineers (USACE) is participating as a cooperating agency. This EIS was prepared by members of the Office of New Reactors with assistance from other NRC organizations, the USACE, Oak Ridge National Laboratory, Argonne National Laboratory, Brookhaven National Laboratory, and Pacific Northwest National Laboratory.

Name	Affiliation	Function or Expertise
Nuclear Regulatory Commission		
Allen Fetter	Office of New Reactors	Lead Environmental Project Manager
Daniel Barnhurst	Office of New Reactors	Groundwater Hydrology; Geology
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Michael McCoppin	Office of New Reactors	Accidents
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Donald Palmrose	Office of New Reactors	Health Physics; Radiation Protection
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Jason Schaperow	Office of New Reactors	Probabilistic Risk Assessment; Design Basis and Severe Accidents
Rao Tammara	Office of New Reactors	External Events; Demographics
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Michael Willingham	Office of New Reactors	Terrestrial Ecology; Land Use
U.S. Army Corps of Engineers		
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Name	Affiliation	Function or Expertise
Oak Ridge National Laboratory[a]		
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Rajiv Prasad		Surface Water Hydrology
Lance Vail		Surface Water Hydrology

(a) Oak Ridge National Laboratory is managed for the U.S. Department of Energy by UT-Battelle LLC.
(b) Argonne National Laboratory is managed for the U.S. Department of Energy by UChicago Argonne LLC.
(c) Brookhaven National Laboratory is managed for the U.S. Department of Energy by Brookhaven Science Associates LLC.
(d) Pacific Northwest National Laboratory is managed for the U.S. Department of Energy by Battelle Memorial Institute.

APPENDIX B

ORGANIZATIONS CONTACTED

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The following Federal, State, Tribal, regional, and local organizations were contacted during the course of the U.S. Nuclear Regulatory Commission staff's review of potential environmental impacts from the building and operation of a new nuclear power plant (within the plant parameter envelope described in this environmental impact statement) at the PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site in Salem County, New Jersey:

Advisory Council on Historic Preservation, Office of Federal Agency Programs, Washington, D.C.

Borough of Penns Grove, Salem County, New Jersey

Cherokee Nation of New Jersey, Newark, New Jersey

City of Salem, Salem County, New Jersey

Cumberland County, New Jersey

Delaware Department of Natural Resources and Environmental Control, Dover, Delaware

Delaware River Basin Commission, Trenton, New Jersey

Delaware State Historic Preservation Office, Dover, Delaware

Delaware Tribe of Indians, Bartlesville, Oklahoma

Eastern Delaware Nation, Troy, Pennsylvania

Eastern Lenape Nation of Pennsylvania, Easton, Pennsylvania

Federal Emergency Management Agency, Region II, New York, New York

Gloucester County, New Jersey

Nanticoke Lenni-Lenape Indians of New Jersey, Bridgeton, New Jersey

Nanticoke Tribe Association, Millsboro, Delaware

National Marine Fisheries Service, Northeast Regional Office, Gloucester, Massachusetts

New Castle County, Delaware

New Jersey Department of Environmental Protection, Trenton, New Jersey

New Jersey Historic Preservation Office, Trenton, New Jersey

Powhatan Renape Nation, Rankokous, New Jersey

Ramapough Mountain Indians, Mahwah, New Jersey

Salem County, New Jersey

South Jersey Transportation Planning Organization, Vineland, New Jersey

Taino Tribal Council of Jatibonicu, Vineland, New Jersey

The Delaware Nation–Delaware Tribe of Western Oklahoma, Anadarko, Oklahoma

Township of Carneys Point, Salem County, New Jersey

Township of Elsinboro, Salem County, New Jersey

Township of Lower Alloways Creek, Salem County, New Jersey

Township of Pennsville, New Jersey

U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania

U.S. Environmental Protection Agency, Region 2, New York, New York

U.S. Fish and Wildlife Service, Northeast Regional Office, Hadley, Massachusetts

APPENDIX C

CHRONOLOGY OF NRC AND USACE STAFF ENVIRONMENTAL REVIEW CORRESPONDENCE RELATED TO THE PSEG APPLICATION FOR AN EARLY SITE PERMIT (ESP) AT THE PSEG SITE

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CHRONOLOGY OF NRC AND USACE STAFF ENVIRONMENTAL REVIEW CORRESPONDENCE RELATED TO THE PSEG APPLICATION FOR AN EARLY SITE PERMIT (ESP) AT THE PSEG SITE

This appendix contains a chronological listing of correspondence between the U.S. Nuclear Regulatory Commission (NRC) and PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), and other correspondence related to the NRC staff's environmental review, under Title 10 of the *Code of Federal Regulations* (CFR) Part 51, for PSEG's application for an early site permit at the PSEG Site. All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: http://www.nrc.gov/reading-rm.html. From this site, the public can gain access to the NRC's Agencywide Document Access and Management Systems (ADAMS), which provides text and image files of the NRC's public documents in the Publicly Available Records component of ADAMS. The ADAMS accession numbers for each document are included below.

July 6, 2009	NRC trip report—May 27–29, 2009, readiness assessment (C-1) visit for a future early site permit application at the PSEG Site (Accession No. ML091800033).
November 23, 2009	NRC trip report—October 20–22, 2009, readiness assessment (C-2) visit for a future early site permit application at the PSEG Site (Accession No. ML093220183).
March 25, 2010	Letter from D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding early site permit application for the PSEG Site (Accession No. ML101480484).
April 30, 2010	Trip report—April 12–15, 2010, readiness assessment (C-3) visit for a future early site permit application at the PSEG Site (Accession No. ML101180344).
June 4, 2010	Letter and information from PSEG in support of early site permit application for the PSEG Site—Alternative Site Evaluation Study (Accession No. ML101600086).
June 9, 2010	Letter and information from PSEG in support of early site permit application for the PSEG Site—cultural and historic resource reports (Accession No. ML101660395).

July 13, 2010	Letter from the New Jersey Department of Environmental Protection to PSEG approving the Coastal Zone Management Certification for the PSEG early site permit application (Accession No. ML1204A109).
August 23, 2010	Letter from the NRC to D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding PSEG early site permit application online reference portal (Accession No. ML102240060).
September 8, 2010	Letter from Gary S. Janosko, Nuclear Development Regulatory Director, PSEG Power, LLC, regarding federal consistency determination by State of New Jersey Department of Environmental Protection (Accession No. ML102530617).
September 10, 2010	Letter from Gary S. Janosko, Nuclear Development Regulatory Director, PSEG Power, LLC, regarding PSEG early site permit application online reference portal (Accession No. ML102570065).
September 24, 2010	Letter to Jeff Dilks, Director, Salem Free Public Library, regarding maintenance of reference materials at the Salem Free Public Library related to PSEG Power, LLC, early site permit application for the PSEG Site near Hancocks Bridge, New Jersey (Accession No. ML102630546).
September 24, 2010	Letter to Barbara Hunt, Manager, Penns Grove–Carneys Point Public Library, regarding maintenance of reference materials at the Penns Grove–Carneys Point Public Library related to PSEG Power, LLC, early site permit application for the PSEG Site near Hancocks Bridge, New Jersey (Accession No. ML102630552).
September 24, 2010	Letter to Deborah Ecret, Library Assistant Supervisor, Pennsville Public Library, regarding maintenance of reference materials at the Pennsville Public Library related to PSEG Power, LLC, early site permit application for the PSEG Site near Hancocks Bridge, New Jersey (Accession No. ML102630558).
October 8, 2010	Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping: Letter to PSEG, and *Federal Register* Notice (published in the *Federal Register* on 10/15/10) (Accession No. ML102710517).
October 8, 2010	*Federal Register* Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process for PSEG early site permit application (Accession No. ML102670686).
October 8, 2010	Letter from the NRC to D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping related to an early site permit application for the PSEG Site (Accession No. ML102710582).

October 22, 2010	Notice of Public Meeting to Discuss Environmental Review Process and Receive Scoping Comments on the PSEG Site Early Site Permit Application (Accession No. ML102920542).
October 26, 2010	Letter to Doris Pieschel, Secretary, Eastern Lenape Nation of Pennsylvania, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990155).
October 26, 2010	Letter to C. W. Longbow, Principal Chief, Cherokee Nation of New Jersey, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102850579).
October 26, 2010	Letter to Larry Jackson, Chief, Nanticoke Tribe Association, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990090).
October 26, 2010	Letter to Taino Tribal Council of Jatibonicu, NJ–US Taino Tribal Affairs Office, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990045).
October 26, 2010	Letter to Doreen Scott, Commissioner, Ramapough Mountain Indians, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990059).
October 26, 2010	Letter to Jerry Douglas, Chief, Delaware Tribe of Indians, Oklahoma, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990185).
October 26, 2010	Letter to Kerry Holton, President, the Delaware Nation–Delaware Tribe of Western Oklahoma, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990210).
October 26, 2010	Letter to Marvin Moriarty, Regional Director, US Fish and Wildlife Service, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102860150).

October 26, 2010	Letter to Peter Colosi, Assistant Regional Administrator, National Marine Fisheries Service, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102860101).
October 26, 2010	Letter to Mollie Eliot, Secretary, Eastern Delaware Nation, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990165).
October 26, 2010	Letter to Vincent Maresca, New Jersey Historic Preservation Office, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102850545).
October 26, 2010	Letter to David Chanda, Director, New Jersey Department of Environmental Protection, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102850556).
October 26, 2010	Letter to Reid Nelson, Director, Office of Federal Agency Programs, Advisory Council on Historic Preservation, regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102850562).
October 26, 2010	Letter to Curtis W. Diggs, Secretary, Powhatan Renape Nation regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990071).
October 26, 2010	Letter to Mark Gould, Tribal Chairperson, Nanticoke Lenni-Lenape Indians of New Jersey regarding Notification and Request for Consultation and Participation in the Scoping Process for the Environmental Review of the PSEG Early Site Permit Application (Accession No. ML102990114).
November 1, 2010	*Federal Register* Notice—Early Site Permit Application for PSEG, Notice of Hearing, Opportunity to Petition for Leave to Intervene and Associated Order (Accession No. ML102460085).
November 4, 2010	11/04/2010 Summary of the Public Scoping Meetings conducted for the environmental review process for the PSEG early site permit application (Accession No. ML103270350).

November 5, 2010	Letter to William Jenkins, U.S. Army Corps of Engineers, regarding U.S. NRC Environmental Impact Statement for the PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), early site permit application on the building and operation of one or more reactors at the PSEG Site, Salem County, New Jersey (Accession No. ML102930260).
November 8, 2010	Letter from the NRC to D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding application for an early site permit for the PSEG Site; the Notice of Hearing, Opportunity to Petition for Leave to Intervene, and Associated Order (Accession No. ML102460154).
November 29, 2010	Summary of the Public Scoping Meetings conducted for the environmental review process for the PSEG Site early site permit application (Accession No. ML102920514).
November 29, 2010	Letter from the NRC to D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding PSEG Site early site permit application review schedule (Accession No. ML102780654).
December 9, 2010	Letter from Stanley Gorski, National Marine Fisheries Service, regarding consultation process for PSEG early site permit application review (Accession No. ML103570197).
January 24, 2011	Letter from Frank Cianfrani, Chief, Regulatory Branch, U.S. Army Corps of Engineers, regarding letter on cooperating on PSEG early site permit environmental impact statement (Accession No. ML110380482).
April 15, 2011	Letter from the NRC to D. P. Lewis, Nuclear Development Director, PSEG Power, LLC, regarding information needs to support the environmental review site audits for the PSEG Site early site permit application (Accession No. ML11101A017).
November 1, 2011	Scoping summary report—Environmental impact statement scoping process (Accession No. ML112150127).
December 23, 2011	Letter from the NRC to James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding change in schedule of PSEG Site early site permit application review (Accession No. ML111390147).
January 18, 2012	Letter from the NRC to James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding environmental project manager change for the early site permit application review for the PSEG Site (Accession No. ML120110021).
May 14, 2012	PSEG early site permit met trip report—May 2012, review of the pre-operational and operational onsite metrological monitoring program (ML12135A608).

May 21, 2012	Letter to the NRC from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding submittal of Revision 1 of the early site permit application for the PSEG Site (Accession No. ML12170A637).
May 31, 2012	Letter from the NRC to James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding change in schedule of PSEG early site permit application review (Accession No. ML121070466).
June 11, 2012	Letter and information from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding PSEG Power, LLC, documents in support of early site permit application for the PSEG Site (Accession No. ML121660484).
June 11, 2012	Letter from the NRC to James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding resubmittal of Revision 1 of the early site permit application for the PSEG Site (Accession No. ML12170A635).
July 30, 2012	Draft environmental Request for Additional Information Table for the PSEG Site early site permit application review—submitted to PSEG (Accession No. ML12202B194).
August 28, 2012	Request for Additional Information Env-01 (eRAI 6728), for general information needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12241A458).
August 29, 2012	Request for Additional Information Env-02 (eRAI 6729), for land use needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12242A537).
August 29, 2012	Request for Additional Information Env-03 (eRAI 6731), for water needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12242A540).
August 29, 2012	Request for Additional Information Env-04 (eRAI 6732), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12242A542).
August 29, 2012	Request for Additional Information Env-05 (eRAI 6733), for aquatic ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12242A544).
August 31, 2012	Request for Additional Information Env-06 (eRAI 6734), for socioeconomics needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A153).
August 31, 2012	Request for Additional Information Env-07 (eRAI 6735), for historic and cultural resources needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A155).

August 31, 2012	Request for Additional Information Env-08 (eRAI 6736), for meteorology and air quality needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A262).
August 31, 2012	Request for Additional Information Env-09 (eRAI 6737), for nonradiological health impacts needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A264).
August 31, 2012	Request for Additional Information Env-13 (eRAI 6741), for need for power needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A268).
August 31, 2012	Request for Additional Information Env-14 (eRAI 6742), for environmental impacts of alternatives needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A270).
August 31, 2012	Request for Additional Information Env-10 (eRAI 6738), for radiation exposure to construction workers needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A266).
August 31, 2012	Request for Additional Information Env-15 (eRAI 6743), for nonradioactive waste impacts needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12244A271).
September 20, 2012	Request for Additional Information Env-11 (eRAI 6739), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12264A586).
September 20, 2012	Request for Additional Information Env-12 (eRAI 6740), for fuel cycle, transportation, and decommissioning needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML12264A589).
September 26, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-01 (eRAI 6728), for general information needed for the PSEG Site early site permit application review (Accession No. ML122830087).
September 27, 2012	Summary of the environmental site audits conducted for the PSEG Site early site permit application review (Accession No. ML12207A142)

September 28, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding Waste Confidence Decision and temporary storage rule and PSEG's early site permit application for the PSEG Site (Accession No. ML12275A460).
September 28, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-03 (eRAI 6731), for water needed for the PSEG Site early site permit application review (Accession No. ML12277A391).
September 28, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-04 (eRAI 6732), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review (Accession No. ML122830118).
September 28, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-04 (eRAI 6732), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review (Accession No. ML12283A120).
September 28, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-05 (eRAI 6733), for aquatic ecology needed for the PSEG Site early site permit application review (Accession No. ML12275A455).
October 1, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-02 (eRAI 6729), for land use needed for the PSEG Site early site permit application review (Accession No. ML122860214).
October 3, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-13 (eRAI 6741), for need for power needed for the PSEG Site early site permit application review (Accession No. ML12279A100).
October 3, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-14 (eRAI 6742), for environmental impacts of alternatives needed for the PSEG Site early site permit application review (Accession No. ML12279A099).
October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-06 (eRAI 6734), for socioeconomics needed for the PSEG Site early site permit application review (Accession No. ML122840593).

October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-06 (eRAI 6734), for socioeconomics needed for the PSEG Site early site permit application review (Accession No. ML122970371).
October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-07 (eRAI 6735), for historic and cultural resources needed for the PSEG Site early site permit application review (Accession No. ML122900207).
October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-08 (eRAI 6736), for meteorology and air quality needed for the PSEG Site early site permit application review (Accession No. ML12284A198).
October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-09 (eRAI 6737), for nonradiological health impacts needed for the PSEG Site early site permit application review (Accession No. ML122900140).
October 4, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-10 (eRAI 6738), for radiation exposure to construction workers needed for the PSEG Site early site permit application review (Accession No. ML122860420).
October 18, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-14 (eRAI 6742), for environmental impacts of alternatives needed for the PSEG Site early site permit application review (Accession No. ML12296A445).
October 18, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-15 (eRAI 6743), for nonradioactive waste impacts needed for the PSEG Site early site permit application review (Accession No. ML12296A443).
October 19, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-11 (eRAI 6739), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review (Accession No. ML12296A770).

October 19, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-12 (eRAI 6740), for fuel cycle, transportation, and decommissioning needed for the PSEG Site early site permit application review (Accession No. ML12296A772).
November 2, 2012	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-11 (eRAI 6739), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review (Accession No. ML12311A268).
December 19, 2012	Draft Supplemental Request for Additional Information Table for the PSEG Site early site permit application review—submitted to PSEG (Accession No. ML12354A589).
January 7, 2013	Revised draft Supplemental Request for Additional Information Table for the PSEG Site early site permit application review—submitted to PSEG (Accession No. ML13007A241).
February 5, 2013	Final Supplemental Request for Additional Information Env-12S (eRAI 7003), for fuel cycle, transportation, and decommissioning needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13036A334).
February 11, 2013	Final Supplemental Request for Additional Information Env-09S (eRAI 7028), for environmental impacts of alternatives needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13042A326).
February 14, 2013	Draft Supplemental Request for Additional Information Env-05S (eRAI 7034), for aquatic ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13045A470).
March 5, 2013	Final Supplemental Request for Additional Information Env-05S (eRAI 7034), for aquatic ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13064A653).
March 7, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-12S (eRAI 7003), for fuel cycle, transportation, and decommissioning needed for the PSEG Site early site permit application review (Accession No. ML130770208).

March 11, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-9S (eRAI 7028), for environmental impacts of alternatives needed for the PSEG Site early site permit application review (Accession No. ML13073A147).
March 20, 2013	E-mail from Steven Mars, Senior Biologist, U.S. Fish and Wildlife Service, New York Field Office, to the NRC regarding potential effects to Federally listed species by activities described in PSEG Site early site permit application (Accession No. ML14070A595).
March 27, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding submittal of Revision 2 of the early site permit application for the PSEG Site (Accession No. ML13098A975).
April 4, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-05S (eRAI 7034), for aquatic ecology needed for the PSEG Site early site permit application review (Accession No. ML131090575).
April 18, 2013	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Nuclear Development Project Conceptual Barge Facilities and Haul Roads Report (Accession No. ML131130145).
April 24, 2013	Letter to the U.S. Army Corps of Engineers, Philadelphia District, on agency roles under Section 106 of the National Historic Preservation Act for the PSEG Site early site permit environmental impact statement (Accession No. ML13058A438).
May 10, 2013	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Roadmaps for Changes to the PSEG Early Site permit Application, Revision 2 (Accession No. ML13134A473).
May 28, 2013	Draft Supplemental Request for Additional Information Env-06S (eRAI 7132), for socioeconomics needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13148A450).
June 5, 2013	Draft Supplemental Request for Additional Information Env-02S (eRAI 6972), for land use (transmission lines) needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13157A120).
June 17, 2013	Final Supplemental Request for Additional Information Env-02S (eRAI 6972), for land use (transmission lines) needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13168A506).

June 17, 2013	Final Supplemental Request for Additional Information Env-06S (eRAI 7132), for socioeconomics needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13168A506).
July 31, 2013	Draft Supplemental Request for Additional Information Env-11S (eRAI 7211), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13212A334).
July 31, 2013	Letter to Louis Chiarella, Assistant Regional Administrator, National Marine Fisheries Service, regarding request for updated consultation for the environmental review of the PSEG early site permit application (Accession No. ML13206A180).
August 2, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-06S (eRAI 7132), for socioeconomics needed for the PSEG Site early site permit application review (Accession No. ML13214A155).
August 2, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-02S (eRAI 6972), for land use needed for the PSEG Site early site permit application review (Accession No. ML13214A153).
August 15, 2013	Final Supplemental Request for Additional Information Env-11S (eRAI 7211), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13227A390).
August 20, 2013	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Archaeological and Cultural Information (Accession No. ML13252A296).
August 27, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-11S (eRAI 7211), for environmental impacts of postulated accidents needed for the PSEG Site early site permit application review (Accession No. ML13246A298).
September 12, 2013	Letter from the NRC to James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding change in schedule of PSEG Site early site permit application review (Accession No. ML12361A136).
September 24, 2013	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Redacted Archaeological Information (Accession No. ML13280A457).

September 25, 2013	Letter from Timothy A. Slavin, Delaware State Historic Preservation Officer, finding of no adverse effect for the PSEG early site permit application (Accession No. ML13275A113)
September 27, 2013	Draft Supplemental Request for Additional Information Env-04S (eRAI 7268), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13270A441).
October 4, 2013	Final Supplemental Request for Additional Information Env-04S (eRAI 7268), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13277A438).
October 4, 2013	Letter to Larry Miller, New Jersey Department of Environmental Protection, Office of Natural Lands Management, request for rare or endangered species and natural communities information for the PSEG early site permit application (Accession No. ML13275A623).
October 24, 2013	Letter from Robert Cartica, New Jersey Department of Environmental Protection, Office of Natural Lands Management, rare or endangered species and natural communities information for the PSEG early site permit application, Alternative Site 4-1 (Accession No. ML13311A021).
October 24, 2013	Letters from Robert Cartica, New Jersey Department of Environmental Protection, Office of Natural Lands Management, rare or endangered species and natural communities information for the PSEG early site permit application, Alternative Sites 4-1, 7-1, and 7-2, Intake Locations Only (Accession No. ML14154A451).
October 24, 2013	Letters from Robert Cartica, New Jersey Department of Environmental Protection, Office of Natural Lands Management, rare or endangered species and natural communities information for the PSEG early site permit application, Alternative Sites 4-1 and 7-4, Site Locations Only (Accession No. ML1414142A004).
October 24, 2013	Letters from Robert Cartica, New Jersey Department of Environmental Protection, Office of Natural Lands Management, rare or endangered species and natural communities information for the PSEG early site permit application, Alternative Sites 7-3 and 7-4, Site and Intake Locations (Accession No. ML14154A448).
October 24, 2013	Letter from Robert Cartica, New Jersey Department of Environmental Protection, Office of Natural Lands Management, rare or endangered species and natural communities information for the PSEG early site permit application, Alternative Site 7-2, Site Location Only (Accession No. ML14154A439).

October 25, 2013	Letter from Mary Colligan, National Marine Fisheries Service, regarding updated consultation information for the PSEG early site permit application review (Accession No. ML13319A998).
October 31, 2013	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Addendum to the Historic Properties Visual Impact Assessment (Accession No. ML13310A572).
November 5, 2013	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to the NRC regarding response to Request for Additional Information Env-04S (eRAI 7268), for terrestrial and wetland ecology needed for the PSEG Site early site permit application review (Accession No. ML13309A826).
December 9, 2013	Letter from Daniel Saunders, New Jersey Historic Preservation Office, to the NRC concurring with NRC's finding of no historic properties affected for the PSEG early site permit application (Accession No. ML13358A139).
December 20, 2013	Draft Supplemental Request for Additional Information Env-08S (eRAI 7369), for meteorology and air quality needed for the PSEG Site early site permit application review submitted by the NRC to PSEG (Accession No. ML13354C105).
January 30, 2014	Final Supplemental Request for Additional Information Env-08S (eRAI 7369), for meteorology and air quality needed for the PSEG Site early site permit application review submitted by NRC to PSEG (Accession No. ML14030A636).
February 24, 2014	Letter and documents from PSEG in support of early site permit application for the PSEG Site—revised land cover data (Accession No. ML14058A142).
February 27, 2014	Letter from James Mallon, Early Site Permit Manager, PSEG Power, LLC, to NRC regarding response to Request for Additional Information Env-08S (eRAI 7369), for meteorology and air quality data needed for the PSEG Site early site permit application review (Accession No. ML14077A023).
February 28, 2014	Request for Electronic Reading Room documents to be submitted to the docket (hydrology) for the PSEG Site early site permit application review—submitted to PSEG (Accession No. ML14059A408)
March 10, 2014	Letter and documents from PSEG in support of early site permit application for the PSEG Site—hydrology references (Accession No. ML14077A028).

March 27, 2014	Letter to NRC from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding information in support of of the early site permit application for the PSEG Site—Clarification of audit summary information (Accession No. ML1409A429)
March 31, 2014	Letter to NRC from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding submittal of Revision 3 of the early site permit application for the PSEG Site (Accession No. ML14093A588).
April 10, 2014	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Roadmap for Changes to the PSEG Early Site Permit Application, Revision 3 (Accession No. ML14101A384).
December 4, 2014	Letter to NRC from Daniel Saunders, New Jersey Historic Preservation Office, issuing new opinion and determination of adverse effect for the PSEG early site permit application (Accession No. ML15005A040).
February 9, 2015	Letter and information from PSEG in support of early site permit application for the PSEG Site—Photos pertaining to Section 106 review (Accession No. ML15055A157).
February 20, 2015	Letter and information from PSEG in support of early site permit application for the PSEG Site—Photos pertaining to Section 106 review (Accession No. ML15055A158).
March 13, 2015	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Quarterly Remedial Action Reports (Accession No. ML15092A732).
March 13, 2015	Letter to NRC from Daniel Saunders, New Jersey Historic Preservation Office, issuing new opinion recommending the Alloway Creek Rural Historic District as eligible for listing on the National Register of Historic Places (Accession No. ML15078A131).
May 21, 2015	Letter and documents from PSEG in support of early site permit application for the PSEG Site—Section 106 field assessments and literature searches (Accession No. ML15146A098).
June 5, 2015	Letter to NRC from James Mallon, Early Site Permit Manager, PSEG Power, LLC, regarding submittal of Revision 4 of the early site permit application for the PSEG Site (Accession No. ML15168A201).
June 24, 2015	NRC letter to Reid Nelson, Advisory Council on Historic Preservation, providing the NRC's determination of adverse effect under the National Historic Preservation Act and invitation to participate in the development of a Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15154B631).

June 24, 2015	NRC letter to Daniel Saunders, New Jersey Historic Preservation Office, providing the NRC's determination of adverse effect under the National Historic Preservation Act and invitation to participate in the development of a Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15155B300).
June 24, 2015	NRC letter to Sally Jewell, U.S. Department of the Interior, providing the NRC's determination of adverse effect under the National Historic Preservation Act and invitation to participate in the development of a Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15155B711).
July 20, 2015	Letter from Daniel Saunders, New Jersey Historic Preservation Office, to the NRC informing the NRC of the Agency's intention to participate in consultation to develop a Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15223B089).
July 21, 2015	Letter from John Fowler, Advisory Council on Historic Preservation, to the NRC informing the NRC of the Agency's intention to participate in consultation to develop a Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15204A219).
July 31, 2015	Letter from Charlene Dwin Vaughn, Advisory Council on Historic Preservation, to the NRC forwarding comments on the draft Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15223B035).
September 4, 2015	*Federal Register* Notice of availability and request for comment on the Draft Memorandum of Agreement for the PSEG early site permit application (Accession No. ML15239B224).
September 24, 2015	Email from J. Davis, NRC, to A. Fetter, NRC forwarding Trip Reports and Teleconference Summaries Associated with Section 106 Consultation - PSEG ESP Review (Accession No. ML15268A481).

APPENDIX D

SCOPING COMMENTS AND RESPONSES

APPENDIX D

SCOPING COMMENTS AND RESPONSES

On October 15, 2010, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process in the *Federal Register* (75 FR 63521-3). The Notice of Intent notified the public of the staff's intent to prepare an environmental impact statement (EIS) and conduct scoping for an application received from PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), for an Early Site Permit (ESP) for the PSEG Site. The PSEG Site is located adjacent to the existing Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS) in Lower Alloways Creek Township, Salem County, New Jersey.

This EIS has been prepared in accordance with provisions of the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality guidelines, and Title 10 of the *Code of Federal Regulations* (CFR) Parts 51 and 52. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the *Federal Register* Notice. The NRC invited the applicant; Federal, Tribal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meeting and/or submitting written suggestions and comments no later than December 14, 2010.

D.1 Overview of the Scoping Process

The scoping process provides an opportunity for public participation to identify issues to be addressed in the EIS and to highlight public concerns and issues. The notice of intent identified the following objectives of the scoping process.

- Define the proposed action that is to be the subject of the EIS.
- Determine the scope of the EIS and identify significant issues to be analyzed in depth.
- Identify and eliminate from detailed study those issues that are peripheral or that are not significant.
- Identify any environmental assessments and other EISs that are being prepared or will be prepared that are related to, but not part of, the scope of the EIS being considered.
- Identify other environmental review and consultation requirements related to the proposed action.
- Identify parties consulting with the NRC under the National Historic Preservation Act (NHPA), as set forth in 36 CFR 800.8(c)(1)(i).
- Indicate the relationship between the timing of the preparation of the environmental analyses and the NRC's tentative planning and decision-making schedule.
- Identify any cooperating agencies and, as appropriate, allocate assignments for preparation and schedules for completing the EIS to the NRC and any cooperating agencies. By letter

dated January 24, 2011, the U.S. Army Corps of Engineers (USACE) accepted the NRC's invitation to participate as a cooperating agency in the environmental review of the PSEG ESP application.

- Describe how the EIS will be prepared and identify any contractor assistance to be used.

Two public scoping meetings were held at the Performing Arts Theater (Davidow Hall) on the campus of Salem Community College in Carneys Point, New Jersey, on November 4, 2010; meetings took place at 1:00 p.m. and 7:00 p.m. The NRC announced the meetings in local and regional newspapers (*Today's Sunbeam*, *News of Cumberland County*, *Gloucester County Times*, and *The News-Journal* of Wilmington, Delaware) and issued press releases locally. Each scoping meeting began with prepared statements from NRC staff members providing a brief overview of the ESP application review process and the NEPA process. After the NRC's prepared statements, the meetings were opened for public comments.

Twenty-three afternoon scoping meeting attendees and eight evening scoping meeting attendees provided oral comments that were recorded and transcribed by a certified court reporter. Twelve written statements were received during the meeting. In addition to the oral and written statements provided at the public scoping meeting, seven letters and one e-mail message were received during the scoping period.

Transcripts for both afternoon and evening scoping meetings can be found in ADAMS under accession numbers ML103270568 and ML103270579, respectively. A scoping meeting summary memorandum (ML103270350) was issued November 29, 2010.

At the conclusion of the scoping period, the NRC staff and its contractor, Oak Ridge National Laboratory, reviewed the scoping meeting transcripts, as well as all written material received, and identified individual comments. These comments were organized according to topic within the proposed EIS or according to the general topic if outside the scope of the EIS. After comments were grouped according to subject area, the staff prepared responses to the comments, identifying which were within the scope of the EIS.

Table D-1 identifies in alphabetical order the individuals providing comments during the scoping period, their affiliation (if given), and the ADAMS accession number that can be used to locate the correspondence. Table D-2 lists the comment categories in alphabetical order and the commenter names and numbers for comments for each category. The balance of this appendix presents the comments with NRC staff responses organized by topic category.

Table D-1. Individuals Providing Comments During the Comment Period

Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession #	Correspondence ID Number
Applegate, Jim	Self	Letter (ML103270230)	0010
Applegate, Jim	Self	Meeting Transcript (ML103270568)	0001-10
Bailey, David	Ranch Hope	Meeting Transcript (ML103270568)	0001-21
Batty, Sandy	Association of NJ Environmental Commissions	Letter (ML103260561)	0003
Birdwell, Margaret (Sally) Sooy	The Swedish Colonial Society	Email (ML103370191)	0015
Blake, Matt	American Littoral Society	Meeting Transcript (ML103270568)	0001-19
Bobbitt, Bruce	Self	Meeting Transcript (ML103270579)	0002-2
Braun, Bob	PSEG	Meeting Transcript (ML103270579)	0002-3
Brown, Elizabeth	Delaware Riverkeeper Network	Letter (ML103500259)	0018
Brubaker, Scott	New Jersey Department of Environmental Protection	Letter (ML103540101)	0019
Brubaker, Scott	New Jersey Department of Environmental Protection	Letter (ML103540101)	0021
Brubaker, Scott	New Jersey Department of Environmental Protection	Letter (ML103540101)	0020
Burger, Joanna	Rutgers, the State University of New Jersey	Letter (ML103370042)	0013
Campbell, Keith	Self	Meeting Transcript (ML103270579)	0002-8
Davis, Robert	Salem City	Meeting Transcript (ML103270568)	0001-1
DeLuca, Mike	Self	Meeting Transcript (ML103270579)	0002-4
Dillingham, Tim	American Littoral Society	Letter (ML103260561)	0003
Duffy, Brian	Salem County Chamber of Commerce	Meeting Transcript (ML103270568)	0001-18
Duvall, Brian	New Jersey Academy for Aquatic Sciences	Meeting Transcript (ML103270579)	0002-5
Eastman, Ajax	Self	Letter (ML103270664)	0012
Eastman, Ajax	Self	Meeting Transcript (ML103270568)	0001-7

Table D-1. (continued)

Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession #	Correspondence ID Number
Elk, John	Elsinboro Township	Letter (ML103470078)	0016
Galetto, Jane Morton	Citizens United to Protect the Maurice River and Its Tributaries, Inc.	Letter (ML103260561)	0003
Gaye, Earl	Salem County Administrator	Meeting Transcript (ML103270568)	0001-15
Goldsmith, Amy	New Jersey Environmental Federation	Letter (ML103260561)	0003
Gorski, Stanley	National Marine Fisheries Service	Letter (ML103571097)	0022
Hassler, Charles	Self	Letter (ML103260587)	0005
Hassler, Charles	Self	Meeting Transcript (ML103270568)	0001-17
Joyce, Tom	PSEG Nuclear	Meeting Transcript (ML103270568)	0001-3
Kehoe, Jim	Building Trades in Southern New Jersey	Meeting Transcript (ML103270568)	0001-22
Kugler, John	Salem County Improvement Authority	Letter (ML103260561)	0009
Kugler, John	Salem County Improvement Authority	Meeting Transcript (ML103270568)	0001-12
Lacandro, Roger	Rutgers, the State University of New Jersey	Letter (ML103270170)	0008
Lacandro, Roger	Rutgers, the State University of New Jersey	Meeting Transcript (ML103270568)	0001-9
Lewis, Kenneth	Maryland Conservation Council	Letter (ML103270162)	0007
Lewis, Kenneth	Maryland Conservation Council	Meeting Transcript (ML103270568)	0001-6
McConaghie, Jennifer	U.S. Department of the Interior	Letter (ML103481202)	0017
McNutt, Richard	Tidewaters Gateway Partnership, Inc.	Letter (ML103260561)	0003
Meadow, Norman	Maryland Conservation Council	Meeting Transcript (ML103270568)	0001-5
Molzahn, Robert	Self	Letter (ML103270654)	0011
Molzahn, Robert	Water Resources Association of Delaware River Basin	Meeting Transcript (ML103270568)	0001-8
Nedd, Sheranee	Self	Meeting Transcript (ML103270579)	0002-7

Table D-1. (continued)

Commenter	Affiliation (If Stated)	Comment Source and ADAMS Accession #	Correspondence ID Number
Nolan, Christine	South Jersey Land and Water Trust	Letter (ML103260561)	0003
O’Gorman, Margaret	Conserve Wildlife Foundation of New Jersey	Letter (ML103260561)	0003
Patouhas, Maria	Chamber of Commerce Southern New Jersey	Letter (ML103260611)	0006
Patouhas, Maria	Chamber of Commerce Southern New Jersey	Meeting Transcript (ML103270568)	0001-23
Pompper, Ellen	Lower Alloways Creek	Meeting Transcript (ML103270568)	0001-2
Richardson, T.J.	Self	Meeting Transcript (ML103270568)	0001-11
Salmon, Edward	New Jersey Energy Coalition	Letter (ML103260578)	0004
Salmon, Edward	New Jersey Energy Coalition	Meeting Transcript (ML103270568)	0001-13
Schneider, Richard	Coalition to Protect Fisheries	Meeting Transcript (ML103270579)	0002-6
Schulte, James	Preservation Salem County	Letter (ML103260561)	0003
Sweeney, Steve	New Jersey State Senate	Meeting Transcript (ML103270579)	0002-1
Thomas, Loren	Salem County Vocational Technical Schools	Meeting Transcript (ML103270568)	0001-20
van Rossum, Maya	The Delaware Riverkeeper	Letter (ML103260561)	0003
Velinsky, David	Academy of Natural Sciences	Letter (ML103350644)	0014
Velinsky, David	Academy of Natural Sciences	Meeting Transcript (ML103270568)	0001-4
Verinoham, Brian	New Jersey State Police	Meeting Transcript (ML103270568)	0001-16
Weinstein, Michael	PSEG Institute for Sustainability Studies	Meeting Transcript (ML103270568)	0001-14

Table D-2. Comment Categories with Associated Commenters and Comment IDs

Comment Category	Commenter (Comment ID)
Alternatives—Energy	• Applegate, Jim (0001-10-1) (0001-10-2) (0001-10-4) (0010-1) • Campbell, Keith (0002-8-3) • DeLuca, Mike (0002-4-7) • Duvall, Brian (0002-5-3) • Eastman, Ajax (0001-7-3) (0001-7-5) (0001-7-6) (0001-7-7) (0001-7-10) (0001-7-14) (0012-3) (0012-6) (0012-7) (0012-10) (0012-12) • Hassler, Charles (0001-17-4) • Kugler, John (0001-12-4) (0009-5) • Lewis, Kenneth (0001-6-2) (0001-6-4) (0001-6-5) (0001-6-6) (0007-3) (0007-4) (0007-5) • Molzahn, Robert (0001-8-4) (0001-8-5) (0011-3) (0011-5) • Nedd, Sheranee (0002-7-1) • Salmon, Edward (0001-13-1) (0001-13-6) (0001-13-7) (0001-13-14) (0004-1) (0004-2) (0004-5) • Schneider, Richard (0002-6-2) (0002-6-22) • Velinsky, David (0001-4-10) (0014-15)
Alternatives—System Design	• Batty, Sandy (0003-6) • Blake, Matt (0001-19-7) • Brown, Elizabeth (0018-5) (0018-8) (0018-10) (0018-14) (0018-18) • Dillingham, Tim (0003-6) • Galetto, Jane Morton (0003-6) • Goldsmith, Amy (0003-6) • Lacandro, Roger (0001-9-4) (0008-5) • McNutt, Richard (0003-6) • Molzahn, Robert (0001-8-6) (0011-8) • Nolan, Christine (0003-6) • O'Gorman, Margaret (0003-6) • Schneider, Richard (0002-6-15) • Schulte, James (0003-6) • van Rossum, Maya (0003-6) • Velinsky, David (0014-17)
Benefit-Cost Balance	• Kehoe, Jim (0001-22-6) • Kugler, John (0009-8) • Salmon, Edward (0001-13-11) (0004-3)
Cumulative Impacts	• Eastman, Ajax (0001-7-4) (0012-5) • Lewis, Kenneth (0001-6-7) (0007-6) • Schneider, Richard (0002-6-1) (0002-6-11)

Table D-2. (continued)

Comment Category	Commenter (Comment ID)
Ecology—Aquatic	• Applegate, Jim (0001-10-5) (0001-10-7) (0001-10-9) (0010-5) (0010-7) • Batty, Sandy (0003-4) • Blake, Matt (0001-19-4) • Brown, Elizabeth (0018-4) (0018-13) (0018-17) (0018-21) • Brubaker, Scott (0019-5) (0019-23) (0019-25) (0020-3) (0020-9) (0020-12) (0020-14) (0020-17) (0020-19) (0020-21) (0020-23) (0020-26) • DeLuca, Mike (0002-4-3) (0002-4-5) (0002-4-6) • Dillingham, Tim (0003-4) • Duvall, Brian (0002-5-2) • Eastman, Ajax (0001-7-8) (0001-7-12) (0012-2) (0012-11) (0012-14) • Galetto, Jane Morton (0003-4) • Goldsmith, Amy (0003-4) • Gorski, Stanley (0022-2) (0022-4) (0022-6) (0022-10) (0022-12) (0022-14) (0022-15) • Lacandro, Roger (0001-9-3) (0001-9-5) (0008-6) • McNutt, Richard (0003-4) • Molzahn, Robert (0001-8-7) (0011-6) (0011-9) (0011-12) • Nolan, Christine (0003-4) • O'Gorman, Margaret (0003-4) • Schneider, Richard (0002-6-10) (0002-6-13) (0002-6-18) (0002-6-20) • Schulte, James (0003-4) • van Rossum, Maya (0003-4) • Velinsky, David (0001-4-2) (0001-4-4) (0001-4-6) (0014-2) (0014-4) (0014-6) (0014-8) (0014-10) (0014-12) • Weinstein, Michael (0001-14-2) (0001-14-4) (0001-14-5) (0001-14-8) (0001-14-10)
Ecology—Terrestrial	• Applegate, Jim (0001-10-4) (0001-10-6) (0001-10-8) (0010-4) (0010-6) • Batty, Sandy (0003-3) (0003-7) • Blake, Matt (0001-19-3) • Brown, Elizabeth (0018-3) (0018-11) • Brubaker, Scott (0019-22) • Burger, Joanna (0013-2) (0013-3) (0013-4) (0013-5) (0013-6) • Campbell, Keith (0002-8-5) • DeLuca, Mike (0002-4-2) • Dillingham, Tim (0003-3) (0003-7) • Duvall, Brian (0002-5-1) • Eastman, Ajax (0001-7-8) (0001-7-9) (0001-7-11) (0001-7-13) (0012-4) (0012-8) (0012-9) (0012-13) • Galetto, Jane Morton (0003-3) (0003-7) • Goldsmith, Amy (0003-3) (0003-7) • Gorski, Stanley (0022-5) (0022-8) (0022-9) (0022-11) (0022-13) • Lacandro, Roger (0001-9-3) (0008-4) • Lewis, Kenneth (0007-7) • McNutt, Richard (0003-3) (0003-7)

Table D-2. (continued)

Comment Category	Commenter (Comment ID)
	• Meadow, Norman (0001-5-5) • Molzahn, Robert (0001-8-10) (0001-8-11) (0011-11) (0011-13) • Nolan, Christine (0003-3) (0003-7) • O'Gorman, Margaret (0003-3) (0003-7) • Schulte, James (0003-3) (0003-7) • van Rossum, Maya (0003-3) (0003-7) • Velinsky, David (0001-4-1) (0001-4-3) (0001-4-5) (0014-3) (0014-5) (0014-7) (0014-9) • Weinstein, Michael (0001-14-1) (0001-14-3) (0001-14-6) (0001-14-7) (0001-14-9)
Geology	• Lacandro, Roger (0008-3) • Schneider, Richard (0002-6-7)
Health—Radiological	• Brubaker, Scott (0019-6) (0019-8) • Meadow, Norman (0001-5-2) (0001-5-4) (0001-5-8)
Historic and Cultural Resources	• Batty, Sandy (0003-7) • Birdwell, Margaret (Sally) Sooy (0015-1) • Blake, Matt (0001-19-6) • Brubaker, Scott (0019-27) (0021-3) (0021-4) (0021-5) (0021-6) • Dillingham, Tim (0003-7) • Galetto, Jane Morton (0003-7) • Goldsmith, Amy (0003-7) • McNutt, Richard (0003-7) • Nolan, Christine (0003-7) • O'Gorman, Margaret (0003-7) • Schulte, James (0003-7) • van Rossum, Maya (0003-7)
Hydrology—Groundwater	• Brubaker, Scott (0019-1) (0019-7) (0021-2)
Hydrology—Surface Water	• Batty, Sandy (0003-2) • Blake, Matt (0001-19-2) • Brown, Elizabeth (0018-2) (0018-9) (0018-12) (0018-15) (0018-16) • Brubaker, Scott (0019-2) (0019-3) (0019-24) (0019-26) (0020-10) (0020-13) (0020-15) (0020-18) (0020-20) (0020-22) (0020-24) (0020-27) • DeLuca, Mike (0002-4-4) • Dillingham, Tim (0003-2) • Galetto, Jane Morton (0003-2) • Goldsmith, Amy (0003-2) • Gorski, Stanley (0022-1) (0022-3) • Lacandro, Roger (0001-9-7) (0008-8) • McNutt, Richard (0003-2) • Molzahn, Robert (0001-8-1) (0001-8-8) (0001-8-9) (0001-8-13) (0011-1) (0011-10) (0011-14) • Nolan, Christine (0003-2) • O'Gorman, Margaret (0003-2) • Schneider, Richard (0002-6-9) • Schulte, James (0003-2) • van Rossum, Maya (0003-2)

Table D-2. (continued)

Comment Category	Commenter (Comment ID)
	• Velinsky, David (0001-4-7) (0001-4-9) (0014-11) (0014-13)
Land Use—Site and Vicinity	• Batty, Sandy (0003-9) (0003-10) • Blake, Matt (0001-19-9) • Brown, Elizabeth (0018-7) • Brubaker, Scott (0019-13) (0019-14) (0019-15) (0019-17) (0019-21) (0020-2) (0020-4) (0020-5) (0020-6) (0020-7) (0020-8) (0020-11) (0020-16) (0020-25) • Dillingham, Tim (0003-9) (0003-10) • Galetto, Jane Morton (0003-9) (0003-10) • Goldsmith, Amy (0003-9) (0003-10) • McNutt, Richard (0003-9) (0003-10) • Molzahn, Robert (0001-8-12) • Nolan, Christine (0003-9) (0003-10) • O’Gorman, Margaret (0003-9) (0003-10) • Schulte, James (0003-9) (0003-10) • van Rossum, Maya (0003-9) (0003-10)
Land Use—Transmission Lines	• Brubaker, Scott (0019-31) • McConaghie, Jennifer (0017-1)
Meteorology and Air Quality	• Brubaker, Scott (0019-4) (0019-9) (0019-10) (0019-11) (0019-12) (0019-16) (0019-18) (0019-19) (0019-20)
Need for Power	• Campbell, Keith (0002-8-2) • DeLuca, Mike (0002-4-8) • Duvall, Brian (0002-5-4) • Hassler, Charles (0001-17-9) (0005-3) (0005-5) • Kehoe, Jim (0001-22-4) • Lacandro, Roger (0008-2) • Molzahn, Robert (0001-8-3) (0011-4) • Patouhas, Maria (0006-4) • Salmon, Edward (0001-13-13) (0004-6) • Schneider, Richard (0002-6-21) • Sweeney, Steve (0002-1-2)
Process—ESP	• Brubaker, Scott (0020-1) • Schneider, Richard (0002-6-17) (0002-6-19)
Process—NEPA	• Batty, Sandy (0003-1) (0003-8) • Blake, Matt (0001-19-1) (0001-19-8) • Brown, Elizabeth (0018-1) (0018-6) (0018-19) (0018-20) • Brubaker, Scott (0019-30) • Dillingham, Tim (0003-1) (0003-8) • Galetto, Jane Morton (0003-1) (0003-8) • Goldsmith, Amy (0003-1) (0003-8) • McNutt, Richard (0003-1) (0003-8) • Nolan, Christine (0003-1) (0003-8) • O’Gorman, Margaret (0003-1) (0003-8) • Salmon, Edward (0001-13-5) • Schulte, James (0003-1) (0003-8) • van Rossum, Maya (0003-1) (0003-8)

Table D-2. (continued)

Comment Category	Commenter (Comment ID)
Socioeconomics	• Batty, Sandy (0003-6) • Blake, Matt (0001-19-5) • Bobbitt, Bruce (0002-2-2) • Braun, Bob (0002-3-1) (0002-3-2) • Campbell, Keith (0002-8-4) • Davis, Robert (0001-1-1) • Dillingham, Tim (0003-6) • Duffy, Brian (0001-18-3) (0001-18-5) • Elk, John (0016-4) (0016-5) • Galetto, Jane Morton (0003-6) • Gaye, Earl (0001-15-2) • Goldsmith, Amy (0003-6) • Hassler, Charles (0001-17-6) (0005-7) • Joyce, Tom (0001-3-1) (0001-3-2) • Kehoe, Jim (0001-22-3) • Kugler, John (0001-12-2) (0001-12-3) (0009-3) (0009-4) • Lacandro, Roger (0001-9-8) (0008-9) • McNutt, Richard (0003-6) • Molzahn, Robert (0001-8-2) (0011-2) • Nolan, Christine (0003-6) • O'Gorman, Margaret (0003-6) • Patouhas, Maria (0001-23-2) (0006-2) (0006-3) • Salmon, Edward (0001-13-12) (0004-4) • Schneider, Richard (0002-6-12) (0002-6-14) (0002-6-16) • Schulte, James (0003-6) • Sweeney, Steve (0002-1-4) • van Rossum, Maya (0003-6)
Uranium Fuel Cycle	• Applegate, Jim (0001-10-3) (0010-3) • Brubaker, Scott (0021-1) • Meadow, Norman (0001-5-6) • Salmon, Edward (0001-13-3) • Schneider, Richard (0002-6-5)

D.2 In-Scope Comments and Responses

The in-scope comment categories are listed alphabetically in Table D-3 in the order that they are presented in this EIS. In-scope comments and responses are included below the table. Parenthetical numbers shown after each comment refer to the Comment Identification (ID) number (document number-comment number) and the commenter name.

Table D-3. Comment Categories in Order as Presented in this Report

D.2.1 Comments Concerning Process—ESP
D.2.2 Comments Concerning Process—NEPA
D.2.4 Comments Concerning Land Use—Site and Vicinity
D.2.5 Comments Concerning Land Use—Transmission Lines
D.2.6 Comments Concerning Geology
D.2.7 Comments Concerning Hydrology—Surface Water
D.2.8 Comments Concerning Hydrology—Groundwater
D.2.9 Comments Concerning Ecology—Terrestrial
D.2.10 Comments Concerning Ecology—Aquatic
D.2.11 Comments Concerning Socioeconomics
D.2.13 Comments Concerning Historic and Cultural Resources
D.2.14 Comments Concerning Meteorology and Air Quality
D.2.16 Comments Concerning Health—Radiological
D.2.20 Comments Concerning the Uranium Fuel Cycle
D.2.25 Comments Concerning Cumulative Impacts
D.2.26 Comments Concerning the Need for Power
D.2.28 Comments Concerning Alternatives—Energy
D.2.29 Comments Concerning Alternatives—System Design
D.2.31 Comments Concerning Benefit-Cost Balance

D.2.1 Comments Concerning Process—ESP

Comment: The Office of Dredging and Sediment Technology's (ODST) primary overall concern is that the final product of the early site permit application (ESPA) process could be a conclusion that the PSEG Salem site is suitable for the construction and operation of a new nuclear power facility, with the resulting future inability of the NJDEP (or anyone else) to raise any concerns about potential environmental impacts of the proposed project. This is because all environmental impacts concerns are supposed to be addressed in the ESPA process - but they have not (at least in the application documents developed to date).

Further, this is problematic because many of the detailed analyses needed to evaluate the potential impacts of the proposed project are to be conducted as part of future State and federal permit review processes. Likewise, the development of potential measures to mitigate identified impacts are also relegated to future State and Federal permitting processes. Thus, it is not clear if approval of the construction and operation of a new nuclear power facility at the Salem site via the ESPA process would preclude the ability of NJDEP (and other regulatory agencies) to deny issuance of any required permits based on environmental impact concerns.

In part, this is due to a lack of specifics concerning the proposed project (reactor design, the need for an off-site transmission line, etc.). However, more detailed, site-specific analyses could be conducted as part of the ESPA process at a level sufficient for a preliminary determination that the site is suitable for use. Issuance of a CZM Consistency Determination by the NJDEP for the project would essentially constitute such a determination. However, as highlighted below in Comment A, although PSEG is seeking a CZM Consistency Determination from NJDEP as part of the ESPA process, the information in the ESPA documents submitted to date is incomplete and not at level sufficient to issue such a determination. (**0020-1** [Brubaker, Scott])

Response*: With respect to environmental matters, the NRC's ESP process is as follows: The NRC regulations governing an ESP application require that an applicant for an ESP must provide the NRC with an ER that meets the requirements of 10 CFR 51.45 and 51.50. As described in 10 CFR 52.17, the contents of an application must focus on the environmental effects of construction and operation of a reactor or reactors that might be built at the proposed site, even though an ESP does not authorize such construction and operation. In addition, Section 52.18 requires that the staff prepare an EIS based on the application that focuses on the same matters. Both the ER and the EIS must include an evaluation of alternative sites to determine whether there is any obviously superior site to the site proposed. Certain issues, however, such as the benefits of the action and alternative energy sources, may be deferred until such time as the applicant submits a COL or CP application. For the ESP, the NRC prepares an EIS that resolves numerous issues on the basis of existing environmental site characteristics, as well as values of power plant design parameters set forth in the application. These issues are candidates for issue preclusion in a proceeding on an application referencing the ESP (i.e., such an issue would not be subject to litigation in a later licensing proceeding). If an applicant chooses the plant parameter envelope (PPE) approach, as PSEG has done here, the application postulates bounding values for these plant design parameters. NRC regulations allow an ESP applicant to defer an issue (e.g., the benefits assessment), as PSEG elected here, but also require that a COL applicant referencing such an ESP address the issue in its COL application. An application for a CP or COL referencing an ESP includes: a) demonstrate that the design of the proposed facility falls within the parameters specified in the ESP; b) indicate whether the site is suitable for construction and operation of one or more nuclear power plants; and c) identify whether there is new and significant information related to any issue resolved in the ESP proceeding. The Supplemental EIS (SEIS) prepared for the COL will build upon the ESP EIS, should one be issued. If there is no new and significant information on an issue, the COL SEIS will bring forward the conclusion reached in the ESP EIS. If there is new and significant information, then a conclusion will be reached in the COL SEIS on the basis of the analysis of the new and significant information.*

D.2.2 Comments Concerning Process—NEPA

Comment: And it does amaze me how long the process takes. If you watched the slides today, you saw that we don't get to the final of this first step, until the spring of 2013. So the process is a long period of time, and I think at some time we have to face, how do we speed that up, so we can make it less expensive, but still do an excellent job of siting nuclear. (**0001-13-5** [Salmon, Edward])

***Response:** These comments provide general information on the NEPA process. They do not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS.*

Comment: The undersigned groups of the South Jersey Bay Shore Coalition are writing with a concern about a potential land swap in Lower Alloways Creek of New Jersey. PSEG is seeking to secure title to 84 acres on Artificial Island, from the Army Corps of Engineers, for the purposes of constructing a new nuclear power plant, Salem 4. PSEG has submitted application materials to the Nuclear Regulatory Commission demonstrating their intent to build a fourth power plant at Salem and Hope Creek. In exchange of these 84 acres the Corps is asking PSEG to identify and transfer ownership, to the Army Corps of Engineers of another 84 acres, yet to be determined, that the Corps would use as a dredge spoils disposal site for its projects.

It is clear the land swap is intended to result in the construction of Salem 4 on Artificial Island. The Corps affirmative action to remove the impediment of federal ownership of the lands that PSEG desires for this purpose, to decide and negotiate a land swap, and to take actions to accomplish this negotiation, all for the purposes of constructing Salem 4 on this location, is a major federal action that will affect the human environment and, therefore, is subject to NEPA.

I think coming in late I was catching the tail end that some of these things are, indeed, happening, which would have us pleased greatly.

Additionally, pursuing the land swap is for the purposes of identifying, securing, and utilizing a new location for a federal confined disposal facility that will receive dredge spoils from the Delaware River, and/or other Army Corps of Engineers projects. This, too, is a major federal action that will affect the human environment and, therefore, is subject to NEPA.

Therefore it was required that before engaging in negotiation and implementation of this action, the Corps must prepare an Environmental Impact Statement. And we would suggest, considering the use to be made of this land, it is most probable that NEPA would require and should require completion of a full Environmental Impact Statement. (**0001-19-1** [Blake, Matt])

Comment: The Army Corps needs to examine these and other issues, including allowing for public comment, and going through the EA and EIS process, before the Corps makes the decision, and takes the action that supports, assists, regulates, approves, and encourages to construct Salem 4 in Artificial Island and create a new confined disposal facility for accommodating dredge spoil sites from federal projects. (**0001-19-8** [Blake, Matt])

Comment: The undersigned groups of the South Jersey Bayshore Coalition are writing with concerns about a potential land swap in the Lower Alloways Creek area of New Jersey. It appears that the Philadelphia District of the US Army Corps of Engineers is in negotiations with PSEG regarding a land swap of 84 acres. PSEG is seeking to secure title to 84 acres on Artificial Island from the Army Corps for the purposes of constructing a new nuclear power plant, (Salem 4). PSEG has submitted application materials to the Nuclear Regulatory Commission (NRC) demonstrating their intent to build a 4th nuclear plant at the Salem-Hope Creek site. In exchange for these 84 acres, the Army Corps is asking that PSEG identify and transfer ownership to the Army Corps of another 84 acres, yet to be determined, that the Army Corps would use as a dredge spoil disposal site for its projects.

We believe that negotiating and undertaking the land swap for the purposes of allowing the construction of Salem 4 by PSEG on this location and identifying a new location to be used for Army Corps spoils disposal, is the undertaking of a new activity(ies) and project(s) that are being assisted, regulated; and/or approved by the Army Corps, a federal agency.

In this process, it is likely that the Army Corps is and/or will be preparing and adopting plans and documents that would encourage, support and guide the selection of the Artificial Island location as the preferred alternative for construction of a new nuclear facility in the region, i.e. Salem 4. We understand that through this process the Army Corps will necessarily also be identifying, pursuing, planning and/or using (including adopting plans and documents) a new location for a federal confined disposal facility for dredge spoils.

It is clear the land swap is intended to result in the construction of Salem 4 on Artificial Island. The Army Corps' affirmative action to remove the impediment of federal ownership of the lands PSEG desires for this purpose, to decide to negotiate a land swap, and to take actions to accomplish this negotiation, all for the purposes of constructing Salem 4 in this location, is a major federal action that will affect the human environment and therefore is subject to NEPA.

Additionally, pursuing the land swap is for the purposes of identifying, securing and utilizing a new location for a federal confined disposal facility that will receive dredge spoils from the Delaware River and/or other Army Corps projects. This too is a major federal action that will affect the human environment and therefore is subject to NEPA.

In our view, the Army Corps is undertaking a series of systematic and connected agency steps in order to accomplish the goals of allowing construction of Salem 4 on Artificial Island and utilizing a new location for purposes of dredge spoil disposal for Army Corps projects. Therefore, it is required that before engaging in the negotiation and implementation of this action the Army Corps must prepare an Environmental Assessment (EA). And we would suggest, considering the use to be made of this land, it is most probable that an EA will and should require completion of a full Environmental Impact Study Statement. (EIS). (**0003-1** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: The Army Corps needs to examine these and other issues, including allowing for public comment, and going through an EA and an EIS process, before the Army Corps makes the decision and takes the action that supports, assists, regulates, approves, encourages, and acquiesces to construction of Salem 4 on Artificial Island and creates a new confined disposal facility for accommodating dredge spoils from federal projects. (**0003-8** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: The EIS should require clearer evaluation of PSEG's use of the Army Corps confined disposal facility, the agreement to do so, and any cumulative impacts resulting from use of the site. According to the ER 4.1-9, there will be construction laydown and related activities located in the Corps CDF site. It is unclear what long-term or permanent impacts may result, despite the site use for temporary activity. The NRC should consider these potential impacts and the full range of alternatives in its EIS. Moreover, the EIS should consider the chain reaction of environmental impacts if the CDF is used for another purpose. The NRC should also examine the mechanism by which the Army Corps is providing the use of this land and any impacts this may have on Army Corps permit reviews or regulatory processes for the Project. (**0018-6** [Brown, Elizabeth])

Response: *The U.S. Army Corps of Engineers-Philadelphia District (Corps) is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange described in these comments will be evaluated in the EIS.*

Comment: PSEG submitted an Environmental Report (ER) to NRC in May 2010 which contains the project proponent's assessment of environmental issues related to site construction and operation. The ER uses the NRC criteria established in 10 CFR 51, Subpart A, Appendix B, Table B-1, Footnote 3 to assess whether environmental effects will be "small", "moderate" or "large" (Footnote #2). Delaware Riverkeeper Network is concerned that the characterizations of environmental effects by PSEG will be accepted whole-cloth in an EIS for the Project, in effect outsourcing the burden of drafting the EIS to the project proponent. This would constitute an inappropriate use of the NEPA process. Therefore, DRN urges NRC to review certain issues in more detail, including: clearer evaluation of PSEG's use of the Army Corps confined disposal facility, and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems.

(Footnote #2): Small effects are defined as "Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission has concluded that those impacts that do not exceed permissible levels in the Commission's regulations are considered small. Moderate effects are defined as "Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource." Large effects are defined as, "Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource." (**0018-1** [Brown, Elizabeth])

Response: *The NRC and U.S. Army Corps of Engineers-Philadelphia District, which is a Cooperating Agency on the EIS for PSEG's ESP application, will use information provided in PSEG's Environmental Report, as well as other publicly-available information, to prepare the EIS. NRC and the Corps will verify the information provided by PSEG, and will conduct a thorough, independent assessment of the environmental impacts of the proposed actions (including actions proposed by the Corps) in the EIS. The EIS will assess potential impacts to all relevant environmental resources, and will address the specific issues raised in this comment: PSEG's use of the Corps' confined disposal facility and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems.*

Comment: One final note is that in considering impacts in the EIS, construction-phase impacts should not be discounted as temporary. According to the ER, construction--and therefore construction-related impacts--will occur over an approximately five year time period and will include site excavation and the construction of safety-related structures. (**0018-19** [Brown, Elizabeth])

Response: *The EIS will evaluate all reasonably foreseeable direct, indirect, and cumulative impacts of building and operating new facility, regardless of whether an impact is temporary.*

Comment: DRN also stresses the importance of public transparency concerning the Army Corps' role in this Project, including transparency regarding the Corps' prior and anticipated commitments to PSEG that may impact its permit review function. (**0018-20** [Brown, Elizabeth])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application will be evaluated in the EIS.*

Comment: 9) Environmental Report, Chapter 4, Page 4.6-2,

4.6.2 Adverse Environmental Impacts

The ESP states, "Upon receipt of an ESP permit, PSEG may choose to obtain a Limited Work Authorization (LWA) to carry out site preparation and preconstruction activities. Additionally, site preparation activities, some excavation work, and construction of support buildings, roads, fences, parking lots, potable water systems, and other nonsafety-related facilities may be initiated prior to receipt of a combined license (COL). These preconstruction activities can be carried out prior to issuance of a COL and are separated from NRC-regulated construction activities."

Comment

Comment 1 (above) also applies to this portion of the project.

10) Environmental Report, Chapter 4, Page 4.6-4

4.6.3 Measures and Controls to Limit Adverse Impacts

The ESP states, "In addition to the general measures discussed above, the following specific factors limit potential adverse environmental impacts related to construction activities at the PSEG Site: compliance with federal, state, and local laws, ordinances, and regulations intended to prevent or minimize adverse environmental effects (for example, solid waste management, erosion and sediment control, air emissions ...)

Comment

Please see comment 1 for a description of one of the Federal regulations that is applicable to this project. (**0019-30** [Brubaker, Scott])

Response: *The EIS assessment of impacts from construction and operations activities will include a discussion of applicable Federal, State, and local laws and regulations.*

D.2.4 Comments Concerning Land Use—Site and Vicinity

Comment: 2) Environmental Report, Chapter 2, Page, 2.2-7

2.2.3.4 Proposed Access Road

The ESP states, "Additional access road capacity is necessary to address future transportation needs for the PSEG Site. This access road is conceptually designed as a three-lane causeway to be constructed on elevated structures for its entire length through the coastal wetlands."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-13** [Brubaker, Scott])

Comment: 3) Environmental Report, Chapter 4, Page 4.2-3

4.2.1.1.2 Land Construction

The ESP states, "Site preparation and construction activities will be conducted in accordance with federal, state, and local regulations, as appropriate. Necessary permits and authorizations will be obtained and appropriate environmental controls implemented (e.g. stormwater management systems, groundwater monitoring wells, and spill containment controls) prior to commencement of earth disturbing activities."

Comment

Please see comment 1 for a description of one of the Federal regulations that is applicable to this project. (**0019-14** [Brubaker, Scott])

Comment: 4) Environmental Report, Chapter 4, Page 4.4-2,

4.4.1.1.1.1 On-site Construction Activities

The ESP states, "An increase in daily traffic (up to 3150 construction worker vehicles and 50 trucks) is expected during peak construction along roads passing through Elsinboro and Lower Alloways Creek Township and Salem City. The composition of this traffic includes passenger cars and light-duty trucks of the construction workforce, as well as truck traffic for delivery of construction materials and heavy equipment used to support facility construction (e.g. excavators, bulldozers, heavy haul trucks, cranes, etc.). Potential effects of this daily traffic are considered as indirect impacts associated with on-site construction activities."

Comment

Comment 1 (above) also applies to this portion of the project.

5) Environmental Report, Chapter 4, Page 4.4-2,

4.4.1.1.1.2 Off-Site Construction Activities

The ESP states, "The proposed causeway and potential new transmission line are the major off-site new plant elements."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-15** [Brubaker, Scott])

Comment:

7) Environmental Report, Chapter 4, Page 4.4-4,

4.4.1.1.2 Borrow Pits

The ESP states, "To the extent possible, this fill material comes from within the PSEG site boundaries. If additional off-site fill material is required, it is expected to come from existing permitted borrow areas such as those used in the construction of HCGS."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-17** [Brubaker, Scott])

Response: *These comments refer to the NJDEQ's assertion that the proposed action must comply with the Federal General Conformity Act (40 CFR 93.150), which addresses air pollution emissions. The NRC will conduct a conformity determination under 40 CFR Part 93, Subpart B, outside of the NEPA process to determine whether additional mitigation is warranted. If an ESP is issued, the PSEG would be required to comply with all Federal, State, and local laws and regulations regarding air quality.*

Comment: The Division of Land Use Regulation has received the PSEG Early Site Permit (ESP) application and has determined that the project will require permits.

As proposed, the project will require a CAFRA Individual Permit, Coastal Wetlands Permit, Waterfront Development Permit and Freshwater Wetlands Individual Permit from the Division. These permits must be obtained prior to any construction activities on the site related to the project described above. The Division has issued a consistency determination for the project that was sent to PSE&G representatives on July 19, 2010. (**0019-21** [Brubaker, Scott])

Response: *If an ESP is issued, PSEG would be required to obtain all necessary Federal, State, and local permits, and to comply with all Federal, State, and local laws and regulations.*

Comment: PSEG is seeking a Coastal Zone Consistency Determination from NJ as part of the ESPA process (Environmental Report, Section 1.3, page, 1.3-1). The Department's CZM review must consider the potential impacts resulting from dredging and dredged material management activities associated with the proposed project. (**0020-2** [Brubaker, Scott])

Response: *Potential impacts from dredging and dredged material management will be evaluated in EIS Chapter 4, 5, and 7.*

Comment: The EIS should require clearer evaluation of PSEG's use of the Army Corps confined disposal facility, the agreement to do so, and any cumulative impacts resulting from use of the site. According to the ER 4.1-9, there will be construction laydown and related activities located in the Corps CDF site. It is unclear what long-term or permanent impacts may result, despite the site use for temporary activity. The NRC should consider these potential impacts and the full range of alternatives in its EIS. Moreover, the EIS should consider the chain reaction of environmental impacts if the CDF is used for another purpose. The NRC should also examine the mechanism by which the Army Corps is providing the use of this land and any impacts this may have on Army Corps permit reviews or regulatory processes for the Project. (**0018-7** [Brown, Elizabeth])

Response: *Impacts to onsite and off-site land use will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

Comment: (1) SSAR, Section 1.2.1, page 1.2-1, para. #1 and para. #2: states that PSEG is planning to acquire 85 acres of land, located immediately north of the Hope Creek Generating Station, from the United States Army Corp of Engineers (USACE). This land is part of the Artificial Island Upland Confined Disposal Facility (CDF) used by the USACE for the disposal of sediments dredged from the Delaware River. The document also notes that the specific timing of this acquisition is not known. Paragraph #2 states that PSEG will obtain a lease on the remaining portion (~ 45 acres - see Section 1.2.2) of the upland CDF for temporary (duration unspecified) construction purposes. [Note: also see ER Sections 2.1.1, 2.2.1.1, and 2.8.1.2.]

The potential impacts of these acquisition and lease activities on the future dredged material disposal capacity available to the USACE for deepening and maintenance dredging activities needs to be evaluated. If acquisition of/leasing this land by PSEG will result in the need for the USACE to develop additional upland CDFs to meet its dredged material disposal needs, this indirect/cumulative impact of the proposed PSEG project must be evaluated. (**0020-4** [Brubaker, Scott])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange described in these comments will be evaluated in the EIS.*

Comment: (2) SSAR, Section 2.1.2.1, page 2.1-2, para. #2: indicates that the use of 146 acres of land currently owned by USACE may ultimately be controlled by PSEG. See Comment #1 - potential impacts of such PSEG use control of this land on the USACE's dredged material disposal capacity should be addressed.

(3) SSAR, Section 2.1.2.2, page 2.1-3, paras. #2 and #3: see Comments #1 and #2. (4) Environmental Report [ER], Section 1.2.2, page 1.2-1, para. #2: see Comments #1 and #2. (**0020-5** [Brubaker, Scott])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange described in these comments will be evaluated in the EIS.*

Comment: (5) ER, Table 1.3-1, page 1.3-4: use of the USACE Artificial Island CDF, and any other dredging or dredged material management activities, associated with the proposed project must be evaluated as part of the CZM Consistency, Clean Water Act Section 401, and NJ Waterfront Development Permit review processes. The NJDEP Office of Dredging and Sediment Technology (Site Remediation Program) will be the NJDEP lead on such evaluations. (**0020-6** [Brubaker, Scott])

Response: *Issues related to land use, including the proposed action's consistency with New Jersey's Coastal Zone Management and Waterfront Development Permit programs, will be addressed in EIS Sections 2.2, 4.1, 5.1, and 7.1.*

Comment: (7) ER, Section, 4.1.1.1, page 4.1-4, para. #2: states that PSEG use of 45 acres of the USACE Artificial Island Upland CDF will not impact the use of the remaining portion of the facility. Additional evaluation is needed to verify this statement. (**0020-7** [Brubaker, Scott])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application will be evaluated in the EIS.*

Comment: (9) ER, Section 4.2.1.1.4, page 4.2-5: briefly describes construction and dredging activities along the Delaware River shoreline. A total area of 92 acres - approximately 590,000 CY of sediment - is proposed to be dredged. The document concludes that impacts associated with dredging are small. However, much more work is needed to comprehensively evaluate the potential impacts resulting from dredging and dredged material management activities - see Comment #8. (**0020-11** [Brubaker, Scott])

Comment: (11) ER, Section 4.3.1, page 4.3-1, para. #5: references a permitted disposal facility on the PSEG site [that] is used for disposal of materials dredged from the intake structures ... Is this referring to an existing dredged material upland CDF on the PSEG property? If so, this facility should be identified in an appropriate figure and described in more detail. [Note: also see Sections 2.3.1.1,2.4.1.3.4, and 2.4.2.1.1] (**0020-16** [Brubaker, Scott])

Comment: (12) ER, Section 4.3.2.3, page 4.3-19, para. #3: see Comment #9. The ~590,000 CY of sediments to be dredged have not been tested/evaluated, nor has a disposal site been selected. (**0020-18** [Brubaker, Scott])

Comment: (8) ER Section 4.1.2.2, page 4.1-7: indicates that dredged material from the USACE Artificial Island CDF and from dredging activities associated with the intake and barge facility areas would be used as fill material on-site.

At a May 9, 2010 meeting with the NJDEP, PSEG representatives indicated that dredging of ~975,000 cubic yards of sediments from the Delaware River would be needed to support the project - this has apparently been reduced to ~ 590,000 CY (see Comment #9). All dredging and dredged material management activities associated with the construction of the proposed project must be described and comprehensively evaluated. This would include testing of dredged material consistent with the requirements of the 1997 NJDEP Dredging Technical Manual. The documents submitted in support of the ESPA barely discuss dredging and dredged material aspects of the proposed project. Section 2.3.1 of the Environmental Report only briefly summarizes some Delaware River sediment samples collected in the vicinity of the project site and subjected only to grain size analyses.

Dredging and dredged material management activities will also require a variety of permits from the NJDEP, including a CZM Consistency Determination. The use of any dredged material as on-site fill - including material excavated from the USACE Artificial Island Upland CDF - will require an Acceptable Use Determination from the Department.

At the May 9, 2010 meeting, it was also stated that construction of a new dredged material upland CDF on the PSEG property may be needed. If still needed, the potential impacts of the construction and use of such a facility must also be comprehensively evaluated and approved by the Department, consistent with the requirements specified in the 1997 NJDEP Dredging Technical Manual. (**0020-8** [Brubaker, Scott])

Response: *Impacts to land use associated with dredging and the management of dredged material will be evaluated in EIS Sections 4.1, 5.1, and 7.1. In addition, the EIS (Chapter 2 and 3) will provide figures of the proposed PSEG ESP site layout and supporting structures.*

Comment: (16) ER, Section 2.8.1.2, page 2.8-3, para. #2: delegates the evaluation of the potential environmental impacts of the transfer of a portion of the USACE Artificial Island Upland CDF to PSEG to a future federal review process. As noted in this paragraph, this transfer is expected to be a relevant factor to the overall nature and composition of impacts associated with the construction and operation of the new plant. Therefore, the impacts of this proposed land transfer should be evaluated as part of the ESPA process. Also see Comment B and Comments #1, #2, and #7. (**0020-25** [Brubaker, Scott])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange described in these comments will be evaluated in the EIS.*

Comment: The Army Corps of Engineers and PSEG must consider an alternative to the land swap, such as using the existing road to Artificial Island, instead of creating a second road if, and when, a nuclear facility is permitted. In our view the existing access road should be sufficient. Issues associated with new spoil disposal site are, as yet, unknown, as the sites under consideration are unknown. But there are likely to be issues, considering the Army Corps of Engineers for riverfront lands. (**0001-19-9** [Blake, Matt])

Response: *Impacts to land use associated with the proposed causeway and the management of dredged material will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

Comment: Although the existing PSEG nuclear complex is an ideal location for an additional unit, because all of the important conveyance systems are in place, and those will not have to be developed, such as they would if it was a greenfield site. New improvements, such as roadways, should be carefully placed and designed to minimize their impact on marshlands. An elevated road system would be a design that would help minimize these impacts. We encourage PSEG to pursue such a design, and develop a comprehensive wetlands mitigation and compensation plan for these impacts. (**0001-8-12** [Molzahn, Robert])

Response: *Impacts to land use associated with the proposed causeway will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

Comment: The undersigned groups of the South Jersey Bayshore Coalition are writing with concerns about a potential land swap in the Lower Alloways Creek area of New Jersey. It appears that the Philadelphia District of the US Army Corps of Engineers is in negotiations with PSEG regarding a land swap of 84 acres. PSEG is seeking to secure title to 84 acres on Artificial Island from the Army Corps for the purposes of constructing a new nuclear power plant, (Salem 4). PSEG has submitted application materials to the Nuclear Regulatory Commission (NRC) demonstrating their intent to build a 4th nuclear plant at the Salem-Hope Creek site. In exchange for these 84 acres, the Army Corps is asking that PSEG identify and transfer ownership to the Army Corps of another 84 acres, yet to be determined, that the Army Corps would use as a dredge spoil disposal site for its projects.

We believe that negotiating and undertaking the land swap for the purposes of allowing the construction of Salem 4 by PSEG on this location and identifying a new location to be used for Army Corps spoils disposal, is the undertaking of a new activity(ies) and project(s) that are being assisted, regulated; and/or approved by the Army Corps, a federal agency.

In this process, it is likely that the Army Corps is and/or will be preparing and adopting plans and documents that would encourage, support and guide the selection of the Artificial Island location as the preferred alternative for construction of a new nuclear facility in the region, i.e. Salem 4. We understand that through this process the Army Corps will necessarily also be identifying, pursuing, planning and/or using (including adopting plans and documents) a new location for a federal confined disposal facility for dredge spoils.

It is clear the land swap is intended to result in the construction of Salem 4 on Artificial Island. The Army Corps' affirmative action to remove the impediment of federal ownership of the lands PSEG desires for this purpose, to decide to negotiate a land swap, and to take actions to accomplish this negotiation, all for the purposes of constructing Salem 4 in this location, is a major federal action that will affect the human environment and therefore is subject to NEPA.

Additionally, pursuing the land swap is for the purposes of identifying, securing and utilizing a new location for a federal confined disposal facility that will receive dredge spoils from the Delaware River and/or other Army Corps projects. This too is a major federal action that will affect the human environment and therefore is subject to NEPA.

In our view, the Army Corps is undertaking a series of systematic and connected agency steps in order to accomplish the goals of allowing construction of Salem 4 on Artificial Island and utilizing a new location for purposes of dredge spoil disposal for Army Corps projects. Therefore, it is required that before engaging in the negotiation and implementation of this action the Army Corps must prepare an Environmental Assessment (EA). And we would suggest, considering the use to be made of this land, it is most probable that an EA will and should require completion of a full Environmental Impact Study Statement. (EIS). (**0003-9** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Response: *Potential impacts to land use associated with the proposed land exchange and the management of dredged material will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

Comment: The Army Corps and PSEG must consider an alternative to the land swap, such as using the existing access road to Artificial Island instead of creating a second road, if and when a new nuclear facility is permitted. This would avoid destruction of wetlands and obviate the need for a new dredge disposal site. In our view, the existing access road should be sufficient and no additional destruction of wetlands should be permitted at the site. Issues associated with a new spoil disposal site are as yet unknown as the sites under consideration are unknown. But there are likely to be issues, considering the Anny [Army] Corps' preference for riverfront lands. (**0003-10** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Response: *Impacts to land use associated with the proposed causeway and the management of dredged material will be evaluated in EIS Sections 4.1, 5.1, and 7.1. In addition, the U.S. Army Corps of Engineers-Philadelphia District will consider impacts associated with the land swapping action as part of a separate environmental review.*

D.2.5 Comments Concerning Land Use—Transmission Lines

Comment: There are two Land and Water Conservation Fund (LWCF) sites within a 6-mile radius of the proposed project located in Delaware. It does not appear that the project will directly affect the Delaware LWCF sites. However, if new transmission lines were to cross the river, they could potentially impact these LWCF sites, depending upon placement. See the attached map for locations of the LWCF properties within the 6-mile radius of the proposal. (**0017-1** [McConaghie, Jennifer])

Response: *Potential impacts to off-site land use, including impacts from transmission lines, will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

Comment: 13) Environmental Report, Chapter 5, Page 5.6-1

5.6.1 Terrestrial Ecosystems

The ESP states, "Transmission needs for the new plant include two or three new on-site transmissions lines crossing between two proposed switchyards on the PSEG Site and a potential off-site transmission line."

Comment

Comment 1 (above) also applies to this portion of the project.

14) Environmental Report, Chapter 10, Page 10.1-5 Table 10.1-1 Construction-Related Unavoidable Adverse Environmental Impacts

Table 10.1-1 of the ESP indicates that the adverse land use impacts include construction of the new plant and causeway which will impact 500 acres of predominantly disturbed or otherwise degraded land. The mitigation measures in Table 10.1-1 states that construction activities will comply with all relevant federal, state, and local regulatory requirements, including BMPs and stormwater management plans to control erosion and runoff.

Comment

Comment 1 (above) also applies to this portion of the project. Please see comment 1 for a description of one of the Federal regulations that is applicable to this project. (**0019-31** [Brubaker, Scott])

Response: *Impacts to land use associated with the proposed action will be evaluated in EIS Sections 4.1, 5.1, and 7.1.*

D.2.6 Comments Concerning Geology

Comment: Much of the needed science for the ESP should be at hand since the new station is being sited adjacent to Hope Creek and Salem Creek generation stations; their track record appears to be good, the new site will share the same geology, use of in place dredge spoils constituting all soils of the area-thus, artificial Island. (**0008-3** [Lacandro, Roger])

Response: *The geology of the site will be discussed in EIS Section 2.1-Site Location and described in detail in EIS Section 2.8-Geology.*

Comment: And, you know, that is also why it is a very bad location. Plus the facility is built on mud. It is river mud that the facility is built on. The three existing facilities have pylons that go down, like, 70 feet. But they still don't hit bedrock. So the new facility will probably be built the same, on mud. Mud has a tendency to sink. It is not a stable foundation. The bedrock is much further below. They just stopped trying to reach bedrock. Will the new facility be based in bedrock, to make it more stable? That is a question that I think the Commission should make part of their review. And then, also, the problem with mud, and building a facility on it, is problem with earthquakes. And what happens is if you have buildings on a soft ground, like mud, you get liquefaction - that is the term that is used. You get the vibration from the earthquake. The earthquake shaking is magnified, by the mud, which shakes. A classic example is the earthquake in Mexico City, about 10 or 15 years ago. It was a mild level, Richter scale event. But because it was located in a valley, which was previously marshland, located on mud, the whole area beneath Mexico City vibrated. So the effect of damage was amplified, even greater. You have this same situation, there, on the mud at Salem Nuclear Facility. You know, who knows when an earthquake is coming. But that, also, needs to be evaluated. So I feel it is, you know, one of the worst locations for an existing facility, as well as adding a new one. (**0002-6-7** [Schneider, Richard])

Response: *The geology of the site will be discussed in the EIS Section 2.8-Geology and Section 3.2.2-Structures with a Major Environmental Interface. Safety related issues such as foundational stability and the impact of earthquakes on the plant will be evaluated as part of the Safety Evaluation Report.*

D.2.7 Comments Concerning Hydrology—Surface Water

Comment: (8) ER Section 4.1.2.2, page 4.1-7: indicates that dredged material from the USACE Artificial Island CDF and from dredging activities associated with the intake and barge facility areas would be used as fill material on-site.

At a May 9, 2010 meeting with the NJDEP, PSEG representatives indicated that dredging of ~975,000 cubic yards of sediments from the Delaware River would be needed to support the project - this has apparently been reduced to ~ 590,000 CY (see Comment #9). All dredging and dredged material management activities associated with the construction of the proposed project must be described and comprehensively evaluated. This would include testing of dredged material consistent with the requirements of the 1997 NJDEP Dredging Technical Manual. The documents submitted in support of the ESPA barely discuss dredging and dredged material aspects of the proposed project. Section 2.3.1 of the Environmental Report only briefly summarizes some Delaware River sediment samples collected in the vicinity of the project site and subjected only to grain size analyses.

Dredging and dredged material management activities will also require a variety of permits from the NJDEP, including a CZM Consistency Determination. The use of any dredged material as on-site fill - including material excavated from the USACE Artificial Island Upland CDF - will require an Acceptable Use Determination from the Department.

At the May 9, 2010 meeting, it was also stated that construction of a new dredged material upland CDF on the PSEG property may be needed. If still needed, the potential impacts of the construction and use of such a facility must also be comprehensively evaluated and approved by the Department, consistent with the requirements specified in the 1997 NJDEP Dredging Technical Manual. (**0020-10** [Brubaker, Scott])

Response: *Potential impacts to surface-water and groundwater quality as a result of construction, including dredging, will be discussed in EIS Sections 4.2.3.1 Surface-Water-Quality Impacts and 4.2.3.2 Groundwater-Quality Impacts.*

Comment: General Comments

The permittee included various estimates of projected impingement and entrainment values for the proposed system. Impingement and entrainment can be assessed by a wide variety of tools and it is not possible to comment on the accuracy of these estimates without understanding more regarding the underlying assumptions. However, as noted above, the Department supports the use of closed cycle cooling as best technology available to minimize water withdrawal rates.

The Department recognizes that the proposed closed cycle cooling system using cooling towers and a low intake velocity of less than 0.5 feet per second constitutes the best technology available for minimizing impingement and entrainment impacts under Section 3l6(b) of the Clean Water Act.

Specific Comments

The Department takes issue with the following statement on page 5.2-7:

"'NJDEP has issued a discharge permit for the SGS (reference 5.2-7) and determined that the SGSs thermal plume, including the maximum temperature, does not impact the balanced indigenous community ...."

Rather, the Department stated the following in its June 29, 2001 NJPDES permit for PSEG-Salem:

"Therefore, based on a review of the current data and modeling pertaining to the thermal plume as well as the biothermal assessment, the Department has determined that a variance under Section 316(a) is warranted. A thermal discharge at the Station, which does not exceed a maximum of 1150 F (46.10 C) is expected to assure the protection and propagation of the balanced indigenous population. These effluent limitations for temperature are set forth in Part III-B/C as described previously. In addition, effluent limitations are also retained for heat in this proposed renewal permit (applied to Units 1 and 2)."

Specifically, the Department did not include a statement in said permit that PSEG does not impact the balanced indigenous community. (**0019-26** [Brubaker, Scott])

Response: *Water quality and aquatic ecology impacts as a result of plant operations at the proposed units will be discussed in Section 3.4.2.1 - Intakes, Discharges, Cooling Towers; 5.2.2 - Water Use Impacts; Section 5.2.2.1 – Surface-Water Impacts; and Section 5.3.2 - Aquatic Impacts Related to Operation.*

Comment: The Bureau of Water Allocation (BW A) has reviewed the Environmental Report (ER) submitted with PSE&G Early Site Permit (ESP) application for a proposed nuclear electric generating plant located adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station, Units 1 and 2 (SGS) in Lower Alloways Creek Township, Salem County, New Jersey (NJ).

A specific reactor technology has not yet been selected. However, the design characteristics of four reactor technologies under consideration were used to establish a plant parameter envelope (PPE) (Site Safety Analysis Report [SSAR] Section 1.3). While issuance of the ESP does not authorize construction and operation of any new nuclear power units, this ER analyzes the environmental impacts that could result from the construction and operation of one or two new nuclear power units at the PSEG site. These impacts are analyzed to determine if the site is suitable for the addition of the new nuclear plant, and whether there is an alternative site that is environmentally preferable to the proposed site.

PSEG has not yet selected a specific reactor(s) technology. Four different technologies are under consideration including:

- Advanced Passive 1000 (AP1000)
- U.S. Evolutionary Power Reactor (U.S. EPR)
- Advanced Boiling Water Reactor (ABWR)
- U.S. Advanced Pressurized Water Reactor (US-APWR)

This ESP application uses a PPE approach that encompasses all four reactor technologies (SSAR Section 1.3). The ESP analyzes the environmental impacts of the four reactor technologies using either one unit (U.S. EPR, ABWR, or U.S. APWR) or two units (AP 1000) at the PSEG site. Since a specific reactor technology has not been selected, the environmental impact analyses are based on reactor bounding conditions derived from detailed reactor information supplied by the vendors. The total bounding PPE value for the new plant is 6830 gross megawatts thermal (MWt) (SSAR Table 1.3-1 Item 17.3) and 2200 MWe net. Section 3.2, Reactor Power Conversion System, provides additional information on these reactor technologies.

The new plant uses a recirculating (closed-cycle) cooling water system that includes natural draft, mechanical, or fan-assisted natural draft cooling towers. A new shoreline intake structure supplies makeup water from the Delaware River to the new plant. A new discharge structure conveys cooling tower blowdown to the Delaware River in conformance with New Jersey Pollutant Discharge Elimination System (NJPDES) permit requirements.

Section 3.4, Cooling System, provides additional detail on the intake, discharge, and cooling tower components of the plant cooling system.

In accordance with Water Supply Management Act, N.J.S.A. 58:1A-I et seq. and its supporting regulations N.J.A.C. 7:19-1 et seq. the following will be required from BWA:

A Water Allocation Temporary Dewatering Permit will be required for construction dewatering where the dewatering rate is 100,000 gallons per day for more than 30 days in a consecutive 365day period. If the dewatering period is 30 days or less, a Permit by Rule will suffice. A Dewatering Permit by Rule may be applicable if the dewatering occurs from within a coffer dam.

The current Water Allocation Permit, No. 2216P requires modification to allow additional ground water use for the new plant. Included with such a request for major modification of the Water Allocation Permit will be a Hydrogeologic Report prepared in accordance with GSR-29 Guidelines pursuant to N.J.A.C. 7:19-22(c).

The site is located in the Salem/Gloucester County USGS Study Area south of Critical Area No.2. Increases in withdrawals from the PRM Aquifer are being reviewed by BWA due to concerns with safe yield and salt water intrusion. The results of t (**0019-24** [Brubaker, Scott])

Response: *The EIS will identify and in some instances discuss all the appropriate Federal, state, and local authorizations and consultations an applicant must obtain before construction and operation can take place. These permits and approvals will be will be discuss in Chapter 1 and Appendix H of the EIS.*

Comment: Increases in turbidity through the resuspension of sediments into the water column from dredging and port operations will degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Sedimentation and wave patterns in the area may be altered as a result of vessels entering and exiting the proposed mooring area also resulting in increased turbidity. Suspended sediments mask pheromones used by migratory fishes, and can smother immobile benthic organisms and demersal newly- settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). As supported above, the project area provides important habitat for striped bass including valuable spawning grounds and nursery habitat. Increases in turbidity will adversely affect striped bass larvae's ability to capture prey (Fay et al. 1983 in Able and Fahay 1998). The decrease in water circulation can also adversely affect striped bass survival as strong current is needed to keep the eggs suspended in the water column and prevent them from being smothered by silt (Bigelow and Schroeder 1953). (**0022-3** [Gorski, Stanley])

Response: *Potential construction impacts as a result of dredging including lowered dissolved oxygen levels, potential releases of chemical contaminants bound to fine- grained sediment, and suspended sediments will be discussed in Sections 4.2, 4.2.3.1, and 4.2.4 of the EIS. Impacts to aquatic fauna will be discussed in Section 4.3.2*

Comment: Impacts to the quality of surface waters and the alteration of river bottom sediments within the Delaware River and adjacent marsh creeks are expected as a result of the construction and operation of the proposed facility, and will include those associated with the development of shoreline features (intake structure, barge facility, heavy haul road), dredging of sediments from the near-shore area of the Delaware River to provide for water intake and discharge and to provide adequate draft for barge access during construction, and the filling of 9.5 acres of coastal tidal wetlands and shallow open water areas. (**0022-1** [Gorski, Stanley])

Response: *Potential impacts to surface-water quality as a result of construction and operation, including dredging, will be discussed in EIS Sections 4.2.3.1 and 5.2.3.1, respectively. In addition, cumulative impacts to surface-water quality will be discussed in Section 7.2.1.*

Comment: (17) Section 5.1.1.1, page 5.1-1, para. #2: briefly discusses dredging activities that may be needed during operation of the proposed facility, and concludes that - since the dredged material will be disposed of in approved upland areas - any resulting impacts will be small. See Comments #8 and #9. [Also see Sections 5.2.1.2 and 10.5.2.1] (**0020-27** [Brubaker, Scott])

Response: *Potential impacts to surface-water quality as a result of construction and operation, including dredging, will be discussed in EIS Sections 4.2.3.1 and 5.2.3.1, respectively. In addition, cumulative impacts to surface-water quality will be discussed in Section 7.2.1.*

Comment: (15) ER, Table 4.6-1: regarding potential measures to mitigate potential water quality and aquatic ecosystem impacts resulting from dredging and dredged material management activities - see Comments #9 and #14. (**0020-24** [Brubaker, Scott])

Response: *Mitigation of water quality impacts, proposed by the applicant, as a result of construction and operation, will be discussed in Sections 4.2.5 and 5.2.5 of the EIS.*

Comment: ER Page 24 of 136-Hydrological Alterations:

"Development of these areas resulting in the loss of the artificial ponds will result in localized runoff that is collected in engineered detention basins, and conveyed to the Delaware River."

Comment: The NJBNE is requesting split samples of surface water from any new engineered basin as part of the pre-operational stage. Initial sampling provides a baseline history prior to plant operation.

In addition, the licensee should investigate whether the retention basins (being added as monitoring locations for non-radiological measurements such as Total Suspended Solids, Total Organic Compounds, pH, etc) need to be added to the Department's NJPDES Permit for Discharge to Surface Water. (**0019-2** [Brubaker, Scott])

Response: *Potential impacts to surface-water quality as a result of construction and operation, including hydrological alterations, will be discussed in EIS Sections 4.2.4, 4.3.1, 5.2.1, and 5.2.1. In addition, the EIS will identify and in some instances discuss all the appropriate Federal, state, and local authorizations and consultations an applicant must obtain before construction and operation can take place. These permits and approvals will be will be discuss in Chapter 1 and Appendix H of the EIS.*

Comment: The impact of the Project, standing alone, as well as that of the cumulative land-use and development patterns in Salem County and the surrounding area, upon stormwater pollution should also be considered in depth in the EIS. The ER does not adequately address this issue. (**0018-12** [Brown, Elizabeth])

Response: *The potential impacts of stormwater pollution resulting from construction (Section 4.2.3) and operation (Section 5.2.3) will be addressed in the EIS. Cumulative impacts of the plant on surface water will be addressed in Section 7.2.2.1 of the EIS.*

Comment: (13) ER, Section 4.3.2.3, page 4.3-19, para. #3: concludes that impacts associated with dredging activities are small; see Comment #9. (**0020-20** [Brubaker, Scott])

Comment: (10) ER, Section 4.2.3.1, page 4.2-13, para #2: states that "Based on the findings of the USACE's Delaware River main channel deepening project Environmental Assessment, dredging is not expected to result in degradation of water quality." The evaluation of potential impacts presented in the referenced Environmental Assessment are of little relevance to the evaluation of the potential impacts of dredging and dredged material management activities associated with the proposed PSEG project. (**0020-15** [Brubaker, Scott])

Comment: (9) ER, Section 4.2.1.1.4, page 4.2-5: briefly describes construction and dredging activities along the Delaware River shoreline. A total area of 92 acres - approximately 590,000 CY of sediment - is proposed to be dredged. The document concludes that impacts associated with dredging are small. However, much more work is needed to comprehensively evaluate the potential impacts resulting from dredging and dredged material management activities - see Comment #8. (**0020-13** [Brubaker, Scott])

Response: *Potential impacts to surface-water quality as a result of construction and operation, including dredging, will be discussed in EIS Sections 4.2.4, 4.3.1, 5.2.1, and 5.2.1. In addition, cumulative impacts to surface-water use will be discussed in Section 7.2.1.1.*

Comment: The ER acknowledges that hydrogeological impacts will result from dredging near-shore areas of the Delaware River for water intake, water discharge, and barge access areas (modifying the existing HCGS barge slip.) DRN has long advocated for comprehensive environmental review of dredging projects that will result in significant harm to the Delaware River's environmental values through dredging and filling, blasting, and degraded water quality. Section 4.2.1.1.4 of PSEG's ER describes the proposed dredging as follows:

"Alteration of surface waters within the Delaware River include those associated with the development of shoreline features (intake structure, barge facility, heavy haul road), and dredging (Figure 3.1-2). Constructed features along the Delaware River shoreline require the filling of 9.5 ac. of coastal wetlands and shallow open water areas (Subsection 4.3.2.3). Construction of these facilities includes the installation of sheet piling, bulkheads, and backfilling to create the constructed project utilization area. Shorelines will be stabilized and protected from erosion by the use of hardened bank applications (concrete, riprap, etc.). Consequently, in consideration of the small area of river to be modified relative to the size of the Delaware River, and based on the use of hardened bank treatments that minimize shoreline erosion, potential construction related impacts to the Delaware River are SMALL, but warrant mitigation in accordance with the NJDEP and USACE requirements.

Sediments from the near-shore area of the Delaware River Estuary will be dredged to provide for water intake and discharge and to provide adequate draft for barge access during construction. Construction of the new barge unloading facility and mooring area will require lowering of the river bottom an average of 4.5 ft. over an area of 61 ac. (dredging of 440,000 cubic yards of sediment). Barge mooring caissons will be constructed. Each caisson is 20 ft. in diameter resulting in the loss of 0.05 ac. of river bottom habitat for seven caissons. Construction of the new intake structure requires lowering the river bottom an average of 4.5 ft. over an area of 31-ac. (dredging of 150,000 cubic yards of sediment).

The total area to be dredged is 92 ac., extending riverward 1700 ft. from the shoreline, or 13 percent of the 2.5-mi. river width at this location. Dredging may include both mechanical and hydraulic dredging methods. Dredged material removed as part of this construction activity will be transported to and placed in an on-site or other approved upland disposal facility. The potential impacts of the dredging activities on water quality are described in Subsection 4.2.3.1.

Potential impacts to benthic organisms are discussed in Section 4.3. BMPs for dredging implemented during this activity will comply with requirements of the USACE Section 10/404 and NJDEP permits. Hydrologic alterations associated with this activity include localized changes in flow patterns along the river bottom due to differences in bottom contours at the edges of the dredge zone. From a river flow cross section perspective, the dredged area for barge access would add a total of 7500 square feet (sq. ft.) to an existing cross section of 220,000 sq. ft. (low water) to 270,000 sq. ft. (high water), or a localized increase in flow area that is in the range of 2.5 to 3.5 percent. Accordingly, the average velocity within the dredged area is reduced in proportion to the increase in cross sectional area. However, these small scale alterations in river flow are minimal in the context of the large size of the Delaware River and regular tidal flows. In consideration of the magnitude of the tidal flow and the size of the Delaware River, potential impacts associated with dredging are SMALL."

Clearly, the EIS will need to address the impact of dredging and related shoreline disturbance and take all viable alternatives into account. (**0018-9** [Brown, Elizabeth])

Response: *Potential impacts to surface-water quality as a result of construction and operation, including dredging, will be discussed in EIS Sections 4.2.4, 4.3.1, 5.2.1, and 5.2.1. In addition, cumulative impacts to surface-water use will be discussed in Section7.2.1.1. The part of the comment dealing with land use and potential impacts to terrestrial resources will be discussed in Sections 4.1.1 and 4.3.1.1, respectively. Finally, potential impacts to aquatic organisms as a result of construction and operation can be in Section 4.3.2 and 5.3.2.*

Comment: Therefore, DRN urges NRC to review certain issues in more detail, including: clearer evaluation of PSEG's use of the Army Corps confined disposal facility, and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems. (**0018-2** [Brown, Elizabeth])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange and relocation of the confined disposal facility, will be discussed in the EIS. Impacts as a result of*

construction including potential impacts to wetlands and habitat can be found in Chapter 4. Finally, potential cumulative impacts as noted in the comment will be evaluated in Chapter 7 of the EIS.

Comment: Finally, NRC must evaluate the impacts and all viable alternatives for cooling. DRN notes that EPA's Phase I regulations for new sources require closed-cycle cooling, which the new plant will have. 68 Fed. Reg. 36749-36755 (June 19, 2003). DRN has long advocated for closed-cycle cooling at the existing Salem facility. However, that does not mean that closed-cycle cooling is without impacts, or that one size fits all when selecting the specific cooling technology. According to the ER "Compared with a once- through cooling system, a closed cycle cooling system substantially reduces the volume of water diverted for cooling but increases consumptive water use as a result of evaporation loss in the cooling tower." (**0018-15** [Brown, Elizabeth])

Response: *Consumptive water use potential operational impacts will be discussed in Sections 5.2 and 7.2 of the EIS. Ecological impacts as result of plant operation will be discussed in Section 5.3.2. Potential thermal impacts, including to water chemistry, will be discussed in Section 5.2.4. Alternative cooling system designs will be discussed in Chapter 9.*

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts of the proposed facility will be limited by the use of a closed cycle cooling system. Compared to a once-through system, these cooling towers will divert much less water for cooling. Projected maximum diversion for the new facility is less than 4% of the current amount used by the Salem Generating Station and is a very small fraction the total volume of the Delaware River flow. As a result, impingement of fish populations will be a small fraction--less than 3% of the current level of the Salem station.

Because of the closed cooling system, we would also expect the thermal plume of the new plant to be localized and relatively small, with no significant impact on the local aquatic biota. The conclusion is based on past studies of the impact of thermal plumes from the existing PSEG generating plants, the expected operation of the proposed cooling structures, and our understanding of the ecology of aquatic species in the vicinity of the plant. (**0014-11** [Velinsky, David])

Response: *Consumptive water use potential operational impacts will be discussed in Sections 5.2 and 7.2 of the EIS. Ecological impacts as result of plant operation will be discussed in Section 5.3.2. Potential thermal impacts will be discussed in Section 5.2.4.*

Comment: WRA is interested in PSEG's proposed project because PSEG's proposed nuclear plant will be a major water user located in the Delaware River Basin and is an important part of the economy of New Jersey and the region at large. (**0011-1** [Molzahn, Robert])

Response: *Consumptive water use potential operational impacts will be discussed in Sections 5.2 and 7.2 of the EIS.*

Comment: Consumptive water use is an important issue on the Delaware River Basin, especially during drought periods. Although the proposed plant is located in the saline estuary, fresh water will still be evaporated by the cooling towers and thereby consumed. During declared drought emergencies the fresh water consumed should be replaced at an appropriate ratio by using water released from the Merrill Creek Reservoir near Phillipsburg, NJ. PSEG, along with several other electric generation companies, is a co- owner of Merrill Creek. Water released from Merrill Creek helps in keeping the salt line from moving upstream to the water intakes for the City of Philadelphia. Merrill Creek was financed, built and operated by electric generating companies for just this purpose. (**0011-10** [Molzahn, Robert])

Comment: Consumptive water use is an important issue on the Delaware River basin, especially during drought periods. Although the proposed plant is located in the salient estuary, fresh water will still be evaporated by the cooling towers and, thereby, consumed. During declared drought emergency the fresh water consumed should be replaced, at an appropriate ratio, by using water release from the Merrill Creek Reservoir, near Phillipsburg, New Jersey. PSEG, along with several other electric generating companies, is a co-owner of Merrill Creek.

Water release from Merril Creek helps in keeping the salt line, which is a 250 isoclore line from moving upstream to the water intakes for the City of Philadelphia. Merrill Creek was financed, built and operated by electric generating companies for just this purpose. (**0001-8-9** [Molzahn, Robert])

Comment: In reviewing the PSEG Early Site Permit application, and Environmental Report filed on May 25th, 2010, we noted that the new units intake and cooling systems will be designed to minimize the impact to the aquatic community, by utilizing cooling towers, and an intake system and design flows that conform to best available technology as required under Section 316B of the Clean Water Act. The cooling tower blow-down discharge should have little impact on the Delaware River, at this location, or significantly elevate river water temperatures. (**0001-8-8** [Molzahn, Robert])

Response: *Consumptive water use potential operational impacts will be discussed in Sections 5.2 and 7.2 of the EIS. Potential thermal impacts will be discussed in Section 5.2.4. Additionally, mitigative measures proposed by the applicant, if needed will be identified in the section titled Potential Mitigation Measures for Operation-Related Water Impacts.*

Comment: With the new facility a good thing is, if it is built, that it would have a closed loop cooling system, which would greatly reduce the amount of water needed to cool the facility. A closed loop cooling system reduces the water take, compared to an open loop system, by 90 to 95 percent. So however, an average nuclear facility draws in, an open loop system, like a billion gallons of water a day, over a billion. So even with the closed loop, you are still talking about 50 million to 100 million of gallons a day. (**0002-6-9** [Schneider, Richard])

Response: *Consumptive water use potential operational impacts will be discussed in Sections 5.2 and 7.2 of the EIS.*

Comment: In addition to the steps being taken to protect wetlands impacted by the construction, the aquatic impacts of the proposed facility will be limited by the use of a closed-cycle cooling system. Compared to the once through system, these cooling towers will divert much less water for cooling. Projected maximum diversion, for the new facility, is less than four percent, depending on the type of facility of the current use by Salem, and is less than .05 percent of the total volume of the Delaware flow. (**0001-4-7** [Velinsky, David])

Response: *Wetland protection during construction will be discussed in Sections 4.2.1 - Hydrological Alterations, 4.2.5 - Potential Mitigation Measures for Construction-Related Water Impacts, and 4.3.1 - Terrestrial and Wetland Impacts. Consumptive water use for plant operational will be discussed in Sections 5.2 and 7.2 of the EIS.*

Comment: Finally, although this does not relate directly to the environmental impacts of the new plant, I would add these thoughts on the prospects of global climate change. As an environmental scientist, I believe it is no exaggeration to say that climate change represents the singular environmental threat of the coming century. Even for the development of the new plant, the reality of sea level rise is a factor that must be and is being taken into account. (**0014-13,** (**0001-4-9** [Velinsky, David])

***Response:** Environmental impacts resulting from construction and operation of the proposed plant, including greenhouse gas emissions will be addressed in the EIS Chapters 4, 5, and 7. Greenhouse gas emissions associated with the fuel cycle will be presented in Chapter 6. Potential impacts of flooding and sea level rise will be evaluated in the safety evaluation report.*

Comment: Sea level rise and storm surge are also a concern at the proposed facility. Critical structures should be elevated or waterproofed at an appropriate elevation to ensure their protection. The NRC should review these design plans to confirm they are protective for sea level rise. (**0011-14** [Molzahn, Robert])

Comment: My questions would include: concern for extreme floods and adequate entrance and egress systems, maintaining a good, continuous dialog with the community and an insistence that only the best science be incorporated in planning and construction. (**0008-8** [Lacandro, Roger])

Comment: The proposed construction of Salem 4 on Artificial Island would have several significant environmental impacts that the Corps must consider, including, but not limited to:

- Increasing level of flooding will take place on the island in the coming 50 and 100 year time frames. The impact of sea level rise must be considered. Development of an additional nuclear plant puts the facility, the workers, and the nuclear materials to be stored on the site at risk of harm and, in the case of the nuclear materials, at risk of release into the River and environment. (**0003-2** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: The other potential impact that has to be considered here is associated with sea level rise. This is occurring, it is not disputed. Certainly in areas of New Jersey this is expected to be greater than in other areas of the country. This is not a game stopper here. One of the things I do at Rutgers is work with coastal communities on developing adaptation strategies to sea level rise. And I'm confident that the new facility will factor into account strategies to deal with a rising sea level along the New Jersey coast. (**0002-4-4** [DeLuca, Mike])

Comment: My questions would include concern for extreme floods, which may be different now than when the original plants were put into existence, adequate entrance and egress systems, maintaining a good, continuous dialogue with the community. (**0001-9-7** [Lacandro, Roger])

Comment: Sea level rise and storm surge are also a concern of the proposed facility, critical structures should be elevated, or waterproofed, at an appropriate elevation to ensure their protection. The NRC should review these design plans to conform that they are protected for sea level rise. (**0001-8-13** [Molzahn, Robert])

Comment: The proposed construction of Salem 4 on Artificial Island would have several significant and environmental impacts that the Corps must consider including, but not limited to, increased level of flooding, that will take place on the island in the coming 50 and 100 year time frame. The impact of sea level rise must be considered. Development of an additional nuclear plant puts the facility, the workers, and the nuclear materials to be stored on this site, at risk of harm. And in the case of nuclear materials, at risk of release into the river, and environment. (**0001-19-2** [Blake, Matt])

Response: *The EIS will evaluate the construction and operational impacts of the proposed plant on the existing environment. Potential impacts of flooding and sea level rise will be evaluated in the safety evaluation report.*

D.2.8 Comments Concerning Hydrology—Groundwater

Comment: As it relates to the ESP and proposed additional unit at Hope Creek, how does the trend of declining water levels in the upper PRM affect the potential water use with the proposed new unit? Will there need to be deeper wells in the mid-levels of the PRM? (**0021-2** [Brubaker, Scott])

Response: *Water withdrawal and impacts on the aquifer will be evaluated in EIS Sections 4.2.2-Water-Use Impacts and 5.2.2.2-Groundwater-Use Impacts. The cumulative impact of site groundwater use combined with the impacts of other past, present, and reasonably foreseeable future actions affecting groundwater resources will be discussed in Section 7.2-Water Use and Quality.*

Comment: ER Page 12 of 42, Section 6 -Environmental Measurements and Monitoring Programs

6.2.2.1 Radiological Monitoring Program

"The existing PSEG REMP serves as the new plant construction/preoperational radiological monitoring program. Additional on-site thermoluminescent dosimetry (TLD) monitoring locations will be added to the north of the HCGS to support the ODCM/REMP for the construction and preoperational period. A description of the new monitoring locations and other applicable parameters will be provided in the combined license (COL) application."

Comment: The NJBNE requests that the licensee establish a Groundwater Protection Program for the proposed site at the construction/pre-operational stage rather than waiting for the operation of the facility. During the construction phase, there will be knowledge as to where all applicable tanks and pipes are going to be located, along with buildings containing radioactive fluids and areas of further investigation for potential tritium in groundwater. (**0019-7** [Brubaker, Scott])

Response: *Potential operational impacts to groundwater quality and water monitoring will be discussed in EIS Sections 5.2.3.2-Groundwater-Quality Impacts and 5.2.4-Water Monitoring. Specific details of PSEG's radiological environmental monitoring program (REMP) will be presented in EIS Section 5.9.6-Radiological Monitoring. As required by an NRC licensing condition, the existing REMP program for the currently operating Salem and Hope Creek units will be updated by the applicant to include specific details related to monitoring of the proposed unit. Per agreement with the NRC, this program includes monitoring of groundwater, is updated once necessary facility design details are available, and must be evaluated and approved by the NRC prior to the operation of the facility. The REMP program is evaluated by NRC staff as part of the safety review process to ensure that it is adequate to monitor each onsite unit, identify potential contamination, and prevent offsite impacts.*

Comment: Environmental Report (ER) Page 13 of 136-Land Use Impacts: "All necessary permits and authorizations will be obtained and appropriate environmental controls implemented (e.g., storm-water management systems, groundwater monitoring wells, and spill containment controls) prior to commencement of earth disturbing activities. Site preparation and construction activities affecting land use include clearing, grubbing, grading, excavating, and stockpiling of soils. Soil management is an important element of construction sequencing. Materials excavated from the power block area will be stockpiled and/or disposed of on-site, or otherwise evaluated for reuse/disposal, potentially under a beneficial use determination (BUD), per NJDEP requirements as appropriate."

Comment: The NJBNE is requesting split samples from any new groundwater monitoring wells installed in association with the new facility. The sampling of these new wells should be added to the existing licensee sampling plan and Groundwater Protection Program (GWPP). In addition, a one-time composite soil core boring sample from any new well is requested by the NJBNE. Initial sampling provides a baseline history prior to plant operation. (**0019-1** [Brubaker, Scott])

Response: *Potential impacts to groundwater as a result of construction and operation of the proposed plant will be evaluated in EIS Sections 4.2.4-Water Monitoring, 5.2.4- Water Monitoring and 7.2.2 Cumulative Groundwater-Quality Impacts. The State of New Jersey would be responsible for requiring that the applicant provide any type of groundwater monitoring program samples. Such activities are not within the NRC's licensing authority.*

D.2.9 Comments Concerning Ecology—Terrestrial

Comment: During the re-permitting of the existing nuclear facilities at Salem, PSEG developed a bay-wide concept of mitigating the impacts of the existing cooler apparatus at those facilities. They were creative in identifying a variety of ways that the bay-wide resource value could be improved through investment in projects, throughout the Delaware Bay Estuary. I was attracted by the scope of their thinking, and the resources they could bring to the table. I testified in favor of this mitigation idea at the repermitting hearing. (**0001-10-4** [Applegate, Jim])

Response: *Comment noted. The NRC staff will discuss ecological impact mitigation, as necessary, in Section 5.3 of the EIS. The EIS will also include a discussion of the bay- wide approach undertaken by PSEG as part of the existing environment.*

Comment: Since then I have followed, with my students, and with great interest, what has become the largest estuarine enhancement project in the world. Without going into any details, the project has been, in my mind, a resounding success at many levels, in increasing the resource value of large acreages throughout the bay. PSEG has a solid track record in delivering on their commitment to bay-wide health. (**0001-10-6** [Applegate, Jim])

Response: *Comment noted. The NRC staff will discuss PSEG's estuarine enhancement program in Section 2.4 of the EIS as part of the existing environment.*

Comment: Returning, finally, to the purpose of this hearing, should this project move forward with construction, there will be on-site habitat impacts that will be unavoidable. I urge the process to embrace the same bay-wide approach used in the estuarine enhancement program, and to be creative and aggressive, in identifying off-site mitigation opportunity. Hold PSEG's feet to the fire. History suggests that they will deliver. (**0001-10-8** [Applegate, Jim])

Response: *The NRC staff will discuss on-site habitat impacts in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will be discussed, as necessary, in Section 4.3 of the EIS. A bay-wide approach will be similarly emphasized over a site- specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: With respect to restoration of wetlands, it has been common knowledge, for a long time, that wetlands support the production of most commercial and recreational fin fish and shellfish species, that we all enjoy eating, or capturing, or both. To the extent that you can find citations in the literature, Irand and Lacy, for example, that say 95 percent of all commercial and recreational species produced, marine species produced in the United States, require wetlands as essential habitats during their first year of life. (**0001-14-1** [Weinstein, Michael])

Response: *The NRC staff will describe the existing wetlands that could be affected in Section 2.4 of the EIS.*

Comment: The company had the foresight, long before the Estuarine Restoration Act was passed, with the goal of restoring a million estuarine acres, including many wetlands, in the U.S. by the year 2010. Long before that Act was passed, and the guardian of that act became two entities, essentially, Restore America's Estuaries, a practitioner coalition nation-wide. Actually now world-wide. And the Community Restoration Center, NOAA Restoration Center, Community Based Restoration Center which has, I think, a collective budget, over the years, now exceeding 28 million dollars. Before that became in the public venue, and popular, restoring wetlands is a good thing, and we needed to know why, of course.

Long before that became the popular trend, the company PSEG had been developing this program as a cost-effective basis for offsetting the effects of the power plant, with respect to its take of fin fish and shellfish. And the goal was to produce enough wetland acreage, or to conserve and restore enough wetland acreage, to produce the number of equivalent adults that would be lost at the facility. (**0001-14-3** [Weinstein, Michael])

Response: *Comment noted. The NRC staff will discuss PSEG's wetland conservation and restoration efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: We have been able to demonstrate, given the extreme variability around any mean you calculate, in these sites, in terms of processes and functions, that the 20 plus thousand acres produced a new increment of secondary production of these fin fish and shellfish that exceeded the loss, again as I said before, of equivalent adults. Also we have been able to document, everybody says phragmites is bad, and we suspected for a long time that it had to do with habitat, and other functional processes.

Some of our research has now demonstrated that a fish growing up in a phragmites dominated marsh, whatever the combination of factors is, and I should say to you, much to the company's chagrin, I was able with my colleagues to demonstrate that carbon nitrogen nutrients from phragmites is, indeed, finding its way into this fish.

But the quality of the animal, the end of the growing season, falls short of the quality of an animal in a naturally cord grass dominated marsh. In other words, they can't put down the energy reserves, for migration and overwintering, if they grow up in a phragmites marsh. (**0001-14-6** [Weinstein, Michael])

Response: *Comment noted. The NRC staff will describe the existing wetlands that could be affected in Section 2.4 of the EIS. Mitigation with native plant species, as necessary, and control of invasive species (i.e., phragmites) will be discussed in Sections 4.3 and 5.3 of the EIS.*

Comment: We have been able to demonstrate, given the extreme variability around any mean you calculate, in these sites, in terms of processes and functions, that the 20 plus thousand acres produced a new increment of secondary production of these fin fish and shellfish that exceeded the loss, again as I said before, of equivalent adults. Also we have been able to document, everybody says phragmites is bad, and we suspected for a long time that it had to do with habitat, and other functional processes.

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Response: *Comment noted. The NRC staff will describe the existing wetlands that could be affected in Section 2.4 of the EIS. Mitigation with native plant species, as necessary, and control of invasive species (i.e., phragmites) will be discussed in Sections 4.3 and 5.3 of the EIS.*

Comment: So let me close with a series of statistics, if I may. First of all, as Seagrant Director, I was able to enter into a public private partnership with the company. The company put up 750,000 dollars over five years, and we Seagrant Directors, in 11 states around the nation, matched those funds, to do some of the basic and applied research to understand what was going on, as we were restoring these sites.

One of those projects funded a young lady by the name of Kristen Solenstal at Yale University. She was the first of many people trying, with that funding, to demonstrate that the variety of phragmites that we call bad is actually an introduced variety, probably from either Asia, or Europe, or probably both.

That was part of this Marsh Ecology Research Program, or the MERP, as we called it. All of these funds were parlayed into many federal grants. For example, I have been funded by the

EPA, by NOAA, several agencies within NOAA, ANS, Solestol Kennedy, I have received NSF funding. All as part of the programmatic opportunity, at the Estuary Enhancement Program created for people interested in understanding how to do this restoration, how to make it effective, and why it actually works.

Two contributions, three contributions that will be the last I say. Three contributions that we made, that come immediately to mind is, as a group, the scientists involved in the Estuary Enhancement Program developed the practitioner skills, or methods, for restoring wetlands. What kinds of criteria and metrics should you be thinking about, when you go in to restore a site? Those metrics have been fully adopted by Restore America's Estuaries, and has been published as a public document by them. We published it, of course, in the peer reviewed literature, on our own.

Secondly, one of the toughest things to do, when you are trying to look at these restored sites with respect to the returns of functions and processes, as opposed to the structure of these sites, it is relatively easy to grow grass. I apologize to my friends in the Corps. But you are the guys that told me to keep it simple, stupid. We can defend 85 percent survival after three years in court, to a wetland ecologist that means absolutely nothing, other than you are pretty good at growing grass, which I guess is not bad. (**0001-14-7** [Weinstein, Michael])

Response: *Comment noted. The NRC staff will discuss PSEG's estuarine enhancement program in Section 2.4 of the EIS as part of the existing environment.*

Comment: I mention that we are able to employ new, really state of the art, modeling efforts, something called Echopath and Echosim, if any of you are familiar with it, to demonstrate, once again, that the increment of new production, one is measurable against background, and two, it is equated with the goals of the program. This is one of the most important projects with regard to coastal wetland management, and coastal management in general, that has ever been undertaken.

And I, personally, applaud the foresight of the company to do something like this, when it wasn't considered, at the time, best management practices. And whether it becomes best management practice, regulatory or law, or otherwise it clearly has been. (**0001-14-9** [Weinstein, Michael])

Response: *Comment noted. The NRC staff will discuss PSEG's estuarine enhancement program in Section 2.4 of the EIS as part of the existing environment.*

Comment: Construction of a new nuclear facility and access road, at this location, will result in the damage of wetlands, and adverse effects on a variety of aquatic life, bird life, and wild life. (**0001-19-3** [Blake, Matt])

Response: *The NRC staff will discuss impacts of the proposed project on aquatic and terrestrial wildlife, along with mitigation measures, as necessary, in Sections 4.3 and 5.3 of the EIS.*

Comment: The natural systems of the Delaware River and estuary are critical environments, with major significance for both regional and global biodiversity, for regional water supply, and water quality, and for supporting important environmental activities. Construction on the scale proposed by PSEG, on the Delaware coast, requires careful consideration of environmental factors. (**0001-4-1** [Velinsky, David])

Response: *The NRC staff will discuss cumulative impacts of the project, including potential impacts to the Delaware River and estuary, in Section 7.3 of the EIS.*

Comment: Before addressing the new construction, I would like to point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the vicinity. In particular, faced with concerns of negative impacts on fisheries, by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the world. The Estuary and Enhancement program began in 1994, and since that time has had large scale efforts to restore and preserve portions of the Delaware River estuary, in both New Jersey and Delaware. It has restored, enhanced and/or preserved more than 20,000 acres of salt marsh, and adjacent uplands to vital, healthy habitat for fish and wildlife. (**0001-4-3** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: The proposed new construction will permanently impact approximately 230 acres of wetlands. While protection of wetlands is a high national priority, the majority of the wetlands acreage impacted by the new construction, has a degraded hydro period that is now a host of mono culture of phragmites.

An invasive reed plant, phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites displaces native plants, and has a negative impact on biodiversity. Targeting these degraded wetlands in close proximity of the existing facilities, will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in green field sort of sites.

Moreover, the amount of wetlands impacted represent a small fraction of the total wetland, many with higher quality functions present in the vicinity of the construction.

In addition, 85 acres of the wetland being permanently altered by the construction are located in the Army Corps of Engineers disposal facility. This has been a site for dumping of spoils from deepening of the Delaware River channel. It is surrounded by dikes, and not open to tidal influences. It is unlikely that this site supports high level wetlands functions, and utilizing it, where the permanent construction is necessary, will limit overall wetland impacts.

PSEG is making acceptable efforts to restrict impact on these wetlands, including a site plan to minimize encroachment, the use of sediment pits to stage some of the construction operations, and the use of raised causeways, rather than using fill material to carry the access road to the new site.

Where permanent disturbance to wetlands occurs, PSEG has outlined a tentative mitigation plan that would create new wetland environments, in adequate amounts, to offset any loss. We anticipate that the resources and expertise in the development of the Estuary Enhancement

Program will provide a very strong foundation for the mitigation steps being taken by PSEG, and the new site construction, both in selecting the mitigation sites, and managing the restored and enhanced wetland sites. (**0001-4-5** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss potential ecological impacts of the proposed project, including causeway construction, in Sections 4.3 and 5.3 of the EIS. Any mitigation measures, proposed by the applicant, including any wetland enhancement efforts, will be discussed in Sections 4.3 and 5.3.*

Comment: You will hear that reactors are a threat to wildlife, but humans are among the species most sensitive to radioactivity, and their health has not been harmed. What will be an immeasurably small effect on wildlife from regulated releases, should be contrasted with the extensive damage to habitat, that would result from renewable installations, which you will hear about shortly. (**0001-5-5** [Meadow, Norman])

Response: *The NRC staff will evaluate the radiological impacts to wildlife from normal operation of the proposed reactor in Section 5.3 of the EIS. Potential effects on ecological receptors will be assessed based on appropriate exposure scenarios. Any mitigation measures, proposed by the applicant, to minimize this potential impact will also be discussed in the EIS in Section 5.3. Potential impacts to terrestrial resources resulting from the proposed project will be contrasted against implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: Whether the area is on land, or offshore, it is mind boggling to think of the potential harm, and humongous impacts of industrial wind. On land, particularly, the Appalachian Mountains of the East, the 396,000 acres, required, would destroy the mainly unfragmented, biologically rich forests, which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is, also, a major migratory corridor for birds, bats, and raptors. Yet without full review of environmental impacts, or cost to taxpayers and customers, permits are being granted. (**0001-7-8** [Eastman, Ajax])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: Whether the area is on land, or offshore, it is mind boggling to think of the potential harm, and humongous impacts of industrial wind. On land, particularly, the Appalachian Mountains of the East, the 396,000 acres, required, would destroy the mainly unfragmented, biologically rich forests, which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is, also, a major migratory corridor for birds, bats, and raptors. Yet without full review of environmental impacts, or cost to taxpayers and customers, permits are being granted.

As for the impacts offshore, we really can't know the full extent of the harm turbines will have on the aquatic resources, benthic organisms, oceanic mammals, or pelagic birds. Where is the precautionary principle in the blind acceptance of, and push for, such a destructive form of energy?

As for the impacts offshore, we really can't know the full extent of the harm turbines will have on the aquatic resources, benthic organisms, oceanic mammals, or pelagic birds. Where is the precautionary principle in the blind acceptance of, and push for, such a destructive form of energy? (**0001-7-9** [Eastman, Ajax])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: After reviewing the Estuary Enhancement Program, by PSEG, I'm impressed by their innovative mitigation measures, such as wetland restoration, phragmites control, fish protection at the nuclear sites, restoration of anadromous fish migration, through fish ladders, research, et cetera. These programs have resulted in long lasting benefits for the saltwater estuary, including expanded biological diversity and habitats, breeding areas, food sources for aquatic, terrestrial, and avian species, especially threatened and endangered species, and better water quality. This leads me to believe that PSEG will do an excellent job of mitigation in the future. (**0001-7-11** [Eastman, Ajax])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment. Mitigation measures proposed by the applicant to minimize impacts and enhance terrestrial resources will be discussed in Sections 4.3 and 5.3 of the EIS.*

Comment: And I was really pleased to hear that the proposed site for these new reactors will be on land that is primarily phragmites, right now. That is a good thing to get rid of. (**0001-7-13** [Eastman, Ajax])

Response: *Comment noted. The NRC staff will describe the existing wetlands that could be affected in Section 2.4 of the EIS. Staff will discuss impacts to wetland resources in Sections 4.3 and 5.3 of the EIS.*

Comment: The Environmental Report indicates an overall wetlands impact of about 229 acres, from the new plant, and proposed causeway. It is further indicated that there is an abundance of wetlands in the vicinity, totaling more than 25,000 acres, and the quality of a dominant species, as we heard previously, is phragmites.

Additional lands targeted for acquisition through a land right exchange to the north of the site, are part of an existing Army Corps of Engineers confined disposal facility area that is surrounded by dikes and not open to the tides.

PSEG would reduce environmental impacts by placing permanent facilities inside these diked areas. And compensation for use of these wetlands, we would recommend that PSEG create or restore degraded wetlands, within the Delaware Bay region, at an appropriate compensation ratio. (**0001-8-10** [Molzahn, Robert])

Response: *The NRC staff will discuss any mitigation measures proposed by the applicant, including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS. Potential off-site* *mitigation measures will also be fully discussed in the EIS in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: Although the existing PSEG nuclear complex is an ideal location for an additional unit, because all of the important conveyance systems are in place, and those will not have to be developed, such as they would if it was a greenfield site. New improvements, such as roadways, should be carefully placed and designed to minimize their impact on marshlands. An elevated road system would be a design that would help minimize these impacts. We encourage PSEG to pursue such a design, and develop a comprehensive wetlands mitigation and compensation plan for these impacts. (**0001-8-11** [Molzahn, Robert])

Response: *The NRC staff will discuss any mitigation proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent that they are deemed necessary, wetlands mitigation and plans for enhancement and compensation will be fully discussed.*

Comment: Particularly impressed, from an ecologist's standpoint, were the tremendous input and environmental plus that they took a 20,000 acre restoration program, instituted by PSEG, has provided in the environment. It is a real, it is internationally recognized as something of real value, and it certainly has made a major change in the ecosystem, in those areas where it has already been established, and we are very optimistic about the program continuing on into the future. (**0001-9-3** [Lacandro, Roger])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: And I know that one of the potential or likely environmental impacts has to do with wetlands, the proposed construction of this facility. I have to tell you that I'm very comfortable with PSEG dealing with the challenges of mitigating impacts on wetlands and, actually, their commitment to restoring wetlands. They have been involved with, perhaps, one of the largest estuarine restoration programs in the country, 20,000 acres of wetlands restored in Delaware Bay, the River, and the estuary, and it has led to increased production of fin fish and shell fish. So there are, like, wetland impacts. But I think the company is certainly up to the challenge of mitigating those. (**0002-4-2** [DeLuca, Mike])

Response: *Comment noted. The NRC staff will discuss potential wetland impacts resulting from the proposed project in Sections 4.3 and 5.3 of the EIS. Overall restoration, preservation and enhancement efforts will also be discussed as part of the existing environment in Section 2.4 of the EIS.*

Comment: The Estuary Enhancement Program has done a phenomenal job of creating substantial new areas of high quality wetland habitat, which very definitely has an impact on, in particular, juveniles of a wide variety of aquatic species, and nutrient flow, in the area. And it, really, is a phenomenal laboratory at this point for understanding the importance of, and the development of, those types of habitats. Most of those habitats were much less productive prior to the work that PSEG engaged in, having been really run over by exotic phragmites. That made them much less valuable as natural systems than they are today. (**0002-5-1** [Duvall, Brian])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: But you know something? The ducks are still flying, the water fowl are still doing well, and there are still muskrats. And I believe if there is going to be an additional plant, it is a great place to have it, the infrastructure is there. (**0002-8-5** [Campbell, Keith])

Response: *Comment noted. The NRC staff will describe the terrestrial ecology of the area, including wildlife resources, in Section 2.4 of the EIS.*

Comment: Construction of a new nuclear facility and access road at this location will result in the damage of wetlands and have adverse effects on a variety of aquatic life, bird life and wildlife. (**0003-3** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Response: *The NRC staff will discuss potential impacts to terrestrial resources and wetlands as a result of this project in Sections 4.3 and 5.3 of the EIS. Any mitigation measures proposed by the applicant, including any wetland enhancement efforts, will also be discussed in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will be fully discussed in the EIS in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: The Army Corps and PSEG must consider an alternative to the land swap, such as using the existing access road to Artificial Island instead of creating a second road, if and when a new nuclear facility is permitted. This would avoid destruction of wetlands and obviate the need for a new dredge disposal site. In our view, the existing access road should be sufficient and no additional destruction of wetlands should be permitted at the site. Issues associated with a new spoil disposal site are as yet unknown as the sites under consideration are unknown. But there are likely to be issues, considering the Anny Corps' preference for riverfront lands. (**0003-7** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Response: *The NRC staff will discuss potential impacts to wetlands as a result of this project in Sections 4.3 and 5.3 of the EIS. Any mitigation measures proposed by the applicant, including efforts to minimize wetland impacts, will also be discussed in Sections 4.3 and 5.3 of the EIS.*

Comment: To many environmental groups renewable energy is a preferable alternative to reactors. To those concerned with the conservation of biological diversity, however, the cumulative ecological impacts of large-scale renewable projects will be their most detrimental effect. We believe that concern for cumulative ecological impacts of the Alternatives, wind, solar, and biomass should be included in the final EIS as a reason for rejecting them as an alternative. (**0007-7** [Lewis, Kenneth])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: Much of the needed science for the ESP should be at hand since the new station is being sited adjacent to Hope Creek and Salem Creek generation stations; their track record appears to be good, the new site will share the same geology, use of in place dredge spoils constituting all soils of the area-thus, artificial Island. Natural resource impacts must be the same for all sites in this homogeneous environment. The 20,000 acre restoration program instituted by PS&G in the greater area has only provided added benefit to the recovery of nearby wetlands, an internationally recognized success. Plans appear to be in place to expand the restoration program to continue to benefit the area. (**0008-4** [Lacandro, Roger])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: During the re-permitting of the existing nuclear facilities at Salem, PSE&G developed a bay-wide concept of mitigating the impacts of the existing cooling apparatus at the facilities. They were creative in identifying a variety of ways that the bay-wide resource value could be improved through investment in projects throughout the Delaware Bay estuary. I was attracted by the scope of their thinking and the resources they could bring to the table. I testified in favor of this mitigation idea at the re-permitting hearings.

Since then I have followed, with my students and with great interest, what has become the largest Estuarine Enhancement project in the world. Without going into details, the project has been a resounding success at many levels in increasing the resource value of large acreages throughout the Bay. PSE&G has a solid track record in delivering on their commitment to baywide health. (**0010-4** [Applegate, Jim])

Response: *Comment noted. The NRC staff will discuss ecological impact mitigation, as proposed by the applicant, in Section 5.3 of the EIS. PSEG's estuarine enhancement program will be discussed in Section 2.4 of the EIS as part of the existing environment. The EIS will also include a discussion of the bay-wide approach undertaken by PSEG.*

Comment: Returning to the purpose of this hearing. Should this project move ahead toward construction, there will be on-site habitat impacts that will be unavoidable. I urge the process to embrace the same baywide approach used in the Estuarine Enhancement program, and to be creative and aggressive in identifying off site mitigation opportunities. (**0010-6** [Applegate, Jim])

Response: *The NRC staff will discuss any off-site mitigation measures as proposed by the applicant in Section 4.3 of the EIS. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: The Environmental Report indicates an overall wetlands impact of 229 acres from the new plant and proposed causeway. It is further indicated there is an abundance of wetlands in the vicinity totaling more than 25,000 acres and the quality of the dominant species is invasive Phragmites. Additional lands targeted for acquisition through a land right exchange to the north of the site are part of an existing Army Corps of Engineers Confined Disposal Facility area (CDF) that is surrounded by dikes and not open to tides. PSEG would reduce environmental impacts by placing permanent facilities inside these diked areas. In compensation for use of these wetlands we would recommend that PSEG create or restore degraded wetlands within the Delaware Bay region at an appropriate compensation ratio. This should be an achievable undertaking by PSEG as their Estuary Enhancement Program has been recognized nationally for restoring and protecting over 20,000 acres of wetlands and adjoining properties in the Delaware Estuary in both New Jersey and Delaware. (**0011-11** [Molzahn, Robert])

Response: *The NRC staff will discuss any mitigation as proposed by the applicant, including any wetland enhancement efforts, in Section 4.3 of the EIS. Potential off-site mitigation measures will be fully discussed, as necessary, in the EIS in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: Although the existing PSEG's existing nuclear complex is an ideal location for an additional unit because all of the important conveyance systems are in place and would not have to be developed and built as with a Greenfield site, new improvements such as roadways should be carefully placed and designed to minimize their impact on marshlands. An elevated road system would be a design that would help minimize these impacts. We encourage PSEG to pursue such a design and develop a comprehensive wetlands mitigation and compensation plan for these impacts. (**0011-13** [Molzahn, Robert])

Response: *The NRC staff will discuss any mitigation measures as proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent they are deemed necessary, wetlands mitigation and plans for enhancement and compensation will also be fully discussed.*

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement (EIS) in order to show that by comparison nuclear energy is a far preferable option. (**0012-4** [Eastman, Ajax])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: I am particularly interested in addressing the biological impacts of renewables, primarily wind. This technology has a huge impact on the biological world. In order to produce an equivalent amount energy, wind requires an enormous footprint. As pointed out in their Environmental Report, ... to replace the energy equivalent a 2200 MWe of nuclear capacity operating at 90 percent capacity factor, approximately 3300 2 MWe wind turbines operating at a capacity factor of 30 percent would be required. These turbines would be sited on 396,000 acres (619 square miles) and disturb 19,800 acres (31 square miles) to accommodate the physical footprint of the towers themselves. (I like the ESP's comparison of that amount of land to 15 times the area of Newark!) (**0012-8** [Eastman, Ajax])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: Whether that area is on land or offshore, it is mind boggling to think of potential harm and humongous impacts of industrial wind. On land, particularly in the Appalachian mountains of the east, the 396,000 acres required would destroy the mainly unfragmented, biologically rich forests which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is also a major migratory corridor for birds, bats, and raptors. Yet without full review of the environmental impacts or the costs to taxpayers and customers, permits are being granted. (**0012-9** [Eastman, Ajax])

Response: *The NRC staff will discuss potential impacts to terrestrial resources resulting from the proposed project in contrast to implementation of other energy alternatives in Chapter 9 of the EIS.*

Comment: After reviewing the Estuary Enhancement Program by PSEG, I am impressed by their innovative mitigation measures such as wetland restoration, phragmites control, fish protection at the reactor sites, restoration of anadromous fish migration through fish ladders, research, etc. These programs have resulted in long- lasting benefits for the saltwater estuary including, expanded biological diversity and habitats, breeding areas, food sources for aquatic, terrestrial, and avian species, especially threatened and endangered species, and better water quality. This leads me to believe that PSEG will do an excellent job of mitigation in the future. (**0012-13** [Eastman, Ajax])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: I have had the opportunity to observe PSE&Gs environmental policies and actions over twenty years, and their restoration and mitigation activities in support of the environment. I know of no company that has such a stellar environmental record, well beyond what has been required of them. Their environmental restoration activities are a model for other states and companies. I have read their Environmental Report, and given what I know about their past performance in habitat enhancement, I am confident that PSE&G will carry out their plans, and create much more habitat than is compromised by the new development. Further, the land that will be used for siting the new facility, is not currently natural high quality salt marsh or other habitat, but is already degraded, By in contrast, I have full confidence that the mitigation habitat will be a functioning, high quality habitat. I encourage the NRC to approve the Early Site Permit, and lend my support to PSE&G for its community-minded, and ecosystem-conscious approach to restoration and mitigation. (**0013-2** [Burger, Joanna])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: Much of the land that will be used for site construction of the new nuclear facility is degraded Phragmites wetlands, and as such, is not natural productive habitat. (**0013-3** [Burger, Joanna])

***Response:** Comment noted. The NRC staff will describe wetlands that could be affected in Section 2.4 of the EIS.*

Comment: Their mitigation efforts include identification of several candidate areas that may be selected for the development of a wetland mitigation plan for the restoration and enhancement in Elsinboro, and work with Mannington Marsh. Both of these habitats will be greatly improved by PSE&G's mitigation work, and the restored habitat will provide much higher quality habitat than is even possible with the planned construction site. The natural tidal flow in the planned restoration/mitigation habitat will lead to habitat with far greater wildlife use and ecosystem integrity. This part of the Delaware Bay ecosystem will be greatly aided by the restoration planned by PSE&G. (**0013-4** [Burger, Joanna])

***Response:** Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant for impacts to wetlands in Sections 4.3 and 5.3 of the EIS.*

Comment: The Environmental Plan they present is sound, well-thought out, and sufficiently developed to ensure that it can accomplished. The Environmental Report is extensive, comprehensive, and devotes considerable attention not only to the environmental, physical, and ecosystem issues, but to appropriate public involvement and monitoring. As an ecologist I have been impressed with their due diligence in addressing all the outstanding environmental issues, and going well beyond what is necessary in terms of mitigation and restoration of additional habitat. The State of New Jersey will be gaining considerable high quality habitat by these actions, in exchange for degraded, low quality Phragmites marsh that is on the current site (and that will be the site of the new nuclear facility). (**0013-5** [Burger, Joanna])

***Response:** Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant, including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will also be discussed, as necessary, in the EIS in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: The plans proposed by PSE&G can be viewed in light of their past mitigation and restoration activities. They have one of the largest and most successful mitigation projects in the country, where they controlled Phragmites to produce high quality salt marsh with attendant mudflats and intertidal habitat that is used by thousands of shorebirds and other species. Thus their Estuary Enhancement Program is one of the most successful in the country, has received a variety of state and national awards -and unlike many other such programs, it is sustainable. Thus, it is my professional opinion that they are capable of, and will, deliver on their environmental mitigation and restoration plans. The company has integrity and environmental vision to ensure that there is little environmental impact, and that their restoration and. mitigation plans will result in far more, high-quality habitat than is presently on site. (**0013-6** [Burger, Joanna])

***Response:** Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant for impacts to wetlands in Sections 4.3 and 5.3 of the EIS.*

Comment: Before addressing the new construction, I would point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the Salem vicinity. In particular, faced with concerns of negative impacts on fisheries by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the world. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced, and/or preserved more than 20,000 acres of salt marsh and adjacent uplands to vital, healthy habitat for fish and wildlife.

Restoration efforts have included the goal of replacing former salt hay farms and marshes dominated by invasive Phragmites australis with salt cord grass-dominated marsh. The Academy has studied many of these sites prior to restoration and visited a number afterwards. The Estuary Enhancement Program has been successful in restoring typical salt marsh conditions at the sites, with most sites meeting targets for reduction in Phragmites and establishment of salt cordgrass. Many of these and related studies have been published in various peer-reviewed scientific journals. (**0014-3** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss PSEG's restoration, preservation and enhancement efforts in Section 2.4 of the EIS as part of the existing environment.*

Comment: The proposed new construction will permanently impact approximately 229 acres of wetland. While protection of wetland is a high national priority (as demonstrated by Section 404 of the Clean Water Act), the majority of the wetland acreage impacted by the new construction has a degraded hydroperiod and now hosts a monoculture of Phragmites australis. An invasive reed grass, Phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites displaces native plants and has a negative impact on biodiversity.

Targeting these degraded wetlands in close proximity to existing PSEG facilities will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in "Greenfield" sites. Moreover, the amount of wetlands impacted represents a small fraction of the total wetland - many with higher quality functions - present in the vicinity of the construction.

In addition, 85 acres of the wetland being permanently altered by the construction are located in the U.S. Army Corps of Engineers Combined Disposal Facility (CDF.) This has been the site for dumping of dredge spoils from deepening of the Delaware River Channel. It is surrounded by dikes and is not open to tidal influences. It is unlikely that this site supports high level wetland functions and utilizing it where permanent construction is necessary will limit overall wetland impacts. (**0014-5** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will also be discussed Section 4.3 of the EIS. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: PSEG is making acceptable efforts to restrict impact on these wetlands, including a site plan to minimize encroachment, the use of sediments pits to stage some of the construction operations, and the use of a raised causeway rather than using fill material to carry the access road to the new site. Where permanent disturbance to wetland occurs, PSEG has outlined a mitigation plan that should create new wetland environments in adequate amounts to offset any loss. We anticipate that the resources and expertise developed in the EEP will provide a foundation for the mitigation steps being taken by PSEG in the new site construction, both in selecting the mitigation sites and in managing the restored and enhanced wetland sites. (**0014-7** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant, including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS.*

Comment: The basic restoration activities developed by the EEP, particularly controlling Phragmites and fostering development of good tidal marsh topography and hydrology, have advanced the field of ecological restoration. The ecological engineering technique of forming primary channels and using estuarine processes to further develop channels and topography is especially notable. As such, the Estuary Enhancement Program has provides an important model for marshland restoration which is an important component of PSEG's proposed mitigation plan. (**0014-9** [Velinsky, David])

Response: *Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant, including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will be discussed in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: Therefore, DRN urges NRC to review certain issues in more detail, including: clearer evaluation of PSEG's use of the Army Corps confined disposal facility, and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems. (**0018-3** [Brown, Elizabeth])

Response: *The NRC staff will discuss any mitigation measures as proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent they are included, wetlands mitigation and plans for enhancement and compensation will be fully discussed. This will include an evaluation of PSEG's use of the Army Corps of Engineers' confined disposal facility. The cumulative impacts on terrestrial and wetland ecosystems resulting from the use of that site will be discussed in Section 7.3 of the EIS.*

Comment: The ER also estimates that the Project will permanently disturb 126.6 acres of wetlands on the site. The EIS must make a full and fair evaluation of the impacts of this permanent loss of wetlands and habitat, and consider all viable alternatives to this loss. (**0018-11** [Brown, Elizabeth])

Response: *The NRC staff will discuss any mitigation measures as proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent they are necessary, wetlands mitigation and plans for enhancement and compensation will be fully discussed.*

Comment: The Division of Land Use Regulation has received the PSEG Early Site Permit (ESP) application and has determined that the project will require permits.

As proposed, the project will require a CAFRA Individual Permit, Coastal Wetlands Permit, Waterfront Development Permit and Freshwater Wetlands Individual Permit from the Division. These permits must be obtained prior to any construction activities on the site related to the project described above. The Division has issued a consistency determination for the project that was sent to PSE&G representatives on July 19, 2010. (**0019-22** [Brubaker, Scott])

Response: *Comment noted. The NRC staff will discuss permit and other regulatory requirements associated with the project in Chapter 1 and Appendix H of the EIS.*

Comment: Guidelines under Section 404(b)(1) of the federal Clean Water Act require that actions proposed within waters of the United States, especially those that are not water-dependent, are required to demonstrate that they have considered all appropriate reasonable and prudent measures to avoid and minimize impacts to waters. If all measures to avoid and minimize wetland impacts have been considered and employed to the extent practicable and result in unavoidable impacts, a compensatory mitigation plan should be developed and implemented.

The applicant should undertake a complete analysis of alternatives that complies fully with the Clean Water Act Section 404 (b)(1) Guidelines that documents avoidance, minimization and mitigation for all impacts. Alternate locations as well as a documentation of purpose and need should be provided as part of this analysis. For any unavoidable impacts, a compensatory mitigation plan to offset all of the projects impacts to aquatic resources including EFH should be developed in accordance with the federal standards and criteria for compensatory mitigation for losses of aquatic resources published in the Federal Register on April 10, 2008 (vol. 73 No. 70). This plan should be developed as early in the permit process as possible and in consultation with the applicable federal, state and local resource agencies and will be implemented on and in the immediate area of the PSEG Site to the extent practicable. (**0022-5** [Gorski, Stanley])

Response: *The NRC staff will discuss any mitigation measures as proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent they are necessary, wetlands mitigation and plans for enhancement and compensation will be fully discussed. Alternative locations will be discussed in Chapter 9 of the EIS.*

Comment: In the State of NJ, coastal wetlands are regulated by the state under the Wetlands Act of 1970. Development in coastal wetlands requires authorization of permits from the NJDEP, and requires separate processes to determine a project's value. However, such processes usually fit in within a federal process. (**0022-8** [Gorski, Stanley])

Response: *Comment noted. The NRC staff will discuss permit and other regulatory requirements associated with the project in Chapter 1 and Appendix H of the EIS.*

Comment: After reasonable measures have been explored to avoid and minimize impacts to wetlands, PSEG will compensate for unavoidable adverse impacts to wetlands by implementing approved wetland restoration and/or rehabilitation measures. PSEG, through their Ecosystem Enhancement Program, has extensive experience and demonstrated success implementing coastal saltmarsh and freshwater wetland restoration and rehabilitation programs. This familiarity with local wetland systems was used to identify appropriate candidate mitigation sites and will be used in developing and implementing the final approved mitigation plan.

Mitigation options mentioned in the NRC's ESP to offset the impacts to NOAA trust resources included the following considerations:

- Minimization of encroachment on coastal wetlands
- Use of previously developed sediment disposal basins for plant development (both PSEG's permitted disposal facility and the USACE's CDF)
- Refinement of the Site Utilization Plan to avoid various wetland areas throughout the PSEG Site

Opportunities for mitigating unavoidable impacts to wetland ecosystems include restoration of natural habitats temporarily disturbed by construction, creation of new habitat types in previously disturbed areas, and enhancement of undisturbed natural habitats.

In general, NMFS does not accept the conversion of one type of aquatic habitat into another habitat as compensatory mitigation when the existing habitat has value to aquatic life. Candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG Alloway Creek Watershed restoration site. (**0022-9** [Gorski, Stanley])

Response: *Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant, including any wetland enhancement efforts, in Sections 4.3 and 5.3 of the EIS. Potential off-site mitigation measures will also be discussed, as necessary, in the EIS in Section 4.3. A bay-wide approach will be similarly emphasized over a site-specific evaluation that can overlook the benefits of an overall ecosystem approach.*

Comment: Fish and Wildlife Coordination Act

Notwithstanding our mandates under the MSA, the NMFS also has responsibilities under the Fish and Wildlife Coordination Act (FWCA) to provide federal agencies such as the NRC with recommendations to avoid, minimize and to mitigate for direct, indirect and cumulative impacts to any and all NOAA trust resources that are present within the Delaware River Basin. (**0022-11** [Gorski, Stanley])

Response: *Comment noted. The NRC staff will discuss any mitigation measures as proposed by the applicant for ecological impacts in Sections 4.3 and 5.3 of the EIS. This will include a complete discussion of design measures to minimize such impacts. To the extent they are* *necessary, wetlands mitigation and plans for enhancement and compensation will be fully discussed. The cumulative impacts on terrestrial and wetland ecosystems resulting from this project will be discussed in the EIS in Section 7.3.*

Comment: Submerged aquatic vegetation (SAV) has historically been absent from Delaware Bay. However, to date, there has been no comprehensive mapping of SAV in the Delaware Estuary to verify its presence or absence. Several species have been observed though in the tidal river since 1970, including: Vallisneria americana, Myriophyllum spicatum, Elodea nuttallii, Najasflexillis, Potamogeton sp. and others (Schuyler, 1988). Wild celery (Vallisneria americana) has been documented in some areas of the Delaware River and its tributaries. SAV provides valuable nursery, forage and refuge habitat for a variety of fish including striped bass, American shad, alewife, and blueback herring. It is also an important food source for waterfowl. As water quality in the Delaware River continues to improve, more areas of SAV may be found within the River. (**0022-13** [Gorski, Stanley])

Response: *Comment noted. The NRC staff will describe the terrestrial ecology of the area, including wildlife resources, in Section 2.4 of the EIS.*

D.2.10 Comments Concerning Ecology—Aquatic

Comment: With the new facility a good thing is, if it is built, that it would have a closed loop cooling system, which would greatly reduce the amount of water needed to cool the facility. A closed loop cooling system reduces the water take, compared to an open loop system, by 90 to 95 percent. So however, an average nuclear facility draws in, an open loop system, like a billion gallons of water a day, over a billion. So even with the closed loop, you are still talking about 50 million to 100 million of gallons a day. So you would be adding to the amount of fish that are killed at that facility. So you must consider the existing damage that the present facility, Salem I and II causes, and adding even more damage. And Salem I and II draws in three billion gallons of water a day, every day. And it kills billions of fish. And the EPA has estimates on how much. And I have a paper I would like to submit as data. And they kill 350 million age one equivalent fish. In other words, fish that would have grown up to be a million, I mean, one year old. That is how they generally use their fish kill data; they call it age one equivalent fish. But, actually, the facility kills billions of fish, billions of smaller fish, which is the food chain for the bigger fish, and the whole ecosystem. So my concern here is that you want to build a new facility, but you are not stopping the existing damage caused by the present facility that is there, units I and II, which draw in three billion gallons of water, and have an open loop cooling system. So before you consider building a new facility you should stop the damage caused by the existing facility, first. I think that is a priority. But it seems like just build another one. But you still have an existing fish kill facility, there. And it kills all species, all ages. And it is destroying the fishing industry along the Delaware Bay and the Delaware River. We used to have a great fishing industry, and we don't now. Not when one facility draws in three billion gallons of water a day. And Salem says we fixed up some wetlands and that will compensate. It is really hard to believe that fixing up a few acres of wetlands will compensate for billions of fish killed, every year, year after year. So I feel that you should fix the first two, units Salem I and II, and then consider moving on. (**0002-6-10** [Schneider, Richard])

Response: *Potential effects of entrainment and impingement on fish populations will be discussed in Sec. 5.3.2. In addition, cumulative impacts of all facilities will be discussed in Chapter 7.*

Comment: Although the water volume withdrawn from the Delaware River by the closed cycle new plant is substantially lower, there will still be impingement and entrainment of aquatic life, as well as potentially significant thermal impacts from the closed-cycle cooling system. Maximum intake of the new plant is estimated in the ER to be equivalent to 3.7 percent of the intake flow of once-through cooling at the existing Salem facility. However, regarding thermal discharge, the new plant discharge is located within the region already influenced by the thermal discharges of the existing Salem and Hope Creek facilities. The impact of this situation on thermal plume must be fully and rigorously evaluated in the EIS, regardless of any applicable mixing zone. (**0018-16** [Brown, Elizabeth])

Response: *Thermal impacts and impacts to surface water as a result of plant operations will be discussed in Sections 5.2.2.1 and 5.2.4 of the EIS. Potential operational impacts to aquatic life, including entrainment and impingement, will be discussed in Section 5.3.2.*

Comment: During the re-permitting of the existing nuclear facilities at Salem, PSEG developed a bay-wide concept of mitigating the impacts of the existing cooler apparatus at those facilities. They were creative in identifying a variety of ways that the bay-wide resource value could be improved through investment in projects, throughout the Delaware Bay Estuary. I was attracted by the scope of their thinking, and the resources they could bring to the table. I testified in favor of this mitigation idea at the repermitting hearing. (**0001-10-5** [Applegate, Jim])

Comment: Since then I have followed, with my students, and with great interest, what has become the largest estuarine enhancement project in the world. Without going into any details, the project has been, in my mind, a resounding success at many levels, in increasing the resource value of large acreages throughout the bay. PSEG has a solid track record in delivering on their commitment to bay-wide health. (**0001-10-7** [Applegate, Jim])

Comment: Returning, finally, to the purpose of this hearing, should this project move forward with construction, there will be on-site habitat impacts that will be unavoidable. I urge the process to embrace the same bay-wide approach used in the estuarine enhancement program, and to be creative and aggressive, in identifying off-site mitigation opportunity. Hold PSEG's feet to the fire. History suggests that they will deliver. (**0001-10-9** [Applegate, Jim])

Comment: The company had the foresight, long before the Estuarine Restoration Act was passed, with the goal of restoring a million estuarine acres, including many wetlands, in the U.S. by the year 2010. Long before that Act was passed, and the guardian of that act became two entities, essentially, Restore America's Estuaries, a practitioner coalition nation-wide. Actually now world-wide. And the Community Restoration Center, NOAA Restoration Center, Community Based Restoration Center which has, I think, a collective budget, over the years, now exceeding 28 million dollars. Before that became in the public venue, and popular, restoring wetlands is a good thing, and we needed to know why, of course.

Long before that became the popular trend, the company PSEG had been developing this program as a cost-effective basis for offsetting the effects of the power plant, with respect to its take of fin fish and shellfish. And the goal was to produce enough wetland acreage, or to conserve and restore enough wetland acreage, to produce the number of equivalent adults that would be lost at the facility. (**0001-14-4** [Weinstein, Michael])

Comment: So let me close with a series of statistics, if I may. First of all, as Seagrant Director, I was able to enter into a public private partnership with the company. The company put up 750,000 dollars over five years, and we Seagrant Directors, in 11 states around the nation, matched those funds, to do some of the basic and applied research to understand what was going on, as we were restoring these sites. One of those projects funded a young lady by the name of Kristen Solenstal at Yale University. She was the first of many people trying, with that funding, to demonstrate that the variety of phragmites that we call bad is actually an introduced variety, probably from either Asia, or Europe, or probably both.

That was part of this Marsh Ecology Research Program, or the MERP, as we called it. All of these funds were parlayed into many federal grants. For example, I have been funded by the EPA, by NOAA, several agencies within NOAA, ANS, Solestol Kennedy, I have received NSF funding. All as part of the programmatic opportunity, at the Estuary Enhancement Program created for people interested in understanding how to do this restoration, how to make it effective, and why it actually works.

Two contributions, three contributions that will be the last I say. Three contributions that we made, that come immediately to mind is, as a group, the scientists involved in the Estuary Enhancement Program developed the practitioner skills, or methods, for restoring wetlands. What kinds of criteria and metrics should you be thinking about, when you go in to restore a site? Those metrics have been fully adopted by Restore America's Estuaries, and has been published as a public document by them. We published it, of course, in the peer reviewed literature, on our own.

Secondly, one of the toughest things to do, when you are trying to look at these restored sites with respect to the returns of functions and processes, as opposed to the structure of these sites, it is relatively easy to grow grass. I apologize to my friends in the Corps. But you are the guys that told me to keep it simple, stupid. We can defend 85 percent survival after three years in court, to a wetland ecologist that means absolutely nothing, other than you are pretty good at growing grass, which I guess is not bad. (**0001-14-8** [Weinstein, Michael])

Comment: I mention that we are able to employ new, really state of the art, modeling efforts, something called Echopath and Echosim, if any of you are familiar with it, to demonstrate, once again, that the increment of new production, one is measurable against background, and two, it is equated with the goals of the program. This is one of the most important projects with regard to coastal wetland management, and coastal management in general, that has ever been undertaken.

And I, personally, applaud the foresight of the company to do something like this, when it wasn't considered, at the time, best management practices. And whether it becomes best management practice, regulatory or law, or otherwise it clearly has been. (**0001-14-10** [Weinstein, Michael])

Response: *These comments provide general information in support of the application. They do not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. However, mitigation measures related to construction and operational impacts will be discussed in Sections 4.3.2 and 5.3.2, respectively.*

Comment: Construction of a new nuclear facility and access road, at this location, will result in the damage of wetlands, and adverse effects on a variety of aquatic life, bird life, and wild life. (**0001-19-4** [Blake, Matt])

Comment: With respect to restoration of wetlands, it has been common knowledge, for a long time, that wetlands support the production of most commercial and recreational fin fish and shellfish species, that we all enjoy eating, or capturing, or both. To the extent that you can find citations in the literature, Irand and Lacy, for example, that say 95 percent of all commercial and recreational species produced, marine species produced in the United States, require wetlands as essential habitats during their first year of life. (**0001-14-2** [Weinstein, Michael])

Comment: We have been able to demonstrate, given the extreme variability around any mean you calculate, in these sites, in terms of processes and functions, that the 20 plus thousand acres produced a new increment of secondary production of these fin fish and shellfish that exceeded the loss, again as I said before, of equivalent adults. Also we have been able to document, everybody says phragmites is bad, and we suspected for a long time that it had to do with habitat, and other functional processes.

Some of our research has now demonstrated that a fish growing up in a phragmites dominated marsh, whatever the combination of factors is, and I should say to you, much to the company's chagrin, I was able with my colleagues to demonstrate that carbon nitrogen nutrients from phragmites is, indeed, finding its way into this fish.

But the quality of the animal, the end of the growing season, falls short of the quality of an animal in a naturally cord grass dominated marsh. In other words, they can't put down the energy reserves, for migration and overwintering, if they grow up in a phragmites marsh. (**0001-14-5** [Weinstein, Michael])

Response: *Potential impacts as a result of construction and operation on wetlands and their associated aquatic life and wildlife will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: The natural systems of the Delaware River and estuary are critical environments, with major significance for both regional and global biodiversity, for regional water supply, and water quality, and for supporting important environmental activities. Construction on the scale proposed by PSEG, on the Delaware coast, requires careful consideration of environmental factors. (**0001-4-2** [Velinsky, David])

***Response:** Potential construction impacts on aquatic systems associated with the Delaware coasts (Delaware River, associated wetland systems) will be discussed in Section 4.3.2*

Comment: Before addressing the new construction, I would like to point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the vicinity. In particular, faced with concerns of negative impacts on fisheries, by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the world.

The Estuary and Enhancement program began in 1994, and since that time has had large scale efforts to restore and preserve portions of the Delaware River estuary, in both New Jersey and Delaware. It has restored, enhanced and/or preserved more than 20,000 acres of salt marsh, and adjacent uplands to vital, healthy habitat for fish and wildlife. (**0001-4-4** [Velinsky, David])

***Response:** This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on aquatic environments in the vicinity of the proposed site will be discussed in Sections 4.3.2 and 5.3.2*

Comment: In addition to the steps being taken to protect wetlands impacted by the construction, the aquatic impacts of the proposed facility will be limited by the use of a closed-cycle cooling system. Compared to the once through system, these cooling towers will divert much less water for cooling. Projected maximum diversion, for the new facility, is less than four percent, depending on the type of facility of the current use by Salem, and is less than .05 percent of the total volume of the Delaware flow. As a result, the impingement on fish population will be a small fraction of the current levels at the Salem station. (**0001-4-6** [Velinsky, David])

***Response:** This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Operational impacts such as impingement, however, will be discussed in Section 5.3.2*

Comment: After reviewing the Estuary Enhancement Program, by PSEG, I'm impressed by their innovative mitigation measures, such as wetland restoration, phragmites control, fish protection at the nuclear sites, restoration of anadromous fish migration, through fish ladders, research, et cetera. These programs have resulted in long lasting benefits for the saltwater estuary, including expanded biological diversity and habitats, breeding areas, food sources for aquatic, terrestrial, and avian species, especially threatened and endangered species, and better water quality. This leads me to believe that PSEG will do an excellent job of mitigation in the future. (**0001-7-12** [Eastman, Ajax])

***Response:** This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects will be addressed in Sections 4.3.2 and 5.3.2*

Comment: In reviewing the PSEG Early Site Permit application, and Environmental Report filed on May 25th, 2010, we noted that the new units intake and cooling systems will be designed to minimize the impact to the aquatic community, by utilizing cooling towers, and an intake system and design flows that conform to best available technology as required under Section 316B of the Clean Water Act. The cooling tower blow-down discharge should have little impact on the Delaware River, at this location, or significantly elevate river water temperatures. (**0001-8-7** [Molzahn, Robert])

Response: This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any potential operational impacts, however, related to the operation of the cooling system will be addressed in Section 5.3.2.

Comment: Much of the needed science, on the Early Site Permit should be, really, right at hand, since this is a contiguous site that is being proposed. Their track record has been good. I, personally, have observed the impingement and entrainment process, since I also teach fishery science, and fishery research, and have had an opportunity to testify as to the value, not only the impingement and entrainment process, but also the continued elevation of new technology, as it came on the scene. (**0001-9-3** [Lacandro, Roger])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any potential operational-related impacts such as entrainment and impingement, however, will be discussed in Section 5.3.2.*

Comment: A new plant will provide an excellent opportunity to incorporate new technology, hopefully to produce cleaner, safer energy, and especially if a cooling tower is incorporated into the new plans. I'm familiar with the impingement and entrainment, as I said. The much reduced need for water in a cooling tower process, you know, will reduce much of that impact, considerably. I know of no scientific study that proves that the present cooling processes, at Salem and Hope Creek has generated any impact on the estuary. It can be debated, it can be argued. But I have not seen a scientific study that really proves that fact. After reviewing the EPS [ESP] request, I find no reason to deny the requested permit. (**0001-9-5** [Lacandro, Roger])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any potential operational impacts, however, such as impingement and entrainment will be evaluated in Section 5.3.2.*

Comment: And I know that one of the potential or likely environmental impacts has to do with wetlands, the proposed construction of this facility. I have to tell you that I'm very comfortable with PSEG dealing with the challenges of mitigating impacts on wetlands and, actually, their commitment to restoring wetlands. They have been involved with, perhaps, one of the largest estuarine restoration programs in the country, 20,000 acres of wetlands restored in Delaware Bay, the River, and the estuary, and it has led to increased production of fin fish and shell fish. So there are, like, wetland impacts. But I think the company is certainly up to the challenge of mitigating those. (**0002-4-3** [DeLuca, Mike])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction effects on wetlands will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: The other potential impact area which is, again, well known with coastal development, and energy facilities, in particular, is that on fin fish and shell fish. And I do note that the application does call for construction of a cooling tower which is, you know, one of the ideal strategies for mitigating harm to fin fish and shell fish, particularly their eggs and larvae. There are, also, thermal impacts that are mitigated by this particular design component. (**0002-4-5** [DeLuca, Mike])

Response: This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any operational effects will be evaluated in Section 5.3.2.

Comment: I would just like to mention two areas of potential interest if, indeed, there is some broader consideration of mitigation strategies. And that is a lot of work has been underway in the Delaware estuary to restore two signature species, the oyster and sturgeon. Oysters are on the rebound. They have beset by disease, and overharvesting, for years. And today we actually enjoy a modest harvest. I don't believe the expansion of this proposed plant will endanger that critter. But, perhaps, there are some opportunities to enhance the restoration of that particular species. And, similarly, with sturgeon. South Jersey used to be the caviar capital of the world, at the turn of the last century. Sturgeon have been just listed as endangered by the federal government. There are efforts, under way, to study their habitat use, their habits, and their spawning grounds. And, again, I think this is fertile area to explore in terms of some broader restoration strategies that might be considered down the road. (**0002-4-6** [DeLuca, Mike])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative strategies, however, resulting from any construction and/or operational effects on aquatic resources will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: The Estuary Enhancement Program has done a phenomenal job of creating substantial new areas of high quality wetland habitat, which very definitely has an impact on, in particular, juveniles of a wide variety of aquatic species, and nutrient flow, in the area. And it, really, is a phenomenal laboratory at this point for understanding the importance of, and the development of, those types of habitats. Most of those habitats were much less productive prior to the work that PSEG engaged in, having been really run over by exotic phragmites. That made them much less valuable as natural systems than they are today. (**0002-5-2** [Duvall, Brian])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on aquatic resources will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: And the Salem PSEG, they have a nice new facility over there, they have a display on the environment, and they have a nice little window, outside. But to be truly environmentally concerned, you would go through and stop the fish kill caused by your facility. To be a responsible member of society, and to stop that damage at your existing facilities. And the moral code, and the principle we should all live by, is that if something is causing harm, it should be stopped. And if you look at it in that basic principle, then they should stop killing the fish at Salem I and II. It is destroying the fishing industry, so you are losing jobs. (**0002-6-13** [Schneider, Richard])

Response: *Any potential impacts on aquatic resources due to construction and/or operation of this facility will be discussed in EIS sections 4.3.2 and 5.3.2.*

Comment: And I spoke with some Nuclear Regulatory Commission people tonight. And I have a major concern, that when the Nuclear Regulatory Commission does an evaluation of an existing permit, or a new permit, the issue of water intake, for the cooling system, is left up to the state, as a state permit. I spoke with a gentleman from the Nuclear Regulatory Commission, and he says it is above his ability to change the rulings, that the EPA has made about this issue. But I feel that it should be part of the Nuclear Regulatory Commission's when they evaluate the water intake, for two reasons. Because NRC is a nuclear, is a federal agency. A federal agency applies to any issue that affects more than one state. The fish kill caused by these facilities affects more than one state, it affects the fishermen in Delaware, in Maryland, in Pennsylvania, in New Jersey, and all up and down the coast, where the fish would have gone, and traveled, and be caught by other people. So therefore the NRC needs to be involved with a federal ruling on it, and not be involved with the water permit. So I'm asking the NRC to talk to the people above them to pursue that. (**0002-6-18** [Schneider, Richard])

Response: *The NRC's regulatory authority includes providing for the adequate protection of public health and safety and the common defense and security, as defined by the Atomic Energy Act. The NRC does not possess authority to act with respect to an issue simply because it involves an interstate matter. Pursuant to NEPA, however, the NRC does examine the reasonably foreseeable environmental impacts attributable to a proposed licensing action regardless of state lines. Subsequently, any potential impacts on aquatic resources due to construction and/or operation of this facility will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: And then, also, the Federal Clean Water Act applies to the fish kill. In the 1970s the Federal Clean Water Act, said that you must use the best technology available to stop the fish kill. This facility, Salem I and II, is killing the fish. And they are not using the best available technology. So, therefore, the federal agency overseeing the nuclear plant, which is the NRC, needs to enforce that particular law. It is a federal law, the Clean Water Act. So, again, I ask the NRC to pursue having open or closed loop systems. (**0002-6-20** [Schneider, Richard])

Response: *Any operational impacts due to the cooling water system will be discussed in EIS Section 5.3.2.*

Comment: Construction of a new nuclear facility and access road at this location will result in the damage of wetlands and have adverse effects on a variety of aquatic life, bird life and wildlife. (**0003-4** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Response: *Any potential effects of construction activities on aquatic resources will be discussed in EIS Section 4.3.2.*

Comment: A new plant will provide an excellent opportunity to incorporate new technology, hopefully, to produce cleaner, safer energy especially if a cooling tower is incorporated to significantly reduce bay water usage, impingement and entrainment of aquatic biota and the impact of large quantities of elevated temperature water reentering the estuary. [I know of no scientific study that proves that the present cooling process at Salem has had a negative impact on the estuary.] (**0008-6** [Lacandro, Roger])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Potential impacts of the cooling water system including entrainment, impingement, and thermal discharges on aquatic resources, however, will be discussed in Section 5.3.2.*

Comment: During the re-permitting of the existing nuclear facilities at Salem, PSE&G developed a bay-wide concept of mitigating the impacts of the existing cooling apparatus at the facilities. They were creative in identifying a variety of ways that the bay-wide resource value could be improved through investment in projects throughout the Delaware Bay estuary. I was attracted by the scope of their thinking and the resources they could bring to the table. I testified in favor of this mitigation idea at the re-permitting hearings.

Since then I have followed, with my students and with great interest, what has become the largest Estuarine Enhancement project in the world. Without going into details, the project has been a resounding success at many levels in increasing the resource value of large acreages throughout the Bay. PSE&G has a solid track record in delivering on their commitment to baywide health. (**0010-5** [Applegate, Jim])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on aquatic resources will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: Returning to the purpose of this hearing. Should this project move ahead toward construction, there will be on-site habitat impacts that will be unavoidable. I urge the process to embrace the same baywide approach used in the Estuarine Enhancement program, and to be creative and aggressive in identifying off site mitigation opportunities. (**0010-7** [Applegate, Jim])

Response: *Any potential impacts on aquatic resources due to construction will be addressed in EIS Section 4.3.2. Mitigative actions relative to the estuarine enhancement program will also be discussed in Section 4.3.2.*

Comment: In reviewing the PSEG ESP Application and Environmental Report filed on May 25, 2010, we noted that the new units intake and cooling systems will be designed to minimize the impact to the aquatic community by utilizing cooling towers and an intake system and design flows that conform to Best Available Technology as required by Section 316(b) of the Clean Water Act. The cooling tower blowdown discharge should have little effect on the Delaware River at this location or significantly elevate river water temperatures. (**0011-9** [Molzahn, Robert])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Potential effects of the cooling water system on aquatic resources, however, will be evaluated in Section 5.3.2.*

Comment: The Environmental Report indicates an overall wetlands impact of 229 acres from the new plant and proposed causeway. It is further indicated there is an abundance of wetlands in the vicinity totaling more than 25,000 acres and the quality of the dominant species is invasive Phragmites. Additional lands targeted for acquisition through a land right exchange to the north of the site are part of an existing Army Corps of Engineers Confined Disposal Facility area (CDF) that is surrounded by dikes and not open to tides. PSEG would reduce environmental impacts by placing permanent facilities inside these diked areas. In compensation for use of these wetlands we would recommend that PSEG create or restore degraded wetlands within the Delaware Bay region at an appropriate compensation ratio. This should be an achievable undertaking by PSEG as their Estuary Enhancement Program has been recognized nationally for restoring and protecting over 20,000 acres of wetlands and adjoining properties in the Delaware Estuary in both New Jersey and Delaware. (**0011-12** [Molzahn, Robert])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on wetlands and aquatic resources will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement (EIS) in order to show that by comparison nuclear energy is a far preferable option. (**0012-2** [Eastman, Ajax])

Response: *Cumulative ecological impacts and alternative energy sources will be discussed in EIS Chapters 7 and 9, respectively.*

Comment: After reviewing the Estuary Enhancement Program by PSEG, I am impressed by their innovative mitigation measures such as wetland restoration, phragmites control, fish protection at the reactor sites, restoration of anadromous fish migration through fish ladders, research, etc. These programs have resulted in long- lasting benefits for the saltwater estuary including, expanded biological diversity and habitats, breeding areas, food sources for aquatic, terrestrial, and avian species, especially threatened and endangered species, and better water quality. This leads me to believe that PSEG will do an excellent job of mitigation in the future. (**0012-14** [Eastman, Ajax])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on wetlands and aquatic resources will be evaluated in Sections 4.3.2 and 5.3.2.*

Comment: Before addressing the new construction, I would point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the Salem vicinity. In particular, faced with concerns of negative impacts on fisheries by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the world. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced, and/or preserved more than 20,000 acres of salt marsh and adjacent uplands to vital, healthy habitat for fish and wildlife.

Restoration efforts have included the goal of replacing former salt hay farms and marshes dominated by invasive Phragmites australis with salt cord grass-dominated marsh. The Academy has studied many of these sites prior to restoration and visited a number afterwards. The Estuary Enhancement Program has been successful in restoring typical salt marsh conditions at the sites, with most sites meeting targets for reduction in Phragmites and establishment of salt cordgrass. Many of these and related studies have been published in various peer-reviewed scientific journals. (**0014-4** [Velinsky, David])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative and restoration actions, however, resulting from any construction and/or operational effects on wetlands and aquatic resources will be evaluated in Sections 4.3.2 and 5.3.2.*

Comment: In looking at the proposed new construction on the PSEG Site, I will be speaking primarily to specific projected ecological impacts on local aquatic systems. The natural systems of Delaware River and Estuary are critical environments with major significance for both regional and global biodiversity, for regional water supply and water quality, and for supporting important economic activities. Construction on the scale proposed by PSEG on the Delaware coast requires careful consideration of environmental factors. (**0014-2** [Velinsky, David])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any effects of construction, however, on aquatic resources of the Delaware Bay ecosystem will be evaluated in Section 4.3.2.*

Comment: Before addressing the new construction, I would point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the Salem vicinity. In particular, faced with concerns of negative impacts on fisheries by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the world. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced, and/or preserved more than 20,000 acres of salt marsh and adjacent uplands to vital, healthy habitat for fish and wildlife.

Restoration efforts have included the goal of replacing former salt hay farms and marshes dominated by invasive Phragmites australis with salt cord grass-dominated marsh. The Academy has studied many of these sites prior to restoration and visited a number afterwards. The Estuary Enhancement Program has been successful in restoring typical salt marsh conditions at the sites, with most sites meeting targets for reduction in Phragmites and establishment of salt cordgrass. Many of these and related studies have been published in various peer-reviewed scientific journals. (**0014-4** [Velinsky, David])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on the aquatic resources of wetland ecosystems will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: The proposed new construction will permanently impact approximately 229 acres of wetland. While protection of wetland is a high national priority (as demonstrated by Section 404 of the Clean Water Act), the majority of the wetland acreage impacted by the new construction has a degraded hydroperiod and now hosts a monoculture of Phragmites australis. An invasive reed grass, Phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites displaces native plants and has a negative impact on biodiversity. Targeting these degraded wetlands in close proximity to existing PSEG facilities will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in "Greenfield" sites. Moreover, the amount of wetlands impacted represents a small fraction of the total wetland - many with higher quality functions - present in the vicinity of the construction.

In addition, 85 acres of the wetland being permanently altered by the construction are located in the U.S. Army Corps of Engineers Combined Disposal Facility (CDF.) This has been the site for dumping of dredge spoils from deepening of the Delaware River Channel. It is surrounded by dikes and is not open to tidal influences. It is unlikely that this site supports high level wetland functions and utilizing it where permanent construction is necessary will limit overall wetland impacts. (**0014-6** [Velinsky, David])

Response: *Impacts as a result of construction including potential impacts to wetlands will be discussed in Section 4.3. of the EIS. Mitigative actions, proposed by the applicant, as a result from any construction effects on aquatic resources will be addressed in Section 4.3.2. In addition, the U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions* *proposed by the Corps to facilitate PSEG's ESP application, including the land exchange and relocation of the confined disposal facility, will be discussed in EIS.*

Comment: PSEG is making acceptable efforts to restrict impact on these wetlands, including a site plan to minimize encroachment, the use of sediments pits to stage some of the construction operations, and the use of a raised causeway rather than using fill material to carry the access road to the new site. Where permanent disturbance to wetland occurs, PSEG has outlined a mitigation plan that should create new wetland environments in adequate amounts to offset any loss. We anticipate that the resources and expertise developed in the EEP will provide a foundation for the mitigation steps being taken by PSEG in the new site construction, both in selecting the mitigation sites and in managing the restored and enhanced wetland sites. (**0014-8** [Velinsky, David])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction effects on wetlands will be evaluated in Section 4.3.2.*

Comment: The basic restoration activities developed by the EEP, particularly controlling Phragmites and fostering development of good tidal marsh topography and hydrology, have advanced the field of ecological restoration. The ecological engineering technique of forming primary channels and using estuarine processes to further develop channels and topography is especially notable. As such, the Estuary Enhancement Program has provides an important model for marshland restoration which is an important component of PSEG's proposed mitigation plan. (**0014-10** [Velinsky, David])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Mitigative actions, however, resulting from any construction and/or operational effects on wetlands and tidal marshes will be discussed in Sections 4.3.2 and 5.3.2.*

Comment: Therefore, DRN urges NRC to review certain issues in more detail, including: clearer evaluation of PSEG's use of the Army Corps confined disposal facility, and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems. (**0018-4** [Brown, Elizabeth])

Response: *The U.S. Army Corps of Engineers-Philadelphia District is a Cooperating Agency on the EIS for PSEG's ESP application. As such, the environmental impacts of any actions proposed by the Corps to facilitate PSEG's ESP application, including the land exchange and relocation of the confined disposal facility, will be discussed in EIS. Potential cumulative impacts as a result of the proposed project will be evaluated in Chapter 7.*

Comment: Impacts to habitat and important aquatic species must also be rigorously evaluated in the EIS. In particular, DRN is concerned with the impact of the Project on Atlantic sturgeon.

The ER acknowledges that appropriate habitat for juvenile Atlantic sturgeon exists in the project area, that direct impacts to Atlantic sturgeon could include exposure to fine sediments, or collisions with propellers or water borne equipment, and that "dredging activities will likely displace this and other fish from the immediate dredge zone."

Since the preparation of the ER, NOAA's National Marine Fisheries Service (NMFS) issued a proposed rule (October 6, 2010) to list five distinct population segments (DPS) of the Atlantic sturgeon as threatened or endangered under the Endangered Species Act (ESA). In recognition of the many threats to riverine habitat, including dredging, filling, and degraded water quality, facing Atlantic sturgeon in the Hudson and Delaware Rivers, NMFS proposed to list a DPS consisting of these populations, the New York Bight (NYB) DPS, as endangered. See, 75 Fed. Reg. 61,872 at 61,881(Oct. 6, 2010). We also note with alarm that the Delaware River population of Atlantic sturgeon is more precariously poised than the Hudson River population, according to research on the record. According to the Delaware River State of the Basin Report, 2008, which is based on science collected in the region, the status of the Atlantic Sturgeon is considered "poor and getting worse" with numbers "estimated to be less than 1,000 and probably less than 100 across the Estuary." Furthermore, there is scientific evidence that the Delaware River is home to a genetically unique population of Atlantic Sturgeon, and that this small but distinct population is currently reproducing. That the Delaware River population is not only genetically unique but also may have a population of fewer than 100 fish makes protection of this portion of the NYB DPS a critical priority.

This change in status means that a critical piece of information is missing from the ER, and must be evaluated fresh in NRC's creation of the EIS. (**0018-13** [Brown, Elizabeth])

Response: *Potential impacts of construction and operation of the proposed facility as they relate to threatened or endangered species such as the Atlantic sturgeon will be evaluated in Sections 4.3.2 and 5.3.2.*

Comment: Although the water volume withdrawn from the Delaware River by the closed cycle new plant is substantially lower, there will still be impingement and entrainment of aquatic life, as well as potentially significant thermal impacts from the closed-cycle cooling system. Maximum intake of the new plant is estimated in the ER to be equivalent to 3.7 percent of the intake flow of once-through cooling at the existing Salem facility. However, regarding thermal discharge, the new plant discharge is located within the region already influenced by the thermal discharges of the existing Salem and Hope Creek facilities. The impact of this situation on thermal plume must be fully and rigorously evaluated in the EIS, regardless of any applicable mixing zone. (**0018-17** [Brown, Elizabeth])

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts of the proposed facility will be limited by the use of a closed cycle cooling system. Compared to a once-through system, these cooling towers will divert much less water for cooling. Projected maximum diversion for the new facility is less than 4% of the current amount used by the Salem Generating Station and is a very small fraction the total volume of the Delaware River flow. As a result, impingement of fish populations will be a small fraction--less than 3% of the current level of the Salem station.

Because of the closed cooling system, we would also expect the thermal plume of the new plant to be localized and relatively small, with no significant impact on the local aquatic biota. The conclusion is based on past studies of the impact of thermal plumes from the existing PSEG generating plants, the expected operation of the proposed cooling structures, and our understanding of the ecology of aquatic species in the vicinity of the plant. (**0014-12** [Velinsky, David])

Response: *Potential impacts related to entrainment, impingement, and thermal discharges of the proposed facility on aquatic resources will be discussed in Section 5.3.2 of the EIS. Also, potential cumulative impacts due to operation of the closed-cycle cooling system will be addressed in Chapter 7.*

Comment: Clearly, the EIS will need to address the impact of dredging and related shoreline disturbance and take all viable alternatives into account. (**0018-21** [Brown, Elizabeth])

Response: *Potential impacts of construction activities such as dredging and shoreline disturbances will be evaluated in Section 4.3.2 of the EIS. In addition, alternatives will be discussed in Chapter 9.*

Comment: The New Jersey Division of Fish & Wildlife (DFW) continues to be concerned with the issue of impingement and entrainment of the eggs, larval forms, juveniles and adults of the fish, shellfish and other invertebrate species which exist in the Delaware River Estuary. Six species of invertebrates occurring near the PSEG Site have been harvested commercially in NJ to include -blue crab, eastern oyster and other shellfish.

Environmental Report, CHAPTER 6, ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS, 6.5.3.2 Aquatic Ecology -includes proposals for monitoring programs to include impingement sampling and entrainment sampling at the new intake for fish and shellfish species.

At present the 1995 -2009 BIOLOGICAL MONITORING PROGRAM ANNUAL REPORT; include data on finfish and blue crabs. The DFW feels that data on shellfish should be included in this report and in the pre-application, construction, pre-operational and operational monitoring.

The possible additional withdrawal of 78,196 gpm from the Delaware River for the CWS and SWS only adds to the existing concerns the DFW has for the impingement and entrainment of the eggs, larval forms, juveniles and adults of the fish, shellfish and other invertebrate species which exist in the Delaware River Estuary. (**0019-23** [Brubaker, Scott])

Response: *Potential operational impacts such as entrainment and impingement on aquatic organisms will be discussed in Section 5.3.2 and the potential cumulative effects of all facilities operating at the Salem-Hope Creek site will be evaluated in Chapter 7.*

Comment: General Comments

The permittee included various estimates of projected impingement and entrainment values for the proposed system. Impingement and entrainment can be assessed by a wide variety of tools and it is not possible to comment on the accuracy of these estimates without understanding more regarding the underlying assumptions. However, as noted above, the Department supports the use of closed cycle cooling as best technology available to minimize water withdrawal rates.

The Department recognizes that the proposed closed cycle cooling system using cooling towers and a low intake velocity of less than 0.5 feet per second constitutes the best technology available for minimizing impingement and entrainment impacts under Section 3l6(b) of the Clean Water Act. (**0019-25** [Brubaker, Scott])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any potential impacts, however, related to entrainment and impingement will be discussed in Section 5.3.2.*

Comment: B - The ESPA includes only a cursory and simplistic evaluation of the potential impacts to the aquatic ecosystem (water quality, biota, wetlands, etc.) that could result from the construction and operation of the proposed project (Chapter 3 of the Environmental Report). Likewise, measures to mitigate such impacts are described in only a general manner. In general, the detailed evaluation of potential impacts is relegated to future permit and other approval actions. (**0020-3** [Brubaker, Scott])

Response: *Potential impacts on aquatic ecosystems due to construction and/or operation of the proposed facility and mitigation of such potential impacts will be discussed in Sections 4.3.2 and 5.3.2 of the EIS.*

Comment: (8) ER Section 4.1.2.2, page 4.1-7: indicates that dredged material from the USACE Artificial Island CDF and from dredging activities associated with the intake and barge facility areas would be used as fill material on-site.

At a May 9, 2010 meeting with the NJDEP, PSEG representatives indicated that dredging of ~975,000 cubic yards of sediments from the Delaware River would be needed to support the project - this has apparently been reduced to ~ 590,000 CY (see Comment #9). All dredging and dredged material management activities associated with the construction of the proposed project must be described and comprehensively evaluated. This would include testing of dredged material consistent with the requirements of the 1997 NJDEP Dredging Technical Manual. The documents submitted in support of the ESPA barely discuss dredging and dredged material aspects of the proposed project. Section 2.3.1 of the Environmental Report only briefly summarizes some Delaware River sediment samples collected in the vicinity of the project site and subjected only to grain size analyses.

Dredging and dredged material management activities will also require a variety of permits from the NJDEP, including a CZM Consistency Determination. The use of any dredged material as on-site fill - including material excavated from the USACE Artificial Island Upland CDF - will require an Acceptable Use Determination from the Department.

At the May 9, 2010 meeting, it was also stated that construction of a new dredged material upland CDF on the PSEG property may be needed. If still needed, the potential impacts of the construction and use of such a facility must also be comprehensively evaluated and approved by the Department, consistent with the requirements specified in the 1997 NJDEP Dredging Technical Manual. (**0020-9** [Brubaker, Scott])

Response: *Any potential impacts of construction activities such as effects of dredging on aquatic resources will be discussed in Section 4.3.2.*

Comment: (9) ER, Section 4.2.1.1.4, page 4.2-5: briefly describes construction and dredging activities along the Delaware River shoreline. A total area of 92 acres - approximately 590,000 CY of sediment - is proposed to be dredged. The document concludes that impacts associated with dredging are small. However, much more work is needed to comprehensively evaluate the potential impacts resulting from dredging and dredged material management activities - see Comment #8. (**0020-12** [Brubaker, Scott])

Response: *Any potential impacts on aquatic ecosystems resulting from construction activities such as dredging will be discussed in Section 4.3.2.*

Comment: (10) ER, Section 4.2.3.1, page 4.2-13, para #2: states that "Based on the findings of the USACE's Delaware River main channel deepening project Environmental Assessment, dredging is not expected to result in degradation of water quality." The evaluation of potential impacts presented in the referenced Environmental Assessment are of little relevance to the evaluation of the potential impacts of dredging and dredged material management activities associated with the proposed PSEG project. (**0020-14** [Brubaker, Scott])

Comment: (12) ER, Section 4.3.2.3, page 4.3-19, para. #3: see Comment #9. The ~590,000 CY of sediments to be dredged have not been tested/evaluated, nor has a disposal site been selected. (**0020-17** [Brubaker, Scott])

Response: *Any potential impacts of construction activities such as dredging on aquatic resources will be discussed in Section 4.3.2.*

Comment: (13) ER, Section 4.3.2.3, page 4.3-19, para. #3: concludes that impacts associated with dredging activities are small; see Comment #9. (**0020-19** [Brubaker, Scott])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any construction impacts, however, on ecological resources will be discussed in Section 4.3.2.*

Comment: (13) ER, Section 4.3.2.3, page 4.3-19, para. #3: concludes that impacts associated with dredging activities are small; see Comment #9. (**0020-19** [Brubaker, Scott])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any impacts associated with dredging, however, on aquatic resources will be discussed in Section 4.3.2*

Comment: (14) ER, Section 4.3.2.5, page 4.3-21, paras. #1 and #2: briefly discuss potential impacts to a variety of fish, including T/E species that could result from construction of the proposed project - particularly as a result of dredging activities. The ER must also consider the various dredging windows that have been established in the Delaware River and Estuary when evaluating potential project impacts. (**0020-21** [Brubaker, Scott])

Response: *Potential effects of dredging activities on fish populations in the Delaware River and estuary will be discussed in Section 4.3.2.*

Comment: (15) ER, Table 4.6-1: regarding potential measures to mitigate potential water quality and aquatic ecosystem impacts resulting from dredging and dredged material management activities - see Comments #9 and #14. (**0020-23** [Brubaker, Scott])

Response: *Measures to mitigate potential aquatic ecosystem impacts resulting from dredging and dredged material management activities will be discussed in Section 4.3.*

Comment: (17) Section 5.1.1.1, page 5.1-1, para. #2: briefly discusses dredging activities that may be needed during operation of the proposed facility, and concludes that - since the dredged material will be disposed of in approved upland areas - any resulting impacts will be small. See Comments #8 and #9. [Also see Sections 5.2.1.2 and 10.5.2.1] (**0020-26** [Brubaker, Scott])

Response: *This comment provides general information in support of the application. It does not provide any specific information related to the environmental effects of the proposed action and will not be evaluated in the EIS. Any impacts due to construction activities such as dredging on aquatic resources will be evaluated, however, in Section 4.3.2.*

Comment: Impacts to the quality of surface waters and the alteration of river bottom sediments within the Delaware River and adjacent marsh creeks are expected as a result of the construction and operation of the proposed facility, and will include those associated with the development of shoreline features (intake structure, barge facility, heavy haul road), dredging of sediments from the near-shore area of the Delaware River to provide for water intake and discharge and to provide adequate draft for barge access during construction, and the filling of 9.5 acres of coastal tidal wetlands and shallow open water areas. (**0022-2** [Gorski, Stanley])

Response: *Potential impacts due to construction and operation of the proposed facility on aquatic ecosystems will be discussed in Sections 5.3.2 and 4.3.2.*

Comment: Increases in turbidity through the resuspension of sediments into the water column from dredging and port operations will degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Sedimentation and wave patterns in the area may be altered as a result of vessels entering and exiting the proposed mooring area also resulting in increased turbidity. Suspended sediments mask pheromones used by migratory fishes, and can smother immobile benthic organisms and demersal newly- settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). As supported above, the project area provides important habitat for striped bass including valuable spawning grounds and nursery habitat. Increases in turbidity will adversely affect striped bass larvae's ability to capture prey (Fay et al. 1983 in Able and Fahay 1998). The decrease in water circulation can also adversely affect striped bass survival as strong current is needed to keep the eggs suspended in the water column and prevent them from being smothered by silt (Bigelow and Schroeder 1953). (**0022-4** [Gorski, Stanley])

Response: *Any potential effects of dredging activities such as increases in turbidity and alteration of water circulation on fish and benthic organisms will be discussed in Section 4.3.2.*

Comment: Guidelines under Section 404(b)(1) of the federal Clean Water Act require that actions proposed within waters of the United States, especially those that are not water-dependent, are required to demonstrate that they have considered all appropriate reasonable and prudent measures to avoid and minimize impacts to waters. If all measures to avoid and minimize wetland impacts have been considered and employed to the extent practicable and result in unavoidable impacts, a compensatory mitigation plan should be developed and implemented.

The applicant should undertake a complete analysis of alternatives that complies fully with the Clean Water Act Section 404 (b)(1) Guidelines that documents avoidance, minimization and mitigation for all impacts. Alternate locations as well as a documentation of purpose and need should be provided as part of this analysis. For any unavoidable impacts, a compensatory mitigation plan to offset all of the projects impacts to aquatic resources including EFH should be developed in accordance with the federal standards and criteria for compensatory mitigation for losses of aquatic resources published in the Federal Register on April 10, 2008 (vol. 73 No. 70). This plan should be developed as early in the permit process as possible and in consultation with the applicable federal, state and local resource agencies and will be implemented on and in the immediate area of the PSEG Site to the extent practicable. (**0022-6** [Gorski, Stanley])

Response: *Potential impacts on aquatic ecosystems, including wetlands, due to construction and/or operation of the proposed facility and mitigation of such potential impacts will be discussed in Sections 4.3.2 and 5.3.2 of the EIS. In addition, alternative energies will be discussed in Chapter 9.*

Comment: Able, K.W. and M.P. Fahay. 1998. The first year in the life of estuarine fishes in the Middle Atlantic Bight. Rutgers University Press, New Brunswick, New Jersey. 342 pp.

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Bigelow, H.B. and Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish and Wild. Servo Fish. Bull. 74 :1-517.

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Fahey, M.P. , P.L. Berrien, D.L. Johnson and W. W. Morse. 1999. Essential Fish Habitat Source Document: Bluefish, Pomatomus saltatrix life history and habitat characteristics. U.S. Dep. Commer., ~NOAA Technical Memorandum NMFS-NE-144. /

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Hastings, R.W., J.C. O'Herron, K. Schick and M.A. Lazzari. 1987. Occurrence and distribution of shortnose sturgeon, Acipenser brevirostrum, in the upper tidal Delaware River. Estuaries 10(4):337-34l.

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Newcombe, C.P. and D.D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems. North American Journal of Fisheries Management. 11: 72-82.

O'Herron. J.C., K.W. Able and R.W. Hastings. 1993. Movements of shortnose sturgeon in the Delaware River. Estuaries 16(2):235-240.

Ryder, J.A. 1888. The sturgeon and sturgeon industries of the Eastern U.S., with and account of experiments bearing on sturgeon culture. Bulletin of the U.S. Fisheries Commission. 1888. p.231-281.

Schuyler, A.E. 1988. Submergent and planmergent flora of the freshwater portion of the Delaware Estuary. Chapter 10. In: S.K. Majumdar, E.W. Miller and L.E. Sage (Eds.), Ecology and Restoration of the Delaware River Basin. PA. Academy of Science, Easton, PA.
(**0022-15** [Gorski, Stanley])

Response: *The comment is noted. The NRC staff will consider the scientific studies referenced in the comment as part of the environmental review.*

Comment: Endangered and Threatened Species

The Atlantic sturgeon (Acipenser oxyrinchus) may be found in the Delaware River in the vicinity of the project area at certain times of the year. On October 6, 2010, NOAA issued a Federal Register Notice (75 FRN 61872). The notice identifies the Hudson River and Delaware River Atlantic sturgeon stocks as a distinct population segment (DPS) called the New York Bight DPS. This DPS has been proposed to be listed as endangered. The Atlantic Sturgeon Status Review Team (ASSRT) identified 15 different stressors that may impact the Atlantic sturgeon populations including poor water quality and habitat loss (2007). Dredging and vessel strikes are also considered to be important stressors on the populations of Atlantic sturgeon (75 FRN 61872 et seq.) According to the ASSRT (2007), Ryder (1888) suggested that juvenile Atlantic sturgeon used the tidal freshwater reach of the Delaware River as a nursery area and Lazzari et al. (1986) frequently captured juvenile Atlantic sturgeon from May -December in the upper tidal portion of the river below Trenton, New Jersey.

Shortnose sturgeon (Acipenser brevirostrum) typically occurs in deep water channels although they do occur in the shallower waters while foraging. The abundance of adult shortnose sturgeon is greatest in the tidal river from Trenton to Philadelphia (Hastings et al. 1987; O'Herron et al. 1993). In-water construction activities can affect shortnose and Atlantic sturgeon through direct injury or mortality, displacing species from the area, or by altering the habitat and destroying forage items.

Shortnose sturgeon (Acipenser brevirostrum) typically occurs in deep water channels although they do occur in the shallower waters similar to that of the project area while foraging. Any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. The NRC should submit its determination of effects, along with justification for the determination and a request for concurrence, to the attention of the Endangered Species Coordinator, NMFS, Northeast Regional Office, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930. For additional information on the Section 7 consultation process or shortnose sturgeon, please contact Julie Crocker at (978) 282-8480 or julie.crocker@noaa.gov. (**0022-14** [Gorski, Stanley])

Response: *The NRC initiated informal consultation with the National Marine Fisheries Service (NMFS) for a list of species protected by the Endangered Species Act that are under the jurisdiction of NMFS and that NMFS believes to occur in the region of influence associated with construction and operation of the PSEG Site. NRC will evaluate the impacts of construction and operation of the proposed facility on threatened and endangered species including the Atlantic and Shortnose sturgeon. These potential impacts will be discussed in Sections 5.3.2 and 4.3.2 of the EIS.*

Comment: Fish and Wildlife Coordination Act

Notwithstanding our mandates under the MSA, the NMFS also has responsibilities under the Fish and Wildlife Coordination Act (FWCA) to provide federal agencies such as the NRC with recommendations to avoid, minimize and to mitigate for direct, indirect and cumulative impacts to any and all NOAA trust resources that are present within the Delaware River Basin.

The Delaware Estuary including its tributaries provides habitat for a wide variety of NOAA trust resources including alewife (Alosa pseudoharengus), American eel (Anguilla rostrata) American shad (Alosa sapidissima), Atlantic croaker (Micropogonias undulatus), Atlantic menhaden (Brevoortia tyrannus), Atlantic sturgeon (Acipenser oxyrinchus), blueback herring (Alosa aestivalis), bluefish, hickory shad (Alosa mediocris), spot (Leiostomus xanthurus) tautog (Tautoga onitis), weakfish, white perch (Morone americana), yellow perch (Percajlavescens), striped bass (Morone saxatilis), hogchoker (Trinectes maculatus), killifish, bay anchovy, silversides, mummichog and may others.

Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-1960's, they have been designated as species of concern by NMFS in a Federal Register Notice dated October 17, 2006 (71 FRN 61022). Species of concern are those species about which NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act. The shallow water environment in this section of the Delaware River provides valuable habitat for these species as well as striped bass and American shad.

The New Jersey Department of Environmental Protection (NJDEP) also has sampled the Delaware River and Bay in the project area for nearly 30 years since 1980. This long- term survey documents the use of the this portion of the river by a wide variety of species including blueback herring, alewife, American shad American shad (Alosa sapidissima), American eel (Anguilla rostrata), Atlantic herring (Clupea harengus), Atlantic menhaden (Brevoortia tyrannus), bay anchovy, (Anchoa mitchilli), blueback herring, gizzard shad (Dorosoma cepedianum), hogchoker (Trinectes maculatus), striped bass, yellow perch (Percajlavescens), white perch (Morone americana), Atlantic silverside (Menidia menidia), and many others (NJDEP 2010). Many of these species are both commercially and recreationally important and managed by the ASFMC or are valuable prey species for ASFMC or federally managed fish.

Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include Alosa species such American shad, blueback herring and alewife as well as bay anchovy, silversides and other fish species. We note that the NJDEP survey data show that federally managed bluefish are present in the project area. This indicates that both the prey species and the predator are present in the Delaware River in and around the project area. Juvenile Alosa species have all been identified as prey species for windowpane (Scophthalmus aquosus) and summer flounder (Paralichthys dentatus) in Steimle et al. (2000). Windowpane and summer flounder are federally managed species whose EFH has been designated in the mixing zone of the Delaware River.

Submerged aquatic vegetation (SAV) has historically been absent from Delaware Bay. However, to date, there has been no comprehensive mapping of SAV in the Delaware Estuary to verify its presence or absence. Several species have been observed though in the tidal river since 1970, including: Vallisneria americana, Myriophyllum spicatum, Elodea nuttallii, Najasflexillis, Potamogeton sp. and others (Schuyler, 1988). Wild celery (Vallisneria americana) has been documented i (**0022-12** [Gorski, Stanley])

Response: *This comment provides general information relevant to some of the aquatic organisms present in the Delaware Bay but it does not provide any specific information related to the environmental effects of the proposed action. Any potential impacts, however, resulting from construction and/or operational effects on aquatic resources will be addressed in Sections 4.3.2 and 5.3.2 of the EIS.*

Comment: Magnuson Stevens Fishery Conservation and Management Act (MSA) Section 305 (b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires all federal agencies to consult with NOAA Fisheries on any action, including those proposed by the NRC, that is authorized, funded, or undertaken by that agency and that may adversely affect EFH. Included in this consultation process is the preparation of a complete and appropriate EFH assessment to provide necessary information on which to consult. Our EFH regulation at 50 CFR 600.905 mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The estuarine portions of the Delaware River and its tributaries including the estuarine areas of both Alloway and Hope Creeks have been designated as EFH for a wide variety of species including red hake (Urophycis chuss), winter flounder (Pseudopleuronectes americanus), windowpane flounder (Scophthalmus aquosus), bluefish (Pomatomus saltatrix), Atlantic butterfish (Peprilus triacanthus), scup (Stenotomus chrysops), summer flounder (Paralichthys dentatus), scup (Stenotomus chrysops), black sea bass (Centropristis striata), king mackerel (Scomberomorus cavalla), Spanish mackerel (Scomberomorus maculatus), cobia (Rachycenlron canadum), little skate (Leucoraja erinacea), winter skate (Leucoraja ocellata) and clearnose skate (Raja eglanteria). A more detailed listing of EFH and federally managed species and EFH consultation requirements can be found on our website at: www.nero.nmfs.gov/hcd.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as: any impact which reduces the quality and/or quantity of EFH. The rule further states that:

"An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions."

The rule also states:

"Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH."

In order to initiate consultation pursuant to the MSA, the NRC must submit a full and complete EFH assessment that considers the individual and cumulative and the direct and indirect impacts of the proposed project on EFH, federal managed species and their prey recognizing the definition of adverse impact discussed above. The required contents of an EFH assessment includes: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the NRC's conclusions regarding the effects of the action on EFH; 4) proposed mitigation, if applicable. Given the scope of this project, other information that should be contained in the EFH assessment includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 5) an analysis of alternatives to the action that could avoid or minimize the adverse (**0022-10** [Gorski, Stanley])

Response: *The NRC initiated informal consultation with the National Marine Fisheries Service (NMFS) for a list of species protected by the Endangered Species Act that are under the jurisdiction of NMFS and that NMFS believes to occur in the region of influence associated with construction and operation of the PSEG Site. Correspondence with NMFS will also occur for the presence of essential fish habitat (EFH). NRC intends to include an EFH assessment in the EIS. In addition, any potential impacts of construction and/or operational activities on the fish populations of the Delaware estuary will be addressed in Sections 4.3.2 and 5.3.2 of the EIS.*

Comment: ER Page 27 of 136-Hydrological Alterations

"Dredged material removed as part of this construction activity will be transported to and placed in an on-site or other approved upland disposal facility."

Does the licensee plan on expanding the REMP program to include air particulate/iodine monitoring, surface water runoff, or soil sampling in the area of this CDP (if onsite area is used for materials)? An air monitoring site should be placed downwind of the CDP based on annual meteorological direction (SE). Also, will there be expanded ground water monitoring in the vicinity of the CDF?

Once complete, sampling locations near the intake and discharge canals will be needed, especially for media such as aquatic biota and sediment. Since the structures are upstream in the Delaware, PSEG will need to rethink their exiting collection location north of the plant that is considered, 'control'. This site may need to be moved further upstream. (**0019-4** [Brubaker, Scott]) (**0019-5** [Brubaker, Scott])

Response: *Any potential impacts due to construction activities such as dredging on aquatic ecosystems will be addressed in Section 4.3.2 of the EIS. Sampling locations for aquatic ecology monitoring will be addressed in Section 4.3.2.4. Finally, regarding the comment to expand the current Radiological Environmental Monitoring Program (REMP) in place for the operating reactors Salem/Hope Creek as a result of construction of the proposed facility, will be discussed as part of the staff's evaluation in Chapter 4 of the EIS.*

D.2.11 Comments Concerning Socioeconomics

Comment: And if you want to create jobs in this state, here, the way to do it is build solar farms, build wind farms. Build two new cooling towers at Salem I and II. They will create hundreds of construction jobs. And, also, you will create fishing jobs, which add up to thousands and thousands of jobs. That should be the approach, also, that should be considered in the overall discussion of this issue. (**0002-6-16** [Schneider, Richard])

Response: *The NRC is not involved in establishing employment programs or policy nor in promoting employment opportunities within any state; rather, it regulates nuclear energy to protect public health and safety within existing policy. Nevertheless, the potential impacts of constructing a nuclear unit(s) at the PSEG Site, including the impacts associated with employment, will be evaluated in Chapter 4 of the EIS.*

Comment: Building a new plant means local jobs, and it would drive business to our little town. (**0001-1-1** [Davis, Robert])

Comment: This new application represents the principles in which the county's economic development strategy is based on. And that being green technology, and construction methods, sustainability, focus location on preservation of open space, regional cooperation, creation of a wide range of employment opportunities, reduction in property taxes, and transparent and civil involvement. (**0001-12-2** [Kugler, John])

Comment: I would just like to mention a few things, that the key facts would be related, if this application is approved. They would generate roughly 430 million in sales of goods and services, in the local community. It would create an additional 40 million dollars in total labor income, for the new unit. This plant would create approximately 450 new permanent jobs, that are so desperately needed in Salem County. While under construction it would be roughly 15 to 2,000 construction jobs that would be created. The plant would generate roughly 20 million dollars in state and local tax revenue. There would be educational opportunities, and local infrastructure benefits from the tax revenues. And the facility would roughly generate 75 million in federal tax payments annually. (**0001-12-3** [Kugler, John])

Comment: And in these difficult economic times, the development of a new nuclear facility would provide much needed job growth. The construction phase, as was mentioned by Jack, creates 1,400 to almost 2,000 jobs. And when completed, the facility would employ over 450 jobs in local, high paying jobs. Every year nuclear plants generate approximately 430 million in sales of goods and services to the local community, not to mention their significant tax benefits that benefit local infrastructure, public services, and schools. (**0001-13-12** [Salmon, Edward])

Comment: With unemployment in the county hovering around 12 percent, the economic possibilities of this expansion cannot be understated. (**0001-15-2** [Gaye, Earl])

Comment: Construction of a new plant would also be very good for the local economy. Building a new plant would result in the creation of thousands of jobs for the construction side of the house. And, afterwards, up to 700 permanent jobs, that pay about 36 percent more than the average salaries in the area. Salem County is a rural community at heart, with very few industries, and very few jobs to offer. If you are fortunate, as our members, and myself, and all others in the company are, PSEG is the place to work. Building a new plant opens doors of opportunities for stable employment, a better career, and a better life for thousands of people in the area. (**0001-17-6** [Hassler, Charles])

Comment: The potential construction of a new plant would mean so much to Salem County, with the increase of hundreds of permanent local jobs, in addition to just on the site, with a ripple effect on other businesses, restaurants, hotels, clothing stores, and other vendors of that nature, would truly benefit. There probably isn't a family, in Salem County, who doesn't benefit, at least indirectly, from the economic impact that PSEG now has, and the increase in their effect in the future would only be a plus. The dollars that are invested here would be unprecedented, and would contribute to increased prosperity and economic development in Salem County for many years to come. (**0001-18-5** [Duffy, Brian])

Comment: Construction of an additional nuclear facility and access road on this location will impact the health, aesthetics, and quality of life of those fishing, boating, and birding, and living in the region. (**0001-19-5** [Blake, Matt])

Comment: On this project, over 4,000 craftsmen will be needed for several years to construct this unit. The economy in southern New Jersey is such right now, 50 percent of the building trades are out of work right now. (**0001-22-3** [Kehoe, Jim])

Comment: A potential new power plant would have many impacts. Some of them are 4,100 construction jobs, during the peak construction, including 1,500 electricians, iron workers, and pipe fitters. It would create an additional 4,000 jobs in New Jersey, Delaware and Pennsylvania, as a result of the purchase of goods and services during construction. And, finally, 600 permanent jobs that would be at the plant when it becomes operational. These impacts, as well as many others, will affect our community. (**0001-3-2** [Joyce, Tom])

Comment: WRA is interested in PSEG's proposed project, because the proposed nuclear plant would be a major water user located in the Delaware River basin, and it is an important part of the economy of New Jersey, and the region at large. (**0001-8-2** [Molzahn, Robert])

Comment: My questions would include concern for extreme floods, which may be different now than when the original plants were put into existence, adequate entrance and egress systems, maintaining a good, continuous dialogue with the community. (**0001-9-8** [Lacandro, Roger])

Comment: With unemployment in the county hovering around 12 percent, the economic possibilities of this expansion cannot be understated. (**0002-2-2** [Bobbitt, Bruce])

Comment: Again, there are no surprises, including our plans to explore the construction of a new nuclear plant. The potential new plant would have many impacts, including some 4,100 construction jobs, during peak construction, including 1,500 electricians, iron workers, and pipe fitters. The creation of an additional 4,000 jobs in New Jersey, Delaware, and Pennsylvania, as a result of the purchases of goods and services during the construction. And, finally, 600 permanent jobs when the new plant would become operational. These impacts, as well as many others, will positively affect our community. (**0002-3-2** [Braun, Bob])

Comment: Will the new jobs have a tremendous impact in Salem County? Absolutely. And that is a good thing. (**0002-8-4** [Campbell, Keith])

Comment: Construction of an additional nuclear facility and access road on this location will impact the health, aesthetics and quality of life of those fishing, boating, birding and living in the region. (**0003-6** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: And in these difficult economic times, the development of a new nuclear facility would provide much-needed job growth. The construction phase creates 1,400 to 1,800 jobs, and when completed the facility would employ over 500 people in local high- paying jobs. Every year nuclear plants generate approximately $430 million in the sales of goods and services in their local communities, not to mention their significant tax contributions that benefit local infrastructure, public services and schools. (**0004-4** [Salmon, Edward])

Comment: Construction of a new plant would also be very good for the local economy. Building a new plant would result in the creation of between 1400 to 1800 jobs and as high as 2500 or more at peak employment during the construction. After that, a new plant would mean 400 to 700 permanent jobs that pay about 36 percent more than average salaries in the area. Salem County is a rural community at heart, with very few industries and very few jobs to offer. If you are fortunate, as our members and all others in the company are, PSEG is the place to work. Building a new plant opens the doors of opportunity for stable employment, a better career and a better way of life for hundreds of people. (**0005-7** [Hassler, Charles])

Comment: Construction of a new plant would result in much needed jobs in the construction trade, which in New Jersey is experiencing unemployment rates of 30% and higher. Plant construction would result in more than 2,000 jobs for steelworkers, pipefitters, electrical contractors and concrete workers. The new plant would also employ between 400 and 700 people with good paying salaries. (**0006-3** [Patouhas, Maria])

Comment: My questions would include: concern for extreme floods and adequate entrance and egress systems, maintaining a good, continuous dialog with the community and an insistence that only the best science be incorporated in planning and construction. (**0008-9** [Lacandro, Roger])

Comment: This new application represents the "principles" in which the County's Economic Development Strategy is based on. That being:

"Green" technologies and construction method

Sustainability

Focused location with preservation of open space

Regional cooperation

Creation of a wide range of employment opportunities

Reduction in property taxes

Transparency and civic involvement (**0009-3** [Kugler, John])

Comment: I would like to mention some keys facts that would be related to this application if approved:

Generate roughly $430 million in sales of goods and services in the local community. Create an additional $40 million in total labor income for the new unit. This new plant would create approximately 450 new permanent jobs that are so desperately needed. While under construction roughly 1,400 to 1,800 construction jobs would be created. This new plant would generate roughly $20 million in state and local tax revenue. Education and local infrastructure benefit from tax revenues. This facility would generate roughly $75 million in federal tax payment annually. A substantial number of non nuclear jobs estimated to be 400 to 500 would be created as a result of a new unit being built.

Other benefits to building this new unit that would have a positive impact regionally are the boost to the local economy with the purchase of commodities such as:

400,000 cubic feet of concrete

66,000 tons of steel

44 miles of piping

300 miles of electrical wiring

130,000 electrical components (**0009-4** [Kugler, John])

Comment: WRA is interested in PSEG's proposed project because PSEG's proposed nuclear plant will be a major water user located in the Delaware River Basin and is an important part of the economy of New Jersey and the region at large. (**0011-2** [Molzahn, Robert])

Comment: In summary, I believe that the construction of a properly permitted additional nuclear power generating facility at Artificial Island will be a benefit to not only the residents and landowners of Elsinboro Township, but also provide a much needed economic boon to Salem County and Southern New Jersey as a whole. (**0016-5** [Elk, John])

Response: *The NRC staff will evaluate the regional socioeconomic impacts of the proposed action in Chapters 4 and 5 of the EIS, including impacts related to the local economy, taxes, transportation, aesthetics and recreation, housing, education, community infrastructure and social services.*

Comment: PSEG has also supported the Chamber of Commerce's efforts to enhance business relationships with the other businesses and organizations in Salem County, and the surrounding areas. In fact, one of our initiatives, recently, has been to buy locally, and we have expanded that message not only to citizens with consumer goods, but to large businesses. And PSEG was already way of the curve with that. They support many local businesses, and vendors. And I think Tom mentioned the figure of 80 million dollars, annually, into the local economy.

One of the most important things is to bring dollars into the county, and not have dollars drift out. And I just did a little bit of rough math, with our 60,000 or so citizens of Salem County. That 80 million dollars would probably be about 5,000 dollars per family, in Salem County, and I hate to think how bad it would be without that. Salem County and Cumberland County are the two poorest counties in the state. So the economic impact, in a positive way, of PSEG is tremendously important, and any growth would only help our situation down here. (**0001-18-3** [Duffy, Brian])

Comment: Just to reiterate some other comments that have been said today. PSEG Nuclear plays a very important role in our regional economy. The company is the largest employer in Salem County, employing 1,500 people, and pays more than two million in local property taxes. Each year PSEG Nuclear spends millions of dollars with local companies in southern New Jersey, to help them generate electricity. This investment results in direct jobs for hundreds of people, and even more indirect jobs in our region. (**0001-23-2** [Patouhas, Maria])

Comment: We recognize the impact of the current operations that we have on the community. We have 1,500 local employees, forty percent of them from Salem County. We purchase goods and services totaling more than 81 million dollars in southern New Jersey. And we pay more than two million dollars in property taxes a year. (**0001-3-1** [Joyce, Tom])

Comment: The jobs to this region, PSEG is the largest employer to Salem. They invest 84, 85 million dollars into the economy of southern New Jersey, and they provide excellent jobs. (**0002-1-4** [Sweeney, Steve])

Comment: We recognize the impact that our current operations have on the community, including 1,500 local employees, some 40 percent of which hail from Salem County. The purchase of goods and services, totaling more than 80 million dollars, per year, from south Jersey businesses, and more than two million dollars a year in local property taxes. (**0002-3-1** [Braun, Bob])

Comment: And if you look at it in that basic principle, then they should stop killing the fish at Salem I and II. It is destroying the fishing industry, so you are losing jobs. (**0002-6-14** [Schneider, Richard])

Comment: PSEG Nuclear plays a very important role in our regional economy. The company is the largest employer in Salem County, employing 1,500 people and pays more than $2 million in local property taxes. Each year, PSEG Nuclear spends millions of dollars with local companies in Southern New Jersey to help them generate electricity. This investment results in direct jobs for hundreds of people, and even more indirect jobs, in our region. In fact, a Nuclear Energy Institute analysis shows that every dollar spent by the average nuclear plant results in the creation of $1.07 in the local community. The electricity generated by the current plant provides millions of businesses and homes with reliable, safe, clean and efficient power. (**0006-2** [Patouhas, Maria])

Comment: PSEG has provided good paying jobs for numerous Elsinboro Residents. The operation of the facilities has not placed any financial burden on the local school system, fire company or rescue squad. Rather, to the contrary, PSEG has been a strong supporter of these entities with their time and financial support. (**0016-4** [Elk, John])

Response: *The existing socioeconomic environment in the region, including the PSEG ESP site's potential impact on the local economy, will be described in Section 2.5 of the EIS.*

Comment: So you would be adding to the amount of fish that are killed at that facility. So you must consider the existing damage that the present facility, Salem I and II causes, and adding even more damage. And Salem I and II draws in three billion gallons of water a day, every day. And it kills billions of fish. And the EPA has estimates on how much. And I have a paper I would like to submit as data. And they kill 350 million age one equivalent fish. In other words, fish that would have grown up to be a million, I mean, one year old. That is how they generally use their fish kill data; they call it age one equivalent fish. But, actually, the facility kills billions of fish, billions of smaller fish, which is the food chain for the bigger fish, and the whole ecosystem. So my concern here is that you want to build a new facility, but you are not stopping the existing damage caused by the present facility that is there, units I and II, which draw in three billion gallons of water, and have an open loop cooling system. So before you consider building a new facility you should stop the damage caused by the existing facility, first. I think that is a priority. But it seems like just build another one. But you still have an existing fish kill facility, there. And it kills all species, all ages. And it is destroying the fishing industry along the Delaware Bay and the Delaware River. We used to have a great fishing industry, and we don't now. (**0002-6-12** [Schneider, Richard])

Response: *Cumulative socioeconomic impacts of the proposed action will be discussed in Section 7.4 of the EIS.*

D.2.13 Comments Concerning Historic and Cultural Resources

Comment: It is also likely that the land swap and resulting new access road would obstruct the view shed of the historic 1722 Able Mary Nicholson brick house, which is a national historic landmark. (**0001-19-6** [Blake, Matt])

Comment: It is likely that the land swap and resulting new access road would obstruct the viewshed of the historic 1722 Abel and Mary Nicholson pattern brick house, which is a National Historic Landmark. (**0003-7** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: The Society's research has provided a strong foundation for the study of the New Sweden Colony in 1638-1655 and is devoted to preserving the historical sites of New Sweden. The New Sweden Colony was an effort by Sweden to claim a stake in colonial America and, from 1643-1652, Fort Elfsborg was a strategic fortification utilized to guard the South River (Delaware River).

It is now the intention of the Swedish Colonial Society to discover the location of Fort Elfsborg built in Southern New Jersey along the Delaware River. The bulk of the documentation for the location of Fort Elfsborg is scattered in The Swedish Settlements on the Delaware 1638-1664, Amandus Johnson, 1911. Additional clues are found in New York Historical Manuscripts-Dutch, Gehring, and in original documents housed in the Swedish National archives. Dr. Johnson cited a number of sources of Swedish, Dutch and English on the specific location. For example: Winsor, IV. 462: Doc. XII 28, 29 “This island was most judiciously selected for the erection of a fort, being protected by the river on the west, on the north by Fishing Creek (Mill Creek), turning east and south, on the south by an immense expanse of wild marsh.” This is probably the most definitive location and is bolstered by a number of other clues. For example: Governor Printz’s account books mention the loss of stockpiled lumber when the Indians set fire to the “island.” The key here is what is considered an island. The entire area is broken into numerous “islands” by narrow channels. Other clues are citations of the distance of Fort Elfsborg south of Fort Christina and in several reports of where ships were anchored in relation to the fort. The location of the site in Johnson is the hub of the general area we wish to search.

The US Army Corp of Engineers, 1986, Heite and Heite Report concludes the river has washed the fort site away. This is based mostly on a 19th century farmer’s request for monetary compensation for land he claimed had been washed away by the river. The area the farmer cited is about a mile from the historical fort location given in Johnson. The Heite and Heite Report cites almost no original 17th century sources regarding the fort location, but relies solely on secondary sources which are based on the farmer’s land washed-away money request. These sources were all created after the farmer’s claim. The Heite and Heite Report was obviously not familiar with New Sweden research.

Although it does not appear that the Mill Creek area, where it is believed the Fort Elfsborg was located, will be affected, we respectfully request that due diligence be exercised when the NRC does the environmental review of the PSEG ESP application. It is of the most importance that the NRC ensures a more comprehensive Phase 1 survey of the area to assure that the Fort Elfsborg historical site is not impacted, compromised or obliterated. (**0015-1** [Birdwell, Margaret (Sally) Sooy])

Comment: The New Jersey Historic Preservation Office (HPO) is currently in consultation with the Nuclear Regulatory Commission (NRC), and other interested parties, regarding the proposed Hope Creek/Salem Nuclear Power Station expansion project pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations 36 CFR part 800. Through ongoing consultation, this undertaking has identified underwater and terrestrial archaeological sites, as well as, historic properties within the physical and visual area of potential effects. Additional investigations are on-going. If historic properties will be adversely affected by the undertaking; NRC, through consultation, shall work to avoid, minimize, and/or mitigate those effects pursuant to the Section 106 process. (**0019-27** [Brubaker, Scott])

Comment: The Historic Preservation Office (HPO) provided comment on July 9, 2009 that the Salem and Hope Creek Generating Stations license renewal would not adversely effect historic properties. The post-license renewal activities (stations expansion, access roads and possible power line upgrades) were subject to a separate review for impacts on historic properties. In your letter dated November 5, 2010, you have identified that the license renewal and post-license renewal activities are in fact one undertaking. In consequence, the following consultation comments for the above- referenced undertaking are provided. (**0021-3** [Brubaker, Scott])

Comment: 800.4 Identifying Historic Properties

The initial cultural resource surveys for expanding the Salem and Hope Creek Generating Stations as part of post-license renewal activities have identified the following archaeological and historic properties within the above-referenced undertaking's area of potential effects (APE). Previous HPO comment on post-license renewal activities is attached and summarized below:

Archaeology

Proposed Barge Facility and Water Intake

Underwater survey identified four probably shipwreck locations (Clusters 1, 2, 3, & 4). If avoidance is not possible, Phase II archaeological survey will be necessary for each cluster to assess their eligibility for listing on the National Register of Historic Places. To date, the HPO has not received any site avoidance documentation, avoidance plan, or Phase II archaeological survey.

Money Island Road Access Alternative Alignment

Phase I archaeological survey for the proposed Money Island Road Access Alternative Alignment identified the following archaeological sites:

Sites 28-Sa-179, 28-Sa-180, 28-Sa-182, 28-Sa-183, and 28-Sa-186

If avoidance is not possible, Phase II archaeological survey will be necessary for each site to assess their eligibility for listing on the National Register of Historic Places. To date, the HPO has not received any site avoidance documentation, avoidance plan, or Phase II archaeological survey.

Alloway Creek Neck Road Access Alternative Alignment

Phase I archaeological survey for the proposed Alloway Creek Neck Road Access Alternative Alignment did not identify any archaeological deposits eligible for listing on the National Register of Historic Places. In consequence, no additional archaeological survey is required unless the alignment, as defined in the 2009 submission, changes in the future. (**0021-4** [Brubaker, Scott])

Comment: Historic Architecture

On January 11, 2010, the HPO received:

Brown, J. Emmett. July 31, 2009. *Draft Historic Properties Visual Impact Assessment PSEG Early Site Permit Application, Salem, New Jersey*. Prepared for PSEG Power, LLC. Prepared by MACTEC Engineering and Consulting, Inc., Knoxville, TN.

The submitted report does not meet the NJ SHPO's guidelines for Architectural Survey. The methodology section of this draft report notes that only known properties listed on the National Register of Historic Places were considered for assessment of visual impacts within the APE. Section 106 of the National Historic Preservation Act requires that the applicant identify all listed and eligible properties within the APE, and then provide an assessment of effects and proposed mitigation, if applicable, pursuant to 36 CFR Part 800.5. To complete the Section 106 process, the applicant must complete the identification of historic properties, and then provide an assessment of the project's effect on the identified properties. (**0021-5** [Brubaker, Scott])

Comment: In consequence, the HPO cannot concur at this time with your November 5, 2010 letter stating that the above-referenced undertaking will not adversely affect historic properties. Pursuant to 36 CFR Part 800.4, Phase II archaeological survey and intensive level architectural survey will provide for evaluation of the National Register eligibility of the sites/structures and assessment of project impacts. For properties on or eligible for National Register inclusion, recommendations must be provided for avoidance of impacts. If impacts cannot be avoided, analyses must be provided exploring alternatives to minimize and/or mitigate impacts. Means to avoid, minimize and/or mitigate impacts to National Register eligible properties will need to be developed and undertaken prior to project implementation. (**0021-6** [Brubaker, Scott])

Response: *As part of its environmental review of historic and cultural resources, the staff will meet with the necessary State Historic Preservation Offices (SHPOs) and will review other appropriate information sources. The results of the analysis will be presented in Chapter 4 of the EIS, and the staff will take any appropriate action called for as a result this review. The NRC will also fulfill its responsibilities under Section 106 of the National Historic Preservation Act with regard to historic properties for the project. The results of the Section 106 review will also be presented in the EIS.*

D.2.14 Comments Concerning Meteorology and Air Quality

Comment: ER Page 22 of 42, Meteorological Monitoring

Comment: Is there any concern with the existing cement pad for the main meteorological tower with regard to stress cracks and integrity? When was the last inspection of the tower pad performed? (**0019-9** [Brubaker, Scott])

Response: *Issues related to the structural safety and integrity of the meteorology tower pad is outside of the scope of environmental review. This evaluation can be found in the Safety Evaluation Report.*

Comment: The Bureau of Air permit has reviewed the proposed Early Site Permit application for the proposed Nuclear Reactor Units at Salem and Hope Creek Generating Stations. The new plant is proposed to have supporting equipment such as cooling towers; auxiliary boilers, emergency diesel generators and/or combustion turbines that emit air pollutants. The application gives details of the expected size of each piece of equipment, the stack height and emissions from the equipment. These equipment will be subject to Federal and State Air Pollution Control Regulations and requires air pollution control permits. PSEG Nuclear will be required to submit a permit modification to incorporate these equipment and their associated emissions in the existing Title V Air Operating Permit for Hope Creek and Salem Generating Stations. (**0019-10** [Brubaker, Scott])

Response: *Comment noted. Meteorology and air-quality impacts resulting from the construction and operation of the proposed facility will be discussed Chapters 4 and 5 of the EIS.*

Comment: The Bureau of Technical Services (BTS) has reviewed the air quality modeling sections of the proposed Early Site Permit application for the proposed Nuclear Reactor Units at Salem and Hope Creek Generating Stations. These sections briefly describe the results of a preliminary analysis of the air quality impacts of the proposed changes.

The new equipment being proposed that emit air pollutants (cooling towers; auxiliary boilers, emergency diesel generators and/or combustion turbines) will require a detailed modeling analysis of their impact on sulfur dioxide, nitrogen oxides, PM-10, and PM-2.S air quality. This modeling must be part of their air permit application that incorporates the new equipment into the existing Title V Air Operating Permit for Hope Creek and Salem Generating Stations. Prior to submittal of the modeling analysis, a modeling protocol which describes the techniques and modeling assumption which will be used should be submitted to BTS prior to submittal of the modeling analysis. Note that the modeling analysis must address the new l-hour sulfur dioxide National Ambient Air Quality Standard. (**0019-11** [Brubaker, Scott])

Response: *Comment noted. Meteorology and air-quality impacts resulting from the construction and operation of the proposed facility will be discussed Chapters 4 and 5 of the EIS.*

Comment: 1) Environmental Report, Chapter 1, Page 1.3-9, Table 1.3-2 Authorizations Required for Preconstruction, Construction, and Operation Activities

The Early Site Permit (ESP) states that the requirements of the Federal Clean Air Act (42 USC 7401) for this project include a Title V Operating Permit and a Prevention of Significant Deterioration Preconstruction Permit.

Comment

Section 40 CFR 93.150 (a) (Prohibition) of the Federal General Conformity regulation states, "No department, agency or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan."

Also, Section 40 CFR 93.150 (b) of the Federal General Conformity regulation states, "A Federal agency must make a determination that a Federal action conforms to the applicable implementation plan in accordance with the requirements of this subpart before the action is taken." The Federal General Conformity regulation requires that a General Conformity Applicability Analysis for ozone (Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NOx)) and if necessary a Conformity Determination is needed for this project.

In addition, Sections 93.153(b) and (1) (Applicability) in the Federal General Conformity regulation states, " . . . a conformity determination is required for each criteria pollutant or precursor where the total direct or indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs (b) (1) of this section." Under the 1-hour Ozone National Ambient Air Quality Standards (NAAQS), the Philadelphia-Wilmington- Atlantic City (PA-DE-MD-NJ) nonattainment area was classified as a "severe" nonattainment area. Under this classification, the de minimis level for Oxides of Nitrogen (NOx) is 25 tons per year (tpy) and the de minimis level for Volatile Organic Compounds (VOCs) is 25 tpy. The State of New Jersey continues to be in nonattainment for the 8-hour ozone NAAQS. In order to prevent backsliding and to meet the goal of the Clean Air Act (42 U.S.C. 7502(e)) to achieve attainment of the Ozone NAAQS, it is necessary to use the de minimis emissions levels established for General Conformity projects under the 1-hour Ozone NAAQS at (40 CFR 93.153(b)(1). When preparing the Applicability Analysis, please use the de minimis levels for the 1-hour Ozone NAAQS.

In addition, Section 93.158 (d) of the Federal General Conformity regulation states, "Any analyses required under this section must be completed, and any mitigation requirements necessary for a finding of conformity must be identified before the determination of conformity is made." A mitigation plan will be required for criteria pollutant emissions and precursors above the 1-hour de minimis levels. (**0019-12** [Brubaker, Scott])

Comment: 6) Environmental Report, Chapter 4, Page 4.4-2,

4.4.1.1.1.2.1 Proposed Causewav

The ESP states, "Construction of the proposed causeway and any improvements of connecting roadways may expose residents of this and other nearby buildings to temporary and intermittent increases in noise, dust, and air pollution emissions associated with these activities."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-16** [Brubaker, Scott])

Comment: 8) Environmental Report, Chapter 4, Page 4.4-6

4.4.1.3 Dust and Other Emissions

The ESP states, "Construction activities result in increased air emissions. Earthmoving and material handling activities may generate fugitive dust and fine particulate matter. Vehicles and engine-driven equipment (e.g. generators and compressors) generate combustion product emissions such as carbon monoxide, nitrogen oxides and, to a lesser extent, sulfur dioxides. Painting, coating and similar operations also generate emissions from the use of volatile organic compounds."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-18** [Brubaker, Scott])

Comment: 11) Environmental Report, Chapter 4, Page 4.6-12, Table 4.6-1 Summary of Measures and Controls to Limit Adverse Impact During Construction

Table 4.6-1 (Socioeconomic Impacts -Physical Impacts) of the ESP indicates that, "the adverse impacts include exposure to fugitive dust, exhaust emissions, and vibrations. The specific measures and controls include best management practices for controlling fugitive dust and proper maintenance of construction equipment for controlling emissions."

Comment

Comment 1 (above) also applies to this portion of the project.

12) Environmental Report, Chapter 5, Page 5.5-3

5.5.1.3 Impacts of Discharges to Air

The ESP states, "The new plant will comply with all regulatory requirements of the Clean Air Act, including requirements of the NJDEP Division of Air Quality and Delaware Department of Natural Resources and Environmental Control, Division of Air and Waste Management, thereby minimizing any impacts on state and regional air quality."

Comment

Please see comment 1 for a description of one of the Federal regulations that is applicable to this project. (**0019-19** [Brubaker, Scott])

Comment: 15) Environmental Report, Chapter 10, Page 10.1-11 Table 10.1-1 Construction-Related Unavoidable Adverse Environmental Impacts

Table 10.1-1 of the ESP indicates that "the atmospheric and meteorological impacts of the project include an increase in dust and emissions from construction equipment and construction workforce vehicles occurs. The mitigation measures in Table 10.1-1 include BMPs for controlling fugitive dust and proper maintenance of construction equipment and vehicles is used to control air emissions."

Comment

Comment 1 (above) also applies to this portion of the project. (**0019-20** [Brubaker, Scott])

Response: *These comments refer to the NJDEQ's assertion that the proposed action must comply with the Federal General Conformity Act (40 CFR 93.150), which addresses air pollution emissions. The NRC will conduct a conformity determination under 40 CFR Part 93, Subpart B, outside of the NEPA process to determine whether additional mitigation is warranted.**

*Subsequent to the issuance of the Scoping Summary Report, NRC determined the following: The Federal action of issuing an ESP with no Limited Work Authorization for the PSEG Site does not directly or indirectly cause any emissions, and therefore, an applicability analysis and potential conformity determination will not be performed at this time. Compliance with 40 CFR Part 93, Subpart B, will be demonstrated when a CP, an OL, or a COL is submitted to the NRC.

D.2.16 Comments Concerning Health—Radiological

Comment: ER Page 27 of 136-Hydrological Alterations

"Dredged material removed as part of this construction activity will be transported to and placed in an on-site or other approved upland disposal facility."

Does the licensee plan on expanding the REMP program to include air particulate/iodine monitoring, surface water runoff, or soil sampling in the area of this CDP (if onsite area is used for materials)? An air monitoring site should be placed downwind of the CDP based on annual meteorological direction (SE). Also, will there be expanded ground water monitoring in the vicinity of the CDF?

Once complete, sampling locations near the intake and discharge canals will be needed, especially for media such as aquatic biota and sediment. Since the structures are upstream in the Delaware, PSEG will need to rethink their exiting collection location north of the plant that is considered, 'control'. This site may need to be moved further upstream. (**0019-3** [Brubaker, Scott])

Comment: ER Page 13 of 42, Radiological Environmental Monitoring Program, Table 6.2-1

Comment: The NJBNE is requesting that the licensee consider increasing the REMP sample frequency from quarter annual to monthly, based on the public interest of tritium contamination in groundwater in New Jersey. Samples of groundwater, including local drinking water wells, are collected in order to provide assurance to the public that these water resources are not impacted. (**0019-8** [Brubaker, Scott])

Comment: ER Page 12 of 42, Section 6 -Environmental Measurements and Monitoring Programs

6.2.2.1 Radiological Monitoring Program

"The existing PSEG REMP serves as the new plant construction/preoperational radiological monitoring program. Additional on-site thermoluminescent dosimetry (TLD) monitoring locations will be added to the north of the HCGS to support the ODCM/REMP for the construction and preoperational period. A description of the new monitoring locations and other applicable parameters will be provided in the combined license (COL) application."

Comment: The NJBNE requests that the licensee establish a Groundwater Protection Program for the proposed site at the construction/pre-operational stage rather than waiting for the operation of the facility. During the construction phase, there will be knowledge as to where all applicable tanks and pipes are going to be located, along with buildings containing radioactive fluids and areas of further investigation for potential tritium in groundwater. (**0019-6** [Brubaker, Scott])

Response: *Impacts to ground and surface water as result of construction and operation, including potential tritium releases, of the proposed facility will be discussed in Sections 4.3 and 5.3 of the EIS. In addition, the Radiological Environmental Monitoring Program (REMP) and* *additional mitigative actions, proposed by the applicant, during the construction and operation phase will be discussed in Chapter 4 and 5.*

D.2.20 Comments Concerning the Uranium Fuel Cycle

Comment: Is the current Independent Spent Fuel Storage Installation (ISFSI) capable of providing storage for all three nuclear generating stations (Salem 1 & 2 and Hope Creek) plus the proposed new plant? Will there be an addition to the existing pad or will a separate new pad be built? How will the cumulative effects of all this storage of spent fuel be assessed? In the Early Site Permit SEIS? (**0021-1** [Brubaker, Scott])

Response: *.The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations. Section 5.9 of the EIS will discuss radiological impacts during operation of the proposed new facility including the storage of spent fuel. The NRC will discuss potential cumulative impacts in Chapter 7 of the EIS, based on the plant parameter envelope established for the site.*

Comment: We worried about safety issues, and even more, about the lack of a long- term safe repository for nuclear wastes. We weren't experts, our concerns were real. (**0001-10-3** [Applegate, Jim])

Comment: In fact, if you have had an opportunity, I have been to Yucca Mountain four times. And I have watched that develop, and know the need that we have of the right place for a waste disposal plant. (**0001-13-3** [Salmon, Edward])

Comment: The storage of spent fuel is widely thought to be a hazard. But a recent proposal from the Health Physics Society, which is the professional scientific society of radiation safety officers, states that dry cask storage of spent fuel for several hundred years, will reduce its radioactivity to the point where reprocessing would not be difficult.

And this very valuable fuel could then be reused. This interim storage would eliminate the necessity for storing large masses of radioactive material in a site like Yucca Mountain, where it must remain physically and chemically stable for hundreds of thousands of years. And the NRC has already approved the safety of dry casks. (**0001-5-6** [Meadow, Norman])

Comment: And then another concern with nuclear is also the waste that is produced by the facility. The half life of nuclear materials, like the 100,000 years, which is basically how much it will degrade in its nuclear power. Well, the problem is you have to worry about this nuclear waste forever. And maintain it, and make sure it is safe. If you don't produce nuclear waste you don't have to worry about it. And we do have a problem with nuclear waste in this country. Salem is storing some there and, you know, it is a concern. (**0002-6-5** [Schneider, Richard])

Comment: We worried about safety issues and even more about the lack of a long- term safe repository for nuclear wastes. We were not experts. The concerns are real. (**0010-3** [Applegate, Jim])

Response: *The NRC staff will assess the environmental impacts of the uranium fuel cycle, including the impacts of solid radioactive waste management in Chapter 6 of the EIS. The NRC staff will assess the environmental impacts of accidents in Chapter 5 of the EIS. The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that sufficient mined geologic repository capacity will be available to dispose of the commercial high-level radioactive waste and spent fuel generated in any reactor when necessary (75 FR 81037).*

D.2.25 Comments Concerning Cumulative Impacts

Comment: To many environmental groups renewable energy is a preferable alternative to nuclear reactors. To those concerned with the conservation of biological diversity, however, the cumulative ecological impacts of large scale, renewable projects, will be their most detrimental effect. We believe that concerns for the cumulative ecological impacts of the alternatives, wind, solar, and biomass, should be included in the final EIS, as a reason for rejecting them as an alternative to nuclear power. (**0001-6-7** [Lewis, Kenneth])

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement, in order to show that, by comparison, nuclear energy is far preferable, is a far preferable option. (**0001-7-4** [Eastman, Ajax])

Response: *The cumulative impacts associated with alternative energy sources will be discussed in EIS Chapter 9.*

Comment: This meeting is about the environmental impact of a new facility. And my comments cover a variety of issues that I feel are important to bring up, and have on the record, also, pertaining to the new facility, and the existing complex, which must also be considered, as a whole, when you add one more to three existing, it is a bigger picture, and a bigger effect. (**0002-6-1** [Schneider, Richard])

Response: *These comments allude to cumulative impacts, which are impacts that result from the combination of a proposed action with past, present, and reasonably foreseeable actions, regardless of who takes the actions. The cumulative impacts associated with issuing the proposed ESP for the existing Salem/Hope Creek site will be evaluated for each affected resource. The results of cumulative impact analyses will be presented in EIS Chapter 7.*

Comment: With the new facility a good thing is, if it is built, that it would have a closed loop cooling system, which would greatly reduce the amount of water needed to cool the facility. A closed loop cooling system reduces the water take, compared to an open loop system, by 90 to 95 percent. So however, an average nuclear facility draws in, an open loop system, like a billion gallons of water a day, over a billion. So even with the closed loop, you are still talking about 50 million to 100 million of gallons a day. So you would be adding to the amount of fish that are killed at that facility. So you must consider the existing damage that the present facility, Salem I and II causes, and adding even more damage. And Salem I and II draws in three billion gallons of water a day, every day. And it kills billions of fish. And the EPA has estimates on how much. And I have a paper I would like to submit as data. And they kill 350 million age one equivalent fish. In other words, fish that would have grown up to be a million, I mean, one year old. That is how they generally use their fish kill data; they call it age one equivalent fish. But, actually, the facility kills billions of fish, billions of smaller fish, which is the food chain for the bigger fish, and the whole ecosystem. So my concern here is that you want to build a new facility, but you are not stopping the existing damage caused by the present facility that is there, units I and II, which draw in three billion gallons of water, and have an open loop cooling system. So before you consider building a new facility you should stop the damage caused by the existing facility, first. I think that is a priority. But it seems like just build another one. But you still have an existing fish kill facility, there. And it kills all species, all ages. And it is destroying the fishing industry along the Delaware Bay and the Delaware River. We used to have a great fishing industry, and we don't now. Not when one facility draws in three billion gallons of water a day. And Salem says we fixed up some wetlands and that will compensate. It is really hard to believe that fixing up a few acres of wetlands will compensate for billions of fish killed, every year, year after year. So I feel that you should fix the first two, units Salem I and II, and then consider moving on. (**0002-6-11** [Schneider, Richard])

Comment: And I spoke with some Nuclear Regulatory Commission people tonight. And I have a major concern, that when the Nuclear Regulatory Commission does an evaluation of an existing permit, or a new permit, the issue of water intake, for the cooling system, is left up to the state, as a state permit. I spoke with a gentleman from the Nuclear Regulatory Commission, and he says it is above his ability to change the rulings, that the EPA has made about this issue. But I feel that it should be part of the Nuclear Regulatory Commission's when they evaluate the water intake, for two reasons. Because NRC is a nuclear, is a federal agency. A federal agency applies to any issue that affects more than one state. The fish kill caused by these facilities affects more than one state, it affects the fishermen in Delaware, in Maryland, in Pennsylvania, in New Jersey, and all up and down the coast, where the fish would have gone, and traveled, and be caught by other people. So therefore the NRC needs to be involved with a federal ruling on it, and not be involved with the water permit. So I'm asking the NRC to talk to the people above them to pursue that. (**0002-6-17** [Schneider, Richard])

Comment: And then, also, the Federal Clean Water Act applies to the fish kill. In the 1970s the Federal Clean Water Act, said that you must use the best technology available to stop the fish kill. This facility, Salem I and II, is killing the fish. And they are not using the best available technology. So, therefore, the federal agency overseeing the nuclear plant, which is the NRC, needs to enforce that particular law. It is a federal law, the Clean Water Act. So, again, I ask the NRC to pursue having open or closed loop systems. (**0002-6-19** [Schneider, Richard])

Response: *These comments allude to cumulative impacts on aquatic resources, which are impacts that result from the combination of a proposed action with past, present, and reasonably foreseeable actions, regardless of who takes the actions. The cumulative impacts associated with issuing the proposed ESP will be evaluated for each affected resource, including aquatic resources. The results of cumulative impact analyses will be presented in EIS Chapter 7.*

Comment: There are two key sections in every EIS: The first is an analysis of the cumulative impacts of the proposed action, and the second is an analysis of alternatives to the proposed action. Thus, the dEIS states: Cumulative impacts result when the effects of an action are added to or interact with other past, present, and reasonably foreseeable future effects on the same resources. And further: These combined impacts ... include individually minor but collectively potentially significant actions taking place over a period of time. To many environmental groups renewable energy is a preferable alternative to reactors. To those concerned with the conservation of biological diversity, however, the cumulative ecological impacts of large-scale renewable projects will be their most detrimental effect. We believe that concern for cumulative ecological impacts of the Alternatives, wind, solar, and biomass should be included in the final EIS as a reason for rejecting them as an alternative. (**0007-6** [Lewis, Kenneth])

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement (EIS) in order to show that by comparison nuclear energy is a far preferable option. (**0012-5** [Eastman, Ajax])

Response: *The cumulative impacts associated with alternative energy sources will be discussed in EIS Chapter 9.*

D.2.26 Comments Concerning the Need for Power

Comment: We need to keep pace with our state's energy needs. The U.S. Department of Energy predicts that the national electrical demand will increase 28 percent by 2035, and to maintain nuclear energy's current 20 percent contribution, which they do today, we must build about one new reactor per year, starting in 2016. (**0001-13-13** [Salmon, Edward])

Response: *This comment affirms the need to build new capacity to keep pace with the nation's energy needs and suggests nuclear should continue to constitute a constant share of this capacity. NRC's assessment of Need for Power will be discussed in detail in Chapter 8 of the EIS.*

Comment: New Jersey Nuclear Power supplies the state of New Jersey with about 52 percent of its electric needs. It is important in meeting electric demand, of not only the state, but the region also. Producing this electricity with nuclear power is done without creating greenhouse gases, which is an important and critical component to this discussion, given the global warming situation. Equally important is that there is no impact on the local environment. Without these plants the reliability of electric delivery to meet demand, would be put at risk. As demand increases, we must consider the need for another nuclear power plant. (**0001-17-9** [Hassler, Charles])

Response: *This comment describes a number of reasons that nuclear power should be considered as a source of new capacity in the New Jersey Region. The balance of benefits and costs will be considered in Chapter 10 in the EIS.*

Comment: At the May 4th, 2010 public meeting that NRC held on the project I commented on the importance of providing additional electrical generating capacity to meet the energy needs of New Jersey residents and businesses. These comments are, of course, still applicable, especially the need to provide base load generating capacity, supplemented by renewable energy projects, such as wind and solar, in New Jersey. (**0001-8-3** [Molzahn, Robert])

Response: *This comment provides a general need for additional generating capacity in the New Jersey region and the desirability of a portfolio of capacity containing nuclear and renewable energy sources. Capacity requirements will be discussed in Chapter 8 of the EIS.*

Comment: This facility is critical to the State of New Jersey for its energy needs. And as we move forward, and we know it is going to take some time to build, I'm excited that we are finally starting it. I think it took them eight years too long to get started, but we started. (**0002-1-2** [Sweeney, Steve])

Response: *This comment offers general support for the construction of the proposed facility and notes the lead time required for such a construction project. This comment will not be discussed specifically in the EIS, but the project's background, including length of the construction period, will be discussed in Chapter 1 of the EIS.*

Comment: And my final point is that I'm very familiar with the efforts to pursue renewable energy off the coast of New Jersey, including wind, wave, and tidal energy. These are in the nascent stages of development. But if you look at the projected production, energy production from these sources, it certainly will not meet the future demand for our state, which continues to grow, as we continue to develop. (**0002-4-8** [DeLuca, Mike])

Response: *This comment suggests that a number of advanced renewable energy sources will be insufficient to meet power needs in the New Jersey region. Capacity requirements will be discussed in Chapter 8 of the EIS.*

Comment: And we feel that it is important to develop nuclear power generation, and feel that siting a plant, here in an area that is already dedicated to producing nuclear power, is a particularly efficient way to do it, because it takes advantage of the infrastructure that is already in place, for the plants that exist there now. (**0002-5-4** [Duvall, Brian])

Response: *This comment provides general support for the construction of additional power generation units at the existing PSEG Site, noting they will take advantage of existing infrastructure. Site attributes will be discussed in detail in Chapter 2 of the EIS.*

Comment: And one other thing, the power that is produced by this facility is sold wholesale; it is on the PGM grid, which includes power plants in 13 states, and 50 million people. They are wholesale producers of electricity. It just doesn't go to the people of New Jersey. The people of New Jersey buy their power on the wholesale market, like everybody else in the PGM grid. So it is slightly misleading to say the power generated in New Jersey comes, so much percentage comes from the Salem Nuclear Plant. That power they produce goes to 13 different states. So if that unit IV is not built, the people in New Jersey will still get power from all the other facilities in the PGM grid. And that is an important aspect that a lot of people don't know about. (**0002-6-21** [Schneider, Richard])

Response: *This comment notes that power from the proposed power plant will be sold to the PJM grid (regional transmission organization that coordinates the movement of wholesale* *electricity within the New Jersey region) and will not be specifically reserved for the State of New Jersey. The nature of the power grid and circumstances relevant to the New Jersey region will be discussed in Chapter 8 of the EIS.*

Comment: The key thing I think, when I take a look at the energy question that we have in the United States, has to do with coal generation, and the fact that fewer and fewer coal generated facilities are going to be used in our future. Whether Cap and Trade passes or not, coal generation is on the way out. And what is going to replace it? At Mannington Mills we have solar generation, and I'm very proud of what we have been able to do with that. But, quite frankly, that solar generation would not be economical unless the federal government had heavy tax subsidies, in order to make it happen. The same thing has to do with wind. And while I think the solar and wind generation title, etcetera, is wonderful, sustainable and good, we have to have large generation of fossil free, in order for us to be able to get environmental goal posts that we would like to hit as a society. And, obviously, I'm here tonight saying I think nuclear is a very, very good alternative. And I have a high degree of confidence in the fact that PSEG can deliver. (**0002-8-2** [Campbell, Keith])

Response: *This comment describes issues associated with several alternative sources of power for the New Jersey region. These and related issues will be discussed in detail in Chapters 8, 9, and 10 of the EIS.*

Comment: We need to keep pace with our state's energy needs. The U.S. Department of Energy projects that national electricity demand will increase 28 percent by 2035, and to maintain nuclear energy's current 20 percent contribution, we must build about one new reactor per year starting in 2016. New wind and solar power will definitely play a part in our energy future, but the simple nature of their intermittency requires something more. The New Jersey Energy Coalition supports the development of a new nuclear facility here in Salem County as it will help mitigate rising energy demand with a clean power source that fuels job growth and strengthens our economy. (**0004-6** [Salmon, Edward])

Comment: And, the power generated by the new plant will help meet the ever growing energy demand. (**0006-4** [Patouhas, Maria])

Response: *These comments note the general need for additional generating capacity in the New Jersey region and the desirability of a portfolio of capacity containing nuclear and renewable energy sources. Need for power will be discussed in Chapter 8 of the EIS.*

Comment: Nuclear power supplies the State of New Jersey with about 52% of its electric needs. It is important in meeting the energy demand of not only the State and but the region as well. Producing this electricity with Nuclear power is done without creating greenhouse gases, which is an important and critical component to this discussion, given the global warming situation. Equally important is that there is no impact on the local environment. (**0005-3** [Hassler, Charles])

Response: *This comment provides general support for nuclear power in the New Jersey region, noting a number of environmental advantages. This comment will not be addressed* *specifically in the EIS, but a discussion of the balance between benefits and costs of the proposed facility will be discussed in Chapter 10 of the EIS.*

Comment: Without these plants the reliability of the electric delivery to meet demand would be put at risk. As demand increases, we must consider the need for another nuclear power plant. (**0005-5** [Hassler, Charles])

Comment: At the May 4, 2010 public meeting that the NRC held on this project I commented on the importance of providing additional electrical generation capacity to meet the energy needs of New Jersey residents and businesses. Those comments are still applicable especially the need to provide base load generating capacity supplemented by renewable energy projects such as wind and solar in New Jersey. (**0011-4** [Molzahn, Robert])

Response: *These comments note the need to increase generating capacity to maintain electric reliability in the face of increasing demand for power. Need for Power will be addressed in detail in Chapter 8 of the EIS.*

Comment: Nuclear energy now supplies over 50% of our state's energy needs and it is recognized an efficient, clean, low carbon form of energy production; our needs for energy continues to grow. (**0008-2** [Lacandro, Roger])

Response: *This comment notes the general attributes of nuclear power that makes it attractive as a power source. This comment will not be discussed specifically, but a balance of the benefits and costs associated with the proposed power plant will be contained in Chapter 10 of the EIS.*

D.2.28 Comments Concerning Alternatives—Energy

Comment: First, let's reduce our demand for energy. More efficient fuel construction in the transportation sector, better construction design, both in new construction and retrofitting existing living and working spaces, were top candidates. We recognized, however, that the economics of inexpensive fossil fuels made voluntary action unlikely without government incentives. (**0001-10-1** [Applegate, Jim])

Comment: New Jersey Nuclear Power supplies the state of New Jersey with about 52 percent of its electric needs. It is important in meeting electric demand, of not only the state, but the region also. Producing this electricity with nuclear power is done without creating greenhouse gases, which is an important and critical component to this discussion, given the global warming situation. Equally important is that there is no impact on the local environment. Without these plants the reliability of electric delivery to meet demand, would be put at risk. (**0001-17-4** [Hassler, Charles])

Comment: In the case of global warming our solutions fell into 3 categories: First: Reduce our demand for energy. More efficient fuel consumption in the transportation sector and better construction design -both in new construction and in retrofitting existing living and working spaces -were top candidates. We recognized, however, that the economics of inexpensive fossil fuels made voluntary action unlikely without government incentives.

Second: Bringing more renewable energy sources on line. Here we liked solar energy, wind energy and biofuels. At the time we were discussing these ideas we had only limited experience with these technologies. Experience over the past decade tells us that each of these solutions comes with a cost. We cover fragile desert habitats with solar panels while ignoring the warehouse rooftops and other existing opportunities that have much less impact. Wind energy leaves a construction and service footprint at the expense of wildlife habitats and operation can have serious impacts on mortality of migrating birds. Land growing biofuels has very limited wildlife habitat value. Barry Commoner was right -There is no such thing as a free lunch.

Our third option was a re-examination of nuclear power generation -a technology not considered a part of the package while we taught the course, but evidently back on the table as evidenced by this hearing. We recognized the value of generating usable energy without increasing greenhouse gases. (**0010-1** [Applegate, Jim])

Response: *The NRC is not involved in establishing energy policy; rather, it regulates nuclear energy to protect public health and safety within existing policy. While energy efficiency measures could reduce demand in the PSEG service area, in accordance with NUREG-1555 a merchant plant is not required to perform a demand-side management analysis or consider measures to increase energy efficiency as an alternative to the proposed action. Chapter 9 of the EIS will describe the potential environmental impacts of alternative energy sources, including fossil fuels and renewable sources of energy.*

Comment: Our second class of solutions was bringing more renewable energy sources online. Here we liked solar energy, wind energy, and biofuels. At the time we were discussing these ideas, we had only limited experience with these technologies. Experience, over the past decade, tells that each of these solutions comes with a cost. We cover fragile desert habitats with solar panels, while ignoring the warehouse rooftops, and other existing opportunities that would have much less impact. Wind energy leaves a construction and service footprint at the expense of wildlife habitats, and operation can have serious impacts on mortality of migrating birds. Land growing biofuels have very limited wildlife habitat value. Barry Commoner was right, 50 years ago, there is no such thing as a free lunch. (**0001-10-2** [Applegate, Jim])

Comment: Our third option was reexamination of nuclear power generation. A technology not considered a part of the package while we taught that course but, evidently, back on the table, as evidenced by this hearing. We recognized the value of generating large amounts of usable energy without increasing greenhouse gases. (**0001-10-4** [Applegate, Jim])

Comment: Salem County is now recognized as the alternative energy capital of the northeast. Not only are we fortunate enough to have three operating nuclear plants, we recently had ground breaking on significant solar projects that will develop 92 megawatts of energy. With the addition of the fourth unit, which has the majority of the infrastructure to support it, we believe that this county, and this country, is moving in the right direction by creating alternative energy projects, and removing our dependency on foreign oil. (**0001-12-4** [Kugler, John])

Comment: New wind and solar power would definitely play a role in our energy future. But the simple nature of their intermittency requires something more. (**0001-13-14** [Salmon, Edward])

Comment: Nuclear is clean, it produces zero carbon emissions, or critical air pollutants. In 2009, alone, New Jersey's nuclear power plants avoided the emission of 142,000 tons of sulfur dioxide, and 30 million, trillion metric tons of carbon dioxide emissions that contribute to green house gases, smog, and acid rain. Nuclear energy accounts for 73 percent of the nation's emission-free, electrical generation. And it needs to expand this role, in commitment with other renewable sources, to meet the rising energy demand in an environmentally responsive manner. (**0001-13-6** [Salmon, Edward])

Comment: As previously stated, we believe that nuclear power, as a source for clean, reliable, carbon free electrical generation, is the best solution to the nation's current and future energy needs. And it poses the least potential threat to the natural environment, when compared with other generation sources, such as wind, solar, and biomass. (**0001-6-2** [Lewis, Kenneth])

Comment: This proposed 2,200 megawatt nuclear facility, sited on 350 acres, operating at a slightly conservative capacity of 90 percent, will produce 1,980 megawatts. By comparison, to grow enough switch grass to fire boilers for electrical generation, equal to the output of this proposed facility, assuming a middle range per acre harvest of switch grass, would require 3,700 square miles. That area required in this particular region, makes the solution really not of any consideration, because it represents about 40 percent of the state area. (**0001-6-4** [Lewis, Kenneth])

Comment: Another alternative, solar cell installations on open land, requires large areas, and poses a significant threat to the flora and fauna in the geographical regions in which they are proposed. For example, at Nellis Air Force Base in the Nevada desert, one megawatt devices installations on 9.3 acres of land, with solar tracking devices, which makes them highly efficient. In New Jersey, where the sun is less intense, a 275 square mile installation would be required to equal the electrical output of the proposed reactor. Solar cells installed on existing structure may not pose any, as yet, recognized threat to the environment. And we support that particular application. (**0001-6-5** [Lewis, Kenneth])

Comment: To many environmental groups renewable energy is a preferable alternative to nuclear reactors. To those concerned with the conservation of biological diversity, however, the cumulative ecological impacts of large scale, renewable projects, will be their most detrimental effect. We believe that concerns for the cumulative ecological impacts of the alternatives, wind, solar, and biomass, should be included in the final EIS, as a reason for rejecting them as an alternative to nuclear power. (**0001-6-6** [Lewis, Kenneth])

Comment: These factors are major part of the reason that the Maryland Conservation Council is bucking the trend of most of the major environmental groups, in our enthusiastic support of nuclear energy, and our opposition to most of the renewable options, particularly wind. (**0001-7-14** [Eastman, Ajax])

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement, in order to show that, by comparison, nuclear energy is far preferable, is a far preferable option. (**0001-7-3** [Eastman, Ajax])

Comment: The PSEG site application, part three, environmental reports, contains a good analysis of the renewable options compared to the nuclear option. The ESP concludes that wind turbines, solar thermal power, and photovoltaic technologies, due to the intermittency of wind and sun, are not competitive to the reliability of nuclear power. (**0001-7-5** [Eastman, Ajax])

Comment: I'm particularly interested in addressing the biological impacts of renewables, primarily wind. This technology has had a huge impact on the biological world. In order to produce an equivalent amount of energy, wind requires an enormous footprint. As pointed out, in their Environmental Report, quote, to replace the energy equivalent of a 2,000 MWe of nuclear capacity, operating at 90 percent capacity factor, approximately 3,300 two MWes, wind turbines, operating at a capacity factor of 30 percent, would be required.

These turbines would be sited on 396,000 acres. That is 619 square miles, and disturbs 19,800, or 31 acres, or 31 square miles, to accommodate the physical footprint of the towers themselves. I like that the ESP's comparison of that amount of land, I like the comparison to 15 times the area of Norfolk, that is a lot of land. (**0001-7-6** [Eastman, Ajax])

Comment: Whether the area is on land, or offshore, it is mind boggling to think of the potential harm, and humongous impacts of industrial wind. On land, particularly, the Appalachian Mountains of the East, the 396,000 acres, required, would destroy the mainly unfragmented, biologically rich forests, which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is, also, a major migratory corridor for birds, bats, and raptors. Yet without full review of environmental impacts, or cost to taxpayers and customers, permits are being granted.

As for the impacts offshore, we really can't know the full extent of the harm turbines will have on the aquatic resources, benthic organisms, oceanic mammals, or pelagic birds. Where is the precautionary principle in the blind acceptance of, and push for, such a destructive form of energy? (**0001-7-7** [Eastman, Ajax])

Comment: At the May 4th, 2010 public meeting that NRC held on the project I commented on the importance of providing additional electrical generating capacity to meet the energy needs of New Jersey residents and businesses. These comments are, of course, still applicable, especially the need to provide base load generating capacity, supplemented by renewable energy projects, such as wind and solar, in New Jersey. (**0001-8-4** [Molzahn, Robert])

Comment: I also mentioned that PSEG new nuclear unit will provide power for more than 3 million homes each day, as opposed to fossil fuel power plants, and there will be no green house gas emissions, such as CO_2 or methane, as was mentioned by previous speakers. No SO_2 or NOX emissions that could contribute to acid rain, or nitrification of our waterways. And also no mercury emissions that could detrimentally affect aquatic life in the Delaware River and Bay. (**0001-8-5** [Molzahn, Robert])

Comment: Solar and wind is safe, and clean energy (**0002-6-22** [Schneider, Richard])

Comment: We need to keep pace with our state's energy needs. The U.S. Department of Energy projects that national electricity demand will increase 28 percent by 2035, and to maintain nuclear energy's current 20 percent contribution, we must build about one new reactor per year starting in 2016. New wind and solar power will definitely play a part in our energy future, but the simple nature of their intermittency requires something more. The New Jersey Energy Coalition supports the development of a new nuclear facility here in Salem County as it will help mitigate rising energy demand with a clean power source that fuels job growth and strengthens our economy. (**0004-5** [Salmon, Edward])

Comment: In evaluating environmental issues relative to this nuclear power facility and alternative energy sources that might be proposed to negate its necessity biomass is listed as a consideration. This proposed 2200 Megawatt (MW) nuclear facility sited on 350 acres operating at a slightly conservative capacity factor of 90% will produce 1980 MW. By comparison to grow enough switch grass to fire boilers for electrical generation equal to the output of the nuclear facility (assuming a middle of the range yield of 2.5 metric tons per acre per year would require planting 3700 square miles. The area required in this region makes this solution impractical because it represents about 40% of the area of the state. (**0007-3** [Lewis, Kenneth])

Comment: Another alternative, solar cell installations on open land, requires large areas and pose a significant threat to the flora and fauna in the geographical regions in which they are proposed. For example, at Nellis Air Force Base in the Nevada desert 1 MW of NAMEPLATE capacity is installed on 9.3 acres of land and these are sophisticated devices that track the sun. In New Jersey where the sun is less intense a 275 square mile installation would be required to equal the electrical output of the proposed reactor. Solar cells installed on existing structure may not pose any as yet recognized threat to the environment and we support them. (**0007-4** [Lewis, Kenneth])

Comment: There are two key sections in every EIS: The first is an analysis of the cumulative impacts of the proposed action, and the second is an analysis of alternatives to the proposed action. Thus, the dEIS states: Cumulative impacts result when the effects of an action are added to or interact with other past, present, and reasonably foreseeable future effects on the same resources. And further: These combined impacts ... include individually minor but collectively potentially significant actions taking place over a period of time. To many environmental groups renewable energy is a preferable alternative to reactors. To those concerned with the conservation of biological diversity, however, the cumulative ecological impacts of large-scale renewable projects will be their most detrimental effect. We believe that concern for cumulative ecological impacts of the Alternatives, wind, solar, and biomass should be included in the final EIS as a reason for rejecting them as an alternative. (**0007-5** [Lewis, Kenneth])

Comment: Salem County is now recognized as the alternative energy capital of the Northeast. Not only are we fortunate enough to have three operating nuclear power plants we recently had ground breakings on significant solar projects that will develop 92 megawatts of energy. With the addition of a fourth unit, which has the majority of the infrastructure to support it, we believe this country is moving in the correct direction by creating alternative energy projects and removing our dependency on foreign oil. (**0009-5** [Kugler, John])

Comment: At the May 4, 2010 public meeting that the NRC held on this project I commented on the importance of providing additional electrical generation capacity to meet the energy needs of New Jersey residents and businesses. Those comments are still applicable especially the need to provide base load generating capacity supplemented by renewable energy projects such as wind and solar in New Jersey. (**0011-3** [Molzahn, Robert])

Comment: I also mentioned that PSEG's new nuclear unit will provide power for more than three million homes each day and, as compared to fossil fuel power plants, there will be no greenhouse gas emissions such as C02 or methane. There will also be no S02 or NOx emissions that would contribute to acid rain or nitrification of our waterways. There will also be no mercury emissions that could detrimentally affect aquatic life in the Delaware River and Bay. (**0011-5** [Molzahn, Robert])

Comment: Whether that area is on land or offshore, it is mind boggling to think of potential harm and humongous impacts of industrial wind. On land, particularly in the Appalachian mountains of the east, the 396,000 acres required would destroy the mainly unfragmented, biologically rich forests which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is also a major migratory corridor for birds, bats, and raptors. Yet without full review of the environmental impacts or the costs to taxpayers and customers, permits are being granted. As for impacts offshore, we really can't know the full extent of the harm turbines will have on aquatic resources, benthic organisms, oceaneantic mammals, or pelagic birds. Where is the precautionary principle in the blind acceptance of and push for such a destructive form of energy? (**0012-10** [Eastman, Ajax])

Comment: In addition, I urge that the cumulative ecological impacts of alternative energy generating sources be included in the Environmental Impact Statement (EIS) in order to show that by comparison nuclear energy is a far preferable option. (**0012-3** [Eastman, Ajax])

Comment: The PSEG Site ESP application, Part 3, environmental reports contains a good analysis of the renewable options compared to the nuclear option. The ESP concludes that the wind turbines, solar thermal power, and photovoltaic technologies, due to the intermittency of the wind and sun are not competitive to the reliability of nuclear power. (**0012-6** [Eastman, Ajax])

Comment: I am particularly interested in addressing the biological impacts of renewables, primarily wind. This technology has a huge impact on the biological world. In order to produce an equivalent amount energy, wind requires an enormous footprint. As pointed out in their Environmental Report, ... to replace the energy equivalent a 2200 MWe of nuclear capacity operating at 90 percent capacity factor, approximately 3300 2 MWe wind turbines operating at a capacity factor of 30 percent would be required. These turbines would be sited on 396,000 acres (619 square miles) and disturb 19,800 acres (31 square miles) to accommodate the physical footprint of the towers themselves. (I like the ESP's comparison of that amount of land to 15 times the area of Newark!) (**0012-7** [Eastman, Ajax])

Response: *Alternate energy sources, including fossil fuels and renewable sources of energy (such as wind, solar, and biomass), will be evaluated and discussed in Chapter 9 of the EIS in comparison to a nuclear plant. The potential environmental impacts of these alternate energy sources will also be addressed in Chapter 9.*

Comment: So we want to educate, and stress the need for a broad energy platform, that includes conservation, green job initiatives, energy efficiency, supply diversity, transmission upgrade, clean baseload generation, and healthy, smart, economically viable, renewable energy projects. (**0001-13-1** [Salmon, Edward])

Comment: Alternative sources are important, and we support them. But they only can take us so far. Wind and solar are intermittent, and lack the sheer capacity of baseload plants. Conservation efforts, energy efficiency enhancements, and a diverse mix of energy sources will serve us best. However, we should promote an increase in the use of nuclear energy, as an environmentally clean and reliable solution. (**0001-13-7** [Salmon, Edward])

Comment: And my final point is that I'm very familiar with the efforts to pursue renewable energy off the coast of New Jersey, including wind, wave, and tidal energy. These are in the nascent stages of development. But if you look at the projected production, energy production from these sources, it certainly will not meet the future demand for our state, which continues to grow, as we continue to develop. (**0002-4-7** [DeLuca, Mike])

Comment: Most of the Academy's programs have a component in them that focuses on global climate change. And we feel that that is an extremely important thing for people to be exposed to, to learn about, and especially the kids that we deal with, in education programs. There is no question that conservation measures, in terms of electrical usage, is an important part of combating that trend, as well as developing increased access to renewable sources of energy. But there is nuclear technology, which has been around for a long time, and has successfully been applied to providing baseload for the state of New Jersey, and the country as a whole, it is a proven technology, and is one that is carbon free. (**0002-5-3** [Duvall, Brian])

Comment: The goal is to make electricity. But I feel that PSEG is going to be spending tens of billions of dollars on this nuclear plant. I think they would be better invested to invest in solar and wind farms, which could be built in the matter of a year, one year; you could have a farm built. With this new plant it will take, probably, ten years to build. You could be generating electricity immediately. I think it is a better investment. (**0002-6-2** [Schneider, Richard])

Comment: As a young engineer, in the nuclear industry, one of the most exciting aspects of my future career, is the possibility of new nuclear. And while wind, solar, and other carbon-free forms of energy are important, and definitely needed, to provide for the energy demand that we have now and in the future, new nuclear must be a part of that equation. (**0002-7-1** [Nedd, Sheranee])

Comment: The key thing I think, when I take a look at the energy question that we have in the United States, has to do with coal generation, and the fact that fewer and fewer coal generated facilities are going to be used in our future. Whether Cap and Trade passes or not, coal generation is on the way out. And what is going to replace it? At Mannington Mills we have solar generation, and I'm very proud of what we have been able to do with that. But, quite frankly, that solar generation would not be economical unless the federal government had heavy tax subsidies, in order to make it happen. The same thing has to do with wind. And while I think the solar and wind generation title, etcetera, is wonderful, sustainable and good, we have to have large generation of fossil free, in order for us to be able to get environmental goal posts that we would like to hit as a society. And, obviously, I'm here tonight saying I think nuclear is a very, very good alternative. And I have a high degree of confidence in the fact that PSEG can deliver. (**0002-8-3** [Campbell, Keith])

Comment: Nuclear generation is clean. It produces zero carbon emissions or criteria air pollutants. In 2009 alone, New Jersey's nuclear power plants avoided the emission of one hundred and forty-two thousand tons of sulfur dioxide and 30 million metric tons of carbon dioxide, emissions that commonly contribute to greenhouse gases, smog and acid rain. Nuclear energy accounts for 73 percent of the nation's emission-free electrical generation, and it needs to expand this role in compliment with other renewable sources to meet rising energy demand in an environmentally responsible matter. Alternative sources are important, but can only take us so far -wind and solar are intermittent and lack the sheer capacity of base load plants. (**0004-1** [Salmon, Edward])

Comment: Conservation efforts, energy efficiency enhancements and a diverse mix of energy sources will serve us best. However, we should promote an increase in the use of nuclear energy as an environmentally clean and reliable solution. New Jersey needs to better acknowledge and take advantage of the proven technology capable of providing carbon-free base load electricity. The development of new nuclear generating facilities is essential if we are going to address climate change, meet demand increases in a meaningful way, and promote energy independence from the Middle East. Changes in federal air regulations, the age of existing facilities and an improving economy all signal the need for new clean base load power supplies. (**0004-2** [Salmon, Edward])

Comment: While I am not an expert in energy generation, there is no question that the future welfare of human society depends on reducing energy use and developing zero carbon sources of energy. Many experts have indicated that nuclear power represents a viable alternative in the short term and must be part of any mix of conservation and new energy sources that are used to make the transition to a zero carbon future. (**0014-15**, **0001-4-10**, **0014-18** [Velinsky, David])

Response: *The NRC is not involved in establishing energy policy; rather, it regulates nuclear energy to protect public health and safety within existing policy. An assessment of a broad energy platform that includes such items as conservation and energy efficiency and/or alternate sources of energy is beyond the scope of this EIS. Nevertheless, Chapter 9 of the EIS will describe the potential environmental impacts of alternative energy sources, including fossil fuels and renewable sources of energy, in comparison to nuclear power.*

Comment: Another factor to consider, in comparing nuclear power to wind, is the life expectancy of the turbines. Many of the nuclear reactors, in the United States, are over 40 years old, and are still producing energy at 90 percent capacity. Whereas the thousands of turbines, being proposed, or already built, have a life expectancy of only 25 years, at a 30 percent capacity factor. (**0001-7-10** [Eastman, Ajax])

Comment: Another factor to consider in comparing nuclear power to wind is the life expectancy of the turbines. Many of the nuclear reactors in the United States are over 40 years old and are still producing energy at 90 percent capacity, whereas the thousands of turbines being proposed or already built have a life expectancy of only 25 years at a 30 percent capacity. (**0012-12** [Eastman, Ajax])

Response: *A detailed assessment of the engineering details of alternate power production (such as those associated with wind turbines) is beyond the scope of this environmental review and will thus not be addressed in the EIS. Nevertheless, the potential environmental impacts of alternatives, such as wind energy, will be addressed in Chapter 9 of the EIS.*

Comment: Whether the area is on land, or offshore, it is mind boggling to think of the potential harm, and humongous impacts of industrial wind. On land, particularly, the Appalachian Mountains of the East, the 396,000 acres, required, would destroy the mainly unfragmented, biologically rich forests, which are not only habitat for bats and nesting neo-tropical birds, but also habitat for terrestrial flora and fauna. The area is, also, a major migratory corridor for birds, bats, and raptors. Yet without full review of environmental impacts, or cost to taxpayers and customers, permits are being granted.

As for the impacts offshore, we really can't know the full extent of the harm turbines will have on the aquatic resources, benthic organisms, oceanic mammals, or pelagic birds. Where is the precautionary principle in the blind acceptance of, and push for, such a destructive form of energy? (**0001-7-8** [Eastman, Ajax])

Response: *Impacts of alternative energy sources such as industrial and wind will be discussed in Chapter 9.0*

Comment: As for impacts offshore, we really can't know the full extent of the harm turbines will have on aquatic resources, benthic organisms, oceaneantic mammals, or pelagic birds. (**0012-11** [Eastman, Ajax])

Response: *Alternative energy sources and their potential impacts to aquatic resources will be discussed in Chapter 9.*

D.2.29 Comments Concerning Alternatives—System Design

Comment: The Army Corps of Engineers and PSEG must consider an alternative to the land swap, such as using the existing road to Artificial Island, instead of creating a second road if, and when, a nuclear facility is permitted. In our view the existing access road should be sufficient. Issues associated with new spoil disposal site are, as yet, unknown, as the sites under consideration are unknown. But there are likely to be issues, considering the Army Corps of Engineers for riverfront lands. (**0001-19-7** [Blake, Matt])

Comment: The Army Corps and PSEG must consider an alternative to the land swap, such as using the existing access road to Artificial Island instead of creating a second road, if and when a new nuclear facility is permitted. This would avoid destruction of wetlands and obviate the need for a new dredge disposal site. In our view, the existing access road should be sufficient and no additional destruction of wetlands should be permitted at the site. Issues associated with a new spoil disposal site are as yet unknown as the sites under consideration are unknown. But there are likely to be issues, considering the Anny Corps' preference for riverfront lands. (**0003-6** [Batty, Sandy] [Dillingham, Tim] [Galetto, Jane Morton] [Goldsmith, Amy] [McNutt, Richard] [Nolan, Christine] [O'Gorman, Margaret] [Schulte, James] [van Rossum, Maya])

Comment: The EIS should require clearer evaluation of PSEG's use of the Army Corps confined disposal facility, the agreement to do so, and any cumulative impacts resulting from use of the site. According to the ER 4.1-9, there will be construction laydown and related activities located in the Corps CDF site. It is unclear what long-term or permanent impacts may result, despite the site use for temporary activity. The NRC should consider these potential impacts and the full range of alternatives in its EIS. Moreover, the EIS should consider the chain reaction of environmental impacts if the CDF is used for another purpose. The NRC should also examine the mechanism by which the Army Corps is providing the use of this land and any impacts this may have on Army Corps permit reviews or regulatory processes for the Project. (**0018-8** [Brown, Elizabeth])

Response: *In regard to the "land swap" mentioned in the comments, Chapters 4 and 5 of the EIS will address the proposed use of the Corps' existing Containment Disposal Facility (CDF) at the north end of Artificial Island, as well as the proposed exchange of property between PSEG and the Corps to provide a functional replacement for the existing CDF. The potential environmental impacts of the proposed new access road to the PSEG Site will be addressed in Chapter 4 of the EIS.*

Comment: In reviewing the PSEG Early Site Permit application, and Environmental Report filed on May 25th, 2010, we noted that the new units intake and cooling systems will be designed to minimize the impact to the aquatic community, by utilizing cooling towers, and an intake system and design flows that conform to best available technology as required under Section 316B of the Clean Water Act. The cooling tower blow-down discharge should have little impact on the Delaware River, at this location, or significantly elevate river water temperatures. (**0001-8-6** [Molzahn, Robert])

Comment: A new plant will provide an excellent opportunity to incorporate new technology, hopefully to produce cleaner, safer energy, and especially if a cooling tower is incorporated into the new plans. I'm familiar with the impingement and entrainment, as I said. The much reduced need for water in a cooling tower process, you know, will reduce much of that impact, considerably. I know of no scientific study that proves that the present cooling processes, at Salem and Hope Creek has generated any impact on the estuary. It can be debated, it can be argued. But I have not seen a scientific study that really proves that fact. After reviewing the EPS request, I find no reason to deny the requested permit. (**0001-9-4** [Lacandro, Roger])

Comment: A new plant will provide an excellent opportunity to incorporate new technology, hopefully, to produce cleaner, safer energy especially if a cooling tower is incorporated to significantly reduce bay water usage, impingement and entrainment of aquatic biota and the impact of large quantities of elevated temperature water reentering the estuary. (**0008-5** [Lacandro, Roger])

Comment: In reviewing the PSEG ESP Application and Environmental Report filed on May 25, 2010, we noted that the new units intake and cooling systems will be designed to minimize the impact to the aquatic community by utilizing cooling towers and an intake system and design flows that conform to Best Available Technology as required by Section 316(b) of the Clean Water Act. The cooling tower blowdown discharge should have little effect on the Delaware River at this location or significantly elevate river water temperatures. (**0011-8** [Molzahn, Robert])

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts of the proposed facility will be limited by the use of a closed cycle cooling system. Compared to a once-through system, these cooling towers will divert much less water for cooling. Projected maximum diversion for the new facility is less than 4% of the current amount used by the Salem Generating Station and is a very small fraction the total volume of the Delaware River flow. As a result, impingement of fish populations will be a small fraction--less than 3% of the current level of the Salem station.

Because of the closed cooling system, we would also expect the thermal plume of the new plant to be localized and relatively small, with no significant impact on the local aquatic biota. The conclusion is based on past studies of the impact of thermal plumes from the existing PSEG generating plants, the expected operation of the proposed cooling structures, and our understanding of the ecology of aquatic species in the vicinity of the plant. (**0014-17** [Velinsky, David])

Response: *No specific nuclear reactor or reactor design has yet been proposed for the PSEG Site; rather, the ESP application is merely seeking approval from the NRC to bank the PSEG Site for possible future use. Subsequent approvals would be needed from the NRC prior to the construction and operation of any nuclear reactor unit(s) at the PSEG Site. Nevertheless, Chapter 3 of the EIS will describe the plant parameter envelope on which the assessment of potential environmental impacts will be based. The hypothetical design of any water intake systems and/or cooling towers will be developed by PSEG and offered to the NRC for review as part of the assessment in the EIS. The potential environmental impacts of such facilities will be addressed in Chapter 4 and 5 of the EIS.*

Comment: Finally, NRC must evaluate the impacts and all viable alternatives for cooling. DRN notes that EPA's Phase I regulations for new sources require closed-cycle cooling, which the new plant will have. 68 Fed. Reg. 36749-36755 (June 19, 2003). DRN has long advocated for closed-cycle cooling at the existing Salem facility. However, that does not mean that closed-cycle cooling is without impacts, or that one size fits all when selecting the specific cooling technology. According to the ER "Compared with a once- through cooling system, a closed cycle cooling system substantially reduces the volume of water diverted for cooling but increases consumptive water use as a result of evaporation loss in the cooling tower." (**0018-14** [Brown, Elizabeth])

Comment: The ER notes that PSEG is evaluating three different closed-loop designs for the cooling water system of the new plant: mechanical draft, natural draft, and fan- assisted natural draft. However, only the mechanical and natural draft designs were evaluated in the ER. The EIS must evaluate all alternatives, including any not evaluated in the ER, to ensure that all environmental impacts are adequately assessed. (**0018-18** [Brown, Elizabeth])

Comment: Therefore, DRN urges NRC to review certain issues in more detail, including: clearer evaluation of PSEG's use of the Army Corps confined disposal facility, and cumulative impacts resulting from use of that site; water impacts including dredging and construction impacts; filling of wetlands; floodplain impacts; habitat impacts and impacts to species, especially Atlantic sturgeon; and impacts and evaluation of alternatives for cooling systems. (**0018-5** [Brown, Elizabeth])

Response: *The impacts of viable alternatives for the cooling system will be addressed in Chapter 9 of the EIS.*

Comment: Clearly, the EIS will need to address the impact of dredging and related shoreline disturbance and take all viable alternatives into account. (**0018-10** [Brown, Elizabeth])

Response: *Potential impacts of construction activities such as dredging and shoreline disturbances will be evaluated in Section 4.3.2 of the EIS. In addition, alternative technologies will be discussed in Chapter 9.*

Comment: And if you want to create jobs in this state, here, the way to do it is build solar farms, build wind farms. Build two new cooling towers at Salem I and II. They will create hundreds of construction jobs. And, also, you will create fishing jobs, which add up to thousands and thousands of jobs. That should be the approach, also, that should be considered in the overall discussion of this issue. (**0002-6-15** [Schneider, Richard])

Response: *The NRC is not involved in establishing employment programs or policy nor in promoting employment opportunities within any state; rather, it regulates nuclear energy to protect public health and safety within existing policy. The alternatives described in the comment are beyond the scope of the review being conducted by the NRC for this Early Site Permit application; hence, they will not be addressed in the EIS.*

D.2.31 Comments Concerning Benefit-Cost Balance

Comment: With rising energy costs a concern for every American, nuclear power plants are the lowest cost producer of baseload electricity, especially in a region that is densely populated, and whose industry drives demand, nuclear generation's low cost, and reliability, fosters a competitive energy market, and keeps electric costs down for the ratepayer. (**0001-13-11** [Salmon, Edward])

Comment: Other benefits to building this new unit that would have a positive impact regionally are the boost to the local economy with the purchase of commodities such as:

400,000 cubic feet of concrete
66,000 tons of steel
44 miles of piping
300 miles of electrical wiring
130,000 electrical components (**0009-8** [Kugler, John])

Comment: And, lastly, we are all ratepayers. And what does a ratepayer want? The ratepayer wants to pay a lower energy cost. And with the added value of a fourth nuclear power plant we will all get that. So with that we support this plan one hundred percent, and I thank you very much. (**0001-22-6** [Kehoe, Jim])

Comment: Nuclear energy is also affordable and reliable. With rising energy costs a concern for every American, nuclear power plants are the lowest-cost producer of base load electricity. Especially in a region that is densely populated and whose industry drives demand, nuclear generation's low cost and reliability fosters a competitive energy market and keeps electric costs down for the ratepayer. (**0004-3** [Salmon, Edward])

Response: *The comments note the general attributes of nuclear power that makes it attractive as a power source. This comment will not be discussed specifically, but a balance of the benefits and costs associated with the proposed power plant will be contained in Chapter 10 of the EIS.*

APPENDIX E

DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS AND RESPONSES

APPENDIX E

DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS AND RESPONSES

As part of the U.S. Nuclear Regulatory Commission (NRC) review of the PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) application for an early site permit (ESP) at the PSEG Site in Lower Alloways Creek Township, Salem County, New Jersey, the NRC and the U.S. Army Corps of Engineers (Corps or USACE) (together referred to as the "review team") solicited comments from the public on the draft environmental impact statement (EIS), which was issued in August 2014. A 75-day comment period began on August 22, 2014, when the U.S. Environmental Protection Agency (EPA) issued a *Federal Register* Notice (79 FR 49774) on the filing of the draft EIS to allow members of the public to comment on the results of the environmental review. The comment period was subsequently extended by an additional 30 days and therefore ended on December 6, 2014.

As part of the process to solicit public comments on the draft EIS, the review team:

- placed a copy of the draft EIS at the Salem Free Public Library in Salem, New Jersey;
- made the draft EIS available in the NRC's Public Document Room in Rockville, Maryland;
- placed an electronic copy of the draft EIS on the NRC website at www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2168/;
- provided a copy of the draft EIS to any member of the public who requested one;
- sent copies of the draft EIS to certain Federal, State, Tribal, and local agencies;
- published a notice of availability of the draft EIS in the *Federal Register* on August 22, 2014 (79 FR 49820-22);
- filed the draft EIS with the U.S. Environmental Protection Agency (EPA);
- held two public meetings on October 1, 2014, in Carneys Point, New Jersey; and
- held two public meetings on October 23, 2014, in Middletown, Delaware.

In addition, as part of the process to solicit public comments on the draft EIS, USACE Philadelphia District issued public notice CENAP-OP-R-2009-0157 dated September 4, 2014.

A combined total of approximately 75 people attended the two public meetings in New Jersey, and another 140 people attended the two public meetings in Delaware. Several attendees at each meeting provided oral comments, and a certified court reporter recorded these oral comments and prepared written transcripts of each meeting. The transcripts of the public meetings were published in October 2014 (see Agencywide Documents Access and Management System [ADAMS] Accession Number ML14310A384 for the transcript of the October 1 afternoon meeting and Accession Number ML14310A433 for the October 1 evening meeting) and November 2014 (see Accession Number ML14310A438 for the transcript of the

October 23 afternoon meeting and Accession Number ML14310A444 for the October 23 evening meeting). In addition to the comments received at the public meetings, the NRC received 45 letters and e-mail messages containing comments.

The comment letters, e-mail messages, and transcripts of the public meetings are available in ADAMS, which is accessible at http://www.nrc.gov/reading-rm.html. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC's Public Document Room reference staff at 1-800-397-4209 or 301-415-4737. ADAMS accession numbers for the letters and e-mail messages are provided in Table E-1.

E.1 Disposition of Comments

Each set of comments from a given commenter was assigned a unique correspondence identifier, allowing each set of comments from a commenter to be traced back to the transcript, letter, or e-mail in which the comments were submitted. After the comment period concluded, the review team considered and dispositioned all comments received. To identify each individual comment, the team reviewed the transcripts of the public meetings and each piece of correspondence related to the draft EIS. As part of the review, the review team identified statements that it believed were related to the proposed action and recorded the statements as comments. Each comment was assigned to a specific subject area, and similar comments were grouped together. Finally, responses were prepared for each comment or group of comments.

Some comments addressed topics and issues that are not part of the environmental review for this proposed action. These comments included questions about NRC's safety review, general statements of support or opposition to nuclear power, and comments on the NRC regulatory process in general. These comments are included, but detailed responses are not provided because the comments address issues not directly related to the environmental effects of this proposed action and are, thus, outside the scope of the National Environmental Policy Act of 1969, as amended (NEPA) review of this proposed action. If appropriate, these comments were forwarded to the appropriate organization within the NRC for consideration. Many comments, however, specifically addressed the scope of the environmental review, analyses, and issues contained in the draft EIS. Examples include comments about potential impacts, proposed mitigation, the agency review process, and the public comment period. Detailed responses to each of these comments are provided in this appendix. When the comments resulted in a change in the text of the draft EIS, the corresponding response refers the reader to the appropriate section of the EIS where the change was made. Throughout the final EIS, with the exception of this new Appendix E, revisions to the text from the draft EIS are indicated by vertical lines (change bars) in the margin beside the text.

Table E-1 provides a list of commenters identified by name, affiliation (if given), comment number, and the source of the comment.

Table E-2 provides an alphabetical index to the comment categories and lists the commenters and the specific comment identification number(s) that were included in each category.

Table E-1. Individuals Providing Comments on the Draft EIS

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
Acton, Julie	Sound County Freeholder	Meeting Transcript (ML14310A384)	0004-10
Applegate, Jim	University of New Brunswick	Meeting Transcript (ML14310A384)	0004-4
August, Bernard	Self	Meeting Transcript (ML14310A438)	0007-3
August, Bernard	Self	Meeting Transcript (ML14310A444)	0008-9
Bailey, David	Ranch Hope	Meeting Transcript (ML14310A433)	0006-11
Baillie, Joan	Salem Community College	Meeting Transcript (ML14310A433)	0006-3
Barch, Alexander	PSEG Nuclear at Salem	Meeting Transcript (ML14310A433)	0006-10
Blair, Kathy	Self	Email (ML14344A211)	0026
Bobbit, John	Salem County Chamber of Commerce	Meeting Transcript (ML14310A384)	0004-19
Bradway, Timothy	Lower Alloways Creek Township	Meeting Transcript (ML14310A433)	0006-2
Braun, Bob	PSEG Nuclear	Meeting Transcript (ML14310A433)	0006-5
Brook, David	Delaware Riverkeeper Network	Meeting Transcript (ML14310A433)	0006-4
Bucic, Sarah	Self	Meeting Transcript (ML14310A438)	0007-12
Burger, Joanna	Rutgers, the State University of New Jersey	Meeting Transcript (ML14310A384)	0004-5
Butch, Kerry Margaret	League of Women Voters of New Jersey	Letter (ML14345A164)	0022
Campion, George	Self	Letter (ML14356A128)	0046
Campion, Mary	Self	Letter (ML14356A186)	0047
Campion, Mary	Self	Meeting Transcript (ML14310A438)	0007-4
Cannon, John	Self	Letter (ML14302A076)	0010
Carter, David	Delaware Audubon Society	Letter (ML14345A847)	0034
Carter, David	Delaware Audubon Society	Meeting Transcript (ML14310A438)	0007-2

Table E-1. (continued)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
Carter, David	Delaware Audubon Society	Meeting Transcript (ML14310A444)	0008-8
Cassling, Margaret	Self	reg.gov comment (ML14345A976)	0043
Cathcart, Richard	Self	Meeting Transcript (ML14310A438)	0007-1
Chiarella, Louis	U.S. Department of Commerce/National Marine Fisheries Service	Letter (ML14332A089)	0018
Clancy, James	Self	Meeting Transcript (ML14310A438)	0007-10
Clapp, Leonard	Self	Email (ML14344A240)	0033
Collins, Carol	Self	reg.gov comment (ML14345A971)	0039
Cooksey, Sarah	Delaware Department of Natural Resources & Environmental Control	Letter (ML14344A252)	0023
Cornelia, Jared	Self	reg.gov comment (ML14345A849)	0036
DeLuca, Mike	Rutgers, the State University of New Jersey	Meeting Transcript (ML14310A433)	0006-6
DeLuca, Mike	Rutgers, the State University of New Jersey	Meeting Transcript (ML14310A438)	0007-17
DePaul, Shelly	Lenape Nation PA	Letter (ML14345A847)	0034
Deschere, Mark	Self	Meeting Transcript (ML14310A444)	0008-10
Doyle, Kathy	Self	Email (ML14344A208)	0024
Durnan, Alexander	Self	reg.gov comment (ML14345A979)	0045
Duvau, Bryan	Center for Aquatic Sciences at Adventure Aquarium	Meeting Transcript (ML14310A433)	0006-8
Eastman, Alice (Ajax)	Self	Meeting Transcript (ML14310A384)	0004-12
Egenton, Michael	New Jersey State Chamber of Commerce in Trenton	Meeting Transcript (ML14310A384)	0004-2
Eilola, Ed	PSEG Nuclear Leadership Team	Meeting Transcript (ML14310A438)	0007-7
Eilola, Ed	PSEG Nuclear Leadership Team	Meeting Transcript (ML14310A444)	0008-5

Table E-1. (continued)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
Elwell, Sean	Elsinboro Township	Meeting Transcript (ML14310A384)	0004-1
Erlich, Marion	Self	reg.gov comment (ML14345A974)	0041
Evans, Brenda	PSEG Hope Creek	Meeting Transcript (ML14310A444)	0008-2
Foster, Ruth	New Jersey Department of Environmental Protection	Letter (ML14344A203)	0021
Furst, Charles	Delaware River Shad Fisherman's Association	Letter (ML14345A847)	0034
Haggerty, Diane	Self	reg.gov comment (ML14345A975)	0042
Heffron, Rich	Delaware State Chamber of Commerce	Meeting Transcript (ML14310A384)	0004-24
Helder, Jason	Salem County Vocational School	Meeting Transcript (ML14310A384)	0004-23
Herron, Stephanie	Environmental Justice and Health Alliance for Chemical Society Reform	Meeting Transcript (ML14310A438)	0007-5
Herron, Stephanie	Environmental Justice and Health Alliance for Chemical Society Reform	Meeting Transcript (ML14310A444)	0008-4
Hufsey, Moe	IBEW Local Union 94	Meeting Transcript (ML14310A384)	0004-18
Hvozdovich, Steve	Clean Water Action	Letter (ML14345A847)	0034
Johnston, Clarence	Self	Letter (ML15005A039)	0048
Joyce, Tom	PSEG Nuclear	Meeting Transcript (ML14310A384)	0004-8
Keating, Thomas	Self	Email (ML14309A795)	0011
Killian, Lynn	Self	Email (ML14344A210)	0025
King, Charlotte	League of Women Voters of Delaware	Letter (ML14345A164)	0022
Kleinschmidt, Mark	New Castle County Chamber of Commerce	Meeting Transcript (ML14310A438)	0007-18
Locandro, Roger	Rutgers, the State University of New Jersey	Letter (ML14272A074)	0009
Lowman, Anthony	Rowan University	Meeting Transcript (ML14310A384)	0004-22

Table E-1. (continued)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
Magyar, David	Self	Letter (ML14309A246)	0012
Mallon, James	PSEG Power, LLC	Letter (ML14316A413)	0015
McHugh, Martin	McHugh Environmental Associates	Meeting Transcript (ML14310A384)	0004-15
McNutt, Richard	Tidewaters Gateway Partnership, Inc.	Letter (ML14345A847)	0034
Meadow, Karen	Maryland Conservation Council	Meeting Transcript (ML14310A384)	0004-7
Meadow, Norman	Maryland Conservation Council	Meeting Transcript (ML14310A384)	0004-6
Meadow, Norman	Maryland Conservation Council	Meeting Transcript (ML14310A438)	0007-6
Miller, Lynn	Self	Meeting Transcript (ML14310A384)	0004-13
Mitchell, Judy-Ann	U.S. Environmental Protection Agency	Letter (ML14332A088)	0017
Molzahn, Robert	Water Resources Association of Delaware River Basin	Meeting Transcript (ML14310A384)	0004-16
Moscovici, Dan	Richard Stockton College	Meeting Transcript (ML14310A384)	0004-14
Muller, Alan	Self	Email (ML14344A216)	0029
Nielsen, Michael	Self	Email (ML14344A213)	0027
Nolan, Christine	South Jersey Land and Water Trust	Letter (ML14345A847)	0034
O, Nancy	Self	reg.gov comment (ML14345A848)	0035
Oppelt, John	Self	Letter (ML14321A329)	0013
Osborn, Sam	Self	Meeting Transcript (ML14310A384)	0004-17
Owens, Caroline	Cohansey Area Watershed Association	Letter (ML14345A847)	0034
Palmer, Dennis	Water Resources Association of the Delaware River	Meeting Transcript (ML14310A438)	0007-16
Pantazes, Jeff	Self	Meeting Transcript (ML14310A444)	0008-1
Passmore, Wills	Self	Letter (ML14335A548)	0019

Table E-1. (continued)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
Pierson, Helene	Stand-Up for Salem	Meeting Transcript (ML14310A384)	0004-21
Prescott, James	BioBehavorial Systems	Email (ML14344A214)	0028
Pringle, David	Clean Water Action	Letter (ML14345A847)	0034
Pryde, Coralie	League of Women Voters of Delaware	Letter (ML14345A164)	0022
Purcell, Leslie	Self	Email (ML14344A239)	0032
Purcell, Leslie	Self	Meeting Transcript (ML14310A438)	0007-13
Raddant, Andrew	U.S. Department of the Interior	Letter (ML14316A412)	0014
Riddle, Frances	Self	Email (ML14344A218)	0030
Roberts, Debra	Self	reg.gov comment (ML14345A972)	0040
Roe, Amy	Sierra Club - Delaware Chapter	Letter (ML14345A847)	0034
Saunders, Daniel	New Jersey Department of Environmental Protection; Historic Preservation Office	Letter (ML15005A040)	0049
Shaffer, Mark	Self	Meeting Transcript (ML14310A444)	0008-7
Slack, Gary	Self	reg.gov comment (ML14345A977)	0044
Slijepeevic, Aleksandra	Self	reg.gov comment (ML14345A851)	0038
Spencer, Scott	Self	Meeting Transcript (ML14310A438)	0007-11
Spiese, Steve	IBEW Local Union 94	Meeting Transcript (ML14310A438)	0007-8
Timberman, Tanya	Women in Nuclear (PSEG Chapter)	Meeting Transcript (ML14310A384)	0004-20
Tittel, Jeff	New Jersey Sierra Club	Letter (ML14323A093)	0016
Tittel, Jeff	New Jersey Sierra Club	Letter (ML14345A847)	0034
Torres, Katherine	Hope Creek PSEG Nuclear	Meeting Transcript (ML14310A438)	0007-15
van Rossum, Maya	Delaware Riverkeeper Network	Letter (ML14345A610)	0020

Table E-1. (continued)

Commenter	Affiliation (if stated)	Comment Source and ADAMS Accession No.	Correspondence ID Number
van Rossum, Maya	Delaware Riverkeeper Network	Letter (ML14345A847)	0034
van Rossum, Maya	Delaware Riverkeeper Network	Meeting Transcript (ML14310A384)	0004-3
Velinsky, David	Academy of Natural Sciences at Drexel University	Email (ML14279A401)	0001
Velinsky, David	Academy of Natural Sciences at Drexel University	Meeting Transcript (ML14310A384)	0004-11
Wall, Roland	Academy of Natural Sciences at Drexel University	Meeting Transcript (ML14310A438)	0007-9
Wasfi, Ellen	Self	reg.gov comment (ML14345A850)	0037
Weinstein, Michael	New Jersey Institute of Technology	Email (ML14279A594)	0002
Weinstein, Michael	New Jersey Institute of Technology	Meeting Transcript (ML14310A384)	0004-9
Widjeskog, Lee	State of New Jersey, Division of Fish and Wildlife	Meeting Transcript (ML14310A433)	0006-7
Widjeskog, Lee	State of New Jersey, Division of Fish and Wildlife	Meeting Transcript (ML14310A438)	0007-14
Willis, Martin	Self	Meeting Transcript (ML14310A444)	0008-3
Windle, Judy and Randy	Self	Email (ML14344A220)	0031
Wiwel, Kathy	Self	Meeting Transcript (ML14310A433)	0006-9
Wiwel, Kathy	Self	Meeting Transcript (ML14310A444)	0008-6

Table E-2. Comment Categories (Alphabetical) and the Associated Commenters

Comment Category	Commenter (Comment ID)
Accidents-Design Basis	• Carter, David (0007-2-3) (0007-2-4) • Cornelia, Jared (0036-3) • Mallon, James (0015-3-19) (0015-4-12)
Accidents-Severe	• August, Bernard (0007-3-19) (0008-9-5) • Campion, George (0046-2) • Campion, Mary (0007-4-6) (0007-4-10) • Doyle, Kathy (0024-3) • Herron, Stephanie (0008-4-5) • Magyar, David (0012-1) (0012-4) (0012-5) (0012-7) (0012-8) • Purcell, Leslie (0032-11) • Spencer, Scott (0007-11-7)
Alternatives-Energy	• Applegate, Jim (0004-4-1) • August, Bernard (0007-3-1) (0007-3-2) (0007-3-10) (0007-3-11) (0007-3-15) (0008-9-11) • Brook, David (0006-4-13) (0006-4-14) (0006-4-18) • Butch, Kerry Margaret (0022-11) • Campion, Mary (0007-4-9) • Carter, David (0034-12) • Clapp, Leonard (0033-2) • DeLuca, Mike (0006-6-5) • DePaul, Shelly (0034-12) • Deschere, Mark (0008-10-1) • Doyle, Kathy (0024-4) • Duvau, Bryan (0006-8-6) • Eastman, Alice (Ajax) (0004-12-2) (0004-12-6) (0004-12-7) • Furst, Charles (0034-12) • Hvozdovich, Steve (0034-12) • King, Charlotte (0022-11) • Mallon, James (0015-5-16) (0015-5-17) (0015-5-19) (0015-5-20) (0015-6-1) (0015-6-2) (0015-6-3) • McNutt, Richard (0034-12) • Meadow, Norman (0007-6-14) • Molzahn, Robert (0004-16-4) • Moscovici, Dan (0004-14-3) (0004-14-5) • Nielsen, Michael (0027-1) • Nolan, Christine (0034-12) • Owens, Caroline (0034-12) • Pringle, David (0034-12) • Pryde, Coralie (0022-11) • Purcell, Leslie (0007-13-2) • Roe, Amy (0034-12) • Spencer, Scott (0007-11-3) • Spiese, Steve (0007-8-5) • Tittel, Jeff (0034-12) • van Rossum, Maya (0004-3-10) (0020-5-1) (0020-5-5) (0020-5-6) (0020-5-7) (0020-5-8) (0020-5-9) (0020-5-10) (0020-5-11) (0034-12) • Wall, Roland (0007-9-10) • Willis, Martin (0008-3-3) • Wiwel, Kathy (0006-9-2) (0008-6-3) (0008-6-5)

Table E-2. (continued)

Comment Category	Commenter (Comment ID)
Alternatives-No Action	• Mallon, James (0015-5-15) (0015-7-12)
Alternatives-Sites	• August, Bernard (0007-3-7) • Chiarella, Louis (0018-1-9) • Duvau, Bryan (0006-8-7) • Locandro, Roger (0009-3) • Mallon, James (0015-5-14) (0015-6-4) (0015-6-5) (0015-6-6) (0015-6-17) (0015-6-18) (0015-6-19) (0015-6-20) (0015-7-1) (0015-7-2) (0015-7-3) • Molzahn, Robert (0004-16-9) • Palmer, Dennis (0007-16-8)
Alternatives-System Design	• Foster, Ruth (0021-5-14) • Locandro, Roger (0009-5)
Benefit-Cost Balance	• August, Bernard (0007-3-13) • Brook, David (0006-4-6) (0006-4-9) • Butch, Kerry Margaret (0022-13) • Heffron, Rich (0004-24-3) • King, Charlotte (0022-13) • Kleinschmidt, Mark (0007-18-3) • Mallon, James (0015-7-13) (0015-7-14) (0015-7-15) • Miller, Lynn (0004-13-2) • Pryde, Coralie (0022-13) • Purcell, Leslie (0032-7) • van Rossum, Maya (0020-4-11)
Cumulative Impacts	• Mallon, James (0015-4-7) • Purcell, Leslie (0007-13-7)
Decommissioning	• August, Bernard (0008-9-7) • Brook, David (0006-4-8) • van Rossum, Maya (0020-4-10) (0020-4-12)
Ecology-Aquatic	• Applegate, Jim (0004-4-6) (0004-4-8) • Brook, David (0006-4-11) • Butch, Kerry Margaret (0022-8) • Carter, David (0007-2-13) (0007-2-14) (0034-9) (0034-13) • Chiarella, Louis (0018-1-1) (0018-1-4) (0018-1-8) (0018-1-10) (0018-1-11) (0018-1-12) (0018-1-13) (0018-1-16) (0018-2-1) (0018-2-2) (0018-2-3) (0018-2-4) (0018-2-5) (0018-2-6) (0018-2-7) • Clapp, Leonard (0033-1) • Cooksey, Sarah (0023-1-4) (0023-1-5) (0023-1-6) (0023-1-7) • DeLuca, Mike (0006-6-3) • DePaul, Shelly (0034-9) (0034-13) • Doyle, Kathy (0024-5) • Duvau, Bryan (0006-8-2) • Evans, Brenda (0008-2-11) • Foster, Ruth (0021-1-2) (0021-1-3) (0021-2-15) (0021-2-16) (0021-2-18) (0021-3-1) (0021-3-5) (0021-4-9) (0021-4-10) (0021-4-19) (0021-6-5) • Furst, Charles (0034-9) (0034-13)

- Hvozdovich, Steve (0034-9) (0034-13)
- Keating, Thomas (0011-5)
- King, Charlotte (0022-8)
- Locandro, Roger (0009-6)
- Mallon, James (0015-1-17) (0015-1-18) (0015-1-20) (0015-11-15) (0015-12-7) (0015-2-20) (0015-3-11) (0015-3-12) (0015-3-13) (0015-4-9)
- McNutt, Richard (0034-9) (0034-13)
- Meadow, Karen (0004-7-4)
- Meadow, Norman (0007-6-10)
- Nolan, Christine (0034-9) (0034-13)
- Owens, Caroline (0034-9) (0034-13)
- Pantazes, Jeff (0008-1-3) (0008-1-5)
- Passmore, Wills (0019-4)
- Prescott, James (0028-1)
- Pringle, David (0034-9) (0034-13)
- Pryde, Coralie (0022-8)
- Purcell, Leslie (0032-9)
- Roe, Amy (0034-9) (0034-13)
- Tittel, Jeff (0016-7) (0034-9) (0034-13)
- van Rossum, Maya (0004-3-2) (0004-3-3) (0020-2-4) (0020-2-15) (0020-3-10) (0020-3-11) (0020-3-12) (0020-3-13) (0020-3-14) (0020-3-15) (0020-3-16) (0020-3-17) (0020-3-18) (0020-4-1) (0020-4-2) (0020-4-3) (0020-4-4) (0020-4-5) (0020-4-6) (0020-5-18) (0034-9) (0034-13)
- Velinsky, David (0001-2) (0001-3) (0001-8) (0004-11-2) (0004-11-3) (0004-11-8)
- Wall, Roland (0007-9-2) (0007-9-8)
- Weinstein, Michael (0002-2) (0002-4) (0004-9-5)
- Widjeskog, Lee (0006-7-1)

Ecology-Terrestrial and Wetlands

- Applegate, Jim (0004-4-4) (0004-4-5) (0004-4-7)
- Burger, Joanna (0004-5-2) (0004-5-3) (0004-5-4) (0004-5-5) (0004-5-6)
- Butch, Kerry Margaret (0022-3) (0022-4) (0022-5) (0022-6) (0022-7)
- Carter, David (0007-2-10) (0007-2-12) (0008-8-4) (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Chiarella, Louis (0018-1-2) (0018-1-6) (0018-1-7) (0018-1-14) (0018-1-15)
- Cooksey, Sarah (0023-1-8) (0023-1-9) (0023-1-12) (0023-1-13) (0023-1-14) (0023-1-15) (0023-1-16) (0023-1-18) (0023-1-19) (0023-2-1) (0023-2-15) (0023-2-17)
- DeLuca, Mike (0006-6-4)
- DePaul, Shelly (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Duvau, Bryan (0006-8-9)
- Eastman, Alice (Ajax) (0004-12-3) (0004-12-4) (0004-12-5)
- Erlich, Marion (0041-2)
- Foster, Ruth (0021-3-2) (0021-3-3) (0021-3-6) (0021-3-7) (0021-4-16) (0021-4-18) (0021-5-3) (0021-5-4)
- Furst, Charles (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Hvozdovich, Steve (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- King, Charlotte (0022-3) (0022-4) (0022-5) (0022-6) (0022-7)
- Locandro, Roger (0009-4)

- Mallon, James (0015-1-12) (0015-1-13) (0015-1-14) (0015-1-15) (0015-1-16) (0015-2-15) (0015-2-16) (0015-2-17) (0015-2-18) (0015-2-19) (0015-3-10) (0015-7-4) (0015-7-8)
- McNutt, Richard (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Mitchell, Judy-Ann (0017-2)
- Molzahn, Robert (0004-16-8) (0004-16-10)
- Nolan, Christine (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Owens, Caroline (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Palmer, Dennis (0007-16-7) (0007-16-9)
- Pringle, David (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Pryde, Coralie (0022-3) (0022-4) (0022-5) (0022-6) (0022-7)
- Purcell, Leslie (0032-1)
- Roe, Amy (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Tittel, Jeff (0016-4) (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- van Rossum, Maya (0004-3-12) (0020-2-3) (0020-2-5) (0020-2-6) (0020-2-7) (0020-2-8) (0020-2-9) (0020-2-10) (0020-2-12) (0020-2-13) (0020-2-14) (0020-2-16) (0020-2-17) (0020-2-18) (0020-2-19) (0020-3-2) (0020-3-3) (0020-3-4) (0020-3-5) (0020-3-6) (0020-3-7) (0020-3-8) (0020-3-9) (0020-4-9) (0034-4) (0034-5) (0034-6) (0034-7) (0034-8)
- Velinsky, David (0001-4) (0001-6) (0001-7) (0004-11-4) (0004-11-6) (0004-11-7)
- Wall, Roland (0007-9-3) (0007-9-4) (0007-9-6) (0007-9-7)
- Wasfi, Ellen (0037-3)
- Weinstein, Michael (0002-1) (0002-5) (0002-6) (0002-8) (0004-9-3) (0004-9-6) (0004-9-7) (0004-9-9)
- Widjeskog, Lee (0006-7-2) (0006-7-4) (0006-7-7)
- Wiwel, Kathy (0006-9-3) (0008-6-4)

Editorial Comments

- Cooksey, Sarah (0023-2-16)
- Mallon, James (0015-1-2) (0015-10-1) (0015-10-2) (0015-10-3) (0015-10-4) (0015-10-5) (0015-10-6) (0015-10-7) (0015-10-8) (0015-10-9) (0015-10-10) (0015-10-11) (0015-10-12) (0015-10-13) (0015-10-14) (0015-10-15) (0015-10-16) (0015-10-17) (0015-10-18) (0015-10-19) (0015-10-20) (0015-11-1) (0015-11-2) (0015-11-3) (0015-11-4) (0015-11-5) (0015-11-6) (0015-11-7) (0015-11-8) (0015-11-9) (0015-11-10) (0015-11-11) (0015-11-13) (0015-11-14) (0015-11-17) (0015-11-18) (0015-11-19) (0015-11-20) (0015-12-1) (0015-12-2) (0015-12-3) (0015-12-4) (0015-12-5) (0015-12-6) (0015-12-8) (0015-12-9) (0015-12-11) (0015-12-12) (0015-12-13) (0015-12-14) (0015-2-7) (0015-2-8) (0015-4-13) (0015-4-14) (0015-5-18) (0015-6-7) (0015-6-10) (0015-6-12) (0015-7-16) (0015-8-1) (0015-8-2) (0015-8-3) (0015-8-4) (0015-8-5) (0015-8-6) (0015-8-7) (0015-8-8) (0015-8-9) (0015-8-10) (0015-8-11) (0015-8-12) (0015-8-13) (0015-8-14) (0015-8-15) (0015-8-16) (0015-8-17) (0015-8-18) (0015-8-19) (0015-8-20) (0015-9-1) (0015-9-2) (0015-9-3) (0015-9-4) (0015-9-5) (0015-9-6) (0015-9-7) (0015-9-8) (0015-9-9) (0015-9-10) (0015-9-11) (0015-9-12) (0015-9-13) (0015-9-14) (0015-9-15) (0015-9-16) (0015-9-17) (0015-9-18) (0015-9-19) (0015-9-20)

Environmental Justice

- Bucic, Sarah (0007-12-4)
- Carter, David (0007-2-5)
- Herron, Stephanie (0007-5-5) (0008-4-3) (0008-4-12)
- Mallon, James (0015-11-12) (0015-6-15)
- Oppelt, John (0013-3)
- Purcell, Leslie (0007-13-6)

Geology	• Foster, Ruth (0021-1-19) (0021-2-1) (0021-2-2) (0021-2-3) (0021-2-4)
Health-Nonradiological	• Mallon, James (0015-2-5) (0015-2-6) (0015-3-16) (0015-3-17) (0015-4-11) (0015-7-11) • Meadow, Karen (0004-7-3) • Meadow, Norman (0007-6-13)
Health-Radiological	• August, Bernard (0008-9-6) (0008-9-9) • Bucic, Sarah (0007-12-2) (0007-12-3) • Campion, Mary (0007-4-3) (0007-4-7) (0047-3) (0047-5) (0047-7) • Foster, Ruth (0021-1-4) (0021-1-5) (0021-1-8) • Mallon, James (0015-3-18) • Meadow, Norman (0007-6-12)
Historic and Cultural Resources	• Foster, Ruth (0021-3-8) (0021-3-9) (0021-3-10) (0021-3-11) (0021-3-12) • Mallon, James (0015-2-2) (0015-2-3) (0015-3-9) (0015-6-9) • Saunders, Daniel (0049-1) (0049-2) (0049-3) (0049-4) (0049-5)
Hydrology-Groundwater	• Cooksey, Sarah (0023-2-2) (0023-2-3) (0023-2-4) (0023-2-5) (0023-2-6) (0023-2-7) (0023-2-8) (0023-2-9) • Foster, Ruth (0021-1-1) (0021-1-6) (0021-1-7) (0021-1-9) (0021-1-10) (0021-1-11) (0021-1-12) (0021-1-13) (0021-1-14) (0021-1-15) (0021-1-16) (0021-1-17) (0021-1-18) (0021-1-20) (0021-2-5) (0021-2-6) (0021-2-7) (0021-2-8) (0021-2-9) (0021-2-10) (0021-2-11) (0021-2-12) (0021-2-13) (0021-6-2) (0021-6-3) (0021-6-4) • Mallon, James (0015-1-10) (0015-1-11)
Hydrology-Surface Water	• Butch, Kerry Margaret (0022-9) • Carter, David (0034-10) • DePaul, Shelly (0034-10) • Duvau, Bryan (0006-8-8) • Foster, Ruth (0021-2-17) (0021-3-4) (0021-4-8) (0021-4-12) (0021-4-13) (0021-4-14) (0021-4-17) (0021-5-2) (0021-5-13) (0021-5-15) (0021-5-16) (0021-5-17) (0021-5-18) (0021-6-1) • Furst, Charles (0034-10) • Herron, Stephanie (0007-5-8) • Hvozdovich, Steve (0034-10) • King, Charlotte (0022-9) • Mallon, James (0015-3-7) (0015-6-13) • McNutt, Richard (0034-10) • Mitchell, Judy-Ann (0017-1) • Molzahn, Robert (0004-16-1) (0004-16-6) (0004-16-7) • Nolan, Christine (0034-10) • Owens, Caroline (0034-10) • Palmer, Dennis (0007-16-1) (0007-16-5) (0007-16-6) • Pringle, David (0034-10) • Pryde, Coralie (0022-9) • Roe, Amy (0034-10) • Tittel, Jeff (0016-6) (0034-10) • van Rossum, Maya (0004-3-4) (0034-10) • Widjeskog, Lee (0006-7-3)
Land Use-Site and Vicinity	• Carter, David (0007-2-11) • Chiarella, Louis (0018-1-3) (0018-1-5) • Cooksey, Sarah (0023-1-10) (0023-1-11)

	• Foster, Ruth (0021-4-2) (0021-4-3) (0021-4-4) (0021-4-5) (0021-4-15) (0021-5-1) (0021-5-5) • Mallon, James (0015-1-3) (0015-1-8) (0015-2-11) (0015-2-12) (0015-2-13) (0015-2-14) (0015-7-17) • van Rossum, Maya (0020-1-17) (0020-4-8) • Widjeskog, Lee (0006-7-6) (0006-7-8)
Land Use-Transmission Lines	• Mallon, James (0015-1-9) (0015-4-8) • van Rossum, Maya (0020-4-17)
Meteorology and Air Quality	• Applegate, Jim (0004-4-2) • Brook, David (0006-4-3) (0006-4-4) • Deschere, Mark (0008-10-3) • Duvau, Bryan (0006-8-5) • Egenton, Michael (0004-2-7) • Foster, Ruth (0021-5-6) (0021-5-7) (0021-5-8) (0021-5-9) (0021-5-10) (0021-5-11) (0021-5-12) • Hufsey, Moe (0004-18-4) • Mallon, James (0015-2-4) (0015-3-6) (0015-4-10) (0015-7-18) • Meadow, Karen (0004-7-1) • Meadow, Norman (0004-6-2) (0004-6-3) (0004-6-4) (0004-6-5) (0004-6-7) (0004-6-9) (0007-6-3) (0007-6-4) (0007-6-5) (0007-6-6) (0007-6-8) • Miller, Lynn (0004-13-1) • Mitchell, Judy-Ann (0017-3) • Molzahn, Robert (0004-16-5) • Palmer, Dennis (0007-16-4) • Spiese, Steve (0007-8-6) • van Rossum, Maya (0020-4-15)
Need for Power	• August, Bernard (0007-3-9) (0007-3-12) • Butch, Kerry Margaret (0022-12) • Hufsey, Moe (0004-18-3) • King, Charlotte (0022-12) • Mallon, James (0015-4-15) (0015-4-16) (0015-4-17) (0015-4-18) (0015-4-19) (0015-4-20) (0015-5-1) (0015-5-2) (0015-5-3) (0015-5-4) (0015-5-5) (0015-5-6) (0015-5-7) (0015-5-8) (0015-5-9) (0015-5-10) (0015-5-11) (0015-5-12) (0015-5-13) • Molzahn, Robert (0004-16-3) • Palmer, Dennis (0007-16-3) • Pryde, Coralie (0022-12) • Purcell, Leslie (0007-13-3) (0032-4) • Spiese, Steve (0007-8-4) • van Rossum, Maya (0020-1-6) (0020-5-2) (0020-5-3)
Nonradiological Waste	• Mallon, James (0015-7-6)
Opposition-Licensing Action	• August, Bernard (0007-3-16) (0007-3-20) (0008-9-10) • Brook, David (0006-4-16) • Campion, Mary (0047-1) • Cannon, John (0010-1) • Carter, David (0008-8-5) (0034-2) • Collins, Carol (0039-1) • Cornelia, Jared (0036-1) • DePaul, Shelly (0034-2)

- Doyle, Kathy (0024-6)
- Durnan, Alexander (0045-1)
- Foster, Ruth (0021-2-14)
- Furst, Charles (0034-2)
- Haggerty, Diane (0042-1)
- Herron, Stephanie (0007-5-11)
- Hvozdovich, Steve (0034-2)
- Keating, Thomas (0011-1) (0011-2)
- Killian, Lynn (0025-1)
- McNutt, Richard (0034-2)
- Nolan, Christine (0034-2)
- O, Nancy (0035-1)
- Owens, Caroline (0034-2)
- Prescott, James (0028-2)
- Pringle, David (0034-2)
- Purcell, Leslie (0032-12)
- Riddle, Frances (0030-1)
- Roe, Amy (0034-2)
- Slack, Gary (0044-1) (0044-5)
- Slijepeevic, Aleksandra (0038-1)
- Tittel, Jeff (0034-2)
- van Rossum, Maya (0004-3-1) (0020-1-2) (0020-5-4) (0034-2)
- Wasfi, Ellen (0037-1)
- Windle, Judy and Randy (0031-1) (0031-2)

Opposition-Licensing Process

- August, Bernard (0008-9-4)
- Brook, David (0006-4-1) (0006-4-15)
- Butch, Kerry Margaret (0022-1)
- Carter, David (0034-1)
- DePaul, Shelly (0034-1)
- Furst, Charles (0034-1)
- Hvozdovich, Steve (0034-1)
- King, Charlotte (0022-1)
- Magyar, David (0012-2) (0012-3)
- McNutt, Richard (0034-1)
- Nolan, Christine (0034-1)
- Owens, Caroline (0034-1)
- Pringle, David (0034-1)
- Pryde, Coralie (0022-1)
- Roe, Amy (0034-1)
- Tittel, Jeff (0016-8) (0034-1)
- van Rossum, Maya (0020-1-3) (0020-1-5) (0020-1-7) (0020-1-9) (0020-1-10) (0020-1-11) (0020-1-12) (0034-1)

Opposition-Nuclear Power

- August, Bernard (0008-9-1)
- Blair, Kathy (0026-1)
- Brook, David (0006-4-2) (0006-4-5) (0006-4-17) (0006-4-20)
- Campion, Mary (0007-4-1) (0007-4-8) (0007-4-11)
- Cannon, John (0010-2)
- Cassling, Margaret (0043-1) (0043-2) (0043-3)
- Doyle, Kathy (0024-1)
- Durnan, Alexander (0045-3)
- Purcell, Leslie (0007-13-4) (0032-5) (0032-10)

	• Riddle, Frances (0030-2) • Roberts, Debra (0040-1) • Slack, Gary (0044-2) (0044-3) • Spencer, Scott (0007-11-12)
Opposition-Plant	• August, Bernard (0008-9-8) • Brook, David (0006-4-12) • Campion, Mary (0047-2) • Herron, Stephanie (0007-5-12) (0008-4-11) • Keating, Thomas (0011-4) • van Rossum, Maya (0004-3-5)
Outside Scope-Emergency Preparedness	• August, Bernard (0008-9-3) • Campion, Mary (0007-4-4) • Carter, David (0007-2-16) (0007-2-17) (0007-2-18) • Herron, Stephanie (0007-5-9) (0008-4-4) (0008-4-7) (0008-4-9) • Locandro, Roger (0009-9) • van Rossum, Maya (0004-3-7) (0004-3-9) (0020-5-14)
Outside Scope-Miscellaneous	• August, Bernard (0008-9-2) • Campion, George (0046-3) • Tittel, Jeff (0016-2) • van Rossum, Maya (0020-4-19) • Weinstein, Michael (0002-3) (0004-9-4)
Outside Scope-Safety	• August, Bernard (0007-3-3) (0007-3-4) (0007-3-5) (0007-3-8) (0007-3-17) • Barch, Alexander (0006-10-1) • Brook, David (0006-4-10) • Butch, Kerry Margaret (0022-10) • Campion, George (0046-4) • Campion, Mary (0047-6) • Cannon, John (0010-3) • Carter, David (0007-2-6) (0007-2-8) (0007-2-15) (0034-11) • Cooksey, Sarah (0023-2-12) (0023-2-14) • Cornelia, Jared (0036-2) • DeLuca, Mike (0007-17-4) • DePaul, Shelly (0034-11) • Durnan, Alexander (0045-2) • Erlich, Marion (0041-1) • Furst, Charles (0034-11) • Herron, Stephanie (0007-5-6) (0007-5-10) (0008-4-6) (0008-4-10) • Hvozdovich, Steve (0034-11) • Keating, Thomas (0011-3) (0011-6) • King, Charlotte (0022-10) • Locandro, Roger (0009-8) • McNutt, Richard (0034-11) • Miller, Lynn (0004-13-3) • Molzahn, Robert (0004-16-11) • Nolan, Christine (0034-11) • Oppelt, John (0013-1) • Owens, Caroline (0034-11) • Palmer, Dennis (0007-16-10) • Passmore, Wills (0019-5)

	• Pringle, David (0034-11) • Pryde, Coralie (0022-10) • Purcell, Leslie (0032-2) (0032-3) • Roe, Amy (0034-11) • Slack, Gary (0044-4) • Tittel, Jeff (0016-1) (0016-3) (0016-5) (0034-11) • van Rossum, Maya (0004-3-6) (0004-3-8) (0020-5-12) (0020-5-13) (0020-5-15) (0020-5-16) (0020-5-17) (0020-1-19) (0034-11) • Velinsky, David (0001-9) (0004-11-9) • Wall, Roland (0007-9-9) • Wasfi, Ellen (0037-2)
Outside Scope-Security and Terrorism	• Magyar, David (0012-6)
Process-ESP	• August, Bernard (0007-3-6) (0007-3-18) • Bucic, Sarah (0007-12-1) • Butch, Kerry Margaret (0022-2) • Carter, David (0007-2-2) (0007-2-9) (0007-2-19) (0008-8-1) (0034-3) • Cooksey, Sarah (0023-1-2) (0023-1-3) (0023-2-13) • DePaul, Shelly (0034-3) • Foster, Ruth (0021-4-1) (0021-4-6) (0021-4-7) (0021-6-6) • Furst, Charles (0034-3) • Herron, Stephanie (0007-5-1) (0007-5-2) (0007-5-3) (0007-5-4) (0008-4-1) (0008-4-2) • Hvozdovich, Steve (0034-3) • King, Charlotte (0022-2) • Mallon, James (0015-1-4) (0015-1-5) (0015-1-6) (0015-1-7) (0015-11-16) (0015-12-10) (0015-7-7) • McNutt, Richard (0034-3) • Mitchell, Judy-Ann (0017-4) • Nolan, Christine (0034-3) • Owens, Caroline (0034-3) • Passmore, Wills (0019-2) • Pringle, David (0034-3) • Pryde, Coralie (0022-2) • Purcell, Leslie (0007-13-1) (0007-13-8) (0007-13-9) • Roe, Amy (0034-3) • Spencer, Scott (0007-11-2) • Tittel, Jeff (0034-3) • van Rossum, Maya (0020-1-1) (0020-1-4) (0020-1-8) (0020-1-13) (0020-1-14) (0020-1-15) (0020-1-16) (0020-1-18) (0020-2-1) (0020-2-2) (0020-2-11) (0020-3-1) (0020-4-13) (0020-4-14) (0020-4-16) (0034-3)
Site Layout and Design	• Cooksey, Sarah (0023-1-17) • Foster, Ruth (0021-4-11) • Mallon, James (0015-1-19) (0015-2-9) (0015-2-10) • van Rossum, Maya (0020-4-7)
Socioeconomics	• Acton, Julie (0004-10-3) • Brook, David (0006-4-19) • Cathcart, Richard (0007-1-2) • Egenton, Michael (0004-2-1) (0004-2-6) (0004-2-9) (0004-2-10) (0004-2-11)

- Elwell, Sean (0004-1-1)
- Evans, Brenda (0008-2-6)
- Heffron, Rich (0004-24-2)
- Helder, Jason (0004-23-3)
- Hufsey, Moe (0004-18-5)
- Joyce, Tom (0004-8-3) (0004-8-5)
- Kleinschmidt, Mark (0007-18-7) (0007-18-9)
- Mallon, James (0015-2-1) (0015-3-1) (0015-3-2) (0015-3-3) (0015-3-4) (0015-3-5) (0015-3-8) (0015-3-14) (0015-3-15) (0015-6-8) (0015-6-11) (0015-6-14) (0015-6-16) (0015-7-5) (0015-7-9) (0015-7-10)
- Molzahn, Robert (0004-16-2)
- Osborn, Sam (0004-17-1)
- Palmer, Dennis (0007-16-2)
- Spiese, Steve (0007-8-7)
- Timberman, Tanya (0004-20-4)
- Torres, Katherine (0007-15-3)
- van Rossum, Maya (0004-3-11) (0020-4-18)
- Weinstein, Michael (0004-9-2)
- Willis, Martin (0008-3-4)

Support-Licensing Action

- Acton, Julie (0004-10-4)
- Bailey, David (0006-11-1)
- Baillie, Joan (0006-3-2)
- Bobbit, John (0004-19-1) (0004-19-3)
- Bradway, Timothy (0006-2-2)
- Braun, Bob (0006-5-2)
- Burger, Joanna (0004-5-1)
- Cathcart, Richard (0007-1-4)
- Clancy, James (0007-10-2)
- Eastman, Alice (Ajax) (0004-12-9)
- Egenton, Michael (0004-2-2) (0004-2-14)
- Heffron, Rich (0004-24-4)
- Helder, Jason (0004-23-2)
- Hufsey, Moe (0004-18-2) (0004-18-6)
- Joyce, Tom (0004-8-6)
- Kleinschmidt, Mark (0007-18-4) (0007-18-8)
- Locandro, Roger (0009-1) (0009-7)
- McHugh, Martin (0004-15-3)
- Miller, Lynn (0004-13-5)
- Moscovici, Dan (0004-14-4)
- Shaffer, Mark (0008-7-1)
- Spiese, Steve (0007-8-3)
- Wiwel, Kathy (0006-9-5) (0008-6-1)

Support-Licensing Process

- Acton, Julie (0004-10-1)
- Braun, Bob (0006-5-1)
- Bucic, Sarah (0007-12-5)
- Carter, David (0007-2-1)
- Clancy, James (0007-10-1)
- Cooksey, Sarah (0023-1-1)
- DeLuca, Mike (0006-6-1) (0007-17-2)
- Egenton, Michael (0004-2-3) (0004-2-15)
- Eilola, Ed (0007-7-1) (0007-7-5) (0008-5-1) (0008-5-5)

- Evans, Brenda (0008-2-14)
- Heffron, Rich (0004-24-1)
- Helder, Jason (0004-23-1)
- Herron, Stephanie (0007-5-13) (0008-4-13)
- Joyce, Tom (0004-8-1)
- Kleinschmidt, Mark (0007-18-1) (0007-18-2)
- Locandro, Roger (0009-10)
- Mallon, James (0015-1-1)
- Meadow, Norman (0004-6-1) (0007-6-1) (0007-6-2)
- Mitchell, Judy-Ann (0017-5)
- Palmer, Dennis (0007-16-12)
- Pantazes, Jeff (0008-1-7) (0008-1-9)
- Passmore, Wills (0019-1)
- Raddant, Andrew (0014-1)
- Spencer, Scott (0007-11-1)
- Spiese, Steve (0007-8-1)
- van Rossum, Maya (0020-5-19)
- Weinstein, Michael (0004-9-1)
- Willis, Martin (0008-3-1)
- Wiwel, Kathy (0006-9-1) (0008-6-2) (0008-6-7)

Support-Nuclear Power

- Barch, Alexander (0006-10-2)
- Deschere, Mark (0008-10-4) (0008-10-5)
- Eastman, Alice (Ajax) (0004-12-1) (0004-12-8)
- Egenton, Michael (0004-2-4) (0004-2-5) (0004-2-8)
- Evans, Brenda (0008-2-4) (0008-2-12)
- Locandro, Roger (0009-2)
- Meadow, Karen (0004-7-2) (0004-7-5)
- Meadow, Norman (0004-6-6) (0004-6-8) (0007-6-7) (0007-6-9) (0007-6-11)
- Miller, Lynn (0004-13-4)
- Osborn, Sam (0004-17-2)
- Shaffer, Mark (0008-7-2)
- Timberman, Tanya (0004-20-1)
- Velinsky, David (0001-10) (0004-11-10)
- Willis, Martin (0008-3-2) (0008-3-5)

Support-Applicant/Plant

- Acton, Julie (0004-10-2)
- Baillie, Joan (0006-3-1)
- Bobbit, John (0004-19-2)
- Bradway, Timothy (0006-2-1)
- Burger, Joanna (0004-5-7)
- Cathcart, Richard (0007-1-1) (0007-1-3)
- Clancy, James (0007-10-3)
- DeLuca, Mike (0006-6-2) (0006-6-6) (0007-17-1) (0007-17-3) (0007-17-5)
- Duvau, Bryan (0006-8-1) (0006-8-3) (0006-8-4) (0006-8-10)
- Egenton, Michael (0004-2-12)
- Eilola, Ed (0007-7-2) (0007-7-3) (0007-7-4) (0008-5-2) (0008-5-3) (0008-5-4)
- Evans, Brenda (0008-2-1) (0008-2-2) (0008-2-3) (0008-2-5) (0008-2-7) (0008-2-8) (0008-2-9) (0008-2-10) (0008-2-13)
- Helder, Jason (0004-23-4) (0004-23-5) (0004-23-6)
- Hufsey, Moe (0004-18-1)

	• Johnston, Clarence (0048-1) • Joyce, Tom (0004-8-2) (0004-8-4) • Kleinschmidt, Mark (0007-18-5) (0007-18-6) • Lowman, Anthony (0004-22-1) (0004-22-2) • McHugh, Martin (0004-15-1) (0004-15-2) (0004-15-4) (0004-15-5) • Molzahn, Robert (0004-16-12) • Moscovici, Dan (0004-14-2) • Palmer, Dennis (0007-16-11) • Pantazes, Jeff (0008-1-1) (0008-1-2) (0008-1-4) (0008-1-6) (0008-1-8) • Pierson, Helene (0004-21-1) (0004-21-2) • Shaffer, Mark (0008-7-3) (0008-7-4) (0008-7-5) (0008-7-6) (0008-7-7) • Spiese, Steve (0007-8-2) (0007-8-8) • Timberman, Tanya (0004-20-2) (0004-20-3) • Torres, Katherine (0007-15-1) (0007-15-2) • Velinsky, David (0001-1) (0001-5) (0001-11) (0004-11-1) (0004-11-5) (0004-11-11) • Wall, Roland (0007-9-1) (0007-9-5) (0007-9-11) • Weinstein, Michael (0002-7) (0002-9) (0004-9-8) (0004-9-10) • Widjeskog, Lee (0006-7-5) (0006-7-9) (0007-14-1) (0007-14-2) (0007-14-3) (0007-14-4) • Wiwel, Kathy (0006-9-4) (0008-6-6)
Transportation	• Cooksey, Sarah (0023-2-10) • Mallon, James (0015-4-5) (0015-4-6)
Uranium Fuel Cycle	• Applegate, Jim (0004-4-3) • August, Bernard (0007-3-14) • Brook, David (0006-4-7) • Campion, George (0046-1) • Campion, Mary (0007-4-2) (0007-4-5) (0047-4) • Carter, David (0007-2-7) (0008-8-2) (0008-8-3) • Cooksey, Sarah (0023-2-11) • Deschere, Mark (0008-10-2) • Doyle, Kathy (0024-2) • Egenton, Michael (0004-2-13) • Herron, Stephanie (0007-5-7) (0008-4-8) • Keating, Thomas (0011-7) • Mallon, James (0015-3-20) (0015-4-1) (0015-4-2) (0015-4-3) (0015-4-4) • Moscovici, Dan (0004-14-1) • Oppelt, John (0013-2) • Passmore, Wills (0019-3) • Purcell, Leslie (0007-13-5) (0032-6) (0032-8) • Spencer, Scott (0007-11-4) (0007-11-5) (0007-11-6) (0007-11-8) (0007-11-9) (0007-11-10) (0007-11-11) (0007-11-13) (0007-11-14)

E.2 Comments and Responses

Table E-3 shows a list of the comment categories included in this appendix in the order in which they appear. The balance of this appendix presents the comments, along with the review team's response to each comment, organized by topic category. The full citation to any references that are called-out in the review team's responses can be found in Section E.3 of this Appendix.

Table E-3. Comment Categories in Order of Presentation

E.2.1 Comments Concerning the ESP Process

Comment: I'm still kind of confused about how the NRC can do a thorough Draft Environmental Impact Statement, and Final Environmental Impact Statement, without knowing the number, size, or kind of reactors planned. I know that this is just an Early Site Permit, and that they would have to get construction permits, and everything. But it seemed like the environmental impact would be largely contingent on the size and scope of the reactor planned. So I'm not really understanding how you can have a really thorough impact statement on that. (**0007-5-3** [Herron, Stephanie])

Comment: I mentioned, earlier, that I'm confused about how the NRC can do the EIS without knowing anything about the size or scope of the reactors. (**0008-4-2** [Herron, Stephanie])

Response: *The NRC action evaluated in this EIS is for the NRC to either issue or deny an ESP for the possible future use of the PSEG Site for a new nuclear power plant; however, the issuance of an ESP does not, by itself, authorize the actual construction and operation of any such plant. Because the NRC must evaluate the environmental impacts of the action proposed, and because site suitability encompasses construction and operational parameters, the NRC review team examined the impacts of both building and operating hypothetical nuclear reactors and their associated facilities at the PSEG Site. The design for such a hypothetical new plant was based upon a composite set of design parameters derived from several nuclear reactor and power plant designs identified and specified by PSEG in a plant parameter envelope (PPE) that the ESP applicant expects would bound the design characteristics of the reactor or reactors that might be constructed at the site. Consequently, the NRC review team's evaluation focused upon the environmental effects of constructing and operating one or more reactors that have characteristics falling within the postulated PPE, which is discussed in greater detail in Section 3.2 of this EIS. A specific design is not needed because the PPE values submitted are reasonable and sufficient to permit a meaningful environmental analysis. No changes were made to the EIS in response to these comments.*

Comment: I also think that I don't know if Delaware Department of Natural Resources and Environmental Control (DNREC) has been consulted. I know they said the New Jersey Department of Environment had been consulted. But I think DNREC, since we are equally impacted, or almost equally impacted. It is not on our soil but Delaware controls a large part of the river also. I think DNREC should be consulting on this project, too. (**0007-13-9** [Purcell, Leslie])

Comment: And for those of you who are from public agencies in Delaware, I fully expect you to comply in any review you do, for federal consistency, wetlands permits, or any other thing we do for all the permits from this site, with the executive order issued by your Governor. (**0007-2-9** [Carter, David])

Response: *These comments deal with agencies consulted. The agencies contacted by the review team, including the Delaware Department of Natural Resources and Environmental Control (DNREC), are those listed in Appendix B of this EIS. The key consultation correspondence with State and Federal agencies are presented in Appendix F of this EIS. No changes were made to the EIS in response to these comments.*

Comment: I just wanted to echo some other people who requested a 30 day extension on the comments. I just found out about this a week ago, and I'm not sure if it was my own overlooking it, or what not. But I think a 30 day extension would be wonderful. (**0007-12-1** [Bucic, Sarah])

Comment: I would like to reiterate. I personally also did not hear about this meeting or hearing, until several days ago, word of mouth. And so I don't really know what the public outreach was. But I think that is an issue that, conceivably, was not adequately performed. And I would like to ask, also, for a 30 day extension, as this is a rather large document. (**0007-13-1** [Purcell, Leslie])

Comment: So it is a very complicated issue. And I think that we need a longer period of time to asses this, so the 30 day extension would certainly be reasonable. (**0007-13-8** [Purcell, Leslie])

Comment: We hope we will get the additional 30 days to do a truly detailed job. I think that will aid you in your efforts. And if you truly do want sound public inputs, you will give us that extra 30 days to do the diligence that needs to be done on this project. (**0007-2-19** [Carter, David])

Comment: I will start out by asking that a 30 day extension, on this public record, be extended to the State of Delaware. We are very glad that our congressional delegation was able to have, I believe, our first-ever hearing for the Salem nuclear power plants here in Delaware. Our residents are not aware of it, they don't have the opportunity. The folks in New Jersey have had a much larger, more extensive time to review this. And I just think, if you really are sincere about getting comments, that it isn't that much to ask, considering the amount of time it takes for this process. (**0007-2-2** [Carter, David])

Comment: I would like to start out, I know that this is not a question session. But I'm curious about how this meeting was publicly noticed. Because I didn't see a public notice in any newspaper, or anything like that. And when I saw the article that Jeff Montgomery wrote in the News Journal, which I was very, very happy to see, given that I have never even heard about this, before that, I started looking for that public notice, everywhere, thinking that I just missed it. And I really searched pretty hard on the internet, and the only thing I could find was the notice that is in the packet. And that was on the NRC's website, which I understand was published around October 9th. And I am wondering who you think is just browsing the NRC's website looking for these things? Because that is certainly something that I do or, really, that anyone I know does. And assuming that this was appropriately noticed, which maybe it was, and maybe I missed it, it was noticed on October 9th, which was 14 days ago, which I understand is within the legal limit that you are required to notice such a meeting. (**0007-5-1** [Herron, Stephanie])

Comment: However, I really don't have a lot of real good technical comments to make on this Draft Environmental Impact Statement, given that it was 1,400 pages long, and I have a job and, you know, life. And I only found out about this less than two weeks ago. So that is concerning. And the reason why I don't have better comments. (**0007-5-2** [Herron, Stephanie])

Comment: I appreciate you explain to me, further, that this process, I'm still concerned about the extremely short notice of this public meeting, which is not a public hearing. And I will look into that, it being noticed a week ago. But given that this is an extremely detailed and, hopefully, very thorough and long Draft Environmental Impact Statement, I do still think that a week or even two weeks is too short. And I would ask that you extend the public comment period at least 30 days so people have a better opportunity to look into the full Draft Environmental Impact Statement, and come up with some really thorough and relevant comments. (**0008-4-1** [Herron, Stephanie])

Comment: I note that you had two public meetings in New Jersey on October 1. Delaware seems to have been overlooked, therefore we have less time to absorb your recommendations. The Delaware meetings were poorly advertised. (**0019-2** [Passmore, Wills])

Response: *These comments reflect the commenters' opinion that the public comment period for the draft EIS is too short; hence, they request an extension of that period. The NRC issued the draft EIS for public comment on August 22, 2014, and a 75-day comment period began at that time. Two sets of public meetings were held during this comment period: an afternoon and an evening meeting in Carneys Point, New Jersey on October 1 and an afternoon and an evening meeting in Middletown, Delaware on October 23. These public meetings were announced in local newspapers including, the Wilmington News Journal, the South Jersey Times, the Cumberland and Salem Guide, and the Middletown Transcript. In response to these comments, the NRC extended the 75-day comment by an additional 30 days (until December 6, 2014) to allow the public and agencies additional time to comment. No changes were made to the EIS as a result of these comments.*

Comment: And I want to thank our congressional delegation for making sure that this hearing is taking place in Delaware. And I hope that the NRC will make this a regular practice, since this cycle, the circle of potential impact, from this plant, includes Delaware. And we shouldn't let that be overlooked. (**0007-11-2** [Spencer, Scott])

Response: *The NRC staff assesses potential impacts to resources in Delaware throughout the EIS. No changes were made to the EIS as a result of this comment.*

Comment: And I would really appreciate, for a change, as Dr. Carter said, about having a meeting here, and letting us know what is going on. Because, before, we had to go down to Rockford, Maryland, and get out information, have bake sales, to fight you guys, over these plants. (**0007-3-18** [August, Bernard])

Response: *The NRC staff has held meetings regarding the proposed action in both New Jersey and Delaware. No changes were made to the EIS as a result of this comment.*

Comment: I was just, now, delighted to hear the manager, from PSEG, talk about their proactive role in working with the citizens. This is the first time we have ever been able to get NRC and PSEG and the groups over here to involve Delaware's public. So we hope you will be very proactive. I can't say that it was a delightful experience to have you come and hold this hearing tonight. There were some people that just didn't want to hold it. So I'm very delighted to hear and I hope that PSEG will continue to press, and press forward, to engage Delaware's public, where 80 percent of the people, within the impacted range, if there is an accident, or a problem occur. And I think there is a lot of education that could take place, and a lot of other learning. (**0008-8-1** [Carter, David])

Comment: The proposed plant site is located outside the boundaries of the State of Delaware. However, the closest residence is actually located in Delaware, and the population is higher in Delaware than New Jersey in proximity to the PSEG site. As of the 2010 census 40,943 Delaware residents lived within the 10-mile emergency planning zone of the Salem/Hope Creek Nuclear Power Plant in New Jersey. In contrast, the same year census data shows only 12,521 New Jersey residents in the same zone. This information is presently to illustrate the uniqueness of this situation in that a nuclear facility entirely contained in one state and generating power solely for the benefit of that state, is in fact closer geographically to denser population centers in the adjacent state. These residents share the potential risk from a catastrophic event, but do not benefit directly from the energy derived from the proposed plant nor from the predicted tax revenue. With this consideration in mind, the NRC should give as much deference to affected adjacent states as given to the state within which the facility may be constructed. (**0023-1-3** [Cooksey, Sarah])

Response: *The NRC staff has consulted with Delaware State agencies on the proposed action, assessed the proposed action's potential impacts on resources in Delaware throughout the EIS, and conducted a draft EIS public comment meeting in Delaware. No changes were made to the EIS as a result of these comments.*

Comment: While the willingness of the Nuclear Regulatory Commission and U.S. Army Corps of Engineers to hold an information session and public meeting in Delaware was appreciated, it is important to note that the limited notice (only nine days) provided to Delaware residents undoubtedly hindered the turnout. This oversight was, in part, ameliorated by the thirty-day extension of the public comment period. (**0023-1-2** [Cooksey, Sarah])

Response: *The NRC staff has consulted with Delaware State agencies on the proposed action and assessed the proposed action's potential impacts on resources in Delaware throughout the EIS. As noted in this comment, the NRC extended the draft EIS comment period by 30 days (until December 6, 2014) to allow the public and agencies additional time to comment. No changes were made to the EIS as a result of this comment.*

Comment: You mentioned that the company can bank the site for up to 20 years, which I knew from reading the Reader's Guide. And that that would be a way to help them leverage, have leverage, when they are negotiating with reactor vendors, some time in the future. But it just seems to me that the duty of the Nuclear Regulatory Commission is to protect the interest of the public, not the interest of the nuclear company, in protecting their profit, and getting a good deal on a reactor in the future. (**0007-5-4** [Herron, Stephanie])

Response: *The ESP process provides for early resolution of siting issues in a manner consistent with the NRC's mission of protecting people and the environment. Draft EIS Section 1.1 states that with an approved ESP, "the applicant can "bank" the site for up to 20 years for future reactor siting and, if a limited work authorization is also requested and granted, can conduct certain site-preparation and preliminary construction activities enumerated in Title 10 of the Code of Federal Regulations (CFR) 50.10(e)(1) (10 CFR 50-TN249)." The draft EIS mentions nothing about leverage on negotiations with reactor vendors. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 1-3; Section No. 1.1.2; Line No. 6-8; Change "CWA Section 401 (33 USC 1251-TN662) requires that applicants for Federal permits that would allow discharges into navigable waters obtain..." to "CWA Section 401 (33 USC 1251-TN662) requires that applicants for Federal permits that would allow discharges into jurisdictional waters of the United States obtain ." This requirement applies to more than just navigable waters. (**0015-1-4** [Mallon, James])

Comment: Page No. 1-3; Section No. 1.1.2; Line No. 14-15; Change "Because the ESP, if granted, would authorize no activities that would allow discharges into navigable waters...." to "Because the ESP, if granted, would authorize no activities that would allow discharges into jurisdictional waters of the United States...." (**0015-1-5** [Mallon, James])

Comment: Page No. 1-3; Section No. 1.1.2; Line No. 21-22; Change "The purpose of the USACE action is to provide a DA decision on PSEG's permit application to build proposed structures and perform work in and under navigable waters...." to "The purpose of the USACE action is to provide a DA decision on PSEG's permit application to build proposed structures and perform work in and under waters of the United States ....." (**0015-1-6** [Mallon, James])

Comment: Page No. 10-14; Section No. 10.2.2; Table 10-2; Description of unavoidable adverse impacts to Infrastructure and Community Services is unclear. Consider changing "from increased industrialization at the PSEG Site and would not be amenable to mitigation strategies" to "from increased industrialization at the PSEG Site that would not be amenable to mitigation strategies". (**0015-12-10** [Mallon, James])

Response: *These comments request editorial changes. The text in the EIS has been revised in response to these comments.*

Comment: Page No. 7-48; Section No. 7.12; Line No. 9; DEIS Section 7.12 is titled "Conclusions and Recommendations"; No recommendations are provided in Section 7.12. (**0015-11-16** [Mallon, James])

Response: *This comment is correct, so the words "and Recommendations" have been deleted from EIS Section 7.12 heading.*

Comment: In light of our concerns on the project's impacts to wetlands and the related mitigation needs, EPA has rated the DEIS as "EC-2" , meaning that EPA review identified environmental impacts that if avoided, would more fully protect the environment. (**0017-4** [Mitchell, Judy-Ann])

Response: *The review team appreciates the review of the draft EIS that was conducted by the U.S. Environmental Protection Agency (EPA). The EPA rating of EC-2 is noted. No change has been made to the EIS as a result of this particular comment; however, the additional comments received in the enclosure from the EPA have been cataloged and are addressed under the respective categories for those separate comments and concerns.*

Comment: We request that the Atomic Safety and Licensing Board (ASLB) conduct a contested hearing due to the environmental concerns about the ESP and that NRC not grant this ESP due to the significant adverse environmental impacts associated with the possible future use of the PSEG site to construct and operate a new nuclear power plant. (**0020-1-1** [van Rossum, Maya])

Comment: A Contested Hearing is needed on this highly controversial and environmentally damaging proposal. DRN would like to request a contested hearing be scheduled by the ASLB and held regarding this application and proposal. Construction of a fourth nuclear plant on Artificial Island, in an area predicted to be consistently under or surrounded by water in just a few decades to come and in a place where hundreds of acres of wetlands are to be further damaged by PSEG, is an obvious danger and threat to the region, highly controversial, and deserves a public airing and hearing before the NRC renders a decision. (**0020-1-4** [van Rossum, Maya])

Comment: A Contested Hearing is needed on this highly controversial and environmentally damaging proposal. We request that the Atomic Safety and Licensing Board (ASLB) conduct a contested hearing. (**0022-2** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: A Contested Hearing is needed on this highly controversial and environmentally damaging proposal. We request that the Atomic Safety and Licensing Board (ASLB) conduct a contested hearing. (**0034-3** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *Requests to participate in a hearing on an NRC license application must be made in accordance with the NRC's regulations in 10 CFR Part 2. The public opportunity to request a hearing on the PSEG ESP application, and the procedures and deadlines for doing so, was announced in a Federal Register notice shortly after the application was docketed (See 75 FR 68624; November 8, 2010). No changes were made to the EIS as a result of these comments.*

Comment: It is interesting to note that the original language of the standards for review of applications clearly stated that "the draft and final environmental impact statements prepared by the Commission focus on the environmental effects of construction and operation of a reactor or reactors ..." [See, 54 F.R. 15388, 10 C.F.R. §52.18 (1989)]. While that may have been the case, it is not the current status of the 10 C.F.R. §52.18 regulations and it raises serious questions as to how this ESP process has "evolved" and if the current ESP process is at all in conformance with all NEPA requirements. (**0020-1-8** [van Rossum, Maya])

Response: *The regulatory provision to which the commenter refers (quoting from a 1989 rulemaking) was subsequently relocated to a different part NRC's regulations, but the regulatory intent did not change. The NRC has promulgated environmental protection regulations applicable to its domestic licensing and regulatory functions in 10 CFR 51 and implements NEPA Section 102(2) in Subpart A of 10 CFR 51. In a rulemaking subsequent to the one quoted in the above comment, the NRC moved text quoted from the 1989 version of 10 CFR 52.18 to 10 CFR 51.50 "Environmental report—construction permit, early site permit, or combined license stage." In the same rulemaking, the NRC also edited 10 CFR 51.71 "Draft environmental impact statement—contents" at 10 CFR 51.71(a) to require draft EISs to address the matters specified in section 51.50. The change in location of the quoted text specifies that the applicant must address the same issues in the environmental report (ER) submitted with its* *application that the agency must also address in the draft EIS. The text of 10 CFR 51 therefore clarifies the NRC's efforts to comply with NEPA requirements. As reflected in the draft EIS for the PSEG ESP, in its ESP review the NRC does consider the environmental effects of construction and operation of a reactor at the proposed site. The comment does not identify any deficiency in the NRC's evaluation of ESP applications under NEPA. No changes to the EIS were made as a result of this comment.*

Comment: Limited Work Authorization for this project is a violation of due process. Limited Work Authorization on this property may be a violation of due process since it further commits both the NRC and PSEG on a track for nuclear permitting approval without providing the public with notice and an opportunity to be heard. (**0020-1-13** [van Rossum, Maya])

Response: *As the NRC explains in draft EIS Section 1.1.2, PSEG is not requesting a limited work authorization in its ESP application. No changes to the EIS were made as a result of this comment.*

Comment: Since the ESP has nothing to do with nuclear power, the NRC should not be the lead agency preparing this Environmental Impact Statement. Since ESP does not involve anything nuclear, then the NRC should not be the lead federal agency preparing this DEIS. Nothing in the ESP relates to nuclear energy or reactor design issues; it all relates to questions of site suitability, land use impacts, water-related impacts, wetlands impacts, endangered species impacts, historic and cultural resource impacts, ecological impacts and environmental justice impacts. (**0020-1-14** [van Rossum, Maya])

Comment: While the NRC will ultimately license a reactor, the ESP Process is entirely environmental, thus the lead agency should be an agency trained in investigating and analyzing site environmental conditions, like the U.S. Environmental Protection Agency (EPA) or the U.S. Fish and Wildlife Service (FWS). The NRC may state that it has contacted these agencies for input, but there is no comparison to actually making that agency the lead agency or a cooperating agency. The NRC should therefore revise the scope of this DEIS to make the EPA and FWS lead or cooperating agencies and not just passive contributors. In addition, the use of the U.S. Army Corps of Engineers (USACE) as a cooperating agency is not a sufficient means to adequately analyze environmental impacts for this DEIS, since its statutory mission is not centered on protecting the environment. (**0020-1-15** [van Rossum, Maya])

Response: *Although an ESP does not authorize the construction and operation of a nuclear facility, an ESP is an NRC approval for a site for one or more nuclear power facilities, and it is issued pursuant to the NRC's authority under the Atomic Energy Act. Because the NRC is the agency taking the "major Federal action" for NEPA Section 102 purposes, it is the agency that must prepare an EIS for the PSEG ESP application.*

The review of the ESP application is also not solely an environmental review; to receive an ESP, an applicant must demonstrate the suitability of the site from a safety standpoint, such as identifying the natural hazards (e.g., flooding and earthquakes) that a facility at the site would need to be protected against. The staff's safety review of the ESP application is documented in a safety evaluation report (SER) separate from the EIS.

Consistent with NEPA, the NRC coordinates the development of its EISs with other agencies that may have relevant expertise or related permitting authority (e.g., the USACE), and it consults with other agencies as part of its compliance with other environmental statutes; for example, it engages in consultation with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS) (collectively "The Services") pursuant to requirements stated in the Endangered Species Act (ESA).

No changes were made to the EIS as a result of these comments.

Comment: It is premature to prepare an EIS for an applicant that does not even own the land upon which this nuclear power plant will be constructed. PSEG does not presently own all of the land upon which the proposed nuclear power plant and its accompanying structures will be built. It may own it in the future or it may not, but right now through the issuance of this DEIS, the NRC is taking official agency action based upon speculation. Agencies of the federal government are not authorized to devote agency resources, unless otherwise approved, for speculative activities. This DEIS is just such a speculative wasteful agency endeavor, since until such time as PSEG can demonstrate bona fide ownership (or permission to use all) of this property, it is premature for the NRC to prepare this DEIS or any agency documents related to this premature proposal. (**0020-1-16** [van Rossum, Maya])

Comment: Since this [land swap] trade has not happened, any preparation of a DEIS is premature and purely speculative as to the outcome of the full ownership of the property in question. Federal agencies are not allowed under any law to issue permits based upon speculative information, since the ultimate decision and any judicial review of such will likely show that it was arbitrary and capricious. Since the NRC is contemplating the issuance of a permit, it has done exactly that and any permit issued based upon an incomplete application, such as this one, will likely be invalidated if challenged in Court. While Courts wi11 not often substitute their judgment for agency decisions based upon conformity with agency substantive expertise, they will readily strike down decisions of agencies that do not follow their own procedural requirements. The preparation of the DEIS and the intent of the NRC to issue the ESP at this time is just such an example of procedural error, readily subject to challenge. (**0020-1-18** [van Rossum, Maya])

Response: *Although an ESP does not authorize the construction and operation of a nuclear facility, an ESP is an NRC approval for a site for one or more nuclear power facilities. By demonstrating that a site is suitable from a safety and environmental standpoint, issuance of an ESP usefully informs an applicant's future decision whether to apply for a construction permit or combined license, and provides greater regulatory efficiency in the event such an application is ultimately submitted. PSEG has an agreement in principle with USACE to acquire an additional 85 ac of USACE Artificial Island Confined Disposal Facility (CDF) land immediately north of the Hope Creek Generating Station (HCGS) as explained in Section 2.2.1 of the draft EIS. Neither the Atomic Energy Act nor the NRC's regulations require rejection of the ESP application due to the existence of PSEG's agreement in principle with USACE. Because the NRC determined that the application contained the necessary information for the NRC to undertake its detailed safety and environmental review, the NRC's regulations require the NRC to prepare an EIS for the application.*

The NRC requires assurance that the applicant will have sufficient control over the site and exclusion area in order to grant an ESP. The NRC is addressing this issue as part of the safety review of the ESP application by requiring a permit condition that will require PSEG to obtain legal authority from the USACE to either allow PSEG and its surrogates to determine all activities including exclusion or removal of personnel and property from the area or require that the USACE exercise control in a specified manner. The commenter does not explain how these concerns about land ownership indicate any deficiency in the draft EIS's evaluation of environmental impacts. No changes were made to the EIS as a result of these comments.

Comment: Since the DEIS fails to include comments from contributing agencies, NRC should leave the record open for comments for an additional 60 Days. Since many other federal agencies will likely provide comments, notably EPA and FWS, the public is precluded from reviewing and commenting on their submissions due to the NRC having closed the comment period. These federal agencies may raise other significant issues and the public should have the opportunity to provide comments on their submissions before the issuance of the Final EIS. Since all of these comments can be posted with on-line access, DRN requests that the NRC post all of these comments and then leave the record open for an additional 60 days so that the public may have the opportunity to supplement their comments to include this additional information. (**0020-2-1** [van Rossum, Maya])

Response: *During the scoping period and development of the draft EIS, the NRC obtained input from many sources, including from other Federal agencies, and that information is reflected in the analysis in the draft EIS. In particular, the USACE, as a cooperating agency, worked directly with the staff in developing the analysis. Appendix A of the draft EIS contains a list of all contributors to the draft EIS, including other Federal agencies and national laboratories. Appendix B of the draft EIS lists the organizations contacted in preparation of the draft EIS. These organizations include Federal and State agencies, and their input is discussed in various sections throughout the draft EIS. Appendix C describes the chronology of NRC and USACE staff environmental review correspondence related to the PSEG application for an ESP at the PSEG Site. Appendix F includes key consultation correspondence between the NRC and the FWS and NMFS, including the NRC's biological assessments of ESA-listed species, and various State and Tribal organizations involved with National Historic Preservation Act consultation. No changes were made to the EIS as a result of this comment.*

Comment: The use of eleven pages of acronyms and abbreviations ("AA") in the DEIS confuses the public and frustrates the NEPA process. . . . The use of many of most of these AAs is unnecessary, and it creates confusing and potentially misleading information to be presented without sufficient public understanding of the DEIS. . . . While the use of common and known acronyms can facilitate reading a document more quickly, the eleven pages used in the DEIS is excessive, especially when many of these terms are not known or may have multiple meanings. (**0020-2-2** [van Rossum, Maya])

Response: *The NRC has taken a number of measures to enhance the readability and understanding of the content of the draft EIS for the public. For terms that appear frequently in the draft EIS, the NRC uses acronyms and abbreviations to facilitate both consistency and efficiency. The NRC considers it helpful to identify those terms at the beginning of the document; accordingly, a list of the definitions of the acronyms and abbreviations used* *throughout the draft EIS is found on pages xxxi through xli of the draft EIS. However, these acronyms are also defined where they first appear in the text of the draft EIS. The draft EIS contains an Abstract and an Executive Summary to aid overall understanding of the organization and findings contained in the draft EIS. The NRC has also published a "Reader's Guide" which provides a high-level summary of the findings described in more detail in the draft EIS. No changes were made to the EIS as a result of this comment.*

Comment: The impact of new transmission lines should have been included in the DEIS. Failure to analyze the impacts of new transmission lines is yet another example of the segmentation allowed by NRC for this project. The failure to include this impact information in the DEIS is a glaring omission by the NRC and demonstrates that this DEIS fails to comply with the requirements of NEPA to give a hard look at this power plant proposal. A new nuclear power plant will require new very large transmission lines and rights of way to be acquired. The DEIS lists this issue (p 7-8) but fails to include any analysis of these transmission lines and their impacts in the needs analysis, in the alternatives analysis, or in the cumulative impacts analysis. PJM has recommended the construction of new transmission lines, and the DEIS is inadequate without performing this analysis. This failure is an issue, since a thorough and objective analysis of transmission lines would have also shown that this location is a poor choice for building another power plant. (**0020-4-16** [van Rossum, Maya])

Response: *PSEG's proposed action does not include the construction and operation of new transmission lines to support a new nuclear power plant at the PSEG Site. However, EIS Chapter 7 addresses the cumulative impacts of the existing transmission lines from the PSEG Site as well as the potential impacts of a new transmission line that could be constructed near the PSEG Site to address grid stability issues in the region. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 10-9; Section No. 10.2.1; Table 10-1; Table 10-1 appears to be missing an entry for Fuel Cycle, Transportation, and Decommissioning, which would have a SMALL adverse impact during construction and preconstruction. This change would make it consistent with Exhibit H of the Reader's Guide. Or if the impacts are considered non-existent, then this should be stated and the Reader's Guide modified. (**0015-7-7** [Mallon, James])

Response: *Table 10-1 in this EIS addresses construction and preconstruction impacts, and there are no fuel-cycle, transportation and decommissioning impacts during these activities. These impacts are included in Table 10-2 (operational impacts). No changes were made to the EIS as a result of this comment.*

Comment: NRC should revise the DEIS to include an evaluation of specific measures done to avoid and minimize impacts [to wetlands], and this evaluation should be subject to public comment. (**0020-2-11** [van Rossum, Maya])

Comment: NRC should not prematurely grant approval before it can properly demonstrate, with any degree of certainty, that proper environmental mitigation measures have been fully agreed upon and evaluated. Furthermore, the mitigation measures and mitigation plan should be subject to public review. (**0020-3-1** [van Rossum, Maya])

Response: *The NRC regulations at 10 CFR 51.45 require applicants for NRC approvals to include, in their ERs, an analysis that considers and balances the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse environmental effects. The regulations at10 CFR 51.71(a) require the NRC to address, in draft EISs, the matters specified in 10 CFR 51.45. Accordingly, the NRC has analyzed measures to mitigate environmental impacts of the proposed action in various impact categories throughout the draft EIS. As solicited in the Federal Register notice of publication of the draft EIS (79 FR 49820; August 22, 2014) and in accordance with 10 CFR 51.73, the NRC accepted public comments on the draft EIS from August 22 to December 6, 2014, including during public meetings held on October 1 and October 23, 2014.*

Mitigation of impacts, including impacts to wetlands, is discussed in Chapters 4, 5, 7, and 9 of the draft EIS. Independently, the USACE will be addressing any necessary mitigation, including compensation, as a part of any Department of the Army authorization pursuant to 33 CFR 332. When discussing mitigation in the draft EIS, the staff specified where Federal, State, or local laws require the mitigation measures or if there is, or is expected to be, a Federal, State, or local permit that requires the particular measures. The draft EIS discusses where requirements are being or are likely to be imposed by the regulatory agency with authority over the resource in question and how, if at all, the staff relied on the mitigation to determine the impact level by discussing how the mitigation will be accomplished and whether the mitigation would affect the impact level conclusion. The draft EIS also considered mitigation measures that are considered best management practices where they are standard industry construction practices or integral parts of the project. For example, in Section 4.3.1.4 of this EIS, the staff discusses measures for restoration and rehabilitation that could be required in permits issued by USACE or New Jersey Department of Environmental Protection (NJDEP), which would further minimize potential impacts. As another example, in Section 4.11, the staff described certain mitigation measures that the applicant proposed to minimize impacts during construction activities.

Therefore, the draft EIS has appropriately considered mitigation and explained the significance of those measures for its impact conclusions. The public has had the opportunity to comment on the mitigation measures discussed in the draft EIS. The commenter did not identify any specific concern with the mitigation measures discussed in the draft EIS or identify any additional mitigation measures that should have been considered. No changes were made to the EIS as a result of this comment.

Comment: This document does indicate that sea level rise and flooding impacts will be further evaluated in the Safety Evaluation Report, however, incorporating detailed information about climate change, sea level rise and flooding during initial planning is critically important. To evaluate these impacts only in the context of the Safety Evaluation Report is at odds with the intent of the NEPA process. The final EIS should clearly define the future climate change and sea level rise scenarios that were utilized in this analysis and should utilize several different climate scenarios to ensure that the full range of climate consequences for the site, its operations, the Delaware River and surrounding areas were considered. Due to the site's proximity to tidal water and the expected lifespan of this facility, climate change and sea level rise should be a lens under which all design and siting decisions for this facility are viewed. (**0023-2-13** [Cooksey, Sarah])

Response: *Climate change was considered as one of the contributing factors to the cumulative impacts of the proposed action and other past, present, and reasonably foreseeable actions in Chapter 7 of the EIS. In assessing the contribution of climate change to cumulative impacts, the review team relied primarily on results from the most recent report of the U.S. Global Change Research Program (GCRP) as documented in "Climate Change Impacts in the United States: The Third National Climate Assessment" (GCRP 2014-TN3472), which considered a range of future scenarios. The review team also considered the results from other studies that addressed climate change impacts in the Delaware River Basin (e.g., USACE and DRBC 2008-TN3040, Pope and Gordon 1999-TN3006). The future climate scenarios considered in these studies may have differed from those included in the GCRP report.*

The NRC staff disagrees with the claim made in the comment that "To evaluate these impacts only in the context of the SER is at odds with the intent of the NEPA process." As explained in the preceding paragraph, the impacts have been considered in the EIS. Furthermore, the NRC's review of the ESP application is not solely an environmental review; that is, in order to receive an ESP, an applicant must demonstrate the suitability of the site from a safety standpoint, such as identifying the natural hazards (e.g., flooding and earthquakes) that a new nuclear plant at the site would need to be protected against. The NRC staff's safety review of the PSEG ESP application will be documented in an SER separate from the EIS. The SER analyzes all aspects of reactor and operational safety related to a new nuclear plant at the PSEG Site. The NRC will make its decision on whether to grant or deny the ESP application for the PSEG Site based on both safety and environmental considerations, thereby complying with the spirit and intent of NEPA. No changes were made to the EIS in response to this comment.

Comment: Decommissioning also raises the critical concern that the DEIS fails to identify and analyze the terminology of a "life cycle analysis" (a.k.a. life cycle assessment or total cost assessment) into this whole proposal to build a nuclear power plant. Life cycle analysis is also the only standard method (ISP 14040 series international standards) capable of assessing environmental impacts through the entire process of a nuclear power plant from the mining, refining of nuclear fuel, to the resources necessary to build a plant, to the irreversible environmental and social impacts, to the operation, and then ultimately the demolition, disposal and restoration of the site. It will include all of the financial costs, environmental impacts and an attempt to identify if constructing the facility actually makes sense in the long term. Without this whole life cycle approach, highly polluting stages associated with the facility could be overlooked. For instance, if one were to study just the operational phase of a nuclear power plant, such as has been done in the DEIS, one could conclude that it produces less pollution than other sources. However, if you look at other life components of the plant, like the costs of construction, the costs of securing radioactive components, the high costs of decommissioning and transportation and disposal costs of low-level radioactive wastes 660 miles away, the viability and the costs of dealing with the storage and the long term disposal of high level radioactive wastes or a nuclear accident (Three Mile Island, Chernobyl, Fukushima) or impacts from refining uranium or its sources (95% is imported from a non-aligned country like Russia) you can begin to identify the actual full costs to society and the environment. (**0020-4-13** [van Rossum, Maya])

Comment: The DEIS should conduct a form of a life cycle analysis since NEPA mandates a "big picture" review so that both the NRC and the affected public can make the best decisions possible as to whether investing in new nuclear power plants makes sense in 2014. (**0020-4-14** [van Rossum, Maya])

Response: *In the draft EIS, the NRC has examined the reasonably foreseeable impacts from constructing and operating a reactor at the proposed ESP site, including cumulative impacts from past, present, and reasonably foreseeable future actions and impacts of energy alternatives. Impacts from the fuel cycle and decommissioning are addressed in Chapters 6 and 7 of the draft EIS. The impacts associated with the risk of severe accidents are analyzed in Sections 5.11 and 7.10 of the draft EIS. Impacts of energy alternatives are discussed in Sections 9.2 of the draft EIS. Issuance of the ESP does not authorize construction and operation of a facility at the site. If an ESP is issued, a future construction permit (CP) or combined construction permit and operating license (combined license or COL) applicant referencing it would still need to consider new and significant information relevant to the environmental analysis. The NRC would consider that information in a supplement to the ESP EIS.*

The environmental impacts of decommissioning along with the NRC's requirements for decommissioning are discussed in draft EIS Section 6.3, which includes discussion regarding and references to the Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities: Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors (GEIS-DECOM), NUREG–0586, Supplement 1. As explained in Section 6.3, at the ESP stage, while applicants for a CP or COL referencing an ESP are required to provide a report containing a certification that financial assurance for radiological decommissioning would be provided, applicants are not required to submit information regarding the process of decommissioning at the ESP stage. However, PSEG did provide information in ER Section 5.9 concerning the environmental impacts of decommissioning based on NUREG-0586, Supplement 1, and a 2004 DOE report focused on decommissioning costs for advanced reactors, and concluded that the environmental impacts of decommissioning discussed in NUREG–0586, Supplement 1, would be the same as those for advanced reactor designs included in the PSEG ER (i.e., AP1000, U.S. EPR, ABWR, and US-APWR) (PSEG 2014-TN3452). The NRC staff's evaluation of the environmental impacts of decommissioning presented in the GEIS-DECOM identifies a range of impacts for each environmental issue for a range of different reactor designs. The staff has no reason to believe that the impacts discussed in the GEIS-DECOM are not bounding for reactors deployed after 2002. Based on the GEIS-DECOM and the staff's evaluation of air-quality impacts as discussed in draft EIS in Section 6.3, the NRC staff explained its conclusion that, as long as the regulatory requirements on decommissioning activities to limit the impacts of decommissioning are met, decommissioning activities would result in a SMALL impact.

The commenter is unclear on what other impacts associated with the fuel cycle have not been examined in Chapters 6 and 7. No changes to the EIS were made as a result of this comment.

Comment: And I would like to ask the NRC, and the, on the Corps of Engineers, has in the history of your agencies together, working together, have they ever turned down a nuclear plant siting? That is one question. (**0007-3-6** [August, Bernard])

Response: *The PSEG ESP application is the fifth ESP application submitted to the NRC since the regulations in 10 CFR 52 established the requirements for ESPs. The NRC determined* *after conducting its detailed technical review that the first four ESP applications met the NRC's rigorous safety and environmental requirements. Applicants seeking NRC authorization to construct nuclear power facilities have withdrawn their applications for a variety of reasons, including where they were unable to demonstrate that the application would meet the NRC's requirements. The USACE does not license nuclear power plants. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 1-10; Section No. 1.1.7; Line No. 5-9; The ER states "The final SER for the PSEG ESP application will be issued following publication of the final EIS. The NRC staff anticipates publication of the final SER for the PSEG ESP application after the issuance of the final EIS." (1) What is the regulatory basis for these statements? (2) The sentences also are contradictory because one states "will" and the other states "anticipates"; suggest deleting the first sentence if there is no regulatory basis for it. (**0015-1-7** [Mallon, James])

Response: *The text in the EIS has been revised to clarify that the NRC staff anticipates publication of the final SER for the PSEG ESP application before the issuance of the final EIS. This sentence in the draft EIS was intended to explain the order in which the staff expected to issue its two review documents for the PSEG ESP application. There is no regulatory requirement that one be published before the other.*

Comment: Well Drilling Permits for construction dewatering wells, permanent water supply wells and closure of abandoned wells will be required from the Bureau of Water Allocation & Well Permitting (BWAWP). (**0021-6-6** [Foster, Ruth])

Response: *The commenter is correct, and the applicant will be required to obtain Bureau of Water Allocation & Well Permitting permits from the NJDEP. Table H-1 in Appendix H of the EIS has a list of permits required, which includes well drilling permits. No changes were made to the EIS as a result of this comment.*

Comment: Section 4.0, page 4-3, para. #3 and Section 5.0, page 5-1, para. #3: the NRC review team that prepared the DEIS assigned impact levels of "small", "moderate" or "large" to the resource areas to be impacted by the proposed project. These "impact category levels [are] **based on the assumption** [emphasis added] that the mitigation measures identified in the [PSEG Environmental Report] or activities planned by various State and county governments ... are implemented. Failure to implement these upgrades might result in a change in the impact category level." Thus, the actual potential impacts of the proposed project have not been evaluated in the DEIS -this is a fundamental flaw in the preparation of the DEIS. For example, by using the above-noted procedure, this suggests that the NRC review team may have underestimated the potential impacts of the proposed project to in the following sections of the DEIS: (a) Section 4.3.2.2, page 4-40: states "Mitigation of unavoidable impacts ... **may include** [emphasis added] restoration of habitats ..." (b) Section 4.3.2.2, page 4-40-Upland Terrestrial Impacts: states "The mitigation of temporary impacts ... **could include** [emphasis added] restoration ... Mitigation of impacts ... may include [emphasis added] grading and planting ... These measures, in combination could restore [emphasis added] quality habitat for resident wildlife populations." (c) Section 4.3.2.3, page 4-43, para. #1: states "Mitigation of wetland resources **may be** [emphasis added] warranted." (d) Section 4.3.3.4, page 4-49: states "PSEG plans to consult with local, State, and federal agencies regarding additional and practicable mitigation needs ..." to address aquatic impacts. Thus, since these mitigation requirements were not known by the NRC review team when preparing the DEIS, how could they be incorporated into its assignment of an impact level? (e) Table 4-21, page 4-108 -Terrestrial and Wetland Resources: states "Proposed compensatory actions could offset some of the impacts." (**0021-4-6** [Foster, Ruth])

Response: *The EIS describes mitigation measures available or proposed for reducing or avoiding adverse effects by resource area. The NRC staff considers mitigation measures in impact determinations for resource areas in the EIS when those mitigation measures are reasonably foreseeable. In some instances, other Federal and State agencies have the regulatory mechanisms to require mitigation commitments with respect to certain environmental matters, but the NRC lacks such statutory authority when mitigation is unrelated to radiological health and safety matters. Implementation of potential mitigation measures listed in the EIS will be at the discretion of the applicant, unless required to satisfy a particular permit. The USACE will ensure that mitigation, including compensatory mitigation, required for any Department of the Army permit, if issued, meets its program requirements. No changes were made to the EIS in response to this comment.*

Comment: Some of the impact evaluations conducted in the DEIS are, in part, made relative to the "quantity" of the affected resource present in the site vicinity or in the surrounding region - since the impacts resulting from the proposed PSEG project would only be a small percentage of this larger quantity, the impacts are considered to be small or minor. This approach - taken to the extreme and applied to all proposed development projects or human activities in a given region - would lead theoretically to imply that there is no/minimal water or air pollution, habitat fragmentation, threatened/endangered species, etc. In addition, this type of analysis does not consider potential threshold effects on natural resources when considering if the level of impact could "destabilize" the resource. Thus, it is not appropriate to use such an analysis in a DEIS to determine the magnitude and scope of potential project impacts. [For example, see: Forestland, page 4-26; Water, page 4-27; Habitat Loss Impacts -page 4-29; Terrestrial Species of Recreational or Commercial Value, page 4-31; Artificial Ponds and Onsite Marsh Creeks, page 4-44; 7.1 -Land Use, page 7-8.] (**0021-4-7** [Foster, Ruth])

Response: *The commenter is concerned about the use of a defined region approach to assessing adverse effects, and references ecological resources. Each resource identified and analyzed in the EIS defines the region of interest (ROI) based on the characteristics that define that resource in terms of function or value. The impact determinations made for terrestrial and aquatic resources in the EIS were dependent upon the effects to the function of these ecosystems in the area, and not based on acreage or linear feet of creeks alone. In addition, the review team considered cumulative impacts to these resources in Chapter 7 of the EIS. Moreover, any Department of the Army authorization would include appropriate mitigation for all impacts to these types of resources. No changes were made to the EIS in response to this comment.*

Comment: The USACE-Philadelphia District is a cooperating agency on the preparation of the EIS, and will use the EIS to support its decision-making process for regulated activities on the PSEG Artificial Island site associated with the construction and operation of new nuclear power generating facilities. The USACE issued a Public Notice to this effect, to which ODST has provided comments (letter dated September 30, 2014). At this point, given that the proposed PSEG project is "conceptual" in nature and the scope and magnitude of potential impacts are to be further clarified in the future after the "selected alternative/design" has been identified, it appears premature for the USACE to make any regulatory decisions concerning the project. (**0021-4-1** [Foster, Ruth])

Response: *While the reactor design has not been selected, the depths and locations of all proposed dredging have been identified and would be fully evaluated prior to the issuance of any Department of the Army authorization. Documentation for that decision would be included in the separate USACE decision documents.*

E.2.3 Comments Concerning Site Layout and Design

Comment: Page No. 2-97; Section No. 2.4.2.2; Line No. 15-17; This section states "Three existing transmission lines convey power from SGS and HCGS. The existing 102 mi of transmission corridors cross Salem, Gloucester, and Camden Counties in New Jersey, and New Castle County in Delaware (PSEG 2014-TN3452)." Page 2-61, Lines 4-6 state "Four existing 500 kV transmission lines extend approximately 150 mi offsite in support of HCGS and SGS. The existing transmission lines include Hope Creek-New Freedom, Salem-New Freedom, Hope Creek-Red Lion, and Salem-New Freedom South." These statements appear to be inconsistent. (**0015-1-19** [Mallon, James])

Response: *The text in the EIS has been revised at the two locations mentioned in the comment to provide clarification and to eliminate the inconsistencies.*

Comment: Page No. 3-27; Section No. 3.4.2.2; Line No. 33-36; Replace the 2nd sentence in this paragraph with: "Safety-related structures, systems and components (SSC) for the new plant will be designed with flood protection features to withstand the flood height of the DBF and its associated effects." per the revised response to RAI No. 67. (See ND-2014-0020, dated August 21, 2014). (**0015-2-10** [Mallon, James])

Comment: Page No. 3-27; Section No. 3.4.2.2; Line No. 33; In accordance with the revised response to RAI No. 67, the design basis flood elevation for the new plant is 42.4 ft. NAVD. (**0015-2-9** [Mallon, James])

Response: *In response to these comments, the text in the EIS has been revised to incorporate the latest information on flooding as presented in the Site Safety Analysis Report (SSAR).*

Comment: There is no justified need for a new three lane causeway to be built on environmentally sensitive deed restricted lands. PSEG proposes to construct a new three lane elevated access roadway, but there is no explanation as to why the current three lane roadway is inadequate for servicing the construction and operation of this new plant especially since it was sufficient for the construction of three other nuclear power plants on the same site (Section 4.1.2.). The DEIS does not discuss who will be ultimately paying for the construction of this expensive roadway and what will happen to the existing three lane roadway. (**0020-4-7** [van Rossum, Maya])

Response: *The commenter expresses concern over the funding of the proposed causeway. NRC does not address how an applicant funds proposed infrastructure. However, the NRC staff assesses the socioeconomic and transportation effects related to the need, construction, and use of the proposed causeway in Chapters 4 and 5. No changes were made to the EIS as a result of this comment.*

Comment: Section 3.4, page 3-26: maintenance dredging activities needed to support the operation of the proposed project are only briefly discussed and evaluated in the DEIS. (**0021-4-11** [Foster, Ruth])

Response: *The discussion of maintenance dredging in Chapter 3 is descriptive and does not address impacts. The potential impacts of maintenance dredging are discussed in Section 5.3.2. No changes were made to the EIS as a result of this comment.*

Comment: The path of the causeway transects a mitigation area that is included in the Estuary Enhancement Program (EEP), as well as two wildlife management areas. The DEIS does not address any possible alternate routes that were considered or how the route presented was chosen. The final EIS should provide background on alternatives presented and the justification for the selected route. (**0023-1-17** [Cooksey, Sarah])

Response: *The proposed causeway route was one of four alternatives evaluated in the Traffic Impact Analysis study (PSEG 2013-TN2525). The causeway route was determined to have the least impacts of the four alternatives evaluated. No changes were made to the EIS as a result of this comment.*

E.2.4 Comments Concerning Land Use–Site and Vicinity

Comment: I would expect that the enhancement program, that they are talking about, if it is done on state property, which would be a first, because right now that has not been done, it has always been done on private property. (**0006-7-6** [Widjeskog, Lee])

Comment: They wanted to put an upland dike around that area to protect the roads within Ellsinboro Township. The Division was unable to do that for lack of funding. PSEG has taken that basic plan and enhanced it. And if they are able to do this, it will be a benefit to the township, it will stop some of the flooding that goes on now, on Mason Point Road, and Abbot's Farm Road, and it will allow the township to maintain their infrastructure at a much lower cost. (**0006-7-8** [Widjeskog, Lee])

Response: *The NRC staff discusses PSEG's Estuary Enhancement Program (EEP) in Section 2.4 of the EIS as part of the existing environment. No changes were made to the EIS as a result of this comment.*

Comment: In addition to the storm surge we are -- we continue to be concerned about wetlands. You know, there is a trade, kind of a sweetheart swapping deal being proposed, with some Corps lands. I bet guessed on appraised value. But we knew, from federal actions here in Delaware, that beyond the value, the land values of wetlands, we put a higher premium on them. We are spending 40 million dollars to try to restore and protect 100 acres of wetlands in prime hook area, going through the U.S. Fish and Wildlife Service. I think we need to put similar values on this type of wetlands. (**0007-2-11** [Carter, David])

Response: *The NRC staff discusses existing wetlands in Section 2.4 of the EIS, and potential impacts to wetlands in Sections 4.3.1 and 5.3.1. No changes were made to the EIS as a result of this comment.*

Comment: Page No. xxiii; Section "Evaluation of Impacts"; Line No. 5-10; Lines 5-7 state that the cumulative impacts on land use and several other resource areas would be MODERATE. Lines 8-10 state "However, the contributions of impacts from the NRC-authorized activities would be SMALL for all of the above-listed resource areas, except for physical impacts and infrastructure and community services impacts." This implies that the land use impacts of NRC-authorized activities would be SMALL and would not contribute to the MODERATE cumulative land use impact. However, lines 21 and 22 on page 4-8 state "the NRC staff concludes that the land-use impacts of the NRC-authorized construction would also be MODERATE." Lines 3-5 on page 7-10 say "the incremental contribution to cumulative land-use impacts of NRC-authorized activities would contribute to the overall [MODERATE] impact ...." It appears that land use impacts should be clarified in the discussion on page xxiii. (**0015-1-3** [Mallon, James])

Response: *The subject text (Executive Summary, draft EIS page xxiii, Lines 8-10) has been revised in the EIS to indicate that the land-use impacts of NRC-authorized activities would contribute to MODERATE cumulative land-use impacts.*

Comment: Page No. 2-6; Section No. 2.2.1; Line No. 7-10; This sentence implies that the dominant land uses on the existing PSEG Site are former construction support areas rather than current developed facilities. Suggest revising the sentence to read, "Dominant land uses on the existing PSEG property are industrial lands that currently house the SGS and HCGS facilities or wetlands that..." (**0015-1-8** [Mallon, James])

Comment: Page No. 4-7; Section No. 4.1.1; Line No. 2; The acreage given in the text for wetland impacts does not match that in DEIS Table 4-1. According to the table, 32 acres of wetlands plus 3 acres of managed wetlands for 35 total wetlands would be temporarily disturbed. (which would total the 160 stated). (**0015-2-12** [Mallon, James])

Response: *The text in the EIS has been revised as recommended in these comments.*

Comment: Page No. 4-6; Section No. 4.1.1; Figure 4-1; Change the title of Figure 4-1 from: "Land Use/Land Cover Impacted by Preconstruction and Construction at the PSEG Site and in the Vicinity." to "Land Use/Land Cover Impacted by Preconstruction and Construction at the PSEG Site". The figure only depicts the LULC at the PSEG Site and does not include the vicinity. (**0015-2-11** [Mallon, James])

Response: *The caption for Figure 4-1 has been revised in the EIS as suggested in this comment.*

Comment: Page No. 4-8; Section No. 4.1.1; Line No. 17-19; The DEIS states: "... the combined land-use impacts of preconstruction and construction activities on the PSEG Site would be MODERATE, primarily because of the USACE loss of dredge spoil disposal capacity at the Artificial Island CDF." Section 1.1.3, page 1-6, defines MODERATE as "Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource." What environmentally important attributes are noticeably altered by the loss of USACE dredge disposal capacity at AI? (**0015-2-13** [Mallon, James])

Comment: Page No. 4-8; Section No. 4.1.1; Line No. 16-22; Similarly, the DEIS concludes that the land-use impacts to the site and vicinity are MODERATE, "primarily because of the USACE loss of dredge spoil disposal capacity at the Artificial Island CDF." PSEG recommends that the impact level be changed to SMALL for the reasons discussed in the Environmental Report and because any loss of dredge spoil disposal capacity at the Artificial Island CDF would be replaced with separate dredge spoil disposal capacity as part of a land swap. Please make conforming changes throughout the DEIS. (**0015-2-14** [Mallon, James])

Response: *In the case of land use on the PSEG Site, the "important attributes of the resource" that would be noticeably altered would be the undeveloped CDF (which would be permanently altered to create a heavily developed industrial area). The existing land use (i.e., undeveloped dredge disposal facility) is important because of the function it serves for the USACE, not because it is environmentally pristine. This importance is highlighted by the fact that the USACE would need to acquire additional dredge disposal capacity elsewhere in the region if a new nuclear power plant is constructed at the PSEG Site. Replacing the existing CDF location with another CDF would be noticeable; however, a separate CDF has been identified, and the loss of the CDF on Artificial Island would not destabilize the resource. No changes have been made to the EIS in response to these comments, and the impact level remains MODERATE.*

Comment: Page No. J-4; Land Use; 4th item: Change to " ... Deeds of Conservation Restriction along the proposed causeway." Releases on the lands "at alternative sites 4-1, 7-1, and 7-3" are not required because PSEG has no intention of developing these sites. The reference to the alternative sites should be deleted. (**0015-7-17** [Mallon, James])

Response: *Table J-2 has been modified as suggested by the commenter.*

Comment: From the information in the DEIS, it appears that PSEG proposes to construct portions of the project, including the causeway, on lands owned by the State of New Jersey and protected by deed restrictions. We do not support the diversion of State-owned wildlife management areas for development activities. These areas are protected and managed due to their high ecological value. Wetlands fill and other construction activities on these protected areas can affect the entire wildlife management area adversely due to habitat loss, hydrologic modifications, and increases in human activity and storm water runoff. (**0018-1-5** [Chiarella, Louis])

Comment: This proposed causeway will be five miles long and will permanently impact at least 45 acres of wetlands on deed restricted land. Virtually all of the roadway traverses either enhanced wetlands or wildlife management areas and will require deed restriction releases from the State of New Jersey. In fact, one of these areas is property that PSEG previously purchased as compensation for other properties that it damaged as part of previous construction. (**0020-4-8** [van Rossum, Maya])

Response: *The EIS addresses the impacts of developing lands protected by Deeds of Conservation Restriction in Sections 4.1.2, 9.3.2.1, and 9.3.5.1. No changes were made to the EIS as a result of these comments.*

Comment: This lack of [property] ownership fact bas been confirmed through Public Notice (CENAP-OP-R-20090157) for a 404 permit by USACE. In that application, PSEG was not able to state that the "applicant possesses or will possess the requisite property interest to undertake the activity." PSEG cannot demonstrate this prerequisite requirement for permit application completeness, since it does not own or currently have legal authority to undertake the proposed activities listed in the draft permit. Based upon a different Public Notice (CENAP-PL-E-14-01, dated July 15, 2014), the USACE has confirmed that PSEG is not at this time the owner of the property proposed for this 404 permit. USACE is the present owner of this property. While that Public Notice proposes some form of land swap by the USACE to PSEG, there is no level of certainty that this will occur, especially since even if the USACE agrees to a trade, there could be additional legal obstacles or actions to challenge it or invalidate it. (**0020-1-17** [van Rossum, Maya])

Response: *The commenter expresses concern regarding the current status of the CDF land swap. A separate action is underway between USACE and the applicant to address the transfer of the requisite real estate interest. The applicant is required to have the requisite property interest and/or authority to undertake the proposed activity before any work may occur. However, the EIS evaluates the effects of the proposed activity including the proposed land exchange in order to fully consider reasonably foreseeable environmental impacts, consistent with NEPA. No changes were made to the EIS as a result of this comment.*

Comment: On the existing PSEG owned site (total of 819.1 acres representing all land use categories) 225.4 acres will have a permanent land use change. From the information presented in Table 4-1 it is unclear what the permanent land use changes will be, although it is expected that much of the change will result in an overall increase in urban or built-up land. (**0023-1-10** [Cooksey, Sarah])

Response: *As stated in EIS Section 4.1.1, "225 ac on the PSEG Site would be permanently disturbed to support developed or industrial land uses associated with a new nuclear power plant." No changes were made to the EIS as a result of this comment.*

Comment: It is also expected that there will be a permanent loss of 8.7 acres of Forestland; 42.3 acres of Water; 108 acres of Wetlands; and 18.8 acres of Barren land. In addition, on the existing PSEG site it is anticipated that there will be a temporary loss, perhaps as long as 8 years during the preconstruction/site mobilization and construction periods of 80.3 acres of Forestland and 31.8 acres of Wetlands. On the Adjacent Offsite Area, located in the USACE Artificial Island Confined Disposal Facility, there will be a temporary, again perhaps as long as 8 years, disturbance of 30.2 acres of Wetlands and 12.5 acres of Barren Land. Mitigation for temporary as well as permanent impacts should be considered and discussed in the final EIS given the potential for long lasting impacts from the proposed "temporary" impacts. Forest impacts are of particular concern here as impacted forest land will take a relatively long time to re-establish. (**0023-1-11** [Cooksey, Sarah])

Response: *The commenter expresses concerns about temporary and permanent loss of habitats. Temporary and permanent habitat impacts from site-preparation and construction activities are addressed in EIS Sections 4.3.1 and 4.3.2, to include mitigation. In addition, the USACE will include further efforts to avoid, minimize, and compensate for unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It will also include an analysis of the Clean Water Act (CWA) Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: The potential impacts of PSEG permanently and temporarily using land associated with the USACE Artificial Island Upland CDF on the present and future dredged material disposal capacity available to the USACE for deepening and maintenance dredging activities have not been evaluated in the DEIS. If the acquisition/use of this land by PSEG will result in the need for the USACE to develop additional upland CDFs to meet its dredged material disposal needs, this cumulative impact of the proposed PSEG project must also be evaluated in the DEIS. Likewise, the potential impacts of construction activities associated with the proposed PSEG project on the present use and operation of the USACE Artificial Island Upland CDF must be evaluated in the DEIS. (**0021-4-3** [Foster, Ruth])

Response: *Sections 4.1 and 7.1 in the EIS address the impacts of the CDF land exchange in regard to construction and cumulative effects, respectively. No changes were made to the EIS as a result of this comment.*

Comment: If an additional on-site or off-site upland CDF is needed to manage the dredged material from the proposed PSEG project (construction and operation/maintenance), the impacts of the construction and operation of this facility should be evaluated in the DEIS. (**0021-4-15** [Foster, Ruth])

Response: *PSEG has not proposed to construct an additional onsite or offsite CDF to manage the material that would be dredged for construction of a new nuclear power plant, and the USACE has not commented that an additional CDF would be needed for this purpose. No changes were made to the EIS as a result of this comment.*

Comment: Many of the construction-related impacts are noted as "temporary" in duration. However, construction activities will occur over an estimated time period of 7 years (see Table 3-2, page 3-20). (**0021-5-1** [Foster, Ruth])

Response: *The term “temporary” is used to describe those impacts or changes that would not be permanent. No changes were made to the EIS as a result of this comment.*

Comment: p. 2-12, lines 15-22[; page 4-7, lines 21-27; page 4-10, lines 24-26]: "Coastal Zone Management Act (CZMA) (16 USC 1451-TN/243). Federal Consistency Determination has been made with conditions by NJDEP stating that the project submitted for NRC review is consistent with New Jersey's Rules on Coastal Zone Management (NJDEP 2010-TN235)." On July 23, 2010, the Division issued a Federal Consistency to PSEG Power, LLC and PSEG Nuclear, LLC in anticipation of the submittal of the ESP. The Federal Consistency was intended to be only for the siting of the project at the Salem Hope Creek site. A Consistency

Determination has not been issued for the project before the NRC and the Corps. The Federal Consistency was conditioned on the applicant receiving the required permits named above. Once those approvals are obtained, the project will be considered consistent with the Coastal Zone Management Act. (**0021-5-5** [Foster, Ruth])

Response: *Draft EIS Sections 2.1 (page 2-12, lines 19-22) and 4.1 (page 4-7, lines 24-27) explicitly identify the NJDEP condition referenced in this comment: "As proposed, the project will require a CAFRA [Coastal Area Facility Review Act] Individual Permit, Coastal Wetlands Permit, Waterfront Development Permit, and Freshwater Wetlands Individual Permit from the Division. These permits must be obtained prior to any construction activities on the site related to the project described above." No changes were made to the EIS as a result of this comment.*

Comment: In order to construct the proposed nuclear power generating facilities, the USACE will have to permanently transfer 85 acres of its existing Artificial Island Upland CDF to PSEG. In exchange, PSEG and USACE have proposed a land exchange, and that PSEG will obtain all the permits needed to construct and operate -and will construct -a new upland CDF at Site 15G along the Delaware River. This land exchange is the subject of a Draft Environmental Assessment (DEA) prepared by the USACE, which the Department has commented on (letter from Ruth Foster dated August 27, 2014). However, the actual acres of land to be exchanged and their relationship to the USACE Artificial Island Upland CDF vary between the DEIS and the Land Exchange DEA: (a) Section 2.2.1, page 2-5, para. #2: states that PSEG will acquire 85 acres of the USACE Artificial Island Upland CDF. However, the land exchange evaluated in the DEA includes the transfer of 631 acres of federally-owned land to PSEG-94 acres comprising Cell 3 of the USACE Artificial Island Upland CDF, and 537 acres of adjacent wetlands (to be used as a "buffer area"). The ESP DEIS and Land Exchange DEA must be consistent with each other. (b) Section 2.2.1, page 2-5, para. #2: states that PSEG will temporarily lease an additional 45 acres of the USACE Artificial Island Upland CDF-but also states "PSEG would return the 45 ac of leased land to the USACE, subject to any required long-term exclusion area boundary (EAB) control conditions from the NRC." Thus, potentially 130 acres of the USACE Artificial Island Upland CDF could be transferred to PSEG. The acreage transferred must be verified to evaluate the potential impacts of the proposed project on the operation of the USACE Artificial Island Upland CDF and its future capacity to meet the maintenance dredging needs of the USACE. [Also see Section 2.12, page 2-193 Proposed Land Exchange Between USACE and PSEG.] (c) Section 2.2.1, page 2-6, para. #2: states that the 85 acres to be pern1anently acquired from the USACE consists of 50 acres that arc part of the USACE Artificial Island Upland CDF and 35 acres of an adjacent coastal marsh. (d) Table 2-1, page 2-9: associated with the "85-Ac Parcel to be Acquired" are 28.3 acres of Phragmites-dominated Coastal Wetlands and 0.2 acres Saline Marsh not 35 acres of adjacent coastal marsh. (**0021-4-2** [Foster, Ruth])

Response: *The commenter asks for clarification concerning the acreage detailed in a draft Environmental Assessment (EA) prepared by USACE and the text in the EIS that describes acreage related to the land swap for the CDF. The land exchange between PSEG and USACE is a separate action that would occur without PSEG's application for an ESP. An independent EA is being prepared by USACE for that action. The EIS evaluates the loss of the USACE Artificial Island CDF as part of cumulative impacts in Chapter 7. No changes were made to the EIS as a result of this comment*

Comment: To quantitatively verify that the remaining portions of the USACE Artificial Island Upland CDF will have adequate capacity to meet the dredged material disposal needs of the USACE, the DEIS should (1) calculate the available dredged material disposal capacity considering the transfer of both 85 acres and 130 acres of the facility to PSEG, and (2) compare that to estimates of the USACE maintenance dredged material disposal needs over the next 50 years for the reaches of the Delaware River that the Artificial Island Upland CDF serves. (**0021-4-4** [Foster, Ruth])

Response: *Dredge disposal needs of the USACE are determined by that agency. An independent EA is being prepared by USACE for the land exchange with PSEG that will address these long-term dredge disposal needs. Section 7.1 of the EIS addresses cumulative land-use impacts including those impacts of the land exchange. No changes were made to the EIS as a result of this comment.*

Comment: Section 4.1.1, page 4-8, para. #1: states "The Artificial Island CDF provides the USACE with dredge spoil disposal capacity . . . the USACE would need to replace some or all of this disposal capacity by using an existing CDF or developing a new CDF at another location." Thus, the DEIS concludes that the proposed project would have "moderate" impacts on land-use. However, since the potential impacts of the proposed project on the operation of the USACE Artificial Island Upland CDF and the potential need to construct and operate a new upland CDF have not been evaluated in the DEIS, it does not appear possible to comprehensively evaluate the potential land use impacts of the proposed project. [Also see Table 4-21, page 4-105-Site and Vicinity.] (**0021-4-5** [Foster, Ruth])

Response: *An evaluation of the USACE Artificial Island CDF land use is presented in EIS Sections 4.1 and 5.1. No changes were made to the EIS as a result of this comment.*

Comment: Throughout [Sections 2.0 and 4.0], the NRC describes the acreages of the various habitats that would be affected by the construction and operation of a new nuclear generating station at the PSEG site. However, the numbers appear inconsistent and seem to vary from section to section even when describing the same impact to the same habitat. In addition, the impacts also appear different from those described in the Public Notice (CENAP-OP-R-2009-0157) issued by the USACE for this project. The final EIS should clearly and concisely identify all of the temporary and permanent impacts to all habitat types and clearly define the habitat types (i.e., estuarine wetlands, freshwater tidal wetlands, freshwater non-tidal, etc.). (**0018-1-3** [Chiarella, Louis])

Response: *The acreage numbers cited in various sections of the draft EIS may appear inconsistent because of the numerous classifications discussed for various habitat types. For example, in addition to the generic "wetland," the draft EIS discusses several types of wetland habitats (e.g., saline marsh, Phragmites-dominated coastal wetlands, deciduous scrub/shrub wetlands, herbaceous wetlands, and Phragmites-dominated interior wetlands); hence, the "wetland" acreages discussed vary among draft EIS sections according to the specific wetland types being discussed. Other commenters have noted some specific inconsistencies in acreages (e.g., on draft EIS 4-7, Line 2), and the text in the EIS was revised to address those inconsistencies. However, none of these revisions affects the conclusions regarding the levels* *of impact during construction for either the land-use or terrestrial ecology resource categories, both of which remain MODERATE, as discussed in Section 4.11.*

Regarding the comment that "the impacts also appear different from those described in the Public Notice (CENAP-OP-R-2009-0157) issued by the USACE for this project," the impact conclusions described in the draft EIS are based on information provided by the applicant to the NRC in the ESP application and in response to the NRC staff's requests for additional information. Because the USACE and the NRC have different permitting responsibilities with regard to the proposed action, it is possible that the applicant may have submitted different acreage information in the Department of the Army permit application than in the NRC ESP application due to the different requirements for those two separate permits. In addition, the USACE utilizes the Cowardin System for land-use classification of wetlands and waters, the overall acreages of impacts described according to NJDEP land use and land cover (LULC) classification system would be similar, but may not be identical, to the acreage calculations for the USACE values. It is also important to note that the habitat condition and extent of wetlands may vary with time, especially in modified or disturbed locations (e.g., CDFs) where dredge materials are being deposited. The USACE has prepared and approved jurisdictional determination for the project site (USACE 2014-TN3282). No changes were made to the EIS as a result of this comment.

E.2.5 Comments Concerning Land Use–Transmission Lines

Comment: Page No. 2-18; Section No. 2.2.2.1; Line No. 25; Change "Salem-New Freedom: extends northeast from SGS for 39 mi in a 350-ft-wide corridor ..." to "Salem-New Freedom: extends northeast from SGS for 50 mi in a 350-ft-wide corridor ..." as stated In ER Section 2.2.3.1. (**0015-1-9** [Mallon, James])

Comment: Page No. 7-8; Section No. 7.1; Line No. 13; Before the word "stability" insert the word "grid" in order to distinguish grid stability from the stability of the Artificial Island which is discussed elsewhere in the DEIS. (**0015-4-8** [Mallon, James])

Response: *The text in the EIS has been revised as suggested in these comments.*

Comment: Transmission lines have a great impact on the hand which they cross. PSEG currently has a network of long distance high voltage transmission lines that emanate from both Salem and Hope Creek Nuclear Generating Stations. These transmission lines consume huge acreage, fragment forests, and prevent any use of the land below it, other than farming or grassland. These transmission lines have a huge cumulative impact on the State and demonstrate that locating this plant far from the users of this electricity creates a need to permanently disrupt thousands of acres of otherwise usable lands across the State in order to deliver the power to the population centers in northern New Jersey. (**0020-4-17** [van Rossum, Maya])

Response: *As the draft EIS explains in Section 3.2.2.2, the existing transmission lines servicing the HCGS/SGS site have adequate thermal capacity to accommodate the additional generation from a new nuclear power plant at the PSEG Site. Independent of this project, PJM is evaluating grid improvements to address congestion and grid stability to determine future* *development of transmission lines. Thus, potential future transmission line development has independent utility with or without additional power generation from the PSEG Site.*

The ESP does not authorize any construction or preconstruction activities at the PSEG Site, nor does it obligate an applicant to undertake any preconstruction work, much of which would not require an NRC license. Nevertheless, the draft EIS discusses the cumulative environmental impacts to transmission line corridors in Chapter 7.

No changes were made to the EIS as a result of this comment.

E.2.6 Comments Concerning Geology

Comment: p. 2-169, lines 31-33. The EIS indicates the Coastal Plain sediments form a wedge that ranges from a feather edge at the Fall Line to 19,685 feet at the coast near Cape May. Comment: Basement (crystalline bedrock) was penetrated in the Anchor Dickinson gas well about 2.5 miles from the coast at Cape May Point at a depth of 6,357 feet, nowhere near the 19,000 feet cited online 32. (**0021-1-19** [Foster, Ruth])

Response: *The thickness of the coastal plain sediments is approximately 6,000 feet in Cape May County, as stated in EIS Section 2.3.1.2. Section 2.8 of the EIS was corrected to be consistent with this earlier section.*

Comment: p. 2-169, lines 35-37 and p. 2-170, Figure 2-30 (Stratigraphic Section of the PSEG Site). The EIS indicates that Figure 2-30 is the stratigraphic section for the PSEG site (see comment below). Comment: It is stated that this figure depicts the stratigraphic section for the site. The upper part of the section shown consists of Quaternary Marsh deposits, Cape May Formation, Kirkwood Formation, Shark River Formation, Manasquan Formation, Vincentown Formation, and Hornerstown Formation for the Cenozoic. Of the those units listed as being at the site, neither the Kirkwood, Shark River or Manasquan Formations are present under Artificial Island. The figure also shows the Hornerstown in both Cenozoic and Mesozoic Eras. The base of the Hornerstown is Paleocene, not Cretaceous so it does not cross into the Mesozoic Era. (**0021-2-1** [Foster, Ruth])

Response: *Figure 2-30 included in the draft EIS is PSEG SSAR Figure 2.5.1-33, which represents geologic units from a larger area than the proposed site itself, instead of SSAR Figure 2.5.1-34, which represents the local stratigraphy. A corrected figure of local stratigraphy was included in the EIS in response to this comment.*

Comment: p. 2-171, lines 27-29. The report indicates that Neogene strata (upper Tertiary) encountered at the PSEG site during the geotechnical investigation is composed of the Kirkwood Formation and it is divided into upper and lower units. Comment: As indicated above (comments for p. 2-39), there is no Kirkwood at the site, even though PSEG and their consultants still call the shallow clays at the site the Kirkwood Formation. The clays below the alluvium and above the Vincentown are Pleistocene, not Miocene, an age difference of about 19 million years. They were exposed during the construction of the Salem reactors and examined and photographed by geologists from the U.S. Geological Survey with a report being published in 1979. Both PSEG and NRC should accept modern geologic mapping and not use mapping done prc-1910. All modern geologic mapping of the area published since the Geologic Map of New Jersey, 1910-1912, indicates the Kirkwood is not present under Artificial Island. Owens and others (1998) shows the lower contact of the Kirkwood orientated almost north-south to the cast of the plant indicating the Kirkwood has been eroded out under the plant site. The fact that the Kirkwood Formation is not present at the site and that the shallow Pleistocene clays between the alluvium and the Vincentown are not continuous running from the river inland under Salem County to the cast and northeast of the plant should be accepted by NRC. (**0021-2-2** [Foster, Ruth])

Comment: p. 3-20 Table 3-2. Comment: The table indicates "Excavate to Kirkwood Formation (both units)." This should be revised to "Excavate to the Pleistocene clay and sand unit" since there is no Kirkwood Formation present on Artificial Island. The material they call Kirkwood is Pleistocene in age and is mapped as the Cape May Formation (Stanford, 20 II). Cross section A-A' depicts the geology from river across the plant site to the eastern edge of quadrangle. Also see Owens and Minard (1979). (**0021-2-3** [Foster, Ruth])

Comment: p. 3-21, lines 41-42. The report indicates the preconstruction excavation would go down to about 50 feet to the Kirkwood. Comment: There is no Kirkwood present on Artificial Island. It should be down to the "Pleistocene clay unit". (**0021-2-4** [Foster, Ruth])

Response: *The NRC staff reviewed the reports and maps cited in this and other comments related to the interpretation of the sediments at the PSEG Site located above the Vincentown Formation. The NRC staff agrees that these reports and maps are consistent with this comment. The relevant sections of the EIS have been changed to be consistent with the interpretation of these sediments as reflected in the reports and maps reviewed by the NRC staff.*

E.2.7 Comments Concerning Surface Water Hydrology

Comment: The Water Resources Association of the Delaware River Basin (WRA) is interested in PSEG's proposed project, because PSEG's proposed nuclear plant will be a major water user, located in the Delaware River basin, and is an important part of the economy in New Jersey, and the region at large. (**0004-16-1** [Molzahn, Robert])

Comment: In reviewing the PSEG ESP application, and Environmental Report filed on May 25th, 2010, we noted that the new unit's intake and cooling system will be designed to minimize the impact to the aquatic community by utilizing cooling towers, and an intake system with design flows that conform to best available technology, as required by Section 316(b) of the Clean Water Act. The cooling tower blowdown discharge would have little effect on the Delaware River at this location, or significantly elevate river water temperatures. (**0004-16-6** [Molzahn, Robert])

Comment: Consumptive water use is an important issue on the Delaware River basin, especially during drought periods. Although the proposed plant is located in the saline estuary, fresh water will still be evaporated by the cooling towers and, thereby, consumed. During declared drought emergencies, the fresh water consumed should be replaced at an appropriate ratio by using water release from the Merrill Creek reservoir near Phillipsburg, New Jersey.

PSEG, along with several other electric generating companies, is a co-owner of Merrill Creek. Water released from Merrill Creek helps in keeping the salt line from moving upstream to the water intakes for the city of Philadelphia. Merrill Creek was financed, built, and operated by electric generating companies for just this purpose. (**0004-16-7** [Molzahn, Robert])

Comment: One of the things about this project, that caught my attention, was the fact that they are going to plan to use an elevated roadway to access the nuclear plant. In the past what people did was build up a roadway across the meadow. And that would involve, literally, tons and tons of fill, and emplacement of culverts and bridges. The intent was to get the vehicles in and out, without being flooded out by high tide. The problem with that is that, even though, you haven't technically altered the marsh, other than that which is underneath the footprint, in reality you have restricted the tidal flow. And once you restrict the tidal flow the area no longer functions as the same type of marsh that it once was. This enables it to be more attractive to invasive plants, such as phragmites, also known as common reed in this area. And, at the same time, it reduces the amount of flow, and that means that there is less fish using the marsh. Today we have another alternative, and that is the elevated roadway. The one that PSEG has proposed is going to be, at least, ten feet above the surface of the marsh. By doing this it is going to, one, not impact the marsh except where the piers come into the marsh itself. The fact that it is ten feet above will also reduce the amount of shading that comes on, underneath. And thus not inhibit the growth of plants. When you get big tides, or even just the tide that you get during the normal full moon, you are going to have water flowing all the way across that area. But it will be underneath the roadway, and it will not be blocked by the roadway itself. With that you are going to have a much better situation, you will be able to get vehicles in and out. And, at the same time, you will not have a major impact on the meadow. (**0006-7-3** [Widjeskog, Lee])

Comment: In addition the plan to include a cooling tower for the new facility, would dramatically reduce the amount of water required from the river for cooling and would, substantially, mitigate the thermal input from the new plant to Delaware Bay. (**0006-8-8** [Duvau, Bryan])

Comment: And we [Water Resources Association of the Delaware River] have wide ranging interests in water resources. We are here, today, because public service proposed project is a major water usage, located in the Delaware River, and has an important part of the economy of New Jersey and the region as a whole. (**0007-16-1** [Palmer, Dennis])

Comment: In reviewing the application, May 25th, 2010, we noted new units, the intake and cooling system would be designed to minimize the impact on the aquatic community, by using cooling towers. And, also, the intake system will be using the best available technology, as required by section 316(b) of the Clean Water Act. The cooling tower blowdown discharge should have little effect on the Delaware River at this location, especially, or elevate river temperatures. (**0007-16-5** [Palmer, Dennis])

Comment: In addition consumptive water usage is an important issue in the Delaware River basin, especially during droughts. Although the proposed plant is located in a saline estuary, fresh water will still be evaporated by the cooling towers, and be consumed. During declared drought emergencies the fresh water consumed should be replaced, at an appropriate ratio, by using water released from the Merrill Creek reservoir, near Phillipsburg, New Jersey. PSEG, as well as other several electric generation companies are co-owners of Merrill Creek, and the water released from Merrill Creek will help keep the salt line from moving upstream to the water intakes of the city of Philadelphia. Merrill Creek was financed, built, and operated by the electrical generating companies for this purpose. (**0007-16-6** [Palmer, Dennis])

Response: *These comments are declarative statements and raise no issues with the conclusions of the draft EIS. No changes were made to the EIS as a result of these comments.*

Comment: We believe that, before PSEG should be allowed to construct another burdensome facility on Artificial Island, or anywhere within the Delaware Estuary before it is even considered, they must be forced to minimize the adverse environmental impact their existing facilities already have. Including their fish kills, their harmful imprint on our wetlands, the water quality impacts they have on the Delaware Estuary waters, and more. (**0004-3-4** [van Rossum, Maya])

Response: *Minimizing impacts from existing facilities is outside the scope of the EIS. The draft EIS evaluates the environmental impacts of the proposed facility. This includes the cumulative impacts of the existing power plants and the proposed facility, which are addressed in Chapter 7 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: I am not a scientist, so I'm not one hundred percent sure about this, but I know that wetlands absorb water and mitigate flooding. So I'm wondering how filling another 100-plus acres of wetlands, which we are already losing very rapidly to sea level rise, could worsen local flooding in Delaware City, and St. George's, and that area near where the adjacent island would be built, I imagine. (**0007-5-8** [Herron, Stephanie])

Response: *The impact on flooding from building the proposed plant was discussed in Section 4.2.1.1 of the draft EIS. As described there, fill material would be placed in about 152 ac of onsite and offsite areas within the existing 100-year floodplain. This acreage includes 108 ac of wetlands. Because the area surrounding the proposed plant site is relatively flat and flooding is controlled by storm surges, the existing floodplain is large—estimated by PSEG to be 59,681 ac within a 6-mi radius of the site. Because the area to be filled is much less than 1 percent of the existing floodplain area, the NRC staff concluded that building the proposed plant would have minimal effect on flooding. No changes to the EIS were made in response to this comment.*

Comment: Page No. 4-101; Section No. 4.11; Table 4-20; The last bullet under 'Water Use and Quality" states: "Obtain potable water from a local municipality, and send wastewater to be treated by a local municipality so as not to affect onsite groundwater resources" This is incorrect. Page 4-73 states: "PSEG indicates that a freshwater aquifer that currently supplies HCGS and SGS would also supply the construction site with potable and sanitary water ...". Page 4-74 states: "There would be no offsite treatment of wastewater from the new plant (PSEG 2014-TN3452)." (**0015-3-7** [Mallon, James])

Response: *The wording in Table 4-20 of the EIS [Table 4-21 of the final EIS] has been revised to reflect the use of groundwater for the potable and sanitary waste system and the treatment of sanitary waste onsite.*

Comment: Page No. 9-162; Section No. 9.3.4.2; Line No. 20-21; Change "However, the review team further concludes that a new plant's incremental contribution to this impact would be SMALL" to "However, the review team further concludes that a new plant's incremental contribution to this impact would be insignificant." This would be more consistent with the discussions of plant impacts for most other resource areas. (**0015-6-13** [Mallon, James])

Response: *The conclusions regarding cumulative impacts on water use and water quality of the alternative sites were reworded to be consistent with each other and with other resource areas.*

Comment: The Draft EIS is thorough in its analysis of environmental impacts, however it provides insufficient information for us to make a reasonable judgment as to whether the proposed discharge will comply with the Clean Water Act Section 404(b)(1) guidelines. Approximately 134 acres of wetlands would be permanently impacted for the construction of the power block area, cooling tower area, the switch yard, and causeway. (**0017-1** [Mitchell, Judy-Ann])

Response: *Under the CWA, the USACE has authority to permit the discharge of dredged or fill materials to wetlands. CWA Section 404(b)(1) guidelines would be considered in the USACE review of PSEG's discharge permit application. Issuance of the ESP would not change the requirement for PSEG to obtain a discharge permit from the USACE. Potential impacts to wetlands and possible wetland mitigation measures are described in EIS Section 4.3.1. No changes to the EIS were made in response to this comment.*

Comment: The DEIS does an inadequate job at looking at the overall environmental impacts from dredging, especially to water quality from filling in wetlands and coastal resources or building new piers. (**0016-6** [Tittel, Jeff])

Comment: Section 4.2.1.1, page 4-16-Delaware River: states that approximately 92 acres of the bottom of the Delaware River will be dredged (using both mechanical and hydraulic means), resulting in about 665,000 cubic yards (CY) of dredged material that "would be disposed on the site or at another approved upland disposal site." The Office of Dredging and Sediment Technology will be the NJDEP lead on all dredging and dredged material management regulatory actions associated with the proposed PSEG project. The DEIS barely discusses the dredging and dredged material aspects of the proposed project. All dredging and dredged material management activities associated with the construction and operation of the proposed PSEG project must be comprehensively evaluated in the DEIS. This would include sampling and testing of the sediment to be dredged consistent with the requirements of the 1997 NJDEP Dredging Technical Manual. (**0021-4-12** [Foster, Ruth])

Comment: Section 4.2.3.1, page 4-22, para. #2: potential dredging impacts to surface water quality cannot be evaluated without (a) identifying the dredging methods, and (b) testing the sediment to be dredged for contaminants of concern. (**0021-4-13** [Foster, Ruth])

Comment: The dredging and construction of a new barge mooring facility will cause immediate and ongoing damage to the Delaware River which was not fully analyzed. The negative effects on water quality through the re-suspension of toxics from dredging and through vessel-related discharges should be evaluated and weighed against the need for a new barge storage/ unloading area. (**0022-9** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The dredging and construction of a new barge mooring facility will cause immediate and ongoing damage to the Delaware River which was not fully analyzed. The negative effects on water quality through the resuspension of toxics from dredging and through vessel-related discharges should be evaluated and weighed against the need for a new barge storage/ unloading area. (**0034-10** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *The anticipated hydrologic alterations and water quality impacts from dredging are discussed in EIS Sections 4.2.1.1 and 4.2.3.1, respectively. As described in the EIS, dredging activities would be regulated under a combination of USACE and NJDEP permits. The volume of sediments to be dredged for the proposed plant is a fraction of the volume of sediments dredged for the Delaware River main channel deepening project. The USACE NEPA documentation for the channel deepening project concludes that there would be no significant water-quality impacts from that project. The majority of sediment samples from Zone 5 considered in the Delaware Estuary Regional Sediment Management Plan were suitable or potentially suitable for aquatic habitat and upland beneficial uses. As part of the NJDEP permitting process, specific sediment sampling, water-quality monitoring, and best management practices would be required. The discussion of dredging impacts in EIS Section 4.2.3.1 was expanded to include references to the USACE main channel deepening documentation, the Delaware Estuary Regional Sediment Management Plan, and the NJDEP dredging technical manual.*

Comment: The expanded area is not in the current sewer service area. Currently, the Hope Creek Generating station, which has process wastewater as well as sanitary wastewater streams, is identified on Block 26, Lot 4 only. Should the expansion or new reactor create additional process and/or sanitary wastewater on an expanded lot, the applicant will have to comply with the Water Quality Management Plan (WQMP) rules at NJAC 7:15-5.24 and 5.25. More details regarding process and/or sanitary wastewater arc required in order to fully assess this project. (**0021-5-13** [Foster, Ruth])

Response: *As stated in EIS Section 5.2, PSEG is expected to comply with applicable Federal, regional, State, and local regulations during the operation of the proposed plant. The specific requirements of the permits would be determined after a specific design for the plant is decided. No changes to the EIS were made in response to this comment.*

Comment: Page 5-11 (Lines 6 and 7); Comment: PSEG did apply for a renewal of the 316(a) variance in 2006 as part of their overall NJPDES permit renewal request, however, the renewal permit has not yet been issued by NJDEP. The original 316(a) variance was issued in the 200 I final permit and remains effective as a result of PSEG's submittal of a timely renewal application. As a result, this language should be clarified as follows: "In 2006, PSEG applied for the NPDES permit renewal with a request for renewal of the 316(a) variance. PSEG submitted a timely application for renewal of the NJPDES permit, therefore the conditions of their expired permit remain in effect pursuant to N.J.A.C. 7: 14A2.8." (**0021-5-15** [Foster, Ruth])

Response: *EIS Section 5.2.3.1 was changed to reflect the content of the comment.*

Comment: Many of the construction-related impacts are noted as "temporary" in duration. However, construction activities will occur over an estimated time period of 7 years (see Table 3-2, page 3-20). (**0021-5-2** [Foster, Ruth])

Response: *While the total period of preconstruction and construction activities is expected to be 7 years, the impacts to specific resources occur from specific building activities, which are expected to be of shorter durations, as noted in Table 3-2 of the EIS. No changes to the EIS were made in response to this comment.*

Comment: [The NJDEP Endangered & Non-game Species Program concerns include:] Possible degradation of the marsh due to changes in hydrology, spread of invasive plants, etc. (**0021-3-4** [Foster, Ruth])

Response: *Impacts to the marshlands potentially affected by the proposed plant are discussed in the relevant subsections of EIS Sections 4.2, 4.3, 5.2, and 5.3. No changes to the EIS were made in response to this comment.*

Comment: Page 5-12 (Lines 17-22); Comment: The [NJDEP] Department has determined that the section summarizing the results from the CORMIX simulations needs to be clarified and/or questioned for the new nuclear power plant. Specifically, it is counterintuitive that two new units with cooling towers could generate a smaller thermal plume than the existing Heat Dissipation Area (HDA) for the single unit at HCGS. NRC should evaluate the conclusions of the CORMIX simulations. (**0021-5-16** [Foster, Ruth])

Comment: Page 5-13 Figure 5-2; Comment: Figure 5-2 is misleading in comparing a 1.5 °F Temperature Envelope for the new plant to the existing HDA for the HCGS. The HDA for HCGS is larger than a 1.5 °F Temperature Envelope would be for HCGS because it includes the allowable increase of 4 °F from September through May. When a HDA is developed for the new plant, it will be larger than the extent depicted in Figure 5-2, with a greater overlap with the HCGS HDA. (**0021-5-17** [Foster, Ruth])

Response: *The review team found the results from the CORMIX simulations to be acceptable. The review team acknowledges that the expected average discharge rate for the proposed plant would be approximately 60 percent larger than the average discharge for HCGS and expects that a heat dissipation area (HDA) for the proposed plant would be larger in size than the HDA for the HCGS. The EIS was modified to clarify the review team's conclusions on these issues.*

Comment: A Water Allocation Temporary Dewatering Permit will be required for construction dewatering where the dewatering rate is 100,000 gallons per day or more for more than 30 days in a consecutive 365-day period. If the dewatering period is 30 days or less, a Permit by Rule will suffice however it is expected the construction phase will be considerably longer. A Dewatering Permit by Rule may be applicable if the dewatering occurs from within a coffer dam. (**0021-6-1** [Foster, Ruth])

Response: *The authority of NJDEP to permit temporary dewatering during building of the proposed plant is acknowledged in Section 4.2 of the EIS. No changes to the EIS were made in response to this comment.*

Comment: Page 5-12 (Lines 24-28); Comment: It is true that the extent of the thermal plume from a new plant will be small in comparison to the existing SGS HDA. However, NRC has not discussed the additive effect of the overlapping thermal discharges from all three power plants (SGS, HCGS, and the new plant) and is understating the effects of the impacts of thermal discharges from a new nuclear power plant as minor relying on the basis that SGS has greater impacts. (**0021-5-18** [Foster, Ruth])

Response: *The potential additive effect of the thermal plumes from SGS, HCGS, and the proposed plant is discussed in EIS Sections 5.2.3.1 and 7.2.2.1. The EIS was modified to clarify that while the review team expects the HDA for the proposed plant to overlap the existing HDA for the HCGS, significant overlap of these two thermal plumes is not expected during the summer months due to the relatively small size of the plumes.*

Comment: The EIS identifies that impacts will occur from the facilities discharge. Possible outcomes include thermal, chemical and physical effects on the substrate and hydrological changes. The EIS goes on further to say that these effects were found to be minimal. Detailed information is required on how these effects were deemed to be minimal. (**0021-2-17** [Foster, Ruth])

Response: *Water-quality impacts from the proposed plant's discharge are evaluated in EIS Section 5.2.3.1. No changes to the EIS were made in response to this comment.*

Comment: Section 2.3.3.1, page 2-45: includes a minimal presentation and discussion of current surface water quality data in the vicinity of the PSEG site; thus, it is not possible to evaluate the potential impacts of the proposed project on surface water quality based on the information provided in the DEIS. (**0021-4-8** [Foster, Ruth])

Response: *EIS Section 2.3.3.1 provides a summary of Delaware River water-quality information contained in Delaware River Basin Commission reports. The EIS also provides a summary of water-quality data obtained by the applicant in the Delaware River, the onsite artificial ponds, and the nearby marsh. More detailed information is contained in the PSEG ER, and references to the specific ER tables containing this information were added to the EIS.*

Comment: Section 4.3.3.1, page 4-45-Delaware River Estuary: an additional 1,350-7,150 CY of dredged material may have to be managed, depending on the final design of the proposed PSEG project. Also, this section of the DEIS estimates that about 590,000 CY of sediment will be dredged (again, subject to final project design), but Section 4.2.1.1 (page 4-16-see above comment) estimates that 665,000 CY of dredged material will be generated. (**0021-4-14** [Foster, Ruth])

Response: *Section 4.3.2.1 (formerly 4.3.3.1) of the EIS was changed to reflect the correct total estimated volume of dredged sediment—665,000 yd^3.*

Comment: Section, 5.2.1, page 5-5, para. #1: the need to conduct maintenance dredging in the future associated with the proposed PSEG project is briefly mentioned, but the quantity of dredged material to be managed -and how the dredged material will be managed-is not addressed. [Also see Section 5.2.3, page 5-14-Physical Effects of Discharge, and Section 5.3.2.1, page 5-39-Physical Impacts.] (**0021-4-17** [Foster, Ruth])

Response: *The potential impacts of maintenance dredging are discussed in EIS Section 5.3.2. The USACE Department of the Army authorization will address maintenance dredging requirements. No changes were made to the EIS as a result of this comment.*

E.2.8 Comments Concerning Groundwater Hydrology

Comment: Page No. 2-41; Section No. 2.3.1.2; Line No. 17-19; The DEIS states "The majority of these gradients indicated downward flow from the alluvium to the Vincentown aquifer. Where it is present, the low permeability of the intervening Upper Kirkwood unit limits vertical flow between the two units." This suggests there is downward flow in a majority of cases. It would be more accurate to say "The majority of measurements indicate a downward vertical hydraulic gradient between the alluvium and the Vincentown aquifers." There is not necessarily hydraulic communication between these two units due to the presence of the intervening Kirkwood aquitard. (**0015-1-10** [Mallon, James])

Response: *The comment refers to two statements made in the draft EIS. The first statement is based on vertical hydraulic gradient data provided in Table 2.3-16 of the ER (see PSEG 2014-TN3452). In this table, a majority (11 of 16) of vertical gradients are indicative of downward groundwater flow. The magnitude of the actual vertical flow will depend primarily on the thickness and permeability of the low-permeability sediments identified in the ER as the upper Kirkwood formation. Borehole data reported in the ER indicate that the thickness of the sediments identified in the ER as the upper Kirkwood formation varies across the site and that these sediments were not encountered at two borings. The statements in the EIS reflect information in the ER and conform to accepted groundwater-flow concepts. No changes to the EIS were made in response to this comment.*

Comment: Page No. 2-42; Section No. 2.3.1.2; Line No. 32-33; The DEIS states: "There is a component of groundwater flow in the alluvium that is directed to the northeast, with likely discharge to the marsh. This marsh drains to the Delaware River via Fishing Creek to the north of the PSEG Site." This is inconsistent with the release scenario described in the response to SSAR RAI 68. In the response to RAI 68, groundwater flow to the northeast in the alluvium discharges at Fishing Creek and not to the marsh. The statement should be modified to read: "There is a component of groundwater flow in the alluvium that is directed to the northeast, with likely discharge to Fishing Creek which flows into the Delaware River to the north of the PSEG Site." (**0015-1-11** [Mallon, James])

Response: *This comment concerns the connection between shallow groundwater and the surface waters east of the site. Section 2.4.13 in the SSAR (see PSEG 2014-TN3453) describes a transport pathway east of the PSEG Site toward Fishing Creek, but makes clear that a number of assumptions were made to produce a conservative (rapid transport) result, including the assumption that the groundwater-transport pathway occurs through the alluvium* *directly to Fishing Creek. Figure 2.5.1-28 of the SSAR indicates that the surficial deposits in the region between the PSEG Site and Fishing Creek are comprised of salt-marsh deposits. This area is outside the current USACE confined disposal facility and is primarily outside the current PSEG property. The PSEG Site investigation located only two shallow piezometers in the area (AS-05 and AS-06, as shown in ER Figure 2.3-21; see PSEG 2014-TN3452), and as a result, the actual connection between shallow groundwater and the surface waters in the marsh is uncertain. In addition, ER Section 2.3.1.2.3.1 states that the upper groundwater in the east location of the PSEG Site discharges to the marsh. The statement in the draft EIS that groundwater in the alluvium will likely discharge to the marsh is consistent with the totality of information presented in the ER and SSAR given the evident uncertainties. No changes to the EIS were made in response to this comment.*

Comment: p. 2-39, lines 20-21. Indicates Figure 2-18 shows the stratigraphy of the PSEG site based on geotechnical borings. Comment: When Figure 2-18 is examined there are problems with the unit identifications, especially in the upper part of the borings. There is no Kirkwood, either upper or lower, at Artificial Island (sec Owens and others, 1998). The Kirkwood was eroded away during the Pleistocene and the sand (lower Kirkwood) and the clay (upper Kirkwood) above the sand and below the artificial fill and alluvium arc both late Pleistocene deposits (see Owens and Minard, 1979). The figure also shows the Hornerstown and Navesink Formations as too shallow at the site. Since the EIS references this figure as being from the PSEG (TN3452), that report was checked, but no boring information could be found there. The SSAR, [PSEG (TN3453)], was found to have the boring logs and other information. When the logs were reviewed it is evident that the geologists logging the borings misidentified the Hornerstown and Navesink in every boring. They describe the Hornerstown as a fine to silty sand having a trace to a few glauconite or a few to little glauconite. The Hornerstown Formation contains the highest glauconite content found in any geologic formation in New Jersey. The glauconite ranges between 40 and 90% of the sand fraction, not a trace or few grains as is described in the boring logs. (**0021-1-10** [Foster, Ruth])

Comment: p. 2-41, Table 2-7. Comment: There is no Kirkwood Formation at Artificial Island. Also as mentioned above the geologists that described the borings for SSAR and ER misidentified the Hornerstown Formation. In the ER, p. 2.6-6, they describe the Hornerstown Formation as having a trace to some glauconite at the site and they indicate the glauconite increases with depth. They further indicate that the glauconite can make up greater than 30% of the sand fraction near the base of the formation. It should be noted that the Vincentown-Hornerstown contact is generally placed where there is a significant increase in glauconite from about 20 to 40%. The Hornerstown Formation is the easiest unit to recognize in the New Jersey because of its high glauconite content. The depths to top of Hornerstown would be deeper than is indicated. Note, the boring information was found in Appendix 2AA (Boring Logs), of the SSAR. This Appendix has the geologist descriptions and formation identifications and in addition, some of the figures in the SSAR show geophysical logs for some of those borings. Benson (2006), Plate I, Section B-B' shows the Hornerstown-Navesink contact in the 1800-foot boring at Artificial Island. This contact is placed at the top of a major gamma spike at about 175 feet below sea level. This is the same gamma spike that is found in Boring NB-1 (about -150') and Boring EB-3 (about -168') The geologic logs for these two borings show the Hornerstown-

Navesink contact over 40 feet higher because the geologists logging the borings at the plant were misidentifying the Hornerstown Formation as indicated above. (**0021-1-13** [Foster, Ruth])

Comment: [O]n page 2-170 of this EIS, Figure 2-30, the description of Hornerstown indicates it is highly glauconitic, not a trace of glauconite as the boring logs indicate. The first appearance of any significant amount of glauconite in the logs is what they are identifying as the Navesink Formation, but it is in fact, the Hornerstown Formation. Owens and others (1998), at a scale of 1:100,000, shows Kirkwood eroded away with the Vincentown Formation being the youngest pre-Pleistocene formation at Artificial Island. Stanford (2011), at a scale of 1:24,000 also indicates that the Kirkwood Formation is not present at Artificial Island since it was eroded away during the Illinoian lowstand about 150,000 years ago. Descriptions of the Horncrstown Formation can be found in Owens and others (1998), Miller and others (2005), and Rosenau and others (1969). (**0021-1-20** [Foster, Ruth])

Response: *The NRC staff reviewed the reports and maps cited in these and other comments related to the interpretation of the sediments at the PSEG Site located above the Vincentown Formation. The NRC staff agrees that these reports and maps are consistent with these comments. The relevant sections of the EIS have been changed to be consistent with the interpretation of these sediments as reflected in the reports and maps reviewed by the NRC staff. The NRC staff also reviewed the reports cited in these and other comments related to the description of the Hornerstown Formation. The staff agrees that these reports are consistent with these comments. The relevant sections of the EIS have been changed to be consistent with the description of the Hornerstown Formation as a glauconite-rich unit as reflected in the reports reviewed by the NRC staff.*

Comment: It is important to recognize that the Kirkwood Formation is not present at Artificial Island since it means that the "confining" clays above the Vincentown Formation are not regional in extent. The clays on site arc limited in aerial extent and do not form a single layer extending inland for miles protecting aquifers below the water table as they would if they were actually the clays of the Kirkwood Formation. The clay and lower sand are Pleistocene deposits and that is the reason why they are so variable in thickness and extent at the site. (**0021-1-11** [Foster, Ruth])

Comment: p. 2-39, lines 37-38. Comment: There is no Kirkwood Formation at Artificial Island. The clay separating the alluvium from the Vincentown Formation is Pleistocene, not Miocene as is the Kirkwood Formation. (**0021-1-12** [Foster, Ruth])

Comment: p. 2-41, line 18. Comment: There is no Kirkwood Formation at the site. The clay over the Vincentown Formation is Pleistocene. (**0021-1-14** [Foster, Ruth])

Comment: p. 4-17, line 28-29. The EIS indicates the excavation would be down through the fill, alluvium, and Kirkwood into the Vincentown. Comment: Again note there is no Kirkwood Formation present at Artificial Island. The Kirkwood Formation was eroded away in this area during the late Tertiary and early Pleistocene and the Cape May Formation was deposited in the incised river valley between 450,000 and 200,000 years ago (Stanford, 2011). (**0021-2-5** [Foster, Ruth])

Comment: p. 4-19, lines 3-4. Comment: Again, the Kirkwood Formation is not present at the site. (**0021-2-6** [Foster, Ruth])

Response: *The NRC staff reviewed the reports and maps cited in these and other comments related to the interpretation of the sediments at the PSEG Site located above the Vincentown Formation. The NRC staff agrees that these reports and maps are consistent with these comments. The relevant sections of the EIS have been changed to be consistent with the interpretation of these sediments as reflected in the reports and maps reviewed by the NRC staff.*

Comment: The DEIS relies heavily on a 1988 study authored by Dames and Moore, (Section 5.2.2, page 5-9 of the DEIS). This study predicted approximately 15 to 20 feet of drawdown after 20 years at 4 miles from the facility using a one-dimensional drawdown calculation. A single calculation of one-dimensional drawdown does not seem adequate for an assessment of groundwater impacts from a nuclear power plant. Nonetheless, a similar one-dimensional calculation was used to project the impact of using an additional 210 gpm for 40 years. The estimate of 210 gpm for the new facility came from a water balance diagram (Figure 3-2 of the DEIS). Although several cooling options are presented, it is not clear how this withdrawal was derived. (**0023-2-2** [Cooksey, Sarah])

Response: *The 1988 Dames and Moore study used a two-dimensional model of groundwater flow. The review team used the results of that study to evaluate the analytical solution used in its independent assessment. The review team selected the one-dimensional analytical solution because it conforms well to the conceptual model of the layered aquifer system of the New Jersey Coastal Plain. The freshwater requirements of the proposed plant are taken from the ER, as* cited in EIS Section 5.2.2.2*. No changes were made to the EIS in response to this comment.*

Comment: The maximum proposed withdrawal is 953 gpm (Section 3.2.1.1, line 15 of the DEIS). The projected impact of 210 gpm withdrawal for 40 years at 5 miles is 14.4 feet of drawdown. At peak withdrawal periods, the drawdown at 5 miles could be between 14.4 and 65 feet. There is not enough data to precisely calculate the impact that this peak use could already be having on the Potomoc aquifer wells in southern New Castle County in Delaware. However, hydrologists within the Delaware Divison of Water estimated possible capacity losses for some Delaware wells and are concerned about the continued viability of these wells given the predicted increase in water usage of the proposed new facility. (**0023-2-3** [Cooksey, Sarah])

Response: *As stated in EIS Section 5.2.2.2, the maximum rate would occur only during abnormal conditions and would thus be temporary. As a result, the review team used the average withdrawal rate to assess impacts of the groundwater withdrawals. No changes to the EIS were made in response to this comment.*

Comment: The further impact that is partially addressed in the DEIS is saltwater intrusion. Section 5.2.3.2 (page 5-15) states: "Recent estimates place the 250 mg/L line of equal chloride concentration close to Artificial Island in the middle PRM aquifer (dePaul et al. 2009-TN2948)." Saltwater intrusion is already active along the New Jersey coastline and could advance toward New Castle County if not properly managed. The same section (page 5-16) of the DEIS states:

"The available data and the modeling results suggest that operational pumping for a new nuclear power plant would increase chloride concentrations in the middle PRM aquifer, but these increases would be manageable." Although the need for management is acknowledged, no management strategy is proposed. A saltwater management strategy must include maps of chloride concentrations, monitor well locations and a monitoring plan. None of these have been proposed or provided. (**0023-2-4** [Cooksey, Sarah])

Response: *As stated in EIS Section 5.2, groundwater use at the site would be subject to Delaware River Basin Commission and NJDEP requirements, including limits on withdrawals and monitoring requirements, such as occurs for the existing units. No changes to the EIS were made in response to this comment.*

Comment: The current Water Allocation Permit, No. 2216P requires modification if additional groundwater withdrawal or additional groundwater sources are planned for the new plant. Included with such a request for major modification of the Water Allocation Permit will be a Hydrogeologic Report prepared in accordance with TM-12-2 guidelines pursuant to N.J.A.C. 7: l9-2.2(c). (**0021-6-2** [Foster, Ruth])

Comment: The Delaware Division of Water has an informal prohibition of new water allocations from the Potomac aquifer in New Castle County, similar to New Jersey's Water Supply Critical Area 2. Upon consideration of the scant information provided in the DEIS, it appears that this prohibition should remain in effect for the proposed facility, and the new water use should not be approved without substantial new information and justification. (**0023-2-5** [Cooksey, Sarah])

Response: *As stated in EIS Section 5.2, groundwater use at the site would be subject to Delaware River Basin Commission and NJDEP requirements, including limits on withdrawals and monitoring requirements, such as occurs for the existing units. No changes to the EIS were made in response to this comment.*

Comment: Section 2.3.3.2 "Groundwater Quality", Page 2-50, Lines 1-3: The statement that SGS Unit 2 " ...has a tritium monitoring system often wells installed due to elevated tritium concentrations in the shallow aquifer resulting from precipitation capture of vented tritiated water vapor" is incorrect. According to PSEG Nuclear, these wells were installed "to assist in identifying potential leaks from Salem Unit 2" following the discovery of a leak of condensate from an expansion joint on the SGS Unit 2 plant vent. The "highly tritiated" water that escaped from the expansion joint leaked onto the Auxiliary Building roof and was transported to nearby catch basins via the roof drain and stormwater collection system (PSEG Nuclear, LLC, Remedial Action Progress Repot1, Second Quarter 2013, January 28, 2014). (**0021-1-1** [Foster, Ruth])

Comment: p. 2-50, lines 1-5. The report indicates here that tritium on the north side of Salem 2 is not due to a major release into the subsurface but due to tritium capture by precipitation of vented tritiated water vapor. Our Comment: The tritium capture is a theory, but is not a proven fact, as the cause of the tritium on the north side of Unit 2. Tritium occurs both in the shallow water table aquifer and in the deeper Vincentown aquifer in wells CB and K significantly above background. (**0021-1-17** [Foster, Ruth])

Comment: Section 7.2.2.2 "Impacts on Groundwater Quality", Page 7-16, Lines 31-40: The existing and potential impacts on groundwater quality arc not accurately characterized here. The NRC states "The existing SGS and HCGS have impacted shallow groundwater quality, but these impacts have been minor and have been limited to the immediate vicinity of the PSEG Site." As documented in the previous comment however, existing impacts to groundwater quality have not been limited to the shallow groundwater. Ground water contamination attributable to the spent fuel pool leak at Salem Unit I has been detected in the deeper Vincentown Aquifer. The extent of the contamination in this aquifer has yet to be determined. (**0021-1-6** [Foster, Ruth])

Comment: With regard to potential impacts on groundwater quality, the NRC states "Potential impacts to groundwater quality could come from inadvertent spills that could migrate to the shallow water zones." This statement incorrectly assumes that the impact of any spills will be limited to the shallow groundwater at the site. Recent experience at Salem Unit I, as well as the Oyster Creek Nuclear Generating Station in Lacey Township, New Jersey, has clearly demonstrated that the probability that tritium contaminated water released into shallow unconfined aquifers will ultimately reach deeper confined aquifers is much greater than previously predicted. Construction activities typically associated with nuclear power plants, such as deep excavations for building foundations and other structures, and the installation of cofferdams to support dewatering operations, can significantly alter site hydrological conditions. An unintended consequence of these activities has been the creation of downward pathways that have allowed contaminants to pass through the confining layers into the deeper aquifers. (**0021-1-7** [Foster, Ruth])

Response: *Portions of EIS Sections 2.3.3.2 and 7.2.2.2 describing the tritium contamination of groundwater at the SGS were modified to correct inaccuracies and to reflect more recent documentation of the remediation and monitoring. The EIS acknowledges the tritium observed in the alluvium and the Vincentown aquifer. As described in the EIS, groundwater in the alluvium and in the Vincentown aquifer is saline and not suitable for potable use. In addition, groundwater in the alluvium and the Vincentown aquifer discharges to the Delaware River. Low-permeability sediments underlie the Vincentown aquifer, reducing the hydrologic connection between the Vincentown aquifer and lower, potable aquifers. Finally, estimates of the cumulative tritium discharge from the groundwater to the Delaware River are much smaller than the permitted tritium discharges from the normal operation of SGS and HCGS, suggesting that the impact on the river of tritium discharge from groundwater is small.*

Comment: p. 2-49, lines 24-41. The EIS discusses the tritium leak and groundwater remediation at Salem and lines 33-35 indicates the leak at the spent fuel has been remediated. Comment: The actual leak has not been scaled. PSEG is just preventing the spent fuel pool water from reaching the environment by better maintenance of the tell tails and collecting the water that builds up in the seismic gap. It should be noted that if approval is given and construction began on a new plant, any dewatering would have to closely monitored to prevent any remaining tritium or any other contaminants in either the water table or Vincentown aquifers from being pulled into uncontaminated areas of both. (**0021-1-16** [Foster, Ruth])

Response: *Section 2.3.3.2 of the EIS does not state that the spent fuel pool leak at SGS Unit 1 has been remediated, only that the source of the release of contaminated water to the* *environment has been remediated by clearing the telltale drains and removing water behind the spent fuel pool liner. Section 4.2.4 of the EIS notes that monitoring of groundwater will occur during construction dewatering to avoid adverse impacts to the SGS and HCGS and to evaluate changes in water quality in the alluvium and Vincentown aquifer. No changes to the EIS were made in response to this comment.*

Comment: p. 4-23 and 2-24, Section 4.2.3.2 Groundwater Quality Impacts. Comment: This section discusses various potential spills such as gasoline, etc. but fails to mention or discuss the ongoing groundwater cleanup of the tritium at the Salem Generating Station. Since the contamination is in both the water table and the Vincentown aquifers, any dewatering in either of these water bearing zones will affect any remaining plumes of contamination. Since the Vincentown Formation is semi-confined at Artificial Island the dewatering affects will extend out significantly further than in the water table aquifer. (**0021-2-8** [Foster, Ruth])

Response: *Tritium contamination of groundwater resulting from the operation of the SGS is described in EIS Section 2.3.3.2. Section 4.2.4 of the EIS notes that monitoring of groundwater will occur during construction dewatering to avoid adverse impacts to the SGS and HCGS and to evaluate changes in water quality in the alluvium and Vincentown aquifer. No changes to the EIS were made in response to this comment.*

Comment: Relevant information is omitted in the DEIS. Readily available data, such as water use graphs and water level hydrographs for the existing plant were not provided. Although frequent references are made to other studies, the references do not include page numbers or figure numbers, and are very burdensome when further information is needed. (**0023-2-6** [Cooksey, Sarah])

Response: *The review team strove to include information in the EIS that was directly relied on for its evaluation of impacts. Additional supporting information was provided by reference to particular documents, but not specific portions of those documents (e.g., page or figure numbers). The review team apologizes for the inconvenience. No changes to the EIS were made in response to this comment.*

Comment: Natural replenishment of ground water is probably not occurring in the middle and lower PRM aquifers as evidenced by the results of USGS monitoring. A localized cone of depression is present in Salem County centered at Artificial Island as the result of local pumping from both the middle and undifferentiated PRM, and the Lower PRM aquifers. A regional cone of depression extends from New Castle County, Delaware encompassing Salem County as a result of heavy pumping in the Middletown and St. Georges USGS quadrangles in Delaware where water levels are as low as -187 feet in the Lower PRM, and -58 in the Middle PRM. (**0021-6-4** [Foster, Ruth])

Comment: Additionally, there is recent literature available that pertains to this site. The United States Army Corps of Engineers (USACE) updated the stratigraphic framework of the Potomac aquifer in Delaware and adjacent areas in Maryland and New Jersey in 2004 (Benson, 2006). This update includes the area surrounding the PSEG site. The USACE used the stratigraphic approach to develop their three dimensional finite element groundwater model for the Potomac Formation. The time-stratigraphic framework of the model allows for the potential correlation of aquifer-quality sands that may be genetically related at the time of their deposition and therefore may be better connected hydraulically (Benson, 2006). In contrast, the model cited in the DEIS (Martin 1998) is based on a sequence of aquifers and confining beds based on general hydraulic properties of sediment and may not accurately represent the degree of lateral transmissivity of groundwater. Additionally, the USACE model assumes direct recharge to the uppermost aquifer sands and limited or no recharge to lower aquifers from the surficial aquifer (Benson, 2006). In contrast, the Martin 1998 model assumed direct recharge to all aquifers from the unconfined aquifers. (**0023-2-7** [Cooksey, Sarah])

Comment: Based on the information presented in the DEIS, one cannot dismiss the concern that additional pumping at the PSEG site would have a significant impact on the PRM aquifer system regionally. An impact to the PRM may affect the quantity and quality of drinking water available to the citizens of New Jersey and Delaware. To address these concerns, a finite analytical model should be developed using current site-specific data. (**0023-2-8** [Cooksey, Sarah])

Comment: The following references provide more recent information than the studies referenced within the DEIS: (1) Benson, R.N., 2006, Internal Stratigraphic Correlation of the Subsurface Potomac Formation, New Castle County, Delaware, and Adjacent Areas in Maryland and New Jersey, Delaware Geological Survey Report of Investigations No. 71, p.15. (2) Mullikin, L., 2011, Expansion of Monitoring Well Network in Confined Aquifers of the New Jersey Coastal Plain, 1996-1997, New Jersey Geological Survey Open File Report 11-1, p. 61. (**0023-2-9** [Cooksey, Sarah])

Response: *The report of Benson (2006) was reviewed, as was a USACE report describing the application of the model referenced in the comment. Information provided in these documents is substantially consistent with documents referenced in the draft EIS. Benson (2006) addresses the stratigraphy within the Middle and Lower Potomac-Raritan-Magothy (PRM) aquifers and would mainly affect the interpretation of the connection between these aquifers and the nature of recharge to these aquifers. The draft EIS acknowledged the leaky nature of the PRM aquifer in the vicinity of the proposed plant site, and assumed that recharge to the Middle and Lower PRM aquifers occurs to the east of the proposed plant site, consistent with the USACE model. The review team notes that results from the USACE simulations show that Delaware groundwater pumping is likely to be significantly impacting groundwater in New Jersey. The review team believes the USACE groundwater simulations provide additional evidence that the estimated average groundwater pumping for the proposed plant would have a minor impact on groundwater use and quality in Delaware. No changes were made to the EIS in response to these comments.*

Comment: The site is south of Water Supply Critical Area No. 2. Increases in withdrawals from the PRM Aquifer are being reviewed by BWA WP due to concerns with safe yield and salt water intrusion. The results of the draft 2008 and 2013 USGS synoptic groundwater-level measurements indicate that the water levels in the Middle PRM aquifer where the site obtains their industrial water supply have declined. (**0021-6-3** [Foster, Ruth])

Response: *In preparing the draft EIS, monthly groundwater-level measurements over the period 2003-2013 from observation wells located on Artificial Island were reviewed. These* *wells, including those screened in the Middle PRM aquifer, do not show a systematic decline over this period. No change to the EIS was made in response to this comment.*

Comment: p. 2-38, lines 17 to 19. The EIS cites Martin (1998) for the heads in the middle aquifer being about 20ft. above sea level before pumping. Comment: It should be noted that two wells were drilled at Artificial Island by the US Army Corps of Engineers in 1930-1932. The Historic Well Records at the NJDEP indicate both wells were completed in what is now termed the middle PRM aquifer. Water levels given for the well at the south end of Artificial Island range from sea level to 4 feet, not the 20 feet above sea level as the computer simulation indicated. These actual measurements agree closely with the -4 feet measured on 4/1/1969 [NWSI (USGS 392744075315301 33030-Art Island)] in the middle PRM at Artificial Island. Before the construction began at Artificial Island there were no large regional pumping areas near enough to reduce the heads in the aquifer at Artificial Island. All the head reductions in the area were the result of the pumping at the plant site, nowhere else. (**0021-1-9** [Foster, Ruth])

Response: *The discussion in EIS Section 2.3.1.2 of groundwater conditions in the region surrounding Artificial Island was changed to better describe the available data on historic groundwater levels.*

Comment: p. 2-42, lines 11-18. The EIS discusses the water levels in the middle and lower PRM aquifers and indicates the water levels in these two aquifers appear to be affected by New Castle County water withdrawals. Comment: The problem with that conclusion is that the pumping at Artificial Island started before significant pumping started in southern New Castle County and caused a significant lowering of the potentiometric surface to below -50 feet over two miles from the plant pumping wells (see Walker, 1983, Plate I, wells #33-363 and #33-364). Lines 16-18, referring to Plate 8, dePaul and others, (2009), states "The head measured in the USGS observation well #33-934 (site observation Well J) at the south end of Artificial Island was -70 ft, a drawdown of about 50 ft below the apparent regional groundwater head." On Plate 8, well #33-934, with a water level of 70 feet, and nearby well #33-918, with a water level of -44 feet, are shown as being in the middle PRM. This difference in the potentiometric surface seems to account for the statement in lines 16-18. The problem with that conclusion is that well #33-918 (Plate 8) with a water level of -44 feet is in the lower PRM, not the middle PRM as shown. The USGS has this well listed in the wrong aquifer in their NWSI database. USGS well #33-918 is the plant production well PW 6 and USGS well #33-458 (Plate 9) is observation well 6 (OW 6). Plate 9 (lower PRM) shows well #33-458 with a water level of -45 feet very similar to well #33-918 with -44 feet. Appendix 9 of dePaul and others (2009) indicates well #33-458 is screened at 1112-1132 feet in the lower PRM and Appendix 8 has well #33-918 screened at 1115-1135 feet in middle PRM. These two wells are less than 50 feet apart, at the essentially the same depth and yet the USGS has these two wells located in different aquifers. Note on p. 2-45, lines 8-11, the EIS indicates the SGS derives its groundwater from two pumping wells in the middle and lower PRM at depths of 840 and 1135 feet. The 1135 foot well is PW 6, USGS well #33-918. If well #33-918 on Plate 8 was plotted where it belongs on Plate 9, then the data on Plate 8 would indicate the -70 feet in the middle PRM aquifer is a more regional drawdown caused by the plant, not a local deep cone of drawdown that changes from -70 to -44 feet in a short distance. All the USGS synoptic water level reports for the New Jersey Coastal Plain show a significant lowering of the water levels in the middle PRM caused by the pumping at Artificial Island. The data indicates the greatest lowering of the water level in the aquifer occurred in about 1978, which was likely a result of pumping at maximum diversion, during construction. (**0021-1-15** [Foster, Ruth])

Response: *As stated in Section 2.3.1.2 of the EIS, past and current pumping for the SGS and HCGS has depressed groundwater levels locally and in the surrounding area. The influence of groundwater use in New Castle County, Delaware, appears to extend to the area of Artificial Island in the Lower PRM aquifer and possibly the Middle PRM aquifer. These two statements are not in conflict and no change was made to the EIS in response. However, discussion of the impact of SGS and HCGS on groundwater levels was modified to reflect the error in De Paul et al (2009), Plate 8, identified in the comment.*

Comment: p. 2-50, lines 15-19. The EIS indicates that the chlorides have been stable over time with notable deviations. Comment: Without plotting the amounts of water pumped from each well on the Figure 2-20 it is difficult to tell what is going on, but there seems to be a correlation that indicates when the chloride levels drop in wells PW 5 and PW 6 the chloride levels increase in HC 1 and HC 2 with well HC 1 jumping to over 200 mg/L, an increase of an order of magnitude. With PW 6 the chlorides are dominantly over 200 mg/L with some readings over 250 mg/L the drinking water standard. It is likely that any increased pumpage from this well in lower PRM will cause the chloride to exceed the drinking water standard on a continuous basis. Also HC 1 shows indications of possibly exceeding the drinking water standard if pumped at a greater rate than it currently being used. These two wells are showing signs being unsuitable for drinking water usage with PSEG currently not pumping the wells at the approved maximum diversion rate. (**0021-1-18** [Foster, Ruth])

Comment: p. 4-24, lines 1-20. The report indicates that the preconstruction and construction impacts on ground water quality would be small in the PRM and cite Section 5.2.3.2. Comment: See [our] comment above for p. 2-50, lines 15-19 and [our] comments on Section 5.2.3.2. (**0021-2-10** [Foster, Ruth])

Comment: p. 5-15, lines 23-42 and p. 5-16, lines 1-17. The EIS discusses the impact of the additional groundwater pumping for the new plant on the potential of saltwater intrusion into the middle PRM. On line 30-31 they indicate that Dames and Moore in 1987 measured chlorides of 15mg/L (HC 1 and HC 2) and 45mg/L (PW 5) in 1987 and in lines 31-33 they indicate from 2003 to 2013 the median chlorides were 8 mg/L (HC 1), 5 mg/L (HC 2) and 22 mg/L (PW 5). The report concludes that the higher chlorides may have been due to the higher plant pumping rate of 493 gpm (1987) to 369 gpm (2003-2013) or due to a greater regional pumping in the early 1980's that was decreased by the initiation of Critical Area 2. Comment: The problem with the analysis and its conclusions in this section is that by comparing the median of the chlorides in the wells, biased the data to the very low end, since the data not evaluated is over an order of magnitude greater than the median chloride concentration. The issue concerning chlorides was also discussed above in comment for p. 2-50, lines 15-1. Without having the amount of water pumped from each of the wells compared to the chlorides it is not possible to know why wells HC 1 and PW 5 increased in chloride concentration by over an order of magnitude a number of times during the 10 year period as shown on Figure 2-20. Until it is known why these two middle PRM wells occasionally increased in chlorides so dramatically up to and over 200 mg/L from the 8 mg/L (HC 1) and 22 mg/L (PW 5), the NRC is only speculating as to what would happen if the pumpage at the plant increases. Is the front of chlorides over the drinking water standards very close to these wells, are the chlorides up coning, or do the wells have leaky casings? Until the source of the high chloride readings in wells HC 1 and PW 5 is known, it is not possible to realistically determine the impact of the additional pumpage from a new plant at Artificial Island. (**0021-2-12** [Foster, Ruth])

Response: *The review team looked at pumping at the site and the observed chloride concentrations, but did not see any noticeable correlation. The review team also looked at available U.S. Geological Survey (USGS) National Water Information System chloride data from onsite wells and the chloride data provided in the 1988 Dames and Moore report referenced in the EIS (see Dames and Moore 1988-TN3311). Based on the history of groundwater pumping at the site, and on the totality of the information examined by the review team, it is expected that groundwater pumping for the proposed plant would have to be managed to maintain low chloride levels. This conclusion is stated in the EIS. No changes were made to the EIS as a result of these comments.*

Comment: p. 5-9, lines 24-26. The EIS states that according to dePaul and others (2009), the existing heads in the middle PRM are about -20 feet at 3 to 5 miles northeast of the site. Comment: It is not clear how they come to that conclusion when the nearest middle PRM wells shown on Plate 8 of dePaul and others are about 7 and 9 miles northeast and have measured water levels of -32 and -31 feet respectively. The nearest wells to the southwest, west and northwest all are 6 or slightly more than 6 miles from the site and they have water levels of -32 to -34 feet. With the potentiometric surface at -32 feet 7 miles from the PSEG site where the potentiometric surface is at -70 feet it is difficult to understand how NRC concluded that the heads were about 20 feet at 3 to 5 miles from the site without any other wells between the two measured wells. Well #33-918, on Plate 8, at the PSEG site has a measurement of -44 feet but as indicated in the comments above for p. 2-42, lines 11-18, well #33-918 is not in the middle PRM, but is in the lower PRM aquifer. It is less than 50 feet from well #33-458 on Plate 9 (Lower Potomac-Raritan-Magothy Aquifer) and is screened at almost the exact same depth, a 1 foot difference in depth. Even if this well was in the middle PRM as shown, there is no indication of the -20 foot number which the EIS cites from dePaul and others. If the 14-17 feet of drawdown on line 26 is added to the more likely -40 to -45 feet at 3 to 5 miles based the actual information on Plate 8 then the impact is somewhat greater than SMALL. (**0021-2-11** [Foster, Ruth])

Comment: p. 4-20, lines 24-38 and 4-21, lines 1-12. The EIS indicates that the preconstruction and construction pumping from the PRM would be minor and small. They cite Section 5.2.2.2. Comment: There are significant issues with Section 5.2.2.2 therefore see comments below on that section. (**0021-2-7** [Foster, Ruth])

Response: *Discussion of the impact of groundwater use by the SGS, the HCGS, and the proposed plant on groundwater levels was modified in the EIS to reflect the error in dePaul et al. (2009), Plate 8, identified in the comment.*

Comment: p. 5-16, lines 12-17. The EIS cites Pope and Gordon (1999) to indicate salinity changes in the aquifers is more responsive to historic sea level changes than to 20th century pumpage and concludes that the operational impacts of the increased pumpage at the plant on the resource would be SMALL. Comment: When Figures 1f, 2f and 3f of Pope and Gordon

(1999) are examined it is impossible to locate the freshwater-saltwater interface by the data shown on each figure, let alone to know where it was in pre-pumping times. The freshwater-saltwater interface is defined on page 1 of Pope and Gordon " ...as the hypothetical line seaward of which the chloride concentration is equal to or greater than 10,000 milligrams per liter." Furthermore, it is not the 10,000 mg/L chloride line that has the impact, it is the 250 mg/L chloride drinking water standard that has the impact on the use of the resource, so it does not matter how fast or slow the 10,000 line moves. But it does matter how fast the 250 mg/L line moves and it must be very close to the plant as evidenced by the anomalous 200 mg/L chloride readings in wells HC 1 and PW 5 shown on Figure 2-20 of this EIS. (**0021-2-13** [Foster, Ruth])

Response: *The history of pumping at the site, the observed chloride concentrations at the site and in the region, and the hydrogeological understanding of the aquifer system are the primary information the review team used to evaluate the potential groundwater-quality impacts from the proposed plant's groundwater use. The site-specific modeling of Dames and Moore (1988-TN3311) and the paper of Pope and Gordon (1999-TN3006) were relied on as corroborating evidence. The review team acknowledges in EIS Section 5.2.3.2 that recent estimates place the 250-mg/L line of equal chloride concentration near the site in the middle PRM aquifer. EIS Section 5.2.3.2 also describes the evidence the review team used in concluding that salinity increases at the site are likely to be manageable. No changes to the EIS were made in response to this comment.*

Comment: p. 4-24, lines 29-30. The EIS indicates the Vincentown is too saline for potable water in the vicinity of the PSEG site. The PSEG Nuclear, LLC, Remedial Action Progress Report, Third Quarter, 2013 (dated March 12, 2014) shows several domestic wells within the 5 mile buffer of the plant utilizing the Vincentown Formation. (**0021-2-9** [Foster, Ruth])

Response: *As stated in the draft EIS, average chloride concentrations in the Vincentown aquifer wells completed for the ESP application were 4,500 mg/L in the northern wells and 5,600 mg/L in the eastern wells. In the potable well search described in the Salem Remedial Action Progress Report, Third Quarter 2013, the closest offsite potable well described as being potentially installed in the Vincentown aquifer is 4 mi from the SGS and stated to be upgradient to groundwater flow. Due to its distance from the site and the observed flow in the Vincentown aquifer toward the Delaware River, this well is not likely to be affected by activities at the proposed plant. No changes to the EIS were made in response to this comment.*

E.2.9 Comments Concerning Terrestrial Ecology and Wetlands

Comment: Before addressing the new construction, I would point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the Salem vicinity. In particular, faced with concerns of negative impacts on fisheries by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the Nation. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced, and/or preserved more than 20,000 acres of salt marsh and adjacent uplands to vital, healthy habitat for fish and wildlife. (**0001-4** [Velinsky, David])

Comment: Before addressing this new construction, I would like to point out that PSEG's past efforts to mitigate the effects of the operations on the aquatic environment in the Salem vicinity. And particularly faced with concerns of negative impacts on fisheries, by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the nation. The Estuary Enhancement Program began in1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced and/or preserved more than 20,000 acres of salt marsh, and adjacent wetlands to vital healthy habitat for fish and wildlife. (**0004-11-4** [Velinsky, David])

Comment: During the re-permitting, of the existing nuclear facilities at Salem, PSEG developed a bay-wide concept of mitigating the impacts of the existing cooling apparatus at the facilities. They were creative in identifying a variety of ways that the bay-wide resource value could be improved through investment in projects, throughout the Delaware Bay estuary. I was impressed by the scope of their thinking, and the resources they could bring to the table. (**0004-4-4** [Applegate, Jim])

Comment: Since then I have followed, with my students and with great interest, what has become the largest privately financed estuary enhancement project in the nation. Without going into details the project has been a resounding success, at many levels, and increasing the resource value of large acreages throughout the bay. PSEG has a solid track record in delivering on their commitment to bay-wide health. (**0004-4-5** [Applegate, Jim])

Comment: Before addressing the new construction I would point out PSEG's past efforts to mitigate the effects of its operations on aquatic environments in the Salem vicinity. In particular faced with concerns of negative impacts on fisheries, by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the nation. This project, the Estuary Enhancement Program, began in 1994. Since that time it has conducted a large scale effort to restore and preserve portions of the Delaware estuary, of wetlands in the Delaware estuary, in both New Jersey and Delaware. PSEG has restored, enhanced and/or preserved more than 20,000 acres of salt marsh, returning it to vital healthy habitat for fish and wildlife. (**0007-9-4** [Wall, Roland])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. No changes were made to the EIS as a result of these comments.*

Comment: PSEG is making acceptable efforts to restrict impact on these wetlands, including a site plan to minimize encroachment, the use of sediment pits to stage some of the construction operations, and the use of raised causeways, rather than using fill material to carry the access road to the new site. Where permanent disturbance to wetland occurs, PSEG has outlined a mitigation plan that would create new wetland environments in adequate amounts to offset any loss. We anticipate that the resources and expertise developed in the EEP will provide a very strong foundation for the mitigation steps being taken by PSEG in the new site construction, both in selecting the mitigation sites and in managing the restored and enhanced wetland sites. (**0001-7** [Velinsky, David])

Comment: PSEG has already demonstrated their ability, and willingness, to engage in environmental mitigation activities, as demonstrated by their marsh restoration program. Every indication points to PSEG's commitment to mitigating any marsh disturbance associated with the construction of a new plant. (**0006-8-9** [Duvau, Bryan])

Comment: The 20,000 acre restoration program instituted by PS&G in the greater area has provided added benefit to the recovery of nearby wetlands, an internationally recognized success. Plans appear to be in place to expand the restoration program to continue to benefit the area. (**0009-4** [Locandro, Roger])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetland mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: But there is also a renewed emphasis on the role of wetlands that has taken center stage in efforts to build a climate resilient nation; they do this by helping to protect people, property and the environment against the ravages of severe storms. (**0002-1** [Weinstein, Michael])

Response: *The NRC staff discusses wetlands and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff discusses the potential impacts of climate change on ecological resources in Section 7.3 of the EIS as part of the discussion on cumulative impacts. No changes were made to the EIS as a result of this comment.*

Comment: Thus, long after these Artificial Island power plants and their infrastructure are gone, EEP's wetlands will continue to serve both of these critical ecological and societal functions, and not only produce fish and shellfish of the "right kind", in copious numbers, but will also help protect people and property in the region against storm related impacts. (**0002-5** [Weinstein, Michael])

Comment: But the restoration effort has also taken center stage in efforts to build a climate resilient nation, by protecting people, property, and the environment, against the ravages of severe storms. (**0004-9-3** [Weinstein, Michael])

Comment: So long after the Artificial Island power plants, and their infrastructure are gone, including those horrible looking cooling towers, EEP wetlands will continue to serve these critical ecological and societal functions. And not only produce fish and shellfish of the right kind, but in copious numbers. It will also help protect people and property in the region, again, against the advent of more severe storm events. (**0004-9-6** [Weinstein, Michael])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff discusses the potential impacts of climate change on ecological resources in Section 7.3 of the EIS as part of the discussion on cumulative impacts. No changes were made to the EIS as a result of these comments.*

Comment: So . . . Why am I saying all of this today? It is because the newly proposed project will result in the unavoidable loss of 108 acres of *Phragmites*-dominated wetlands and will require mitigation in some form. (**0002-6** [Weinstein, Michael])

Response: *The NRC staff discusses the loss of Phragmites-dominated wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of construction. The NRC staff also discusses wetlands and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of this comment.*

Comment: I am absolutely certain that a satisfactory effort to replace these lost wetlands will be undertaken by the Company to the vast satisfaction of the majority of the public, resource and regulatory agencies, both Federal and State, and a broad array of decision makers. They have done this admirably before, involving a multidisciplinary group of the nation's best scientists, and quality engineers to design and implement their marsh restoration plan. I see no reason that they will not do the same again, inviting in the top technical talent to achieve their mitigation objectives. (**0002-8** [Weinstein, Michael])

Comment: I'm absolutely certain that a satisfactory effort to replace these lost wetlands, will be undertaken, by the company, to the vast satisfaction of the majority of public resource, and regulatory agency personnel, both federal and state, and a broad array of decisionmakers. They have done this admirably before, involving a multi-disciplinary group of the nation's best scientists, and quality engineers to design and implement their marsh restoration program. I see absolutely no reason why they will not do the same again, inviting in the top technical talent to achieve their mitigation objectives. (**0004-9-9** [Weinstein, Michael])

Comment: There are other examples, as well. They have a lot of expertise in mitigating impacts of their activities on the environment. Some of the best practices for restoring wetlands came out of their Estuary Enhancement Program. And it is, certainly, a model for a lot of the restoration that is under way now, in the aftermath of superstorm Sandy. So I'm very confident that PSEG is up to the task of addressing and mitigating the impacts of this particular project. (**0006-6-4** [DeLuca, Mike])

Comment: Because there is going to be some impact on the meadow [from the causeway], you are going to lose certain acreage. And their plans are to enhance an area presently owned by the division, or I should say, managed by the New Jersey Division of Fish and Wildlife. And this area is over near Mason's Point, and Abbot's Farm road. Their plan is to mitigate that area by enhancing the area, much as was talked about, by the last speaker, similar to what they did with their Estuary Enhancement Program. (**0006-7-4** [Widjeskog, Lee])

Comment: The Environmental Report indicates an overall wetlands impact of 229 acres from the new plant, and proposed causeway. It further indicated that there is an abundance of wetlands in the vicinity, of more than 25,000 acres. Unfortunately the quality, and the dominant species is the invasive species phragmites. PSEG will reduce the environmental impact by replacing permanent facilities, inside the current diked areas, and in compensation free wetlands. We recommend that Public Service continue to restore the degraded wetlands in the Delaware Bay region, by appropriate compensation ratio. This could be achieved by undertaking and furthering the Estuary Enhancement Program that has been recognized, nationally, for restoring and protecting over 20,000 wetlands of adjoining properties on the estuary of both New Jersey and Delaware. (**0007-16-7** [Palmer, Dennis])

Comment: In addition to the storm surge we are -- we continue to be concerned about wetlands. You know, there is a trade, kind of a sweetheart swapping deal being proposed, with some core lands. I bet guessed on appraised value. But we knew, from federal actions here in Delaware, that beyond the value, the land values of wetlands, we put a higher premium on them. We are spending 40 million dollars to try to restore and protect 100 acres of wetlands in prime hook area, going through the U.S. Fish and Wildlife Service. I think we need to put similar values on this type of wetlands. (**0007-2-10** [Carter, David])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands, wetlands loss, and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: The proposed new construction will permanently impact some wetlands. While protection of wetlands is a high national priority (as demonstrated by Section 404 of the Clean Water Act), the majority of the wetland acreage impacted by the new construction has a degraded hydroperiod and now hosts a monoculture of Phragmites. An invasive reed grass, Phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites displaces native plants and has a negative impact on biodiversity. Targeting these degraded wetlands in close proximity to existing PSEG facilities will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in "Greenfield" sites. Moreover, the amount of wetlands impacted represents a small fraction of the total wetland - many with higher quality functions - present in the vicinity of the construction. (**0001-6** [Velinsky, David])

Comment: The proposed new construction will permanently impact some wetlands. While protection of wetlands is a high priority, as demonstrated by Section 404 of the Clean Water Act, the majority of these wetland acreages impacted by the new construction, has a degraded hydro period, and now hosts a monoculture of phragmites, and invasive reed grass. Phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites replaces native plants, and has a negative impact on the biodiversity overall. Targeting these degraded wetlands in close proximity to the existing facility, will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in Green field sites. Moreover, the amount of wetlands impacted represents a small fraction of the total wetland, mainly with higher quality functions, present in the vicinity of the construction area. (**0004-11-6** [Velinsky, David])

Comment: The proposed new construction will permanently impact some wetlands. While protection of wetlands is a high national priority, and it should be, as is demonstrated by the Section 404 of the Clean Water Act, the majority of the wetland acreage, impacted by the new construction, has a degraded hydro period, and now hosts a monoculture of phragmites. An invasive reed grass phragmites is often found in disturbed marsh areas, where plant communities, hydrology and topography have been altered. Phragmites displaces native plants and has a negative impact on biodiversity. By converting these already degraded wetlands that are in close proximity to existing PSEG facilities, it will reduce the need for new infrastructure, minimizing the environmental disturbance that would result if development occurred in green field sites. Moreover, the amount of wetlands impacted represents a small fraction of the total wetland in the vicinity of the construction. And many of these remain unaltered and have higher quality functions. (**0007-9-6** [Wall, Roland])

Response: *The NRC staff discusses wetlands, wetlands loss, the small percentage of wetlands that would be disturbed in relation to acreages available in the vicinity, wetlands mitigation, and the negative attributes of Phragmites-dominated wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff discusses CWA Section 404 in Chapters 4 and 5 of the EIS as part of the impacts of preconstruction/construction and operation of a new nuclear power plant on the site. No changes were made to the EIS as a result of these comments.*

Comment: PSEG is making acceptable efforts to restrict impacting these wetlands, including a site plan to minimize encroachment, the use of sediment pits to stage some of the construction operations, the use of a raised causeway, rather than using fill material to carry the access road to the new site. While permanent disturbance, to wetlands, occurs PSEG has outlined mitigation plan that would create new wetland environments in adequate amounts to offset the loss. We anticipate that the resources, and expertise developed in the EEP will provide a strong foundation for the mitigation steps taken by PSEG, in the new site construction. Both in selecting the mitigation sites, and managing and restoring the enhanced wetland sites. (**0004-11-7** [Velinsky, David])

Comment: PSEG is making several efforts to restrict impact on the remaining wetlands, including a site plan to minimize encroachment, the use of sediment pits to stage some of the construction operations, and the use of raised causeways, rather than using fill material, to carry the access roads to the new site. Where permanent disturbance to wetlands occurs, PSEG has outlined a mitigation plan that would create new wetland environments in adequate amounts to offset loss. We anticipate that the resources and expertise developed in the Estuary Enhancement Program will provide a very strong foundation for the mitigation steps being taken by PSEG in the new site construction, both in selecting the mitigation sites, and in managing the restored enhanced wetland sites. (**0007-9-7** [Wall, Roland])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands, wetlands loss and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff also discusses minimizing impacts by using a raised causeway in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: New improvements, such as roadways, should be carefully placed and designed to minimize their impact on marshlands. An elevated road system would be a design that would help minimize these impacts. We encourage, PSEG, to pursue such a design, and develop a comprehensive wetlands mitigation, and compensation plan for these impacts. (**0004-16-10** [Molzahn, Robert])

Comment: From the information in the DEIS, it appears that PSEG proposes to construct portions of the project, including the causeway, on lands owned by the State of New Jersey and protected by deed restrictions. We do not support the diversion of State-owned wildlife management areas for development activities. These areas are protected and managed due to their high ecological value. Wetlands fill and other construction activities on these protected areas can affect the entire wildlife management area adversely due to habitat loss, hydrologic modifications, and increases in human activity and storm water runoff. (**0018-1-6** [Chiarella, Louis])

Comment: The DEIS ignores any discussion of justified need for the causeway which should be discussed and evaluated. DRN can identify no justified need for this causeway and the resulting effective elimination of productive wetlands and "protected" wildlife areas. DRN strongly opposes any lifting of these deed restrictions by the State of New Jersey, since it will fragment existing productive wetlands and the replacement lands may not be worthy of acquisition by the State. (**0020-4-9** [van Rossum, Maya])

Response: *The NRC staff discusses wetlands, wetlands loss, and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff also discusses minimizing impacts by using a raised causeway in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: Returning to the purpose of this meeting, should this project move ahead toward construction, there will be on site habitat impacts that will be unavoidable. And I urge that the process to embrace the same bay-wide approach used in the estuarian enhancement program, and to be creative and aggressive in identifying off-site mitigation opportunities. Hold PSEG's feet to the fire. History suggests that they will deliver. (**0004-4-7** [Applegate, Jim])

Comment: I have had the opportunity to observe PSEG's environmental policy actions over 20 years, and the restoration and mitigation activities in support of the environment. I know of no company that has such a stellar environmental record, well beyond what has been required of them. Their environmental restoration activities are a model for other states, and other countries. And I have read the Environmental Report, and given what I know about their past performance, in habitat enhancement, I'm confident that PSEG will carry out their plans and create much more habitat than is compromised by the new development. Further, the land that will be used for siting the new facility is not currently natural high quality habitat. But it is already degraded. But, in contrast, I feel confidence that the mitigation habitat will be functioning high quality habitat. I encourage the NRC to approve the Early Site Permit and lend my support to PSEG for its community minded ecosystem conscious approach to restoration and mitigation. (**0004-5-2** [Burger, Joanna])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands, wetlands loss and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: Much of the land that will be used for site construction, of the new nuclear facility is degraded, phragmites wetlands. And, as such, is not a natural productive habitat. (**0004-5-3** [Burger, Joanna])

Response: *The NRC staff discusses the negative attributes of Phragmites-dominated wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of construction. No changes were made to the EIS as a result of this comment.*

Comment: Their mitigation efforts include a mitigation plan that has identified compensatory lands that could offset some of the impacts to wetlands, including candidate areas in portions of the existing PSEG site Mannington Meadows, Mason's Point, and the additional areas of the company's Alloway Creek restoration site. These habitats will be greatly improved by PSEG's mitigation work. And the restored habitat will provide much higher quality than is even possible with the plant, at the plant construction site. The natural tidal flows, in the planned restoration and mitigation habitat, will lead to habitat with far greater wildlife use, and ecosystem integrity. This part of the Delaware Bay ecosystem will be greatly aided by the restoration plan by PSEG (**0004-5-4** [Burger, Joanna])

Comment: If it is done it will be beneficial to both the wildlife, as well as the community. In fact, the Division of Fish and Wildlife, back around 2002, had a proposal to actually do some of this same work. (**0006-7-7** [Widjeskog, Lee])

Response: *The NRC staff discusses wetland mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: The environmental plan they present is sound, well thought out, and sufficiently developed to ensure that it can be accomplished. The environmental report is extensive, comprehensive, and devotes considerable attention, not only to the environment, physical and ecosystem issues, but to appropriate public involvement and to monitoring. As an ecologist I have been impressed with their due diligence in addressing all the outstanding environmental issues, and goes well beyond what is necessary in terms of mitigation and restoration of additional habitat. The State of New Jersey will be gaining considerable high quality habitat by these actions, in exchange for degraded, low quality, phragmites marsh, that is on the current site. (**0004-5-5** [Burger, Joanna])

Response: *The NRC staff discusses the negative attributes of Phragmites-dominated wetlands and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of construction. No changes were made to the EIS as a result of this comment.*

Comment: The plans, proposed by PSEG, can be viewed in light of their past mitigation, and restoration activities. They have one of the largest and most successful mitigation projects in the country, where they control phragmites to produce high quality salt marsh with its attendant mud flats and inter-tidal habitat that is used extensively by thousands of shore birds, and other species. Thus their estuary enhancement program is one of the most successful in the country, has received a variety of state and national awards. And unlike many such programs, it is sustainable. Thus it is my professional opinion that they are capable of and will deliver on their environmental mitigation and restoration plans. The company's integrity, and environmental vision, to ensure that there is little environmental impact, and that the restoration and mitigation plans will result in a far more high quality habitat than is presently on that site. (**0004-5-6** [Burger, Joanna])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands, wetlands loss, wetlands mitigation, and the negative attributes of Phragmites-dominated wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of this comment.*

Comment: The Environmental Report indicates an overall wetlands impact of 229 acres from the new plant, and the proposed causeway. It is further indicated that there is an abundance of wetlands, in the vicinity, locating -- totaling more than 25,000 acres. And the quality of the dominant species, as we heard, is invasive phragmites. PSEG would reduce environmental impacts by placing permanent facilities inside currently diked areas in compensation for use of these wetlands. We would recommend that PSEG create or restore, degraded wetlands within the Delaware Bay region, at an appropriate compensation ratio. This should also be achievable, this should be an achievable undertaking, by PSEG, as their Estuary Enhancement Program has been recognized nationally, for restoring and protecting over 20,000 acres of wetlands. And we have heard quite bit about that. (**0004-16-8** [Molzahn, Robert])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. The NRC staff discusses wetlands, wetlands loss, wetlands mitigation, and the negative attributes of Phragmites-dominated wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff also discusses the small percentage of wetlands that would be disturbed in relation to acreages available in the vicinity in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of this comment.*

Comment: [W]hy have I said all of this? The proposed project will result in the unavoidable loss of about 100 acres of phragmites dominated wetlands, that will require mitigation in some form. (**0004-9-7** [Weinstein, Michael])

Response: *The NRC staff discusses wetlands, wetlands loss and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of this comment.*

Comment: One of the things about this project, that caught my attention, was the fact that they are going to plan to use an elevated roadway to access the nuclear plant. In the past what people did was build up a roadway across the meadow. And that would involve, literally, tons and tons of fill, and emplacement of culverts and bridges. The intent was to get the vehicles in and out, without being flooded out by high tide. The problem with that is that, even though, you haven't technically altered the marsh, other than that which is underneath the footprint, in reality you have restricted the tidal flow. And once you restrict the tidal flow the area no longer functions as the same type of marsh that it once was. This enables it to be more attractive to invasive plants, such as phragmites, also known as common reed in this area. And, at the same time, it reduces the amount of flow, and that means that there is less fish using the marsh. Today we have another alternative, and that is the elevated roadway. The one that PSEG has proposed is going to be, at least, ten feet above the surface of the marsh. By doing this it is going to, one, not impact the marsh except where the piers come into the marsh itself. The fact that it is ten feet above will also reduce the amount of shading that comes on, underneath. And thus not inhibit the growth of plants. When you get big tides, or even just the tide that you get during the normal full moon, you are going to have water flowing all the way across that area. But it will be underneath the roadway, and it will not be blocked by the roadway itself. With that you are going to have a much better situation, you will be able to get vehicles in and out. And, at the same time, you will not have a major impact on the meadow. (**0006-7-2** [Widjeskog, Lee])

Comment: Also, the road system being elevated is also designed to minimize impacts. (**0007-16-9** [Palmer, Dennis])

Response: *The NRC staff discusses minimizing impacts by using a raised causeway in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. No changes were made to the EIS as a result of these comments.*

Comment: As described, in the Draft EIS, the size of a wind farm needed to equal the electrical output of the proposed nuclear plant, would have 3,300 large scale turbines, occupying a land mass of 386,000 acres, or 620 square miles. Similarly a photovoltaic solar installation would need to occupy between 11,000 and 22,000 acres, or over 30 square miles. This extensive land area would be necessary due to the low energy density, and intermittency, inherent in wind and solar generation. The impacts to the regional and migratory bird and bat populations, from this scale, of renewable development, would be significant. There is a growing body of evidence, and peer reviewed research, that existing large scale wind farms are killing increasing numbers of raptors, and other bird species, due to collisions with turbine tower and blade impacts. Wind turbines have also been shown to attract and kill regional bats thus impacting already declining bat populations. Not only are bats physically impacted by the rotation of the massive spinning turbine blades, it has been shown that their lungs are violently ruptured when they fly through the large pressure drop produced by wind turbines. Large scale wind farms have also been shown to negatively affect migratory patterns of avian species, due to the extensive land masses required to generate meaningful amounts of electricity. (**0006-9-3** [Wiwel, Kathy])

Comment: As described in the Draft Environmental Impact Statement, the size of the wind farm, needed to equal the electrical output of the proposed nuclear plant, would have 3,300 large scale turbines occupying a land mass of 386,000 acres, or 620 square miles. Similarly, a photovoltaic solar installation would need to occupy between 11,000 and 22,000 acres, or over 30 square miles. This extensive land area would be necessary due to the low energy density and the intermittency inherent in the wind and solar generation. The impacts to the regional and migratory bird and bat populations, from this scale of renewable development, would be significant. There is a growing body of evidence, in peer reviewed research, that existing large scale wind farms are killing increasing numbers of raptors, and other bird species, due to collisions with turbine towers and blade impacts. Wind turbines have also been shown to attract and kill regional bats, thus impacting an already declining bat populations. Not only are bats physically impacted by the rotation of the massive spinning turbine blades. It has been shown that their lungs are violently ruptured when they fly through the large pressure drop produced by wind turbines. Large scale wind farms have also been shown to negatively affect migratory patterns of avian species, due to the extensive land mass that is required to generate meaningful amounts of electricity. (**0008-6-4** [Wiwel, Kathy])

Comment: What we have seen, in the early days, of much of the renewables for wind, they place them in the wrong places, particularly out in the Midwest. We had some areas where eagles have been hit pretty hard. I think we have learned a fair amount about that. I'm very aware of the bat issue. And I'm delighted to say that our own researchers, here in Delaware, at the University of Delaware, largely led by some graduate students, and some others, have found a good solution that bat issue. What they have found is that those strikes occur during low wind areas. That fast winds the bats avoid them. So we are learning. (**0008-8-4** [Carter, David])

Response: *The NRC staff discusses potential impacts of wind turbines on bird and bat populations in Section 9.2 (energy alternatives) of the EIS. No changes were made to the EIS as a result of these comments.*

Comment: We can make plans about mitigation. I actually was involved in a fair amount of the [wetlands] restoration work using some of the mitigation summit funds from PSEG. Unfortunately, with sea level rise, I think that most of those sites are now going to be lost and drowned, over the next 30 or 40 years, due to sea level rise. So mitigation has further issues. And in addition to your storm surge modeling with accurate numbers, I think you need to get together with Fish and Wildlife Service, or someone, and do some sea level rise effects on marsh management, and some of the other models, to look at what the likely habitat impacts are. (**0007-2-12** [Carter, David])

Comment: Furthermore, this assessment does not take into account the trend of extensive wetland losses in the watershed along with the impact of sea level rise on wetland losses in the near future. For this reason, the proposed project results in unacceptable permanent impacts to critical wetlands, and the NRC should not issue the ESP or authorize activities which would have such detrimental impacts to wetland resources. (**0020-2-7** [van Rossum, Maya])

Response: *The NRC staff discusses wetlands and wetlands mitigation in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff discusses the potential impacts of climate change and sea-level rise on ecological resources in Section 7.3 of the EIS as part of the discussion on cumulative impacts. No changes were made to the EIS as a result of these comments.*

Comment: The natural systems of the Delaware River and estuary are critical environments with major significance for both regional and global biodiversity, for regional water supply, and water quality, and for supporting important economic activities. Construction on the scale proposed by PSEG on the Delaware coast requires careful consideration of the environmental factors. (**0007-9-3** [Wall, Roland])

***Response:** The NRC staff discusses potential ecological impacts of preconstruction/construction in Section 4.3 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: This project will fill in 108 acres of wetlands, a loss of 40 acres of ponds, and 9,585 feet of creek channel. We believe they need to look at the secondary and cumulative impacts of filling in wetlands, ponds and tidal pools with this project. (**0016-4** [Tittel, Jeff])

***Response:** The NRC staff discusses potential impacts associated with the loss of wetlands and artificial lakes in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. The NRC staff discusses the potential cumulative impacts associated with the loss of wetlands and artificial lakes in Section 7.3 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: The proposal results in unacceptable permanent and temporary impacts to wetlands. Generally, the only way to adequately protect aquatic resources is to avoid impacting them in the first place. Constructing upon such a large acreage of wetlands in the Delaware estuary will contribute to the decline in wetland resources. (**0022-3** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: Impact to wetlands--the Permanent Fill of 108 acres of wetlands, plus an additional 23 wetlands acres filled for the proposed causeway, equaling 131 acres permanently filled wetlands. This is a significant impact to our diminishing coastal wetlands and the animals and plants that live there. 52 additional acres would be impacted during construction, which may never be fully recovered due to soil disturbance and habitat destruction. (**0032-1** [Purcell, Leslie])

Comment: The proposal results in unacceptable permanent and temporary impacts to wetlands. Generally, the only way to adequately protect aquatic resources is to avoid impacting them in the first place. Constructing upon such a large acreage of wetlands in the Delaware estuary will contribute to the decline in wetland resources. (**0034-4** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Comment: There is limited discussion and analysis of avoidance/ minimization measures. Avoidance/ minimization should be explicit and carried out in a way that compensatory mitigation is only used as a last case resort, and the avoidance/minimization measures should be the subject of public review and comment. Furthermore, the analysis of compensatory actions is inadequate without knowing what actions are actually being implemented to avoid or minimize impacts. (**0034-5** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

***Response:** The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. Most of the wetlands that would be impacted are dominated by near monocultures of common reed (Phragmites australis), a nonnative aggressive invasive plant species that significantly impacts wetland diversity and habitat structure with resultant significant impacts to wildlife habitat quality. However, as noted in Section 4.3 of the EIS alterations to these wetlands were considered noticeable but not destabilizing. USACE will include further* *efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of these comments.*

Comment: As part of the project, it is proposed that a publicly owned dredge disposal area near the existing Artificial Island be swapped for land in the upper river reach, potentially leading to inadequate long term options for dredged disposal in the Delaware City/Listen Point Reach. The proposal is for the Army Corps of Engineers to give PSEG acres of federally owned area, (primarily wetlands) in exchange. This may impact new natural areas or lead to the need for disposal areas along the C&D canal to be refurbished and utilized in conflict with ongoing ecotourism trails and development efforts. Additionally, we are unclear and concerned about the impact that permanent filling of existing wetlands will have on local flooding and wildlife. (**0037-3** [Wasfi, Ellen])

Comment: As part of the project, it is proposed that a publicly owned dredge disposal area near the existing Artificial Island be swapped for land in the upper river reach, potentially leading to inadequate long term options for dredged disposal in the Delaware City/Listen Point Reach. The proposal is for the Army Corps of Engineers to give PSEG acres of federally owned area, (primarily wetlands) in exchange for This may impact new natural areas or lead to the need for disposal areas along the C&D canal to be refurbished and utilized in conflict with ongoing ecotourism trails and development efforts. Additionally, we are unclear and concerned about the that permanent filling of _____[sic] acres of existing wetlands will on local flooding and wildlife. (**0041-2** [Erlich, Marion])

Response: *The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. Most of the wetlands that would be impacted are dominated by near monocultures of common reed, a nonnative aggressive invasive plant species that significantly impacts wetland diversity and habitat structure with resultant significant impacts to wildlife habitat quality. However, as noted in Section 4.3 of the EIS alterations to these wetlands were considered noticeable but not destabilizing. USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines.*

Dredge disposal needs of the USACE are determined by that agency. An independent EA is being prepared by USACE for the land exchange with PSEG that will address these long-term dredge disposal needs and impacts resulting from the land exchange.

No changes were made to the EIS as a result of these comments.

Comment: The DEIS underestimates the permanent impacts to wetlands because the determination of the impacted wetlands as low quality is not based on the best science available. The EIS declares that "[t]he quality of the habitat provided by wetlands at the [PSEG] site is impacted by the fact that much of the area is dominated by the invasive common read (Phragmites australis)" (p. 4-41). Asserting as a justification for the impacts that the Phragmities dominated wetlands are degraded and their ruination is somehow less impactful or harmful to the ecology or communities of the region is not supported by PSEG's own science or by reality [See Kiviat, E. (2013). Ecosystem services of Phragmites in North America with emphasis on habitat functions. AoB Plants, 5, plt008.; Kettenring et al. (2012). Moving from a regional to a continental perspective of Phragmites australis invasion in North America. AoB plants, 2012, pls040.] (**0020-2-12** [van Rossum, Maya])

Comment: Furthermore, the unsubstantiated assumption that converting a Phragmities dominated wetland to a Spartina alterniflora wetland will enhance the ecological value of proposed mitigation sites is also faulty. This false assumption makes the evaluation of the proposed project inadequate, and also influences the evaluation of mitigation measures. (**0020-2-13** [van Rossum, Maya])

Comment: The NRC asserts as justification that Phragmites dominated wetlands are degraded and their ruination is somehow less impactful but this perspective is not supported by the science. Furthermore, the unsubstantiated assumption that converting a Phragmites dominated wetland to a Spartina alterniflora wetland will enhance the ecological value of the proposed mitigation sites is also faulty. This false assumption makes the evaluation of the proposed project inadequate, and also influences the evaluation of mitigation measures. PSEG's own data, as well as research by others, demonstrates this to be false and that Phragmites-dominated wetlands are usable and used by a variety of species. (**0022-5** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The NRC asserts as justification that Phragmites dominated wetlands are degraded and their ruination is somehow less impactful but this perspective is not supported by the science. Furthermore, the unsubstantiated assumption that converting a Phragmites dominated wetland to a Spartina alterniflora wetland will enhance the ecological value of the proposed mitigation sites is also faulty. This false assumption makes the evaluation of the proposed project inadequate, and also influences the evaluation of mitigation measures. PSEG's own data, as well as research by others, demonstrates this to be false and that Phragmites-dominated wetlands are usable and used by a variety of species. (**0034-6** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *The NRC staff discusses wildlife that may frequent the PSEG Site in Section 2.4 of the EIS. It is acknowledged in that section that certain wildlife species will utilize Phragmites-dominated wetlands (e.g., northern harrier, black-crowned night-heron, red-winged blackbird, and marsh wren). The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. Section 4.3 includes a discussion of potential impacts on wildlife populations due to habitat loss, including loss of wetlands. It is acknowledged in this section that certain wildlife species will be impacted by the loss of Phragmites-dominated wetlands (e.g., northern harrier). The NRC staff has reviewed the information provided by the commenters. However, current literature indicates that monocultures of Phragmites-dominated wetlands are generally not considered to be of high quality and offer less value to terrestrial and aquatic resources than other wetland types. As noted in Section 4.3 of the EIS, alterations to these wetlands were considered noticeable but not destabilizing. USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings* *addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of these comments.*

Comment: The review of mitigation measures is based on insufficient information due to the lack of detail and use of qualifying language. More information is necessary in order to make an informed decision. Potential mitigation measures for unavoidable and permanent impact to wetland resources is discussed in Section 4.3.2.2. However, the description is vague and uses qualifying language such as "may include," "could include," or "could be undertaken." The mitigation plans should be explicitly developed and evaluated, especially given the likelihood for adverse impacts that some of the "potential" mitigation methods could have on the local environment (i.e. herbicide use). (**0020-2-19** [van Rossum, Maya])

Comment: There is limited discussion and analysis of avoidance/ minimization measures. Avoidance/ minimization should be explicit and carried out in a way that compensatory mitigation is only used as a last case resort, and the avoidance/minimization measures should be the subject of public review and comment. Furthermore, the analysis of compensatory actions is inadequate without knowing what actions are actually being implemented to avoid or minimize impacts. (**0022-4** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The description of potential mitigation measures is vague. The mitigation plans should be explicitly developed and evaluated, especially given the likelihood for adverse impacts that some of the "potential" mitigation methods could have on the local environment (i.e. herbicide use). Furthermore, mitigation methods should be the subject of public review and comment. Wetlands are an important terrestrial resource and provide habitat for wildlife in the Delaware River watershed. It is imperative that any impacts to these important resources are mitigated appropriately and that an approved wetlands restoration or rehabilitation program actually enhances the ecosystem resources. (**0022-6** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The description of potential mitigation measures is vague. The mitigation plans should be explicitly developed and evaluated, especially given the likelihood for adverse impacts that some of the "potential" mitigation methods could have on the local environment (i.e. herbicide use). Furthermore, mitigation methods should be the subject of public review and comment. Wetlands are an important terrestrial resource and provide habitat for wildlife in the Delaware River watershed. It is imperative that any impacts to these important resources are mitigated appropriately and that an approved wetlands restoration or rehabilitation program actually enhances the ecosystem resources. (**0034-7** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *There are a number of measures that could be taken by PSEG to minimize encroachment into wetlands to the maximum extent possible. As noted in Section 4.3 of the EIS alterations to these wetlands were considered noticeable but not destabilizing. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of these comments.*

Comment: We believe that, before PSEG should be allowed to construct another burdensome facility on Artificial Island, or anywhere within the Delaware Estuary before it is even considered, they must be forced to minimize the adverse environmental impact their existing facilities already have. Including their fish kills, their harmful imprint on our wetlands, the water quality impacts they have on the Delaware Estuary waters, and more. (**0004-3-12** [van Rossum, Maya])

Response: *The environmental impacts associated with the existing SGS and HCGS are described in Chapter 7 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: Also, we cannot conclude, from the information provided in the DEIS, whether the proposed mitigation for this project will adequately compensate for the impacts described. The DEIS provides a brief list of potential candidate sites. Without an opportunity to review a comprehensive mitigation plan for the project, we cannot determine that the proposed mitigation will be sufficient to compensate for the project's impacts. Therefore, EPA recommends that the Final EIS provide additional discussion of options for more fully avoiding and minimizing wetland impacts, and mitigation plans for impacts that could not be avoided. (**0017-2** [Mitchell, Judy-Ann])

Comment: There is limited discussion and analysis of avoidance/ minimization measures. Avoidance/ minimization measures should be considered early and as an integral and critical component of the alternatives development and decision-making processes. Avoidance/ minimization should be explicit and carried out in a way that compensatory mitigation is only used as a last resort. Furthermore, this analysis should also be the subject of public review and comment. The discussion of avoidance/ minimization within the DEIS uses vague qualifying language such as "most likely" (p. 3-22), "could include" (p.4 -41), and "could continue to be devised" (p.4-41). Since avoidance/ minimization is not explicitly discussed, the analysis of compensatory actions is inadequate without knowing what actions are actually being implemented to avoid or minimize impacts. (**0020-2-8** [van Rossum, Maya])

Response: *Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the PSEG Site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of these comments.*

Comment: The proposed project results in unacceptable permanent and temporary impacts to wetlands. Although the United States is making important progress in the conservation of wetland resources, FWS continues to report that wetland losses are greater than wetland gains [See Dahl, T.E. 2011. Status and trends of wetlands in the conterminous United States 2004 to 2009. U.S. Department of the Interior; Fish and Wildlife Service, Washington, D.C. 108 pp.]. Wetlands continue to face pressures from development, from the effects of sea level rise, and from the cumulative effect of other environmental pollutants and stressors. (**0020-2-3** [van Rossum, Maya])

Response: *The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. There are a number of measures that could be taken by PSEG to minimize encroachment into wetlands to the maximum extent possible. Potential offsite wetland impacts will already be mitigated by using an elevated causeway design, with impacts limited to pier placement and shading of vegetation. Additional measures to avoid or minimize potential impacts to wetlands could be formulated with the refinement of the PSEG Site Utilization Plan and following the selection of a reactor technology. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Several candidate mitigation areas that have the potential to meet some or all of the PSEG wetland mitigation needs were identified during the ESP application process. These candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG Alloway Creek Watershed Wetland Restoration (ACW). The NRC staff discusses potential cumulative impacts on ecological resources, including wetlands, in Section 7.3 of the EIS.*

The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It will also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.

Comment: "NRC-authorized activities would be significant contributors to the noticeable impact. . ." from the loss of important wetland resources (p 4-43). However, the review team asserts that the "habitat loss would not destabilize wetland resources in the vicinity" (p 4-43). This assessment is contradictory since the NRC states the impact will be "noticeable" but not "destabilizing." (**0020-2-6** [van Rossum, Maya])

Response: *The NRC staff discusses wetlands lost in relation to wetlands that will remain in the vicinity in Section 4.3 of the EIS (page 4-28). Based on the acreage that would be lost (131 ac) as the result of building activities, alteration would be noticeable. However, this represents less than 1 percent of the 25,534 ac of wetlands available in the vicinity. The conclusion that the loss will not be destabilizing is based on the fact that only a very small percentage of area wetlands will be lost. No changes were made to the EIS as a result of this comment.*

Comment: The determination of whether there are unavoidable impacts should not be arbitrary. Avoidance is always the best alternative, and restored wetlands cannot replace natural wetland functions. Avoidance and minimization bas received less attention, and this lack of priority on these initial steps has resulted in the ineffective wetland conservation and the preservation of aquatic ecosystem functions by allowing too often, irreparable harm and permanent destruction of wetlands. It is imperative that these avoidance/ minimization measures are not only considered but also implemented during decision-making. Instead the DEIS states: "[a]dditional measures to avoid or minimize potential impacts . . . could be formulated following the selection of a reactor technology and could continue to be devised throughout the design phase as detailed site layouts were developed" (p.4-41). A voidance/ minimization should be done during this phase of the proposal and should not be put off until the project site has been decided on and the project is moving forward. (**0020-2-9** [van Rossum, Maya])

Response: *Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site.*

The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.

Comment: In order to accomplish the goal of "no net loss" of wetlands, compensatory mitigation should only be used to offset unavoidable impacts after avoidance and minimization measures have been evaluated. There is limited discussion of how PSEG is avoiding and minimizing impacts to wetlands. For example, there is a simply blanket assertion that elevation of a roadway/causeway will eliminate the need for wetlands and water fill but no discussion beyond that (p. 3-21). There is no detailed discussion with regards to the large footprint of the proposed plant and associated infrastructure. (**0020-2-10** [van Rossum, Maya])

Response: *The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. This includes a discussion of potential impacts on wetlands resulting from building the plant and associated infrastructure on the site. Potential impacts on wetlands resulting from construction of the proposed elevated off-site causeway is also discussed in Section 4.3. Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site.*

The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.

Comment: Page No. 4-39; Section No. 4.3.1.2; Line No. 7; Change "Onsite building activities would impact a total of 63.4 ac of coastal wetlands ..." to "Onsite building activities would impact a total of 65.2 ac of coastal wetlands ..." (See ER Table 4.3-3). (**0015-2-17** [Mallon, James])

Comment: Page No. 4-43; Section No. 4.3.2.3; Line No. 31-32; The numbers provided for permanent and temporary loss of wetlands are not consistent with the information provided in Lines 36-38 of DEIS on page 4-39. (**0015-2-19** [Mallon, James])

Comment: Throughout [Sections 2.0 and 4.0], the NRC describes the acreages of the various habitats that would be affected by the construction and operation of a new nuclear generating station at the PSEG site. However, the numbers appear inconsistent and seem to vary from section to section even when describing the same impact to the same habitat. In addition, the impacts also appear different from those described in the Public Notice (CENAP-OP-R-2009-0157) issued by the USACE for this project. The final EIS should clearly and concisely identify all of the temporary and permanent impacts to all habitat types and clearly define the habitat types (i.e., estuarine wetlands, freshwater tidal wetlands, freshwater non-tidal, etc.). (**0018-1-2** [Chiarella, Louis])

Response: *The acreage numbers cited in various sections of the draft EIS may appear inconsistent because of the numerous classifications discussed for various habitat types. For example, in addition to the generic "wetland," the draft EIS discusses several types of wetland habitats (e.g., saline marsh, Phragmites-dominated coastal wetlands, deciduous scrub/shrub wetlands, herbaceous wetlands, and Phragmites-dominated interior wetlands); hence, the "wetland" acreages discussed vary among draft EIS sections according to the specific wetland types being discussed. Other commenters have noted some specific inconsistencies in acreages (e.g., on draft EIS 4-7, Line 2), and the text in the EIS was revised to address those inconsistencies. However, none of these revisions affects the conclusions regarding the levels of impact during construction for either the land-use or terrestrial ecology resource categories, both of which remain MODERATE as discussed in Section 4.11.*

Regarding the comment that "the impacts also appear different from those described in the Public Notice (CENAP-OP-R-2009-0157) issued by the USACE for this project," the impact conclusions described in the draft EIS are based on information provided by the applicant to the NRC in the ESP application and in response to the NRC staff's requests for additional information. Because the USACE and the NRC have different permitting responsibilities with regard to the proposed action, it is possible that the applicant may have submitted different acreage information in the Department of the Army permit application than in the NRC ESP application due to the different requirements for those two separate permits. In addition, the USACE utilizes the Cowardin System for land-use classification of wetlands and waters, the overall acreages of impacts described according to NJDEP LULC classification system would be similar, but may not be identical, to the acreage calculations for the USACE values. It is also important to note that the habitat condition and extent of wetlands may vary with time, especially in modified or disturbed locations (e.g., CDFs) where dredge materials are being deposited. The USACE has prepared and approved jurisdictional determination for the project site (USACE 2014-TN3282). No changes were made to the EIS as a result of this comment.

Comment: Although the NRC asserts that the wetlands impacts "are regulated under the authority and jurisdiction of the USACE and NJDEP" (p 4-41), the NRC should also independently evaluate the impact of wetland losses associated with this project as part of their decision-making. The Delaware River watershed is in need of wetlands restoration, and this project will surely not accomplish an improvement in wetland ecosystem function. It is critical that decision-making is done such that proposed projects help improve the ecological state of the estuary instead of justifying further damage by asserting the ecosystem is already degraded. (**0020-2-5** [van Rossum, Maya])

Response: *The NRC staff fully evaluates potential impacts to wetlands as an integral part of the EIS process. The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. In this section it is noted that any wetlands are considered to be important habitat and alteration of wetlands resulting from this project will be noticeable. It is further stated on page 4-41 of the draft EIS that wetlands are considered to be an important terrestrial habitat on the PSEG Site and provide habitat for wildlife that frequent the area. There are a number of measures that could be taken by PSEG to minimize encroachment into wetlands to the maximum extent possible. Potential offsite wetland impacts will already be mitigated by using an elevated causeway design, with impacts limited to pier placement and shading of vegetation. Additional measures to avoid or minimize potential impacts to wetlands could be formulated with the refinement of the PSEG Site Utilization Plan and following the selection of a reactor technology. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed.*

The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines.

Several candidate mitigation areas that have the potential to meet some or all of the PSEG wetland mitigation needs were identified during the ESP application process. These candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG ACW. No changes were made to the EIS as a result of this comment.

Comment: Phragmites dominated wetlands support numerous native organisms, provide important ecosystems services, and support biodiversity and habitat functions that arc linked to distinctive characteristics of the plant [See Kiviat 2013, Ecosystem services of Phragmites in North America with emphasis on habitat functions. AoB Plants, 5, plt008]. For example, a new cryptic spec1es of leopard frog (Rana kauffeldi) with limited and restricted range has just been identified in the Delaware watershed and persists in Phragmites dominated wetlands [See Feinberg, J.A., Newman, C.E., Watkins-Colwell, G.J., Schlesinger, M.D., Zarate, B., Curry, B.R., & Burger, J. (2014). Cryptic Diversity in Metropolis: Confirmation of a New Leopard Frog Species (Anura: Ranidae) from New York City and Surrounding Atlantic Coast Regions. PloS one, 9(10), el08213.]. This recent discovery of R. kauffeldi illustrates that we must protect sensitive species where they occur not just pristine environments. (**0020-2-14** [van Rossum, Maya])

Response: *The NRC staff acknowledges and agrees that sensitive species need protection wherever they occur, not just in pristine environments. The NRC staff discusses wildlife that may frequent the site in Section 2.4 of the EIS. It is acknowledged in this section that certain wildlife species will utilize Phragmites-dominated wetlands (e.g., northern harrier, black-crowned night-heron, red-winged blackbird, and marsh wren). The NRC staff discusses wetland impacts* *and potential mitigation activities in Section 4.3 of the EIS. Section 4.3 includes a discussion of potential impacts on wildlife populations due to habitat loss, including loss of wetlands. It is acknowledged in Section 4.3 that certain wildlife species will be impacted by the loss of Phragmites-dominated wetlands (e.g., northern harrier). Although the leopard frog has not been recorded on the PSEG Site, it has the potential to be affected by the construction and operation of new nuclear facility. As stated in Section 4.3, wetlands resources on the PSEG Site are considered to be important habitat and alteration of wetlands as the result of this project will be noticeable, but would not destabilize important attributes of the resource within the vicinity or region.*

The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.

Comment: The Estuary Enhancement Program (EEP) that was so often referenced in the NRC public hearing on October 1, 2014, and which is most certainly to serve as the model for any wetlands mitigation options proposed by PSEG, is based on the false premise that Phragmites australis is of lesser ecological value than Spartina alterniflora. Converting a Phragmites dominated wetlands to Spartina wetlands will not enhance the ecological value of the proposed mitigation sites. The EEP model is not substantiated by scientific research, is not a net positive contribution to the Delaware Estuary wetland system, and is not an independently sustainable mitigation option. (**0020-2-16** [van Rossum, Maya])

Comment: The "potential" mitigation measures (Section 4.3.2.2) are based on the false premise that converting Phragmites dominated wetlands to Spartina alterniflora dominated wetlands will enhance the ecological value of the proposed mitigation site [See Kiviat 2013, Ecosystem services of Phragmites in North America with emphasis on habitat functions. AoB Plants, 5, plt008; and See also Kettenring et al. 2012, Moving from a regional to a continental perspective of Phragmites australis invasion in North America. AoB plants, 2012, pls040]. The proposed mitigation measures would be to transform existing tidal marshes through the removal and conversion of the dominant vegetation. This type of mitigation will not restore more valuable (enhancement) nor return natural (restoration) wetland functions--two of the appropriate forms of compensatory mitigation [See U.S. Environmental Protection Agency. Wetlands Compensatory Mitigation Factsheet. EPA-843-F-08-002.]. (**0020-2-17** [van Rossum, Maya])

Response: *The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. Section 4.3 includes a discussion of potential impacts on wildlife populations due to habitat loss, including loss of wetlands. It is acknowledged in this section that certain wildlife species will be impacted by the loss of Phragmites-dominated wetlands (e.g., northern harrier). The NRC staff has reviewed the information provided by the commenters. However, current literature indicates that monocultures of Phragmites-dominated wetlands are generally not considered to be of high quality and offer less value to terrestrial and aquatic resources than other wetland types. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public* *interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of these comments.*

Comment: The review team concluded that"... habitat loss would not destabilize wetland resources in the vicinity" (p 4-43). However, this conclusion, which falsely assumes proper mitigation for unavoidable and permanent impacts, is unsubstantiated and inaccurate without a full analysis of the mitigation plans. (**0020-3-2** [van Rossum, Maya])

Response: *The commenter indicates that the NRC staff's conclusion is based on proposed mitigation. The NRC staff concluded that the habitat loss due to this project would be noticeable, but would not destabilize overall wetland resources in the area because the loss represents less than 1 percent of the wetlands in the vicinity and does not take into account mitigation (Section 4.3 of the EIS). No changes were made to the EIS as a result of this comment.*

Comment: According to the DEIS, wetland mitigation methods " ... might include the control of Phragmites, restoration of the hydrologic state (Levee removal, channel design, and reestablishing a connection of upland areas to tidal influences), and wetland enhancement that include restoration of desirable and native vegetation." (p 4-42). Without explicit descriptions of the methods that PSEG intends to utilize to accomplish mitigation, we can only assume that PSEG is proposing the same mitigation measures for this project that it used for previous projects. PSEG has applied tens of thousands of pounds of herbicides, as well as engaging in discing, mowing, and burning, all of which adversely impact the habitat and introduce dangerous chemicals into our environment. For example, one-time applications of herbicide are never effective, and therefore, herbicides must be used in a multi-year application, resulting in a long-term commitment and ongoing environmental damage [see Kettenring, K.M., & Adams, C.R. (2011). Lessons learned from invasive plant control experiments: a systematic review and meta-analysis. Journal of Applied Ecology, 48(4), 970-979]. Due to the potential for environmental impact from specific mitigation measures, a full mitigation plan should be established and the environmental impact of such measures should be fully evaluated by the NRC as part of their analysis of the environmental impact of this project. (**0020-3-3** [van Rossum, Maya])

Response: *Any proposed mitigation methods will be reviewed and go through the Department of the Army permit application approval process. The USACE permit review process will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It will also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: The NRC should also consider whether PSEG will, in fact, fully and adequately implement all mitigation measures. PSEG is proposing the same "potential" mitigation measures for this project that it made, and subsequently failed to implement, in previous projects. (**0020-3-4** [van Rossum, Maya])

Response: *Any proposed mitigation methods will be reviewed and go through an approval process. The USACE will include further efforts to avoid, minimize, and compensate for the* *unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: The EEP model for compensatory mitigation used by PSEG in the past is not sustainable because the change in vegetation that is proposed can only persist through continual and often invasive interventions the Delaware Bay area is borne to large swaths of Phragmites and so there is a perpetual source for the species which will repopulate any area of appropriate habitat condition that is not concertedly managed to prevent this. For example, PSEG eliminated 1,200 acres in the Mill Creek area from the EEP program because of an inability to convert Phragmites to Spartina after 5 years of herbicide application. The Alloway Creek EEP site was also reduced in size (p 4-43). The fact that these wetlands will not be sustainable in the absence of an ongoing obligation by PSEG to continue these damaging activities is indefensible for achieving the goal of wetlands protection or mitigation. (**0020-3-5** [van Rossum, Maya])

Response: *The NRC staff acknowledges that any non-native invasive plant control program requires persistence to achieve success. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: Scientific research has documented that land-use patterns on adjacent sites influence the success of restoration plans, and for Phragmites management to be successful, plans should be developed at the watershed-scale (vs. a site level scale) so to address the source of invasion and should focus on restoring native plant communities rather than simply eradicating Phragmites stands [See Hazelton et al. 2014, Phragmites australis management in the United States: 40 years of methods and outcomes. AoB plants, 6, plu001]. The methods used by PSEG in the past do little to reduce the dominance of Phragmites in the long term. For example, mowing can actually stimulate shoot production resulting in an increased density of Phragmites shoots [See Derr, J.F. (2008). Common reed (Phragmites australis) response to mowing and herbicide application. Invasive Plant Science and Management, 1 (I), 12-16.; and See also Warren et al. (2001). Rates, patterns, and impacts of Phragmites australis expansion and effects of experimental Phragmites control on vegetation, macroinvertebrates, and fish within tidelands of the lower Connecticut River. Estuaries, 24(1), 90-107]. The fact that PSEG has made identical mitigation plans in past projects, and has been unsuccessful in enhancing the wetland resources of the watershed, weighs heavily against PSEG's credibility. Furthermore, it demonstrates the inadequacy of the NRC's review to specifically and substantively respond to this criticism in this DEIS. (**0020-3-6** [van Rossum, Maya])

Response: *The NRC staff acknowledges that any non-native invasive plant control program requires persistence to achieve success, and that watershed or regional approaches are always desirable in order to achieve overall success. Even on a watershed basis there are limitations on the ability to control activities on other properties. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with* *a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: There is insufficient information about mitigation methods that involve "control of Phragmites." The review of "potential" mitigation methods is necessary because methods using herbicides and more specifically, glyphosate, have detrimental impacts to the environment. The "potential" mitigation methods listed in the DEIS focus on Phragmites control without specifying how the vegetation removal will occur. The EEP has been largely dependent upon the use of the broad spectrum herbicide glyphosate that is dangerous to the environment and to people. (**0020-3-7** [van Rossum, Maya])

Comment: [T]he ongoing application of glyphosate into our sensitive ecological systems is a high priority concern that should not be perpetuated by the NRC in their consideration, review and approvals of the [PSEG] proposal. The ecosystem services provided by Phragmites and the wetland mitigation sites should be weighed against the environmental damages caused by the removal of Phragmites through the use of herbicides and glyphosate. (**0020-3-8** [van Rossum, Maya])

Comment: The NRC should evaluate the environmental impact of the methods that PSEG will use to compensate for permanent wetland losses as a result of the proposed project. Scientific research has shown that the herbicide glyphosate is dangerous to the environment and to people, and therefore, should not be used for compensatory mitigation because it will cause greater harm. (**0020-3-9** [van Rossum, Maya])

Comment: The review of "potential" mitigation methods is necessary because methods using herbicides and more specifically, Glyphosate, have detrimental impacts to the environment. PSEG's previous mitigation plans have been largely dependent upon the use of the broad spectrum herbicide glyphosate that is dangerous to the environment and to people. The ecosystem services provided by the wetland mitigation sites should be weighed against the environmental damages caused by the use of herbicides and glyphosate. (**0022-7** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The review of "potential" mitigation methods is necessary because methods using herbicides and more specifically, Glyphosate, have detrimental impacts to the environment. PSEG's previous mitigation plans have been largely dependent upon the use of the broad spectrum herbicide glyphosate that is dangerous to the environment and to people. The ecosystem services provided by the wetland mitigation sites should be weighed against the environmental damages caused by the use of herbicides and glyphosate. (**0034-8** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid,* *minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts which would include compliance with Department of the Army regulations related to mitigation (33 CFR 320-332). That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest. It would also include an analysis of the Section 404(b)(1) guidelines. PSEG would also be required to meet applicable NJDEP rules and regulations concerning mitigation. No changes were made to the EIS as a result of these comments.*

Comment: Wetlands also provide many other important ecological functions and services to society including fish and wildlife habitat, food chain support, surface water retention or detention, groundwater recharge, and nutrient transformation, sediment retention and atmospheric equilibrium. The primary production in wetlands forms the base of the food web that supports insects and forage fish that are then prey species for larger fish such as bluefish, summer flounder and other species that have been documented in the marsh creeks surrounding the project site. The water quality services provided by these wetlands retain nutrients, sediments and contaminants and improve water quality. Wetlands may also help to moderate global climate change through carbon storage within the plant communities and soil. The loss of wetlands as a result of this project can adversely affect resources of concern to NMFS species though the reduction in prey species and primary production, as well as water quality degradation from the reduction in sediment retention and pollution filtration. (**0018-1-14** [Chiarella, Louis])

Response: *The NRC staff discusses the value of wetlands to terrestrial wildlife that may frequent the site in Section 2.4 of the EIS. It is acknowledged in this section that certain wildlife species will utilize the mainly Phragmites-dominated wetlands (e.g., northern harrier, black-crowned night-heron, red-winged blackbird, and marsh wren). The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. Section 4.3 includes a discussion of potential impacts on wildlife populations due to habitat loss, including loss of wetlands. It is acknowledged in this section that certain wildlife species will be impacted by the loss of Phragmites-dominated wetlands (e.g., northern harrier). As stated in Section 4.3, impacts to wetlands as the result of this project will be noticeable, but will not destabilize important attributes of these resources. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: The CWA Guidelines require avoidance, then minimization of impacts to the aquatic environment. Compensatory mitigation is also required for all unavoidable impacts. Due to the nature of the Early Site Permit process, on-site avoidance and minimization has not been demonstrated. Once a site design is selected, PSEG should demonstrate that the design selected avoids and minimizes adverse impacts to the aquatic environment, including minimizing wetlands fill. A compensatory mitigation plan should be developed in accordance with the 2008 Federal Mitigation Regulations to offset any unavoidable adverse effects. We understand that some of the potential mitigation sites may be State-owned Wildlife Management

Areas. Conducting compensatory mitigation on State-owned land may not be permitted by the New Jersey Department of Environmental Protection. In addition, since these areas are primarily wetlands already, sufficient information must be presented to demonstrate that the ecological enhancements proposed on the mitigation site will offset the functions and values at the project site. (**0018-1-15** [Chiarella, Louis])

Response: *Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. Such steps are aimed at improving wetland habitat and function. No changes were made to the EIS as a result of this comment.*

Comment: Section 2.4.1.1, page 2-59-Amphibians: reports the first known siting of green tree frogs (Hyla cinerea) in New Jersey on the PSEG site; the significance of this discovery -- and potential project impacts to this frog population-should be evaluated by the Division of Fish and Wildlife. [Also sec Section 4.3.1.2, page 4-38-Other Important Terrestrial Species and Section 5.3.1.2, page 5-28-Other Important Species] (**0021-5-4** [Foster, Ruth])

Response: *Specific measures to avoid or minimize potential impacts to the green tree frog will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. Based on the current overlay of the PSEG Site Utilization Plan, habitats in which green tree frogs were observed would be altered or eliminated as the result of preconstruction and construction activities. However, refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts, and mitigation of potential impacts to the green tree frog are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. If application is made for a COL, there will be additional opportunities for evaluation of potential impacts to the green tree frog at that time. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: [The NJDEP Endangered & Non-game Species Program (ENSP)] would want to have sufficient mitigation for loss of marshes, both permanent and temporary, and especially to target the most at-risk species -- the ones that require high marsh and which have been hurt by earlier PSE&G projects. ENSP would even suggest they need to set aside mitigation funding that the DEP can use to make improvements on state and conservation lands to benefit the high marsh species. (**0021-3-7** [Foster, Ruth])

Response: *Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. No changes were made to the EIS as a result of this comment.*

Comment: [The NJDEP Endangered & Non-game Species Program concerns include:] Possible degradation of the marsh due to changes in hydrology, spread of invasive plants, etc. (**0021-3-3** [Foster, Ruth])

Response: *The NRC staff evaluates potential impacts to wetlands as an integral part of the EIS process. The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. In this section it is noted that any wetlands are considered to be important habitat and alteration of wetlands resulting from this project will be noticeable. It is further stated in Section 4.3.1.4 in this FEIS that wetlands are considered to be an important terrestrial habitat on the PSEG Site and provide habitat for wildlife that frequent the area. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. In addition, PSEG will be required to meet NJDEP rules and regulations pertaining to mitigation activities. No changes were made to the EIS as a result of this comment.*

Comment: At this latitude of the Bay, the most prominent species of concern arc bald eagles and the highmarsh dependent birds (harrier and black rail). The wetland mitigation should address these species and include creation and stabilization of tidal marsh and high marsh. (**0021-3-6** [Foster, Ruth])

Response: *The NRC acknowledges the importance of bald eagles, northern harriers, black rails and other bird species frequenting wetlands in this area of the Delaware Bay. Specific measures taken to mitigate impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for mitigation are not possible at this stage of the project. Specific measures taken to mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a* *statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. In addition, PSEG will be required to meet NJDEP rules and regulations pertaining to mitigation activities. No changes were made to the EIS as a result of this comment.*

Comment: The DEIS states on page [5-17], that Total Dissolved solids (TDS) found in the vapor and drift have the potential to be deposited onto foliage or soil and cause visible damage and or chronic effects. Discussion focuses solely on salt deposition. Are there any other dissolved solids that should be discussed (such as chemicals/cleaning agents/biocides/etc.)? (**0023-2-17** [Cooksey, Sarah])

Response: *The discussion of impacts to foliage due to the vapor and drift from the cooling towers is based on salt deposition because salt is the primary constituent that has the potential to cause damage to foliage. This is particularly true for the water taken from this portion of the Delaware River, which has estuarine characteristics. Therefore, the analysis focused on deposition from salt and not the other dissolved solids, substances, or chemicals that may be found in the vapor from the cooling towers, because these other constituents would be present in trace amounts that would not be expected to cause any discernible impact to the environment. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 2-53; Section No. 2.4.1.1; Line No. 42-43; The DEIS states: "Deciduous scrub/shrub wetlands are composed of young saplings of tree species such as red maple ..." Recommend changing to say "Deciduous scrub/shrub wetlands may be composed of young saplings of tree species such as red maple ...". Although these species may be present in scrub/shrub wetlands within the region, these species are not typical of wetlands on site. (**0015-1-12** [Mallon, James])

Response: *A minor change has been made in Section 2.4.1.1 of the EIS to address this comment.*

Comment: Page No. 2-59; Section No. 2.4.1.1; Line No. 20-22; To be consistent with ER 2.4.1.2.3, it should be noted that neither the tiger salamander nor any other listed amphibians were observed during the 2009 surveys. (**0015-1-13** [Mallon, James])

Response: *The Fowler's toad, a species listed as "special concern" in New Jersey, was recorded during 2009 field surveys. The text in Section 2.4.1.1 of the EIS has been modified to reflect that tiger salamanders were not recorded during 2009 surveys.*

Comment: Page No. 2-59; Section No. 2.4.1.1; Line No. 27; Coyote is a valuable native species, not a nuisance species. (**0015-1-14** [Mallon, James])

Response: *The NRC staff acknowledges that coyotes can be beneficial as a predator in the food chain in natural settings. However, they can become a nuisance in urban/suburban settings where they lose their fear of humans, which can result in more confrontations with people and their pets. Additional language has been added to Section 2.4.1.1 of the EIS to further clarify the role of the coyote in the environment.*

Comment: Page No. 2-59; Section No. 2.4.1.1; Line No. 32-33; The DEIS states: "The PSEG Site has one invasive pest plant species, the invasive strain of common reed..." The statement is not accurate. There are other non-native invasive plant species onsite, such as Lespedeza cuneata. The one that has caused serious problems, however, is the common reed (Phragmites australis). (**0015-1-15** [Mallon, James])

Response: *The text in Section 2.4.1.1 of the EIS has been modified to reflect that the common reed is not the only invasive plant species found on the PSEG Site.*

Comment: Page No. 2-79; Section No. 2.4.1.3; Line No. 21-22; Suggest changing " ... any work or structures affecting waters of the United ..." to " ... any work or structures affecting navigable waters of the United ..." (**0015-1-16** [Mallon, James])

Response: *The text in Section 2.4.1.3 of the EIS has been revised to insert the word "navigable" at the location indicated in the comment.*

Comment: Page No. 4-33; Section No. 4.3.1.2; Line No. 17-18; Change "A total of 80.3 ac of this habitat would be temporarily eliminated." to "A total of 100 ac of this habitat would be temporarily eliminated." (See ER Subsection 4.3.1.3.1.3). (**0015-2-16** [Mallon, James])

Response: *The 80.3 ac of temporary disturbance does not include acreage in upland rights-of-way (ROW) (undeveloped). Table 4-1 in the EIS notes that temporary disturbance of upland ROW (undeveloped) equals 19.6 ac. This additional acreage increases the total acres to 99.9 ac (80.3 ac + 19.6 ac) . The text in Section 4.3.1.2 of the EIS has been revised to reflect this change.*

Comment: Section 4.3.1.1, page 4-26-Forestland, para. #1: notes that 80.3 acres of forests will be "temporarily disturbed" on the PSEG site, and an additional 1 acre "temporarily disturbed" associated with construction of the proposed causeway. If these impacts to forests are "temporary" -how will they be restored? (**0021-4-18** [Foster, Ruth])

Comment: A mitigation and compensation plan should be developed and implemented. The DEIS states on page 4-41 "Following the implementation of reasonable measures to avoid or minimize impacts to wetlands, compensation for unavoidable adverse impacts could be undertaken with the execution of an approved wetland restoration and/or rehabilitation program." - This tiered approach of avoid, minimize and mitigate for impacts need not be solely for wetland impacts. The same considerations and compensation should be discussed in the final EIS for upland habitats and the associated species that utilize these habitats including the bird species and habitats mentioned above. (**0023-1-16** [Cooksey, Sarah])

Response: *The NRC staff discusses potential restoration measures for temporary impacts to upland terrestrial habitats in Section 4.3.1.4 of this EIS. Mitigation of temporary impacts could include restoration with native cover types. Specific measures to avoid or minimize potential impacts to terrestrial habitats will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts, and mitigation are not possible* *at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. No changes were made to the EIS as a result of these comments.*

Comment: Many of the construction-related impacts are noted as "temporary" in duration. However, construction activities will occur over an estimated time period of 7 years (see Table 3-2, page 3-20). (**0021-5-3** [Foster, Ruth])

Response: *The NRC staff acknowledges that preconstruction and construction activities associated with a new reactor can be lengthy. However, these impacts are considered to be temporary because these areas will ultimately be restored through mitigation activities. No changes were made to the EIS as a result of these comments.*

Comment: The DEIS describes anticipated ecological impacts to plants and animals living in the various land-use categories covered in Table 4-1. Forestland cover, particularly old field communities represent important habitat for many birds and insects. Almost 90 acres of this habitat would be disturbed, most (80.3 acres) temporarily. The DEIS states that there are over 2000 acres of this habitat nearby, but that does not alleviate concerns with regards to the up to eight years of temporary impacts and permanent loss proposed. In addition agricultural lands (currently offsite) provide important habitat for migrating songbirds and Monarch butterflies. Over 12 acres of agricultural lands (Table 4-2) would be permanently lost. The DEIS notes that the greatest challenge to species impacted by disturbance would be competition from existing resident species in adjacent suitable habitat. This will place additional pressure on neighboring species outside of the impact areas. (**0023-1-13** [Cooksey, Sarah])

Response: *The NRC staff acknowledges that there will be both temporary and permanent impacts to terrestrial wildlife habitat. The NRC staff discusses these impacts in Section 4.3.1 of the EIS. In this section it is acknowledged that displacement of species into surrounding areas would likely cause increased competition for resources (i.e., food, cover, and nesting sites) in those areas, resulting in some negative overall impacts to species populations where habitat carrying capacity is exceeded.*

The NRC staff also acknowledges that preconstruction and construction activities associated with a new reactor can be lengthy. However, those impacts noted as temporary will ultimately be restored through mitigation activities. The NRC staff discusses potential restoration measures for temporary impacts to upland terrestrial habitats in Section 4.3.1.4 of this EIS. Mitigation of temporary impacts could include restoration with native cover types. Specific measures to avoid or minimize potential impacts to terrestrial habitats will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts, and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. No changes were made to the EIS as a result of these comments.

Comment: Specific impacts to avian species that frequent old fields and open habitat should be compensated through establishing permanent habitat protections for those species. These species include brown thrasher, eastern meadowlark, yellow-breasted chat, horned lark, bobolink, grasshopper sparrow and savanna sparrow. (**0023-1-14** [Cooksey, Sarah])

Response: *The NRC staff discusses potential restoration measures for temporary impacts to upland terrestrial habitats in Section 4.3.1.4 of this EIS. Mitigation of temporary impacts could include restoration with native cover types. Specific measures to avoid or minimize potential impacts to terrestrial habitats will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for avoidance, minimization of impacts, and mitigation are not possible at this stage of the project. Specific measures to avoid, minimize, or mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. No changes were made to the EIS as a result of these comments.*

Comment: Chapter 7 "Cumulative Impacts" states that "Literature regarding bat collisions with cooling tower structures is limited." Yet goes on the state that Erickson et al. suggest that bat species may not use echolocation during migration, which can result in higher collision rates with human-made structures. The project and other actions considered in the Cumulative Impact Analysis presented in Table 7-1 notes several additional nearby human made structures where avian and bat collisions are documented or are thought to cause additional impacts. Until additional site specific information is collected, relying on Erickson et al.'s 2002 report is not prudent. (**0023-2-15** [Cooksey, Sarah])

Response: *There is additional discussion of potential impacts on avian and bat species due to collisions with human-made structures in Section 4.3.1 of the EIS. This includes results of a past study of avian mortalities associated with a natural draft cooling tower at the existing HCGS. If PSEG applies for a license to construct and operate a reactor or reactors at the PSEG Site, there would be an opportunity to collect site-specific data based on the specific design selected if necessary. No changes were made to the EIS as a result of this comment.*

Comment: Statements within the DEIS are generally dismissive of the potential wetland impacts; the rationale being that wetlands are abundant in the area. While this is a likely habitat to predominate an estuarine environment, coastal wetlands are subject to development pressure and sea level rise, and losses are occurring at alarming rates. The final EIS should evaluate predicted wetland losses from these pressures. (**0023-1-19** [Cooksey, Sarah])

Response: *The NRC staff discusses potential impacts associated with the loss of wetlands in Section 4.3 of the EIS as part of the discussion on ecological impacts of preconstruction/construction. In this section the importance of wetlands as habitat is noted and the alteration of wetlands as a result of the project would be noticeable. The NRC staff discusses the potential cumulative impacts associated with the loss of wetlands in Section 7.3 of the EIS. The NRC staff discusses the potential impacts of climate change and urban development on ecological resources in Section 7.3 of the EIS as part of the discussion on cumulative impacts. No changes were made to the EIS as a result of this comment.*

Comment: The DEIS indicates that the northern parula and hooded warbler, two species of concern, were recorded during the Breeding Bird Survey by USGS, yet these species are not expected to be impacted because the site contains very little viable habitat to support these species. However, these species were found breeding nearby, indicating that they are also foraging to feed their young during this time. It is likely they would enter the site to collect food and thus be impacted by disturbance at the proposed site. (**0023-1-15** [Cooksey, Sarah])

Response: *The text in Section 4.3.1.2 of the EIS has been modified to reflect that potential foraging habitat for these species could be impacted by building on the site.*

Comment: The DEIS states that there are no known heron/egret rookeries or tern colonies on the PSEG site. Importantly, Pea Patch Island is approximately six nautical miles northwest from PSEG and supports the largest heron rookery in the Mid-Atlantic and perhaps the entire east coast. Nine species of wading birds nest on Pea Patch island; Black-Crowned Night-Heron, Yellow-Crowned Night-Heron; Great Blue Heron; Glossy Ibis; Tri-colored heron, Snowy Egret, Great Egret, Little Blue Heron and Cattle Egret. A Special Area Management Plan for Pea Patch Island region has been developed to better manage the island and the surrounding foraging areas. This information should be included in the final EIS and used to develop compensating measures for the loss of nesting and foraging habitat. The plan can be found here: http://www.dnrec.delaware.gov/coastal/Documents/PPISAMP/PPISAMPFinal1998.pdf . (**0023-1-12** [Cooksey, Sarah])

Response: *The NRC staff discusses the Pea Patch Island rookery in Section 2.4.1.1 of the EIS. Potential wetland mitigation activities are discussed in Section 4.3 of the EIS. Specific measures to avoid or minimize potential impacts to wetlands will be further defined with the refinement of the PSEG Site Utilization Plan and once a reactor technology has been selected. These refinements could continue to be devised throughout the design phase as detailed site layouts are developed. Therefore, detailed plans for mitigation are not possible at this stage of the project. Specific measures taken to mitigate impacts would be addressed in the EIS for a COL, if PSEG applies to NRC for a COL to build and operate a new nuclear power plant at the site. The USACE will include further efforts to avoid, minimize, and compensate for the unavoidable impacts. That process will conclude with a separate decision document, which will consist of a statement of findings addressing public interest consistent with 33 CFR 320-332. It would also include an analysis of the Section 404(b)(1) guidelines. In addition, PSEG would be required to meet NJDEP rules and regulations pertaining to mitigation activities. Text has been added to Section 2.4.1.1 of the EIS to make note of The Pea Patch Island Heronry Region Special Area Management Plan.*

Comment: Page No. 4-42; Section No. 4.3.2.2; Line No. 29-31; The DEIS states "There are plans to purchase additional land to the north of the site ... Once acquired, this area could be considered for onsite mitigation." The ER, Section 4.3.1.6.2.1, page 4.3-14, states: "PSEG is currently in the process of acquiring additional acreage to the north of the site ..." PSEG does not state anywhere in ER Chapter 4 that it plans to purchase additional land north of the site for mitigation purposes. (**0015-2-18** [Mallon, James])

Response: *the text in Section 4.3.1.4 of the EIS has been modified to reflect the information offered in the comment.*

Comment: There are extensive areas mapped as Key Wildlife Habitat (KWH) in the Delaware Wildlife Action Plan (DEWAP -http://www.dnrec.delaware.gov/fw/dwap/Pages/DEWAPlan.aspx) that are within the Vicinity of the project area. These areas are considered KWH either because they are rare within the state and have the potential to harbor a high diversity of Species of Greatest Conservation Need (SGCN) or they are part of a large complex/block that can support an array of plant and animal species. KWH documented include: Chestnut Oak - Hairgrass Forest, Early Successional Habitat, Impoundments, Mixed Broadleaf Freshwater Tidal Marsh, Spartina High Salt Marsh, Un-vegetated Intertidal Mudflats and Wetlands. (**0023-1-9** [Cooksey, Sarah])

Response: *The text in Section 2.4.1.3 of the EIS has been modified to include the information offered in the comment.*

Comment: Table 1 (below) includes a list of rare species that occur the vicinity (6 mile radius) of the project area within State of Delaware boundaries. Please note that we have not surveyed all of the areas within Delaware and additional rare species may occur within the vicinity of the project area. (**0023-1-8** [Cooksey, Sarah])

Response: *Modifications have been made to Table 2-8 in Section 2.4.1.3 of the EIS based on the table provided. This section and table do not address fish and sea turtles, which are discussed in Section 2.4.2.3 of the EIS.*

Comment: What are the implications of impacting a designated wetland mitigation area [along the route of the proposed causeway]? The EEP is supposed to be compensating for species impacts from the existing facility by providing nursery habitat for aquatic species. Degradation of this habitat must be addressed. Further, the compaction of wetland soils around the causeway as a result of construction and staging of materials and equipment is not adequately addressed. Compaction could alter hydrology and the distribution of plant species. (**0023-1-18** [Cooksey, Sarah])

Response: *Discussion of potential impacts of the proposed causeway are addressed in Section 4.3.1.1 of the EIS. The proposed causeway is to be designed as an elevated structure to minimize potential impacts to plant communities. Permanent impacts to wetland plant communities along the causeway would be limited to placement of piers and direct shading. Construction work mats are expected to be used within a 50-ft-wide easement and will result in only temporary impacts. Design and construction methods are aimed at minimizing permanent impacts, over a conventional road design that would involve permanent filling of wetlands. No changes have been made to the EIS as a result of this comment.*

Comment: Because the scientific research on the value of Phragmites dominated wetlands was not discussed or evaluated, the identification of the wetland ecological resources and description of the functional attributes of the wetland ecosystems that could be affected by the proposed project are inadequate (Section 2.4 Ecology). Until the value of the impacted sites has been fully evaluated, the conclusions and the determinations of the impact category levels are also inadequate and inaccurate (Section 4.1). (**0020-2-18** [van Rossum, Maya])

Response: *The NRC staff fully evaluates potential impacts to wetlands as an integral part of the EIS process. The NRC staff discusses wetland impacts and potential mitigation activities in Section 4.3 of the EIS. In this section it is noted that any wetlands are considered to be important habitat and alteration of wetlands resulting from this project will be noticeable. It is further stated in Section 4.3.1.4 of the EIS that wetlands are considered to be an important terrestrial habitat on the PSEG Site and provide habitat for wildlife that frequent the area. However, as stated in the draft EIS, it is important to note that the Phragmites that dominates these communities is invasive and non-native, and to the detriment of native wetland communities. No changes have been made to the EIS as a result of these comments.*

Comment: The DEIS uses a scientific paper that, in my estimation, downplays the avian and bat mortality caused by turbines, by comparing the rates to millions killed by other human causes. It fails to mention that the same NRC paper states that there are other indirect impacts on birds and bats. Indeed, a great deal of the bird mortality occurs in urban areas, where thousands of communal birds, such as house sparrows, that are not even native, feral cats and tall buildings with lots of glass, etcetera. But why would we add another threat? Especially if that threat is not justified by an unreliable source of energy? I agree that measuring the number of birds killed in the urban areas is far greater than the number of birds and bats killed by wind turbines. However, the number of turbines, since 2008, when the study was conducted, has grown substantially, and is projected to grow in the future. Therefore it follows that the number of bird and bat fatalities has grown since then and will continue to grow, a well. I also question how accurate the bird and bat fatalities were, when each turbine site is not monitored by humans on a daily basis. Scavenging predators could change the count before humans can be on site to make an accurate count. (**0004-12-3** [Eastman, Alice (Ajax)])

Response: *The NRC staff analysis in Section 9.2.2.1 discusses the effect of wind turbines on avian and bat mortalities. The estimated mortalities were based on available scientific literature and are designed to be a conservative comparison between nuclear power plants and wind turbines. The NRC staff acknowledges that additional studies have been completed and that estimations of avian and bat mortalities have indicated a significant increase in collisions with wind turbines. However, the new information does not change the conclusion that a wind energy facility at the PSEG Site or elsewhere within the PSEG ROI is not currently a reasonable alternative to construction of a 2200-MW(e) nuclear generation facility that would be operated as a baseload plant. No changes were made to the EIS as a result of this comment.*

Comment: Even more disturbing, according to the renowned ornithologist Chandler Robbins, who has spent more than 50 years studying migrating birds in western Maryland, those Appalachian ridges, being targeted for industrial wind installations, are the major flyway for migrating neo-tropical birds. They congregate from their summer breeding grounds in Canada, and North America, along those ridges as they head to their wintering grounds in Central and South America. (**0004-12-4** [Eastman, Alice (Ajax)])

Comment: These birds are already declining due to loss of both winter habitat and summer breeding habitats. In fact, the forest and ridges of western Maryland are mostly unfragmented, and provide habitat necessary for their successful breeding. Fragmented forests provide edges that are favored by nest predators, such as the brown headed cow birds. Industrial wind sites necessitate the fragmentation of long small songbirds' nesting territories, adding to the diminishing of their species. (**0004-12-5** [Eastman, Alice (Ajax)])

Response: *These comments do not provide new information for the environmental review done for the EIS. No changes have been made to the EIS as a result of these comments.*

Comment: [The NJDEP Endangered & Non-game Species Program (ENSP)] has attached a few pages from [Table M in the Reader's Guide] that summarizes the "unavoidable impacts" but those numbers are different from another section that summarizes this way: (1) 430 acres on PSEG site & vicinity, of which 225 will be permanently disturbed (lost) and 205 temporarily disturbed. Loss of PSEG's CDF, which may require ACE to build another CDF in the region. (2) Causeway: 69 acres disturbed of which 46 would be permanent and 23 ac temporary. The road crosses Alloways Creek wetlands, Abbott's Meadow WMA and Mad Horse Creek WMA. ENSP concerns include: (a) Loss of marsh habitat for marsh species (N. harrier, black rail, sedge wren, short-eared owl, bald eagle, shorebirds, etc.) (b) Disturbance, mortality, and other secondary effects of a new roadway across marsh (all marsh species). (**0021-3-2** [Foster, Ruth])

Response: *The first set of numbers does not actually state acreages for temporary disturbance; the second set of numbers states those acreages. That represents the difference in these two sets of numbers. Tables 4-1 and 4-2 of the EIS provide further details on these acreages. Discussion of potential impacts of the proposed causeway are addressed in Section 4.3.1.1 of the EIS. The proposed causeway is to be designed as an elevated structure to minimize potential impacts to plant communities and wildlife habitat. Permanent impacts to wetland plant communities along the causeway would be limited to placement of piers and direct shading. Construction work mats are expected to be used within a 50-ft-wide easement and will result in only temporary impacts. Design and construction methods are aimed at minimizing permanent impacts, over a conventional road design that would involve permanent filling of wetlands. No changes have been made to the EIS as a result of these comments.*

Comment: Page No. 4-108; Section No. 4.12; Table 4-21; ER Section 4.3.1.6.2 indicates PSEG intends to provide full compensatory mitigation for wetland impacts. Mitigation ratios from permit conditions will prescribe compensation associated with wetland type, temporal losses, etc. Suggest this sentence be reworded to indicate that proposed compensatory actions will mitigate the impacts (delete "could offset some of the impacts."). (**0015-3-10** [Mallon, James])

Response: *An editorial change has been made to Table 4-21 of the EIS [Table 4-22 of the final EIS].*

Comment: Page No. 10-6; Section No. 10.2.1; Table 10-1; Under Terrestrial and Wetland Resources, the table states that temporary disturbance would include 20.1 acres of wetland habitat, but line 39 on Page 10-10 states that 19.6 acres of wetland habitat would be temporarily disturbed. Table 4.2 also states that temporary disturbance would include 19.6 acres of wetland habitat. (**0015-7-4** [Mallon, James])

Response: *Sections 3.3.1, 4.3.1.2, and 10.2.1 (Table 10-1) of the EIS have been revised to state that the causeway will result in the temporary disturbance of 19.6 ac of wetlands.*

Comment: Page No. 10-13; Section No. 10.2.2; Table 10-2; Under Ecological Impacts-Terrestrial and Wetland Resources, the table states that permanent disturbance on the site includes 126 acres of wetland habitat and 9 acres of old field. Line 24 on page 10-12 and elsewhere in the DEIS state that 108 acres of wetland habitat will be permanently disturbed. (**0015-7-8** [Mallon, James])

Response: *Sections 4.3.1.2 and 10.2.2 (Table 10-2) of the EIS have been revised to state that 108 ac of onsite wetlands will be permanently disturbed.*

Comment: Page No. 4-33; Section No. 4.3.1.2; Line No. 4-6; Change "... construction-related impacts would include 65.2 ac of unmapped ..."to "... construction-related impacts would include 90 ac of unmapped ..." (see ER Subsection 4.3.1.3.1.2). (**0015-2-15** [Mallon, James])

Response: *As this sentence is referring to the CDF/disposal basin wetlands, 90 ac is the correct acreage to use in this context. The EIS has been revised to reflect this change.*

Comment: The ecological effects of the proposed wetland fill are not adequately addressed in Section 4.0. The effects are only viewed on the large scale of the estuary as a whole. The effects on individual watersheds such as the Alloway Creek and Mad Horse Creek watersheds or individual Wildlife Management Areas are not considered. This broad scale view inappropriately diminishes the local effects of habitat loss and degradation that would result from the construction of the facility. (**0018-1-7** [Chiarella, Louis])

Response: *Potential impacts to adjacent Wildlife Management Areas (WMAs) are discussed in Sections 4.3.1.2 and 5.3.1.2 of the EIS. Any potential impacts to Mad Horse Creek WMA, Abbotts Meadow WMA, Alloway Creek, and accompanying watersheds would be associated with the proposed causeway. This causeway would be elevated above the surface through these areas, and the flow of water through wetlands and open water is not expected to be affected. Less than 1 ac of the WMAs is expected to be affected, which is less than 1 percent of the total available WMAs. Therefore, the impacts of constructing and operating a new nuclear power plant at the PSEG Site on important terrestrial and wetland habitats and on these WMAs and associated watersheds are expected to be minimal. No changes have been made to the EIS as a result of this comment.*

Comment: In Chapter 5 it is stated that avian mortality as a result of collision with natural draft cooling tower design could occur, but would not result in a significant decline in avian populations. This statement is supported by reference to an NRC publication (NRC 2013-TN2654). This cited document is entitled Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS) Revision 1, Volume 1 (Main Report), Washington, D.C. Accession No ML13106A241. A generic EIS is insufficient to use as evidence that avian impacts in the Atlantic flyway are minimal. The final EIS should substantiate this claim with peer-reviewed journal publications. (**0023-2-1** [Cooksey, Sarah])

Response: *The NRC staff discusses avian mortality at the PSEG Site as a result of operations in Section 5.3.1.1 of the EIS. To facilitate the environmental review for license renewal, the NRC staff has codified its findings regarding potential environmental impacts as documented in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS).*

The GEIS examines the possible environmental impacts that could occur as a result of renewing any commercial nuclear power plant license, and, to the extent possible, establishes the bounds and significance of these potential impacts. The 2013 GEIS Revision 1 (as referenced in the comment) identifies 78 environmental impact issues for consideration in license renewal environmental reviews, 59 of which have been determined to be generic to all plant sites. The generic impacts are addressed and resolved (with respect to their impact level) wholly within the GEIS. The impacts which are identified as not generic are subsequently examined in a site-specific environmental review for the plant seeking the license renewal.

The impacts from birds colliding with cooling towers and transmission lines were evaluated in the GEIS by reviewing the primary literature for avian collision mortality associated with all types of human-made objects, as well as the results of monitoring studies conducted at six nuclear plants. The available data on cooling tower collision mortality suggest that cooling towers at nuclear power plants cause only a very small fraction of the total annual bird collision mortality from all sources. Because the frequency of avian mortality resulting from collisions with cooling towers is small for any species, it is unlikely that the losses would threaten the stability of local migratory bird populations or result in a noticeable impairment of the function of a species within local ecosystems. Based on this information, the GEIS concluded that avian mortality from collisions with plant structures and transmission lines during the license renewal term would meet the criteria of Category 1, and hence, no additional plant-specific analysis is required in future site-specific environmental reviews for relicensing, unless new and significant information is identified. In its environmental review of the PSEG ESP application, the NRC staff relied upon the findings and conclusions of the GEIS and avian mortality observations made by PSEG; hence, no changes were made to this EIS as a result of this comment.

Comment: Section 7.3.1.1, pages 7-19/20: concludes that "The effects on terrestrial and wetland habitat would be expected to be less than, but consistent with, those of the Delaware River Main Channel Deepening Project." This is incorrect -since the Delaware River Main Channel Deepening Project did not require the construction of any new upland CDFs, and it appears one or more new upland CDFs are needed to support the proposed PSEG project, associated impacts resulting from the PSEG project are not consistent with - and would potentially be greater than those associated with the Delaware River Main Channel Deepening Project. Thus, it is not possible for the NRC review team to conclude that "the cumulative impact on terrestrial and wetland ecology habitats from dredging activities as a result of building and operating a new nuclear power plant at the PSEG site in conjunction with past, present, and reasonably foreseeable dredging activities would be minimal." (**0021-4-16** [Foster, Ruth])

Response: *The USACE has evaluated the potential environmental impacts of developing a new upland CDF to replace the dredge disposal capacity it would lose at the north end of Artificial Island in the proposed land exchange with PSEG (USACE 2014-TN4229), and those impacts were found to be minimal. The volume of material to be dredged for the new intake structure, discharge structure, and barge facility at the PSEG Site (i.e., 665,000 yd^3, see draft EIS Section 4.2.1) would be only about 1 percent of the total volume of material to be dredged (i.e., 65 million yd^3, see draft EIS Section 2.12) during the USACE's Delaware River Main Channel Deepening Project. The dredged material associated with a new nuclear plant at the PSEG Site would be disposed of onsite or at an approved upland disposal facility. The text in Section 7.3.1.1 of the EIS has been revised to add these clarifications. In addition, the sentence* *referenced in the comment has been revised in this EIS to indicate that the effects on terrestrial and wetland habitat would be similar to and consistent with, those of the Channel Deepening Project. The review team's conclusions regarding potential impacts to terrestrial resources and wetlands did not change as a result of this comment.*

E.2.10 Comments Concerning Aquatic Ecology

Comment: In looking at the proposed new construction on the PSEG Site, I will be speaking primarily to specific projected ecological impacts on local aquatic systems. The natural systems of Delaware River and Estuary are critical environments with major significance for both regional and global biodiversity, for regional water supply and water quality, and for supporting important economic activities. Construction on the scale proposed by PSEG on the Delaware coast requires careful consideration of environmental factors. (**0001-2** [Velinsky, David])

Comment: In looking at the proposed new construction at the PSEG site I will be speaking, primarily, to the specific projected ecological impacts on local aquatic systems. The natural systems, of the Delaware River and estuary, are critical environments with major significance, for both regional and global biodiversity, for regional water quality supply, and water quality, and for supporting important economic activities. Construction on a scale proposed by PSEG, on the Delaware coast requires careful consideration of environmental factors. (**0004-11-2** [Velinsky, David])

Comment: The natural systems of the Delaware River and estuary are critical environments with major significance for both regional and global biodiversity, for regional water supply, and water quality, and for supporting important economic activities. Construction on the scale proposed by PSEG on the Delaware coast requires careful consideration of the environmental factors. (**0007-9-2** [Wall, Roland])

Response: *The commenters describe the importance of consideration of impacts to aquatic resources from construction. Section 4.3.2 of the EIS describes building activities and effects to aquatic resources. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: Before addressing the new construction, I would point out PSEG's past efforts to mitigate the effects of its operations on the aquatic environment in the Salem vicinity. In particular, faced with concerns of negative impacts on fisheries by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the Nation. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced, and/or preserved more than 20,000 acres of salt marsh and adjacent uplands to vital, healthy habitat for fish and wildlife. (**0001-3** [Velinsky, David])

Comment: Before addressing this new construction, I would like to point out that PSEG's past efforts to mitigate the effects of the operations on the aquatic environment in the Salem vicinity. And particularly faced with concerns of negative impacts on fisheries, by cooling water intake operations, PSEG responded with the largest private wetlands restoration project in the nation. The Estuary Enhancement Program began in 1994 and since that time has been a large scale effort to restore and preserve portions of the Delaware Estuary in both New Jersey and Delaware. PSEG has restored, enhanced and/or preserved more than 20,000 acres of salt marsh, and adjacent wetlands to vital healthy habitat for fish and wildlife. (**0004-11-3** [Velinsky, David])

Comment: Since then I have followed, with my students and with great interest, what has become the largest privately financed estuary enhancement project in the nation. Without going into details the project has been a resounding success, at many levels, and increasing the resource value of large acreages throughout the bay. PSEG has a solid track record in delivering on their commitment to bay-wide health. (**0004-4-6** [Applegate, Jim])

Comment: And I will mention one example, in particular. And it has to do with the Estuary Enhancement program that was developed, perhaps, about 15 years ago, now. And it is, perhaps, one of the largest estuarine restoration programs undertaken in our nation. And it set out to restore 20,000 acres of wetlands, very important habitat, 20,000 acres of wetlands to natural tidal flow and function. And that led to an increase in production of fin fish and shellfish to the Delaware River and bay system. That cost a lot of money. They brought in the experts to do that, from a variety of institutions, up and down the coast. (**0006-6-3** [DeLuca, Mike])

Comment: Without PSEG's work there would be much less productive marsh habitat providing nutrient cycling and aquatic animal nursery roles in this important system. (**0006-8-2** [Duvau, Bryan])

Response: *The commenters acknowledge the past efforts of PSEG to restore and preserve aquatic habitats near SGS and the PSEG Site. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts of the proposed facility will be limited by the use of a closed cycle cooling system. Compared to a once-through system, these cooling towers will divert much less water for cooling. Projected maximum diversion for the new facility is less than 4% depending on the type of facility of the current use by Salem, and is less than 0.05% of the total volume of the Delaware River flow. As a result, impingement of fish populations will be a small fraction of the current level of the Salem station. (**0001-8** [Velinsky, David])

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts of the proposed facility will be limited by the use of a closed cycle cooling system, compared to the once through system, these cooling towers will divert much less water for cooling, much less for cooling. Projected maximum diversion, for the new facility, is less than four percent, depending on the type of facility of the current use, by Salem, and less than .05 percent of the total volume of the Delaware River flow. As a result the impingement of fish populations will be a small fraction of the current level of the Salem Station. (**0004-11-8** [Velinsky, David])

Comment: In addition to the steps being taken to protect the wetlands impacted by construction, the aquatic impacts, of the proposed facility will be limited by the use of a closed cycle cooling system, compared to the once-through system. These cooling towers will divert much less cool water for cooling, projected maximum diversion, for the new facility, is seen as less than four percent of the current use of Salem, as less than .05 percent of the total volume of the Delaware River flow. As a result impingement on fish populations will be a small fraction of the current level of the Salem station. (**0007-9-8** [Wall, Roland])

Response: *The commenters acknowledge the expected reduction in water use and impingement of fish at the new plant. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: The comments appearing in *Federal Actions for a Climate Resilient Nation*, Progress Report was issued by the Interagency Climate Change Adaptation Task Force on 28 October 2011 included highlighting the use of coastal wetlands as "green infrastructure" for storm buffering and to contribute to the success of the nation's fisheries. (**0002-2** [Weinstein, Michael])

Response: *The commenter acknowledges the importance of coastal wetlands in general. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: Thus, long after these Artificial Island power plants and their infrastructure are gone, EEP's wetlands will continue to serve both of these critical ecological and societal functions, and not only produce fish and shellfish of the "right kind", in copious numbers, but will also help protect people and property in the region against storm related impacts. (**0002-4** [Weinstein, Michael])

Comment: So long after the Artificial Island power plants, and their infrastructure are gone, including those horrible looking cooling towers, EEP wetlands will continue to serve these critical ecological and societal functions. And not only produce fish and shellfish of the right kind, but in copious numbers. It will also help protect people and property in the region, again, against the advent of more severe storm events. (**0004-9-5** [Weinstein, Michael])

Response: *The commenters acknowledge the importance of coastal wetlands in general and for the PSEG Site. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: The nuclear operations at PSEG already has on Artificial Island, already inflict an incredibly harmful burden on the resources of the Delaware Estuary. For example, the over 3 billion Delaware River fish, a year, that they kill needlessly, with a simple change in operation, they could reduce their fish kills by over 95 percent, but they choose not to do so. (**0004-3-2** [van Rossum, Maya])

Comment: We believe that, before PSEG should be allowed to construct another burdensome facility on Artificial Island, or anywhere within the Delaware Estuary before it is even considered, they must be forced to minimize the adverse environmental impact their existing facilities already have. Including their fish kills, their harmful imprint on our wetlands, the water quality impacts they have on the Delaware Estuary waters, and more. (**0004-3-3** [van Rossum, Maya])

Comment: And how about the impact to the environment? The Delaware Riverkeeper Network works to protect and enhance the Delaware River, and the lands that drain into it. We take that role very seriously. You could say that we speak for the fish. Well, if the fish could speak, right now, they would tell you that another nuclear power plant would not be good for their future. Already, already, millions of fish are being constantly killed, by PSEG, and its cooling water intakes used for the existing plants. Some of those fish are endangered species. And it will only get worse with one more nuclear plant sucking ever more water, and ever more fish. (**0006-4-11** [Brook, David])

Response: *These comments are not specific in identifying what might have an impact on aquatic ecosystems from construction and operation of a new plant at the PSEG Site. The EIS addresses impacts on aquatic ecosystems from preparation, construction, and operation of the proposed plant in Sections 4.3.2 and 5.3.2. Cumulative effects from the operation of a new plant at the PSEG Site are addressed in Section 7.3.2, and describe the significantly reduced volume of water for closed-cycle cooling that the new units would use compared to the operation of SGS which uses once-through cooling. The review team concluded that the impact on the aquatic ecosystem would be SMALL. No changes were made to the EIS in response to these comments.*

Comment: Returning to the purpose of this meeting, should this project move ahead toward construction, there will be on site habitat impacts that will be unavoidable. And I urge that the process to embrace the same bay-wide approach used in the estuarian enhancement program, and to be creative and aggressive in identifying off-site mitigation opportunities. Hold PSEG's feet to the fire. History suggests that they will deliver. (**0004-4-8** [Applegate, Jim])

Response: *The commenter expresses concern regarding construction impacts. Aquatic resource impacts from construction are described in Section 4.3.2, and terrestrial and wetland impacts, including mitigation, are discussed in Section 4.3.1. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: In addition, the increasing CO2 concentrations, in the atmosphere, are causing elevated ocean acidification, which is drastically affecting the aquatic food chain and will result in world-wide food shortages. Deleterious effects of acidification have already been documented in shellfish aquaculture in the Pacific Northwest. (**0004-7-4** [Meadow, Karen])

Comment: Finally, increasing carbon dioxide emissions, in the atmosphere, are acidifying the ocean, which is dramatically affecting the aquatic food chain, and will result, or could result in world-wide food shortages. Deleterious effects of acidification have already been documented in shellfish aquaculture in the Pacific Northwest. (**0007-6-10** [Meadow, Norman])

Response: *The commenters state concerns regarding increasing acidification in general and cite an example of adverse effects in the Pacific Northwest. These comments provide no new information for consideration of impacts from construction and operation of a new plant at the PSEG Site, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: One of the things about this project, that caught my attention, was the fact that they are going to plan to use an elevated roadway to access the nuclear plant. In the past what people did was build up a roadway across the meadow. And that would involve, literally, tons and tons of fill, and emplacement of culverts and bridges. The intent was to get the vehicles in and out, without being flooded out by high tide. The problem with that is that, even though, you haven't technically altered the marsh, other than that which is underneath the footprint, in reality you have restricted the tidal flow. And once you restrict the tidal flow the area no longer functions as the same type of marsh that it once was. This enables it to be more attractive to invasive plants, such as phragmites, also known as common reed in this area. And, at the same time, it reduces the amount of flow, and that means that there is less fish using the marsh. Today we have another alternative, and that is the elevated roadway. The one that PSEG has proposed is going to be, at least, ten feet above the surface of the marsh. By doing this it is going to, one, not impact the marsh except where the piers come into the marsh itself. The fact that it is ten feet above will also reduce the amount of shading that comes on, underneath. And thus not inhibit the growth of plants. When you get big tides, or even just the tide that you get during the normal full moon, you are going to have water flowing all the way across that area. But it will be underneath the roadway, and it will not be blocked by the roadway itself. With that you are going to have a much better situation, you will be able to get vehicles in and out. And, at the same time, you will not have a major impact on the meadow. (**0006-7-1** [Widjeskog, Lee])

Response: *The commenter acknowledges the benefits of the proposed elevated causeway to lessen impacts to marsh habitat and aquatic resources. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: We continue to be concerned about the fish impingement. It says you are coordinating, we are going to review that data. We had lots of data that said there were no impacts to sturgeon. Guess what? You were wrong. We have now confirmed sturgeon, an endangered species, are being hit by the existing intakes. Even if it is a modest increase, it is still a large volume of water. That needs to be more adequately addressed throughout this. (**0007-2-13** [Carter, David])

Comment: There are three main concerns that I have about your proposal. They are waste disposal; fish and marine creatures kills; and safety . . . . The fish and other marine creatures kills at your water intakes are inexcusable. Your 'once through' cooling systems, as at Salem, are abuses of river creatures. No wonder the fish catch has lessened! . . . We are abusing the Delaware river! (**0019-4** [Passmore, Wills])

Response: *The comments are not specific in identifying how operation of a new intake at the plant at the PSEG Site would adversely affect fish impingement. The EIS addresses impacts on aquatic resources, including Federally protected species, from intake operations of the proposed plant in Section 5.3.2. The review team concluded that the impact on aquatic resources from operations would be SMALL. No changes were made to the EIS in response to these comments.*

Comment: I was unclear, with the water intake, it says you will meet the requirements, particularly for the fish issue. But I think, much like the data used for the population, I'm not sure which data you are using. In August the Federal Register came out with new 16(b) regulations. So if this EIS is based on what came prior, versus now, it needs to be completely re-written, based on the new regulations that are coming out, because that will be the future. It should be what you are adhering to and you need to follow those laws. (**0007-2-14** [Carter, David])

Response: *The commenter is concerned that the newest revision of regulations under Section 316(b) of the CWA (Phase II Rule, existing facilities) was not used to assess fish impacts for the proposed plant at the PSEG Site. The EIS addresses impacts on aquatic resources, including fish, from intake operations of the proposed plant in Section 5.3.2, using the most recent 316(b) regulations for Phase I (new facilities) as required by the U.S. Environmental Protection Agency (EPA). The review team concluded that the impact on aquatic resources from operations would be SMALL. No changes were made to the EIS in response to this comment.*

Comment: An example of that and one of the little-known facts, is that PSEG constructed a total of 13 fish ladders in New Jersey and Delaware. But that nine of those were in Delaware, as they had the highest probability of successfully reestablishing river herring spawning habitat. (**0008-1-3** [Pantazes, Jeff])

Comment: As you may or may not know, PSEG has constructed, and continues to monitor nine fish ladders in the state of Delaware, on several tributaries in New Castle and in Kent County. The northernmost fish ladder is just around the corner, here in Noxingtown pond. Southernmost provides fish access to Silver Lake at Millford and Kent County Delaware. Again, the success of these fish ladders has been made possible by the input provided by local communities, both in New Castle County, and in Kent County, as well as the support from the Delaware Department of Natural Resources and Environmental Control fisheries biologists. (**0008-2-11** [Evans, Brenda])

Response: *The commenters acknowledge the past efforts of PSEG to fish migration by installing fish ladders. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: Another often overlooked subtlety is that the biological data collected, under the Estuary Enhancement Program, for the last 20 years, is provided annually to Delaware Department of Natural Resources and Environmental Control (DNREC), New Jersey Department of Environmental Protection (NJDEP), and the federal regulatory agencies, for their review and use. It is one of the most complete and consistent aquatic biology data sets in existence for the Delaware River. And it complements the data collected by DNREC and NJDEP, under their fishery management programs, and helps to assure that there is a consistent, and comprehensive understanding of that information. (**0008-1-5** [Pantazes, Jeff])

Response: *The commenter acknowledges the significant amount of biological information collected through the EEP and made available to other agencies to use for aquatic management of resources. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: A new plant will provide an excellent opportunity to incorporate new technology to produce cleaner, safer energy especially if a cooling tower is incorporated to significantly reduce bay water usage, the impingement and entrainment of aquatic biota, and the impact of large quantities of elevated temperature water reentering the estuary. I know of no scientific study that proves that the present cooling process at Salem has had a negative impact on the estuary. (**0009-6** [Locandro, Roger])

Response: *The commenter acknowledges the use of closed-cycle cooling technology to reduce impacts to aquatic resources, and the general condition of the estuary. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: As a fisherman, I can tell you there are very few fish in the water for miles around the plant. The warm water, incorrect PH, huge intake screens, and cleaning chemicals dumped in the river have compromised safe fishing in the whole area. I've read all your reports on the fish in the water in this area and can't believe a group of government employees can be so wrong and allow such dishonesty. (**0011-5** [Keating, Thomas])

Response: *The commenter is concerned with water quality and poor fishing in the vicinity of the proposed plant at the PSEG Site. The EIS characterizes the historic and current status of fish populations in the vicinity in Section 2.4.2, and addresses cumulative impacts on aquatic resources, including operation of SGS and HCGS, in Section 7.3.2. The review team concluded that the cumulative impact on aquatic resources from past and historic water-quality degradation, past water-management practices, and historic fishing pressure would be MODERATE to LARGE, but the incremental impact from construction and operation of the new plant at the PSEG Site would not be a significant contributor to this cumulative impact. No changes were made to the EIS in response to this comment.*

Comment: Page No. 2-91; Section No. 2.4.2.1; Line No. 4-6; This DEIS states: "These potential changes are likely to result in movement of populations of more marine and euryhaline species farther up the Delaware River Estuary." This statement is dependent on the relative change in temperature and salinity. An appreciable change in temperature and salinity would have to occur for species distributions to significantly change. (**0015-1-17** [Mallon, James])

Response: *Given that the aquatic habitat in the vicinity of a new nuclear power plant at the PSEG Site is already a transition zone with fluctuating salinity and temperature, any increase in sea-level rise will contribute to changes that, although slight, may provide additional habitat for species that can tolerate incremental shifts of a few salinity units or degrees. Section 2.4.2.1 was revised to make clear that the changes would be expected to be incremental over time.*

Comment: Page No. 2-91; Section No. 2.4.2.1; Line No. 18-20; Suggest changing " ... and there is little to no submerged aquatic vegetation observed ..." to "... and there was no submerged aquatic vegetation observed ...". No submerged aquatic vegetation was located during the surveys conducted to support this application. (**0015-1-18** [Mallon, James])

Response: *The commenter is correct, there has been no documentation of submerged aquatic vegetation near the PSEG Site. Section 2.4.2.1 was revised to reflect this correction.*

Comment: Page No. 2-108; Section No. 2.4.2.3; Line No. 20-24; As stated in the ER, Subsection 2.4.2.2.3, the knobbed whelk and the channeled whelk have also been encountered in the Delaware Bay. The whelk species have been collected primarily along the Atlantic Coast, over 30 miles downriver of the PSEG site. Clarify in text. (**0015-1-20** [Mallon, James])

Response: *The knobbed whelk and the channeled whelk were not included in the discussion of commercial species in Section 2.4.2.3 because they were encountered in Delaware Bay 30 mi or more downriver of the PSEG Site. Section 2.4.2.3 was revised to provide clarity regarding the location of the described commercial species.*

Comment: Page No. 7-25; Section No. 7.3.2; Line Nos. 37 & 39; "Recommend changing "Atlantic Sturgeon" to "Atlantic sturgeon" and "Striped Bass" to "striped bass". Common names of fish species should not be capitalized except for directional names (e.g. American, Atlantic). Make conforming changes through the DEIS. (**0015-11-15** [Mallon, James])

Response: *Following American Fisheries Society Special Publication 29 on nomenclature for common fish names, the common name is now capitalized when referring to a specific species. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 9-239; Section No. 9.4.2.1; Line No. 33-36; The DEIS states: "The intake canal would result in greater land use and could also result in favorable habitat conditions for aquatic life over time. Therefore, the review team determined an intake canal would not provide significant advantages compared to the proposed intake system ..." Should "favorable" in the 1st sentence be "unfavorable"? (**0015-12-7** [Mallon, James])

Response: *The creation of an intake canal may provide additional available aquatic habitat that may be favorable to support aquatic life depending on length and depth of the new canal. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 4-50; Section No. 4.3.3.5; Line No. 8-10; The DEIS states: "Filling in of onsite ponds and small marsh creeks would result in a loss of those habitats." As noted in ER Subsection 4.3.3.2, "These artificial ponds consist of perched water bodies that are within the actively permitted CDF facilities (USACE CDF and PSEG's onsite desilt basin). These ponds are generally shallow and have no connection to the Delaware River or adjacent marsh creeks." Recommend adding these sentences to the DEIS so that it is consistent with the ER. (**0015-2-20** [Mallon, James])

Response: *This sentence is found in summary Section 4.3.3.5. The suggested additions are already described in Section 4.2.1.1, which describes the hydrology of the site. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 5-36; Section No. 5.3.2.1; Line No. 15; To be consistent with ER Subsection 5.3.1, page 5.3-5, recommend changing " ... use of closed-cycle cooling, the review team concludes to" use of closed-cycle cooling, considered Best Technology Available under the Phase I Clean Water Act Section 316(b) regulations, the review team concludes ..." (**0015-3-11** [Mallon, James])

Response: *The sentence is a conclusion based on the review team's independent assessment, which includes regulations under Clean Water Act Phase I 316(b) as stated in previous paragraphs within Section 5.3.2.1. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 5-36; Section No. 5.3.2.1; Line No. 19; Change" ... traveling screens would be killed by passage through ...". To "...traveling screens would be entrained by ...".Without entrainment survival information, mortality of these organisms is not known. (**0015-3-12** [Mallon, James])

Response: *The commenter is correct. Mortality is assumed for entrained organisms based on exposure to extreme heat, physical stress, and chemical exposure. Section 5.3.2.1 was modified to clarify mortality assumptions.*

Comment: Page No. 5-42; Section No. 5.3.2.3; Line No. 9-10; Suggest adding the following summary statement from DEIS Appendix F, page 43, lines 46 -48. Recommend changing " ... aspects of EFH. Appendix F ..." to "... aspects of EFH. The review team concludes that the incremental contribution of the NRC-authorized activities related to construction and operation of a new nuclear power plant at the PSEG Site would be negligible. Appendix F...". (**0015-3-13** [Mallon, James])

Response: *Section 5.3.2.3 discusses operational effects only and does not include construction, whereas the EFH assessment analyzes all aspects of construction and operation pursuant to consultation with NMFS under the Magnuson-Stevens Act. EFH consultation with NMFS was updated since the publication of the draft EIS and is included in Section 5.3.2.3 and in supplemental material in Appendix F.*

Comment: Page No. 7-28 to 7-29; Section No. 7.3.2.5; This section implies that Hurricane Sandy in 2012 was attributable to Climate Change. There is no evidence for that, and discussion of Hurricane Sandy should be deleted. (**0015-4-9** [Mallon, James])

Response: *The discussion of climate change effects in Section 7.3.2.5 notes that climate change could lead to an increase in the frequency and intensity of extreme precipitation events, which could have impacts on aquatic resources. Hurricane Sandy was cited as an example of an extreme precipitation event that had impacts on aquatic environments; the section does not attribute Hurricane Sandy to climate change. No changes were made to the EIS as a result of this comment.*

Comment: The DEIS does an inadequate job at looking at the overall environmental impacts from dredging, especially to water quality from filling in wetlands and coastal resources or building new piers. The DEIS does not take an adequate look at the impacts to aquatic life or fisheries. (**0016-7** [Tittel, Jeff])

Response: *The comment is not specific in identifying how dredging for a new barge facility for the plant at the PSEG Site would adversely affect aquatic life or fisheries. The EIS addresses impacts on all aquatic resources from dredging and installation of the barge facility for a new nuclear plant in Section 4.3.2. Impacts to wetlands are described in Section 4.3.1. Additional* *information related to dredging and installation of the barge facility has been added to Section 4.3.2 that further characterizes the effects of these activities on aquatic resources.*

Comment: Section 2.0 Affected Environment/Section 4.0 Construction Impacts at the Proposed Site: Several minor updates to the discussion of species listed under the Endangered Species Act (ESA) of 1973, as amended, are necessary. Because you have determined that neither hawksbill nor leatherback sea turtles occur near Artificial Island, we recommend these species be deleted from Table 2-8. You should also note that several Distinct Population Segments (DPS) of loggerhead sea turtles are listed under the ESA; only the threatened Northwest Atlantic DPS occurs in the action area. Five DPSs of Atlantic sturgeon are listed under the ESA; subadults or adults from any of the five DPSs could occur in the action area. The sections discussing shortnose and Atlantic sturgeon should note that due to the salinity near Artificial Island, early, life stages (i.e., eggs, larvae and young of the year) are not expected to be present. (**0018-1-1** [Chiarella, Louis])

Response: *The species information provided was reviewed and revisions were made to Sections 2.4.2, 4.3.2, and 5.3.2 relevant to providing clarity around known or expected species and life stage occurrences near the PSEG Site. Table 2-8 was revised to list terrestrial species described in Section 2.4.1 and Table 2-12 was revised to list aquatic species described in Section 2.4.2.*

Comment: In [Sections 2.0 and 4.0], it states that little to no submerged aquatic vegetation (SAV) is present at the PSEG site. Survey results were not included to verify this assertion. Several species have been observed in the Delaware River, including: *Vallisneria americana*, *Myriophyllum spicatum*, *Elodea nuttallii*, *Najasjlexillis*, *Potamogeton* sp. and others (Schuyler, 1988). SAV provides valuable nursery, forage and refuge habitat for a variety of fish including striped bass (*Marone saxatilis*), alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), and blueback herring (*Alosa aestivalis*). It is also an important food source for waterfowl. As water quality in the Delaware River continues to improve, more areas of SAV may be found within the River. Without additional site specific survey data, it is not possible to determine if SAV exists in the project site or if it will be impacted by the proposed project. (**0018-1-4** [Chiarella, Louis])

Response: *Section 2.4.2 was revised to state that no submerged aquatic vegetation was observed during sampling surveys in the vicinity of the PSEG Site.*

Comment: Also not adequately addressed [in Section 4] are the effects of wetland losses on fish, especially those identified in the EIS as occurring in the wetland creeks in and around the project area. These fish species include bluefish (*Pomatomus saltatrix*), summer flounder (*Paralichthys dentatus*), alewife, American shad, Atlantic croaker (*Micropogonias undulatus*), blueback herring, spot (*Leiostomus xanthurus*), weakfish (*Cynoscion regalis*), white perch (*Marone americana*), striped bass, bay anchovy (*Anchoa mitchili*), various killifish, silversides, mummichog and many other forage species. (**0018-1-8** [Chiarella, Louis])

Comment: [The NMFS has] concerns regarding the impacts of more than 100 acres of wetland fill. Estuarine wetlands provide nursery and forage habitat for a variety of species of concern to NMFS including alewife, Atlantic croaker, Atlantic menhaden, spot, striped bass, as well as federally managed bluefish and summer flounder (Graff and Middleton undated). Important forage species such as mummichog (*Fundulus heteroclitus*), Atlantic silverside (*Menidia menidia*), inland silverside (*Menidia beryllina*), striped killifish (*Fundulus majalis*) and bay anchovy also use these areas. Mummichog, killifish, anchovies and other small fish and benthic organisms found in estuarine wetlands provide a valuable food source for many of the commercially and recreationally valuable species mentioned above including striped bass, summer flounder, weakfish, red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*) and windowpane (Steimle et al. 2000). (**0018-1-13** [Chiarella, Louis])

Response: *Impacts to wetlands from construction are discussed in Section 4.3.1. Section 4.3.2 was revised to reflect wetland fill impacts specific to effects on fish populations.*

Comment: Magnuson-Stevens Fishery Management and Conservation Act (MSA): The essential fish habitat (EFH) final rule published in the Federal Register on January 17, 2002 defines an adverse effect . . . . Based upon the information in the EIS, adverse effects to several federally managed species including bluefish, summer flounder, and others, and their prey will result from the construction activities at the site including, wetlands fill, bulkhead and barge facility construction and the dredging of the Delaware River. Anadromous fish such as alewife, blueback herring, and American shad use the Delaware River and its tributaries including those around the project site as spawning, nursery and forage habitat. These fish are a food source for several federally managed species. Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include *Alosa* species such as these. Juvenile *Alosa* species have all been identified as prey species for windowpane (*Scophthalmus aquosus*) and summer flounder in Steimle et al. (2000). The EFH final rule states that the loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH. As a result, activities that adversely affect the spawning success and the quality for the nursery habitat of these anadromous fish can adversely affect the EFH for juvenile bluefish, windowpane and summer flounder by reducing the availability of prey items. (**0018-1-10** [Chiarella, Louis])

Response: *This comment addresses the importance of describing the effects of site-preparation activities on prey species for Federally managed fish under the Magnuson-Stevens Act. Section 4.3.2 describes the effects of in-water work and site-preparation activities on these important prey species and was revised to provide additional information. These revisions are also relevant to the Essential Fish Habitat Assessment and will be addressed with NMFS through consultation under the Magnuson-Stevens Act and included as supplemental material in Appendix F.*

Comment: Noise from the construction activities may also result in adverse effects. Our concerns about noise effects comes from an increased awareness that high-intensity sounds have the potential to harm both terrestrial and aquatic vertebrates (Fletcher and Busnel 1978; Kryter 1984; Richardson et al. 1995; Popper 2003; Popper et al. 2004). Effects may include (a) non-life threatening damage to body tissues, (b) physiological effects including changes in stress hormones or hearing capabilities, or (c) changes in behavior (Popper et al. 2004). (**0018-1-11** [Chiarella, Louis])

Response: *Building impacts including noise and vibration from in-water work, are discussed in Section 4.3.2. The NRC staff reviewed the referenced sources and Section 4.3.2 was revised to add additional information regarding frequency thresholds and likelihood of adverse effects due to vibration and noise.*

Comment: In order to minimize the adverse effects of suspended sediment and sound on migrating anadromous fish, [the NMFS] recommends in-water work including dredging and pile driving be avoided from March 1 to June 30 during the upstream migration to their spawning grounds. (**0018-1-12** [Chiarella, Louis])

Response: *This comment recommends a specific work schedule for in-water work. Section 4.3.2 was revised to include this recommendation.*

Comment: Section 305 (b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires all federal agencies to consult with NMFS on any action authorized, funded, or undertaken by that agency that may adversely affect EFH. Included in this consultation process is the preparation of a complete and appropriate EFH assessment to provide necessary information on which to consult. Our EFH regulation at 50 CFR 600.905 mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. Unfortunately, the provided EFH assessment is not sufficient to fully assess potential impacts to EFH as required pursuant to 50 CFR 600.920. Specifically, the EFH assessment does not evaluate impacts to juvenile bluefish and its EFH, or the effects of more than 100 acres of wetland losses on EFH, federally managed species and their prey. We seek to extend the comment period pursuant to 50 CFR 600.920(i)(5) so that you may provide us with better information for the development of EFH Conservation Recommendations. Once we receive the information outlined above, we will initiate consultation and provide EFH conservation recommendations, as necessary. (**0018-1-16** [Chiarella, Louis])

Response: *This comment addresses the Essential Fish Habitat Assessment and will be addressed with NMFS through consultation under the Magnuson-Stevens Act and included as supplemental material in Appendix F.*

Comment: [In regard to the Biological Assessment (BA)], the proposed action has not been clearly defined. It remains unclear what activities would be authorized under the ESP and which activities you consider to be interrelated and interdependent. For example, while you state on page 1 that the ESP does not authorize the construction and operation of a nuclear power plant, on pages 29-31, you present an analysis of effects of cooling water intake system operations. The BA should be revised to clearly state the proposed action and identify the direct and indirect effects as well as the effects of any interrelated or interdependent activities. Further, because no decision has been made as to the specific facility that will be built, it is unclear what scenario you are basing your assessment on. The BA should identify the full range of construction and operation options and clearly identify the impacts associated with each option. If you intend the BA to represent a "worst case" scenario, this should be noted in the BA. The BA should also be clear as to whether the discussion of cumulative effects is based on the ESA definition of cumulative effects or the NEPA definition of the term. It would also be helpful for the NRC to explain any subsequent consultation that may be necessary if PSEG applies for a construction permit, operations license or combined construction permit and operating license. (**0018-2-1** [Chiarella, Louis])

Comment: The BA [Biological Assessment] provides no indication of the likely timing of any of the activities considered. It is our understanding that PSEG would have up to 20 years from the time the ESP is issued to apply for a construction permit and operations license. This long timeline introduces significant uncertainty in predicting effects of the proposed action that must be addressed in the BA. The BA should provide your best estimate of the timing of the activities considered. (**0018-2-2** [Chiarella, Louis])

Comment: The BA indicates that dredging and pile driving will be carried out in relation to the barge slip, barge storage and unloading facility, the intake and discharge structures and the causeway structures. You conclude that these activities will have no effects to listed species because "turtles and sturgeon would avoid any noise or disturbances." You have not provided any analysis to support this conclusion. No information is provided on the type of dredge to be used. Sturgeon and sea turtles can be killed by hopper dredges; sturgeon are also vulnerable to entrainment in cutterhead dredges and capture in bucket/clamshell dredges. Additionally, the turbidity associated with dredging can affect listed species and their prey. Dredging and other benthic disturbances can also result in the reduction in available prey. The BA must be revised to describe: the type of dredge to be used; any time of year restrictions or other mitigation measures (e.g., silt curtains) to be deployed; the likelihood of interactions between the dredge and listed species; expected characteristics and duration of the turbidity plume; and, impacts of dredging on prey species. Pile driving can negatively impact aquatic life by resulting in increased underwater noise. No information is provided on the number or type of piles to be installed. In order to assess the effects of pile driving on sea turtles and sturgeon, you must provide an estimate of the expected underwater noise and the expected duration of pile installation. (**0018-2-3** [Chiarella, Louis])

Comment: The discussion of barge traffic [in the Biological Assessment (BA)] does not address the potential for project related vessels to strike sturgeon or sea turtles. The BA must include this assessment. Important information to consider includes the speed of the vessels, their size, and the draft of the vessels compared to water depths in the areas where they will be operating. (**0018-2-4** [Chiarella, Louis])

Comment: [In the Biological Assessment (BA),] you state that the new plant "would not be expected to impinge listed turtle or sturgeon species." However, as stated elsewhere in the BA, while the new facility would employ closed-cycle cooling, "details about the screen design, screen wash, and fish return system for a new plant are not available." Without any information on the likely size of any screen mesh or trash bar spacing, any conclusions regarding the likelihood of impingement or entrainment seem premature. You state that any "turtle or sturgeon standings on the PSEG Site intake trash bars are unlikely and would be limited to moribund or compromised individuals." It is unclear what information you have used to determine that impingement is unlikely to occur. Further, as noted in Biological Opinions we have issued to you for other nuclear energy facilities, including Salem, interactions at the trash bars, regardless of whether the animal is dead or dying, constitute "capture" or "collect" in the definition of "take." (**0018-2-5** [Chiarella, Louis])

Comment: [In the Biological Assessment (BA),] the analysis of effects of the discharge is incomplete. It contains no assessment of the effects of increased water temperatures on sea turtles or sturgeon, other than to state hat foraging behavior will not be affected due to the buoyancy of the thermal plume. It is our understanding that the entirety of the thermal plume will not be limited to surface waters. A more thorough analysis of effects of the thermal plume on sea turtles and sturgeon, their habitats and prey, must be provided. You should also consider any predicted changes in ambient water temperature in the action area due to climate change. This is particularly important given that PSEG may not even apply for a construction and operations license until 20 years after the ESP is issued. You state that turtles and sturgeon may avoid the area that experiences high velocity and turbulence; there is no analysis of the effects of this avoidance. Further, while you mention a chemical discharge, there is no indication of which chemicals may be discharged and no analysis of the effects of that discharge. (**0018-2-6** [Chiarella, Louis])

Comment: We also note that Section 5.3 should be updated to reflect the conclusions of our July 2014 Biological Opinion on the effects of the continued operation of the Salem and Hope Creek Nuclear Generating Stations. (**0018-2-7** [Chiarella, Louis])

Response: *These comments concern preparation of the Biological Assessment and will be addressed with NMFS through ESA section 7 consultation and included as supplemental material in Appendix F.*

Comment: Generally, the only way to adequately protect aquatic resources is to avoid impacting them in the first place. Wetlands receive legal protection because they have been shown to be a significant ecological resource that provides a variety of functions that are of value to humans, wildlife and the economy. For example, wetland declines are believed by experts to be responsible in part for the "significant decline in blue fish populations" in New Jersey. Blue fish and striped bass are recreationally important and depend on wetlands that provide habitat for their small prey fish [See Frumhoffet al. 2007. Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS).]. Constructing upon such a large acreage of wetlands in the Delaware Estuary will contribute to this decline. (**0020-2-4** [van Rossum, Maya])

Response: *The commenter is concerned about the loss of wetlands and the decline of Bluefish due to construction. Section 4.3.1 of the EIS describes the permanent loss of 131 ac of wetlands habitat, predominantly Phragmites, associated with building activities in context of the ecological function of 25,534 acres of wetlands habitats in the vicinity. Section 2.4.2 describes the aquatic communities in the onsite small marsh creeks associated with these wetlands and compares the aquatic assemblages with large marsh creeks in restored and unaffected wetlands areas. As described in Section 2.4.2, the small marsh creek segments and associated wetlands that will be permanently lost as a result of installation activities have limited diversity and lower overall biomass compared to the unaffected marsh creek segments. No changes were made to the EIS as a result of this comment.*

Comment: Studies have shown that fish assemblages can be similar in *Phragmities* and *Spartina alterniflora* wetlands or even present in greater densities [See Fell et al. (2006). Short-term effects on macroinvertebrates and fishes of herbiciding and mowing Phragmites australis-dominated tidal marsh. Northeastern Naturalist, 13(2), 191-212.; Warren et al. (2001). Rates, patterns, and impacts of Phragmites australis expansion and effects of experimental Phragmites control on vegetation, macroinvertebrates, and fish within tidelands of the lower Connecticut River. Estuaries, 24(1), 90-107.]. Data collected by PSEG in and around Artificial Island in the Delaware River ecosystem demonstrates that Phragmites dominated wetlands provide both food and habitat valuable to the Delaware Bay system. For example, according to an evaluation of the restored wetlands from the previous Salem NJPDES permit [See Delaware Riverkeeper Network. 2003. Evaluation of special conditions contained in Salem Nuclear Generating Station NJPDES permit to restore wetlands, install fish ladders, and increase biological abundance within the Delaware Estuary. Prepared by Carpenter Environmental Associates. Inc. Dec 3, 2003.]: "It has not been demonstrated that the restoration of the Phragmites dominated sites is increasing fish utilization of those areas. . . . These results indicate that Phragmites eradication has not been proven to increase utilization of the site and increased fish production." (**0020-2-15** [van Rossum, Maya])

Response: *The commenter questions the value of restored wetlands as advantageous over Phragmites-dominated wetlands for increasing fish habitat. Fish sampling in restored wetlands areas and Phragmites-dominated wetlands areas were combined in Section 2.4.2 under descriptions for small marsh creeks and large marsh creeks in order to present a more robust assessment of the aquatic community for the area. The NRC Staff reviewed the referenced scientific articles and determined that the research represented in these documents neither supports or diminishes the attributes of long-term restoration of tidal marshes in the Delaware Estuary. The goals of the EEP extend to improving wetland habitats for more than just fish, as described in Section 2.4.1. No changes were made to the EIS as a result of this comment.*

Comment: The best available science was not used to evaluate the aquatic impacts from building activities, and therefore, the conclusion that impacts would be small is based on insufficient information. The DEIS should reevaluate the construction impacts on aquatic species, specifically the science related to noise impacts and avoidance behavior related to pile driving and increased vessel traffic. The impacts to aquatic resources are "expected to be temporary because fish and mobile invertebrates likely would avoid areas of building activity ..." (p 4-49) and impacts "would be largely controlled by the use of BMPs associated with the management of water quality [sedimentation and erosion]" (p 4-50). The review team concluded that impacts to aquatic biota during construction would be small and no mitigation measure would be warranted. However, no scientific research was analyzed or referenced to support the assumptions of this assessment, and therefore, this conclusion is based on insufficient information. (**0020-3-10** [van Rossum, Maya])

Comment: The NRC needs to evaluate both the short-term and long-term impacts of construction noise and increases in barge/ vessel traffic noise as a result of the proposed project. (**0020-3-11** [van Rossum, Maya])

Comment: [T]he construction phase of a project, despite being temporary, has the potential for impact on aquatic species; of particularly grave concern is pile driving and increased vessel traffic [See Hawkins et al. (2014). Responses of free-living coastal pelagic fish to impulsive sounds. The Journal of the Acoustical Society of America, 135(5), 3101-3116.; Bailey et al. (2014). Assessing environmental impacts of offshore wind farms: lessons learned and recommendations for the future. Aquatic biosystems, 10(1), 8.]. Offshore energy development in recent years has resulted in research around the world involving the biological and population effects of underwater noise associated with construction and pile driving. This research should be evaluated as part of the analysis of aquatic impacts of the proposed project, and the impacts should be mitigated. (**0020-3-12** [van Rossum, Maya])

Comment: A review of research and data related to construction noise impacts to aquatic and marine species within the Delaware Estuary is needed, including the adverse effect on natural behavior, feeding, or reproductive habits and the potential to cause injury or even death. Since the best available science indicates a potential for impact, construction specification and guidelines should be used to avoid and minimize impacts to, at a minimum, Atlantic Sturgeon and sea turtles. A review of West Coast construction projects should be conducted along with other major bridge construction projects in the Mid-Atlantic States which have developed and implemented underwater noise monitoring and mitigation measures [See Thalheimer et al. 2014, Development and Implementation of an Underwater Construction Noise Program. Development]. Furthermore, impact analyses and mitigation methods have been utilized in other industries for pile-driving activities including offshore wind farms and oil exploration, and the outcomes and research resulting from these projects should be reviewed. (**0020-3-13** [van Rossum, Maya])

Comment: In addition to the direct impacts of construction noise, indirect impacts to aquatic resources from increased vessel/ barge activity were also not evaluated. Vessels have the potential to have major negative population level effects on fish due to increased noise levels and propeller strikes [See Becker et al. (2013). Does boat traffic cause displacement offish in estuaries? Marine pollution bulletin, 75(1):168-173.]. Lower-level and chronic vessel noise can impact fish through masking acoustic communication and triggering endocrinological stress responses [See Slabbekoom et al. (2010). A noisy spring: the impact of globally rising underwater sound levels on fish. Trends in Ecology & Evolution, 25(7), 419-427.; Codarin et al. (2009). Effects of ambient and boat noise on hearing and communication in three fish species living in a marine protected area (Miramare, Italy). Marine pollution bulletin, 58(12), 1880-1887.; Smith et al. (2004). Noise-induced stress response and hearing loss in goldfish (Carassius auratus). Journal of Experimental Biology, 207(3), 427-435.]. Additionally, both vessel and towboat propellers are a major turbulent force entraining high volumes of water with the potential of killing or striking large numbers of organisms [See Miranda & Killgore (2013). Entrainment of shovelnose sturgeon by towboat navigation in the Upper Mississippi River. Journal of Applied Ichthyology, 29(2), 316-322.; Kilgore et al. (2005). Interim Report for the Upper Mississippi River-Illinois Waterway System Navigation Study, Evaluation of Towboat Propeller-Induced Mortality of Juvenile and Adult Fishes. US Army Engineer, ENV Report 56.]. (**0020-3-14** [van Rossum, Maya])

Comment: The urbanization of the Delaware Estuary in the vicinity of the proposed project makes alternative habitat less available and displacement of fish more impactful on the aquatic populations. An analysis of the impacts of increased vessel traffic on ambient noise and the potential for boat strikes should be conducted. This information is necessary in order for the

NRC to make an informed decision regarding the need for a new mooring facility that might facilitate increased vessel/barge activity. (**0020-3-15** [van Rossum, Maya])

Comment: No scientific research was analyzed to support the assumption that the impacts to aquatic resources would be temporary. The NRC needs to evaluate both the short-term and long-term impacts on aquatic species of construction noise and increases in barge/ vessel traffic noise as a result of the proposed project. There is an increasing amount of awareness and research on the effect of anthropogenic sounds in the aquatic environment and how these sounds affect aquatic mammals, diving birds, fishes, amphibian, reptiles, and invertebrates. The construction phase of a project, despite being temporary, has the potential for the greatest impact on aquatic species, and of the construction activities, pile driving and increased vessel traffic is of great concern. (**0022-8** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: No scientific research was analyzed to support the assumption that the impacts to aquatic resources would be temporary. The NRC needs to evaluate both the short-term and long-term impacts on aquatic species of construction noise and increases in barge/ vessel traffic noise as a result of the proposed project. There is an increasing amount of awareness and research on the effect of anthropogenic sounds in the aquatic environment and how these sounds affect aquatic mammals, diving birds, fishes, amphibian, reptiles, and invertebrates. The construction phase of a project, despite being temporary, has the potential for the greatest impact on aquatic species, and of the construction activities, pile driving and increased vessel traffic is of great concern. (**0034-9** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *The commenters are correct that no specific information was presented in the EIS with reference to noise tolerance or adverse effects from pile-driving activities or barge vessel traffic. Section 4.3.2 was revised to include this information as a part of the impact determination.*

Comment: The dredging and construction of a new barge mooring facility will cause immediate and ongoing damage to the Delaware River which was not fully analyzed. The negative effects on water quality through the resuspension of toxics from dredging and through vessel-related discharges were not evaluated. The proposed project will include the construction of a new barge unloading and mooring facility resulting in new dredging of the river, permanent impact to tidal waters, and on-going impacts from the use of the barge slip and barge storage and unloading facility. (**0020-3-16** [van Rossum, Maya])

Comment: The DEIS indicates that the Delaware River bottom would be "lowered 4.5 ft over a 92-acre area, requiring dredging 665,000 yd^3 of sediment" (p 4-22) and"[d]redging may be required to maintain use of the Hope Creek Generating Station barge slip ... during operation" (p 5-39). The expansion of the existing barge slip and the new barge storage and unloading facility are "to be in use to transport large plant components to the site during building activity" (p 4-46), but the use of these facilities "...are expected to be infrequent during operation." (p 5-39). This is in contrast to the dredging and other maintenance needed to allow access to the facility, which will be continuous. Both the dredging proposed in order to construct the barge facility and the increased vessel traffic will have negative water quality impacts to the Delaware River system which were not evaluated. (**0020-3-17** [van Rossum, Maya])

Comment: Dredging can resuspend and reintroduce toxics back into the Delaware River system. Research has shown that dredging operations via the resuspension of large amounts of sediment, can release chemical contaminants that are bound to the fine-grained estuarine/ marine sediments into the water [See Yeager et al. (2010). Impacts of dredging activities on the accumulation of dioxins in surface sediments of the Houston Ship Channel, Texas. Journal of Coastal Research, 743-752.; Boccbetti et al. (2008). Contaminant accumulation and biomarker responses in caged mussels, Mytilus galloprovincialis, to evaluate bioavailability and toxicological effects of remobilized chemicals during dredging and disposal operations in harbour areas. Aquatic Toxicology, 89(4), 257-266.; Sundberg et al. (2007). Dredging associated effects: maternally transferred pollutants and DNA adducts in feral fish. Environmental science & technology, 41(8), 2972-2977.]. This resuspension can therefore reintroduce heavy metals, pesticides, and other toxins back into the River and into the food chain, resulting in both negative impacts on organisms that rely on good water quality but also putting at risk drinking water aquifers important to communities in New Jersey and Delaware. For example, contaminants can be transferred to higher trophic levels after ingestion by filter feeders through biomagnification. (**0020-3-18** [van Rossum, Maya])

Comment: The negative impacts associated with both the dredging and construction of a new barge mooring facility should be fully evaluated by the NRC, and the permanent impacts of this activity weighed against the need for this facility in the long-term. (**0020-4-3** [van Rossum, Maya])

Response: *Effects to surface-water quality from dredging required for a new barge unloading facility are assessed in Section 4.2.3 of the EIS. Effects to aquatic organisms from sedimentation and turbidity from dredging are assessed in Section 4.3.2 of the EIS. Effects from maintenance dredging for the barge unloading facilities are described in Sections 5.2.3 and 5.3.2; maintenance dredging is expected to be infrequent. Effects from propeller wash from barge traffic in the area of the barge unloading facility are described in Section 4.3.2 and were assessed as minimal. Sections 4.2.3 and 4.3.2 describe the requirements for minimization of sedimentation and turbidity effects during dredging as required under Section 10 of the Rivers and Harbors Appropriation Act and Section 404 of the CWA. Section 4.3.2 was revised to include additional information regarding sediment characterization for dredging operations., the potential for resuspension of sediments in surface waters during dredging activities, and effects to aquatic biota from dredging activities and increased barge traffic.*

Comment: Among the negative effects that have not been adequately considered or addressed by the NRC is the impact of vessel related discharges as a result of a new mooring facility and increased vessel/ barge activity. There would definitely be increased vessel and barge activity during the construction phase, but the DEIS does not specify how "infrequent" the barge facility will be used during operation. Furthermore, why are permanent impacts being permitted to construct an "infrequently" used facility? Despite this, vessel-related operational discharges have not been evaluated. Vessel-related operational discharges represent one of the largest anthropogenic inputs of pollutants into estuary environments and pose a long-term and substantial threat to coastal ecosystems. Vessel discharges result in negative environmental impacts by releasing both traditional pollutants (i.e., oil, nutrients, toxics, sewage) and by contributing to the spread of aquatic invasive species. (**0020-4-1** [van Rossum, Maya])

Response: *The commenter is concerned with the possibility of barge discharges to surface waters and increased barge activity. Section 4.3.2 of the EIS was revised to discuss increased barge traffic and discharges from barges and their effects to aquatic biota.*

Comment: Furthermore, alterations to sedimentation and wave patterns caused by vessels entering and exiting the mooring area could also increase turbidity which can decrease dissolved oxygen, can mask pheromones used by migratory fishes, and can smother immobile benthic organisms. (**0020-4-2** [van Rossum, Maya])

Response: *Sections 2.3.3 and 2.4.2 describe the surface waters near the PSEG Site to include the barge unloading facility site area as turbid and poor benthic habitat for aquatic life, and noted no presence of protected, commercially or recreationally important species in these sediments. Section 5.3.2 determined that barge use in this area would not adversely affect benthic habitats or communities as the quality of the habitat is poor, and is not preferred habitat for aquatic organisms. No changes were made to the EIS as a result of this comment.*

Comment: The evaluation of federally endangered Atlantic Sturgeon is based on outdated information. In Section 3.3.3.2 of the DEIS, the NRC references observations of Atlantic Sturgeon juveniles from 1991 and 1998 as well as tagging studies in 2005 and 2006. All of these documents are dated and therefore, the NRC did not provide due consideration to current conditions and/or impacts. Since these reports were completed, there have been a number of significant changes in and around the project areas. For example, the Atlantic Sturgeon was declared endangered in 2012 [See NOAA. 2012. NOAA lists five Atlantic sturgeon populations under Endangered Species Act. Retrieved from: http://www.nmfs.noaa.gov/stories/2012/0l/31_atlantic_sturgeon.html.]. (**0020-4-4** [van Rossum, Maya])

Comment: The Delaware River has been determined to have a genetically unique line of Atlantic Sturgeon, [See Grunwald et al. 2007. Conservation of Atlantic sturgeon Acipenser oxyrinchus oxyrinchus: delineation of stock structure and distinct population segments, Printed Springer Science+Business Media, B.V. 2007; Wirgin, I., Grunwald, C., Stabile, J., & Waldman, J. (2007). Genetic evidence for relict Atlantic sturgeon stocks along the mid Atlantic coast of the USA. North American Journal of Fisheries Management, 27(4), 1214-1229] one that reproduces only in the Delaware River system. Juvenile Atlantic Sturgeon from this line has been found in the Delaware River, thus supporting its ongoing existence and survival. This genetically unique line is known to rely heavily on various parts of the estuary for various critical stages of its life cycle, and in fact in 2014 alone, over a dozen Atlantic Sturgeon have been found dead, dying or seriously injured in PSEG's Salem Nuclear Generating Station cooling water intake structure located on Artificial Island [Reports can be found on the Nuclear Regulatory Commission website, filed by PSEG] - all of which is new and vitally important information. (**0020-4-5** [van Rossum, Maya])

Response: *Evaluation of effects on Atlantic Sturgeon is presented in a Biological Assessment as part of ESA section 7 consultation with the NMFS. Updated information on the results of consultation is presented in Sections 4.3.2, 5.3.2, and 7.3.2 of the EIS and in Appendix F as supplemental material.*

Comment: The dated and deficient nature of the data reviewed in the DEIS makes it deficient. Furthermore, the DEIS does not take into account the cumulative impact of PSEG's existing nuclear facilities at Salem Nuclear Generating station which kills some number of both Shortnose and Atlantic Sturgeon due to impingement despite not undertaking mitigation measures that benefit or enhance impacted fish populations. Before further impacts are permitted, PSEG should be required to comply with mitigation requirements. The fact that PSEG has failed to mitigate past damages should weigh heavily against PSEG's credibility. (**0020-4-6** [van Rossum, Maya])

Response: *Evaluation of effects on both Shortnose and Atlantic Sturgeon is presented in a Biological Assessment as part of ESA section 7 consultation with the NMFS. This evaluation includes effects from operations at SGS and HCGS. Updated information on the results of consultation is presented in Sections 4.3.2, 5.3.2, and 7.3.2 of the EIS and in Appendix F as supplemental material.*

Comment: The importance of our state's aquatic resources cannot be overstated. The Delaware River is in great need of restoration activity. It is very important that decision-making is done such that proposed projects help improve water quality. A reevaluation of the deficient sections of the DEIS will illustrate that the project as proposed will surely not accomplish a "no net loss" of aquatic resources. (**0020-5-18** [van Rossum, Maya])

Comment: The Delaware River is in great need of restoration and it is critical that decision-making is done such that proposed projects help improve water quality and wetland and aquatic ecosystems. A reevaluation of the deficient sections of the draft EIS will illustrate that the project as proposed will surely not accomplish a "no net loss" of aquatic resources. (**0034-13** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *These comments express concern about the need for Delaware River restoration and effects on aquatic resources. A cumulative assessment for aquatic resources within the Delaware River basin is presented in Section 7.3.2 and discusses the past and present adverse effects of natural and anthropogenic stressors on aquatic resources. Due to the past actions described, these effects are considered noticeable and destabilizing for many aquatic resources and the cumulative impact determination is characterized as MODERATE to LARGE. However, the incremental effects of site preparation, construction, and operation of the new plant at the PSEG Site are not described as a no net loss, but would not be expected to elevate the MODERATE to LARGE impact already evident. No changes were made to the EIS as a result of these comments.*

Comment: Section 2.4.2.3 "Important Aquatic Species and Habitats", Page 2-109, Lines 6-33 and Section 4.3.3.2 "Important Aquatic Species and Habitats", Page 4-47, Lines 14-19: The descriptions of the eastern oyster population and fishery arc inaccurate and incomplete. The assertion that the eastern oyster was not " ...observed in the Delaware River Estuary in the vicinity of the PSEG Site between 2003 and 2010" is contrary to the well documented descriptions of the oyster beds in the New Jersey portions of Delaware Bay provided by the Haskin Shellfish Research Laboratory of the Rutgers University New Jersey Agricultural Experiment Station since the 1990's. According to those reports, there are extensive oyster beds within the 6-milc vicinity of the PSEG Site. The nearest oyster bed, the Hope Creek Bed, extends from approximately 0.56 miles to 2.3 miles downstream from Artificial Island and covers 734 acres. Additional oyster beds located downstream from Artificial Island and within the 6-mile vicinity include the Fishing Creek Bed (315 acres), the Liston Range Bed (289 acres), the Round Island Bed (472 acres), the Upper Arnolds Bed (446 acres) and portions of the Arnolds Bed (630 acres). The vast majority of the commercial oyster harvest comes from the Direct Market beds located 14-16 miles downstream from Artificial Island. It is important to note however, that as part of the management of this fishery, the oyster population of these Direct Market beds is supplemented with large numbers of oysters transplanted from the above described upstream beds located within 6-miles of Artificial Island. In 2013 for example, 21,050 bushels of oysters/cultch were transplanted from the beds located within the 6-mile vicinity to the Direct Market beds. Based upon the estimated density of 404 oysters per bushel of oyster/cultch material during 2013, this equates to approximately 8,504,200 oysters. Transplants from the Hope Creek Bed, the upper portions of which are located less than 3,000 feet downstream from Artificial Island, have been suspended since 2012 to allow for recovery from a 2011 low salinity mortality event attributable to flooding associated with Hurricane Irene and Tropical Storm Lee. During the 2009-2011 period however, the Haskin Shellfish Research Laboratory reported that 16,450 bushels of oysters/cultch, or the equivalent of nearly 10 million oysters, were transplanted to the downstream Direct Market beds from the Hope Creek Bed alone. (**0021-1-2** [Foster, Ruth])

Comment: Shellfisheries major concern is that the EIS states that there are no oysters in the sampling areas (page 167). If they are using river sampling zone 7, the one closest to the plant, there is a large oyster population in the south end of that zone. There is also large population just south of that zone. (**0021-3-1** [Foster, Ruth])

Response: *Sections 2.4.2.3 and 4.3.3.2 indicated oysters were not found near the site as a part of the sampling performed as described in those references. However, the commenter is correct that oyster beds are in Delaware Bay. Sections 2.4.2, 4.3.2 (formerly Section 4.3.3), and 5.3.2 of the EIS were revised to include oyster bed information and characterize effects from building and operation on these communities.*

Comment: With regard to the New Jersey commercial harvest of eastern oysters, according to the EIS " .... the last reported commercial fishery in New Jersey reported a harvest of 550,086 lb in 2008". More recent Delaware Bay specific harvest data are available from the above referenced reports by the Haskin Shellfish Research Laboratory. According to the February 2014 report, the total harvest from the New Jersey portions of Delaware Bay in 2013 was 84,276 bushels. This was an increase of 6,136 bushels compared to the 2012 harvest, and the seventh consecutive year in which the harvest equaled or exceeded the 18-year mean of 75,409 bushels. The available data on the oyster fishery in the New Jersey portions of Delaware Bay, as well as similar data for the State of Delaware portions of the bay, need to be evaluated in order to ensure an accurate assessment of the potential impacts of the construction and operation of the proposed nuclear power facility on the eastern oyster. For example, construction activities that result in increased sediment load in the river could adversely impact the nearby oyster beds. (**0021-1-3** [Foster, Ruth])

Response: *Section 2.4.2 was revised to include commercial landings of oysters not limited to National Oceanic and Atmospheric Administration (NOAA) reported landings. Sections 2.4.2, 4.3.2, and 5.3.2 of the EIS were revised to include oyster bed information and characterize effects from building and operation on these communities.*

Comment: Even though the system proposed is a closed-cycle cooling system with a fish screening system designed to "increase survival" of impinged fishes, impacts on aquatic organisms in the Delaware River will occur through the intake system. The EIS does not attempt to quantify in any way the amount of fish that will be impinged and potentially survive but loosely categorizes the loss as minimal. More information is required on what the actual losses will be and what percentage of fishes will survive the new and improved fish screening system. (**0021-2-15** [Foster, Ruth])

Response: *Estimations of impingement rates are described in Section 5.3.2 based on the likelihood of similar intake technology for closed-cycle cooling used at HCGS. Mortality from impingement at SGS, which uses once-through cooling, is presented as minimal for blue crab, and approximately 50 percent for finfish species with the exception of White Perch and Atlantic Croaker juveniles. Section 5.3.2 of the EIS was revised to include a discussion of conservative estimates of mortality for impinged blue crab and finfish based on mortality at SGS, which has a higher through-screen velocity than is expected for the new plant at the PSEG Site.*

Comment: The EIS identifies that impacts will occur from the facilities discharge. Possible outcomes include thermal, chemical and physical effects on the substrate and hydrological changes. The EIS goes on further to say that these effects were found to be minimal. Detailed information is required on how these effects were deemed to be minimal. (**0021-2-16** [Foster, Ruth])

Response: *Section 5.3.2 of the EIS describes the effects of discharge related to thermal, chemical, and physical impacts on aquatic resources. Thermal plume characterization is assessed in Section 5.2.3 and shows the location of the minimal thermal plume contained within the larger designated HDA for SGS, and discusses in great detail the varying tidal and seasonal conditions that contribute to the fluctuation and dissipation of thermal plume from the new plant. Section 5.2.3 also describes how the discharge would only be permitted by NJDEP if it is compliant with chemical concentration levels for discharge to the Delaware River, and concludes the effect on water quality would not be noticeable. In addition, Section 5.2.3 describes the engineered discharge structures that are expected to dissipate discharge flow energies and minimize scouring of the bottom habitat near the point of discharge. Section 5.3.2 uses the conclusions from the hydrological descriptions of thermal discharge effects and describes the likely effects on aquatic resources. Because thermal, chemical, and physical effects of the discharge would be compliant with thermal and chemical discharge permitting requirements, they are expected to be protective of aquatic life. Likewise, the engineered design of the discharge itself is expected to dissipate discharge energy, and would not have a* *noticeable effect on aquatic resources except at the exact point of discharge. No changes were made to the EIS as a result of this comment.*

Comment: If this project moves forward, [the NJDEP Bureau of Marine Fisheries] would suggest they set aside mitigation funding for the DEP that can be utilized for anadromous fisheries research in the area and for the remaining fish species that utilize the project site as essential fish habitat. (**0021-2-18** [Foster, Ruth])

Response: *The commenter makes a suggestion that PSEG contribute funds to be used for funding anadromous fish research. This comment offers no new information regarding the EIS, and no changes were made as a result of this comment.*

Comment: [The NJDEP Endangered & Non-game Species Program concerns include:] Possibility of increased impingements of marine fish and turtles due to increased water intake. (**0021-3-5** [Foster, Ruth])

Response: *The commenter expresses concern over the possibility of increased impingement of marine fish and turtles due to operation of a new plant at the PSEG Site. The effects on aquatic resources from intake operation for the new plant are described in Section 5.3.2 and the cumulative effects on aquatic resources from intake operation for the new plant, HCGS, and SGS are described in Section 7.3.2. No changes were made to the EIS as a result of this comment.*

Comment: Section 2.4.2.1, page 2-83, para. # 1: briefly mentions "PSEG's active licensed desilt basin". This basin should be clearly shown on an appropriate figure, and its operation discussed in the DEIS. [Also see Section 4.3.1.1, page 4-25-Impacts on Habitats, para. #2.] (**0021-4-9** [Foster, Ruth])

Response: *Revisions to EIS Sections 2.3.1.1, 2.4.2.1, and 4.2.1.1 were made to provide more clarity regarding this feature in the text.*

Comment: Section 2.4.2.1, page 2-91, para. #2-Delaware River Estuary: uses data from 1973-1976 to characterize plankton in the Delaware River Estuary -- use of 40-plus year old data to describe existing conditions is not appropriate. (**0021-4-10** [Foster, Ruth])

Response: *The applicant has not characterized plankton in the area of the proposed plant since 1976. The inclusion of this information in Section 2.4.2.1 is descriptive, and as there is no comparative information, this information was removed from the EIS.*

Comment: Section 4.3.3.2, page 4-48 - Shortnose Sturgeon and Atlantic Sturgeon: best management practices to minimize impacts to these fish will also include seasonal dredging "windows" (see Section 4.3.3.3, page 4-49). (**0021-4-19** [Foster, Ruth])

Response: *Section 4.3.2.2 (formerly Section 4.3.3.2) of the EIS was revised to include more information on seasonal restrictions for dredging activities.*

Comment: The negative effects of the continuing operation of SGS Units 1 and 2 on the aquatic resources of the Delaware Estuary have been a source of contention between PSEG and the Delaware Division of Fish and Wildlife (Division) since SGS Units 1 and 2 began operation. According to the DEIS, "operation of SGS Units 1 and 2 continues to impinge and entrain aquatic species and would contribute, in part, to the cumulative loss of these species in the Delaware River Estuary." Conversely, the DEIS states that the Nuclear Regulatory Commission (NRC) staff concluded "entrainment, impingement, and thermal discharge impacts on aquatic resources from the operation of SGS Units 1 and 2 collectively have not had a noticeable adverse effect on the balanced indigenous community of the Delaware Estuary." (Generic Environmental Impact Statement for License Renewal of Nuclear Plants-Supplement 45: Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2 Final Report (NRC 2011-TN3131)). (**0023-1-4** [Cooksey, Sarah])

Response: *The description of SGS impingement and entrainment in Section 7.3.2 characterizes the resulting loss of aquatic species in context of continuing operations, but does not quantitatively assess species losses for SGS operation as an impact separate from other anthropogenic and natural stressors that contribute to species loss in the ROI. The citation from licensing renewal of SGS and HCGS is not a description of cumulative effects, and therefore the descriptions of effect are different. No changes were made to the EIS as a result of this comment.*

Comment: The Division has provided data and comments regarding the impact from the once-through cooling system on the fish community of the Delaware River during each permit renewal of SGS Units 1 and 2. An assessment of the annual impingement and entrainment losses conducted by the Division in 2001 concluded that the SGS Units 1 and 2 killed the equivalent of 815,097 adult weakfish and 723,418 lbs. of adult striped bass in 1999 (Kahn, D.M. 2001. Assessment of the Impact of the Salem Nuclear Generating Station on Weakfish and Striped Bass. Delaware Division of Fish and Wildlife, Dover, DE). The scale of mortality as a result of the continued operation of the SGS Units 1 and 2 have contributed to declining trends in fish populations, thereby decreasing community resilience. While the increase in fish mortality predicted from new generating stations may not be significant (due to reduced intake water requirements), it is unacceptable if it is in addition to the fish mortality already caused by SGS Units 1 and 2. The Division recognizes that the scope of this permit only covers use of the current Salem site as the location for the new generating stations, and that the New Jersey Department of Environmental Protection has been directed to issue a draft discharge permit by June 2015 for the Salem Nuclear Station by the New Jersey Superior Court. It is expected that the draft permit will require protective technologies which will reduce aquatic impacts from the facility. Nonetheless, the final EIS should better characterize the magnitude of the impact of the existing units in the discussion of cumulative effects. (**0023-1-5** [Cooksey, Sarah])

Response: *The commenter expresses concern over intake operation mortality of fish species at SGS. Cumulative effects on fish populations from operation of SGS and HCGS are described in Section 7.3.2. No changes were made to the EIS as a result of this comment.*

Comment: Development of these new reactors is also a concern given the anticipated impacts to numerous federally endangered and state-rare species that are known to utilize Delaware River adjacent to Artificial Island. Currently, the water intake structures of the adjacent nuclear power plants (Salem 1 and 2) are known to entrain or impinge federally endangered Atlantic and shortnose sturgeons (Acipenser oxyrinchus and Acipenser brevirostrum, respectively), additional anadromous species that are important to Delaware's commercial and recreational fishing industries species (e.g. striped bass Morone saxatilis), and several federally protected sea turtle species, including two Kemp's Ridley sea turtles (Lepidochelys kempii). Expected increases in salinity as a result of climate change, sea level rise and channel deepening activities may bring more sea turtles to this part of the River thereby increasing incidence of sea turtle impingement and/or entrainment at these water intake structures. Given the existing conditions at the Salem Nuclear Power Plants, we expect that additional water intake structures associated with the new plants would have a detrimental additive impact on the species referenced above. (**0023-1-6** [Cooksey, Sarah])

Response: *Evaluation of effects on Shortnose Sturgeon, Atlantic Sturgeon, and Federally protected sea turtles is presented in a Biological Assessment as part of ESA section 7 consultation with the NMFS. Updated information on the results of consultation is presented in Sections 4.3.2 and 5.3.2 of the EIS and in Appendix F as supplemental material.*

Comment: Table 1 (below) includes a list of rare species that occur the vicinity (6 mile radius) of the project area within State of Delaware boundaries. Please note that we have not surveyed all of the areas within Delaware and additional rare species may occur within the vicinity of the project area. (**0023-1-7** [Cooksey, Sarah])

Response: *Section 2.4.2 of the EIS discusses Federally and State-listed (both Delaware and New Jersey) aquatic species that may occur in the ROI, and provides a species list of fish collected over several years from a variety of different sampling techniques within the same ROI as described, which is not necessarily a 6-mi radius. Species that are discussed as important species include commercial and recreational species, Federally and State-listed species, and species monitored as ecosystem indicators per NUREG–1555. Sections 4.3.2 and 5.3.2 of the EIS assess the impacts from construction and operation, respectively, on these species. No changes were made to the EIS as a result of this comment.*

Comment: Today's article by Jeff Montgomery states that the current units (Salem 1 and 2) require over 3 billion gallons of cooling water per day which has caused "large aquatic life losses." Obviously, the addition of another reactor will significantly increase these already unacceptable losses. (**0024-5** [Doyle, Kathy])

Comment: Testimony has been given: "PSEG also is working with a company on designs for a new type of 'small, modular reactor' with fewer parts, a simpler design, deep underground containment and waterless cooling features. Although recycling water systems and cooling towers would be required for any new conventional reactors, a permit fight is expected in 2015 over renewal of the more-than 3 billion gallon per day cooling water intakes for Salem Units 1 and 2. Environmental groups have argued that any increase in cooling water withdrawals from the Delaware River will worsen already large aquatic life losses caused by existing demands." (**0028-1** [Prescott, James])

Comment: An environmental objection exists. The necessity for large amounts of cooling water means that the fish intake is probably appreciable. (**0033-1** [Clapp, Leonard])

Response: *The operation of the proposed new intake for the new units would require less than 4 percent of the total intake flow used at SGS. The effects on aquatic resources from intake operation for the new plant at the PSEG Site are described in Section 5.3.2, and the cumulative effects on aquatic resources from intake operation for the new plant, HCGS, and SGS are described in Section 7.3.2. No changes were made to the EIS as a result of these comments.*

Comment: Potential impacts to waters of the US, the Delaware River and Bay, and to fish populations from dredging and fill could be significant, as well as from possible contamination and/or leakage, and radioactivity. (**0032-9** [Purcell, Leslie])

Response: *Dredging activities required for installation of barge facilities and intake and discharge structures are described in Section 4.3.2 and were assessed as having a minor and temporary impact to aquatic resources in the area. No changes were made to the EIS as a result of this comment.*

Comment: the [NJDEP] Department's Division of Fish and Wildlife must be contacted to determine the impact to the aquatic biota in the Delaware River due to impingement and entrainment due to cooling systems operation, heat stress due to the thermal discharge plume, and chemicals in the discharged blowdown from the new nuclear power plant. (**0021-6-5** [Foster, Ruth])

Response: *This EIS is for an ESP, and provides the postulated details of operation per information obtained from PSEG. Final operational information necessary for compliance with Sections 316(a) and 316(b) of the CWA and to apply for a discharge permit would be provided by PSEG when they apply for an operating license or COL. No changes were made to the EIS as a result of this comment.*

E.2.11 Comments Concerning Socioeconomics

Comment: They employ a lot of our residents. This just doesn't happen, it happens through leadership. And from the top on down we thank them for their leadership and guidance. This additional reactor I know will impact our community in a positive way through additional tax revenue, through income tax, additional income tax revenue, through additional real estate revenue, even sales tax. It will impact our community directly, and indirectly. If you ride down Sound County roads you will see a lot of empty businesses. There will no longer be empty businesses. (**0004-10-3** [Acton, Julie])

Response: *The NRC staff discusses the socioeconomic impacts of the proposed action, including tax revenues, in Sections 4.4.3 and 5.4.3 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: The nearly 32 square miles of PSEG's Estuary Enhancement Program, and we all heard that this is probably the largest privately-funded program in the world, consists mainly of newly enhanced restored and/or preserved wetlands, all of which contribute, materially, to New Jersey's three billion dollar commercial and recreational fisheries. (**0004-9-2** [Weinstein, Michael])

Response: *The NRC staff discusses PSEG's EEP in Section 2.4 of the EIS as part of the existing environment. No changes were made to the EIS as a result of this comment.*

Comment: Three of my neighbors, within a block or two of where I live, work on the island. They are happy with their jobs, good paying permanent jobs. That we need more of in Salem County. This new plant will provide that. (**0004-17-1** [Osborn, Sam])

Comment: Finally, let me talk about jobs. I am a union leader, after all. A fourth nuclear power plant, as proposed by PSEG, could mean about 600 new full-time jobs, good quality jobs, running that plant. That is extremely important here in Salem County where the unemployment rate remains above the state average, and where neighboring Cumberland County, has the worst unemployment rate in New Jersey. Building that new nuclear plant would also bring in more than 4,000 construction jobs to the site. Statewide there are 20 IBEW locals representing 35,000 members. I know how important a project like this would be to my brothers and sisters in the construction locals. I will let the experts talk about the economy. I just know that the direct effect of thousands of operating and construction jobs is vitally important here in south Jersey. (**0004-18-5** [Hufsey, Moe])

Comment: At our school we have a program that trains students in architectural drafting, and construction, in electrical and welding. Certainly people what would have immediate impact from a project of this nature. I have been the principal of the high school for the past five years. I have been an employee in the district since 2001. And there has been no other project like this in Salem County, that would create that type of job creation, here locally, for our students. (**0004-23-3** [Helder, Jason])

Comment: I did a little research before I came here, today, and found that about 20 percent of the workforce, at that location, are residents of the State of Delaware. If PSEG moves forward with the new construction, we know that the construction workforce could grow to over 4,000 jobs, many of which will go to Delawareans. And we know that new construction will bring a major and much needed boost to our economy. I think we have all experienced that, through the last several years of the legislature. (**0007-1-2** [Cathcart, Richard])

Comment: Finally, let me talk about jobs. After all I am a union leader. Currently about 20 percent of PSEG Nuclear employees are Delaware residents. A fourth nuclear plant, as proposed by PSEG, could mean about 4,100 construction jobs to build the plant. And an additional 600 new full-time good quality jobs to run the plant. I will let the experts talk about the economy. I just know that the direct effect of thousands of operating and construction jobs, is vitally important here in Delaware, and the entire mid-Atlantic region. (**0007-8-7** [Spiese, Steve])

Response: *The NRC staff discusses the socioeconomic impacts of the proposed action, including potential employment impacts, in Sections 4.4 and 5.4 of the EIS. No changes were made to the EIS as a result of these comments.*

Comment: The new plant will also generate business for other firms that supply PSEG with various products and services. These purchases are expected to amount to 339 million dollars, within New Jersey, and 15 million dollars per year within the four county local economic area. PSEG's Hope Creek and Salem Nuclear Facilities are already a primary economic engine for their communities. And the building and operation of a new plant will further enhance the company's key role. (**0004-2-10** [Egenton, Michael])

Comment: PSEG is the largest employer in Salem County, with more than 1,500 employees. Moreover, PSEG is a significant contributor to many local charities, educational and civic organizations. The company also plays an active role in sponsoring educational opportunities for students as part of its efforts to prepare the workforce of the future. (**0004-2-11** [Egenton, Michael])

Comment: While emitting no carbon, or other pollutants, nuclear generation provides tremendous economic and job benefits. (**0004-2-6** [Egenton, Michael])

Comment: The construction of a new nuclear generating facility will give an important boost to job creation, and economic growth, here in New Jersey, making both a near term and lasting contribution to the local, state, and regional economy. These beneficial economic impacts are especially impressive when examined in further detail. First, in terms of job creation, the new plant is likely to create 600 jobs to staff the plant's workforce; 4,100 construction jobs to build the plant, and an additional 586 local and 4,000 regional indirect jobs during construction; and 185 local, and 1,265 regional indirect jobs, during operation, due to a multiplier effect. The economic value of these jobs will also result in a projected one million dollars, per year, in additional income tax revenue, and projected 23 million dollar per year in sales tax revenue, for the State of New Jersey. (**0004-2-9** [Egenton, Michael])

Comment: I'm here to tell you why this project is important to the economy of Delaware, which is important, obviously to my members, my 1,800 members of businesses, the whole business community in Delaware, and to our residents. There are two things. We have recovered from the recession about 85 percent of the jobs that we lost. But if you look at our personal income tax collections, it is obvious that these jobs are not paid nearly the amount of the jobs that we lost. Our construction industry was devastated, and it is still having a difficult time recovering from that recession. This project will create somewhere in the range of about 400 construction jobs for Delawareans. It will also create somewhere around 120 to 130 permanent jobs for Delawareans. That is important to us, as we try to recover from the recession. (**0004-24-2** [Heffron, Rich])

Comment: A new plant for the community means more jobs and more opportunities, a continued source of clean, safe, and reliable energy. It also provides the opportunity to impact new generations in the community that we can inspire them to go to college, get careers in the nuclear power, and grow and develop in this industry, which I think is a great opportunity to impact, to have productive people in our community. (**0007-15-3** [Torres, Katherine])

Comment: When we talk about impact, economic impact, we need to think about the regional impact. Again, while most of the electricity, or all, will probably be used in New Jersey, a lot of our employees are people here in Delaware, work in New Jersey, and Pennsylvania, and around the area. So we have to think of this as a regional asset that we have. (**0007-18-7** [Kleinschmidt, Mark])

Comment: You have heard a lot, lately, about on-shoring, companies coming back to the United States, manufacturing particularly. One of the reasons they are coming back is for a quality workforce, and affordable and dependable electricity. So the more of that we can have, the more jobs will be here in our region, which will benefit our families near-term and long-term. (**0007-18-9** [Kleinschmidt, Mark])

Comment: A new nuclear facility would not only provide this reliable energy for the region, but high paying jobs, and fulfilling careers. In addition, PSEG encourages use of local vendors, for most materials and service. And that provides another needed boost for our local economy here in Delaware. (**0008-2-6** [Evans, Brenda])

Response: *The comments do not provide any new information for analysis but describe the potential benefits of the proposed project. The NRC staff discusses the socioeconomic impacts of the proposed action, including potential economic and employment impacts, in Sections 4.4 and 5.4 of the EIS. No changes were made to the EIS as a result of these comments.*

Comment: Obviously the question that Elsenberg Township is curious about is the traffic flow associated with this. The Environmental Impact Statement discussed a lot about the causeway, stopping at Money Island, Mason Point. But we are interested in what, potentially, that looks like from that point forward, and how that impacts our residents. So our hope would be to have some dialogue with our residents, and some PSEG staff, to discuss that moving forward. (**0004-1-1** [Elwell, Sean])

Response: *The NRC staff discusses the socioeconomic impacts of the proposed action, including the traffic impacts of the proposed causeway to Money Island. Impacts during construction are in Chapter 4 of the EIS, impacts during operations are in Chapter 5, and the impacts in conjunction with other reasonably foreseeable future projects in the area are in Chapter 7. No changes were made to the EIS as a result of this comment.*

Comment: The Water Resources Association of the Delaware River Basin (WRA) is interested in PSEG's proposed project, because PSEG's proposed nuclear plant will be a major water user, located in the Delaware River basin, and is an important part of the economy in New Jersey, and the region at large. (**0004-16-2** [Molzahn, Robert])

Comment: What does the potential new nuclear plant mean for the community, for Women in Nuclear (WIN), and for me? For me this means that I can be happily employed until I choose to retire. It is also beneficial to our WIN members, who want to continue, and further, and develop their careers, and provide for their families. The new plant for the community means more jobs, a source of clean, and safe, and reliable energy. However, these opportunities are not only for me, or our WIN members, but also for those that we have been reaching out to, the younger generation in grade school. That is why it is so important that we reach them at a young age, encourage them to go to college, and hire them when they graduate. This would come full circle. Our outreach making an impact on our local community, and providing opportunities for the young generation, like myself. (**0004-20-4** [Timberman, Tanya])

Comment: I believe this would be a good thing. I'm a boilermaker, and if this facility goes, it would be work for me for the next five years, in a five year construction period. (**0008-3-4** [Willis, Martin])

Response: *These comments state the general interest in the proposed project and employment issues in particular. These comments provide no new information and no changes were made to the EIS as a result of these comments.*

Comment: Our members provide jobs for over a million people in the Garden State. As one of our founding principles, the State Chamber of Commerce continues to work towards streamlining the regulatory process, while striving to maintain the economic vitality of our members. Jobs is foremost and critical to this state, and our organization. (**0004-2-1** [Egenton, Michael])

Comment: We know that [Mayor] Sean [Elwell] has some concerns about traffic, and we are going to address that, we are going to talk to him, and make sure that he has a very clear understanding of what the impact would be on his community. (**0004-8-5** [Joyce, Tom])

Comment: The other thing about renewables, yes, nuclear creates jobs. But renewables probably create ten times more jobs across the entire spectrum. (**0006-4-19** [Brook, David])

Comment: And we [Water Resources Association of the Delaware River] have wide ranging interests in water resources. We are here, today, because public service proposed project is a major water usage, located in the Delaware River, and has an important part of the economy of New Jersey and the region as a whole. (**0007-16-2** [Palmer, Dennis])

Response: *While these comments take exception with specific content of the EIS, the exceptions are based on opinions or unsupported assertions. Consequently, these comments provide no new information for additional analysis. No changes were made to the EIS as a result of these comments.*

Comment: And we do recognize our current operations having an impact on the community. We have, now, over 1,800 local employees, including about 40 percent of them from Salem County, itself. The purchase of goods and services, totaling about 81 million dollars a year, from the South Jersey businesses, and more than two million dollars a year in property taxes. (**0004-8-3** [Joyce, Tom])

Response: *This comment discusses the economic importance of the current operations at the site, but it provides no new information for additional analysis. No changes were made to the EIS as a result of this comment.*

Comment: And I would just like to say, in conclusion, when it comes to jobs, there is no bigger job creator, in our region, than our healthy Delaware River and its water quality, the wetlands, the aquatic life, the terrestrial life, the bird life, that it supports here in our region. They are our biggest job creators. And we must, above all else, protect the health of our Delaware River and its ecological systems, if we want to protect ourselves, if we want to protect our health, if we want to protect our future, and if we want to protect our jobs, and our economy. (**0004-3-11** [van Rossum, Maya])

Response: *The comment is related to socioeconomic impacts, specifically tourism, recreation, or historic appeal. Impacts to public services involving tourism and recreation are discussed in Sections 4.4 and 5.4 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 2-139; Section No. 2.5.2.5; Table 2-30; This table is titled Housing Data for Counties in the Economic Impact Area (2012), but the source listed at bottom of table is "USCB 2010". This seems inconsistent; either title should indicate 2010 or source should indicate 2012 or later. (**0015-2-1** [Mallon, James])

Response: *This comment indicates an error in the date in the reference citation used in Table 2-30 in the EIS. The correct date is 2013, not 2010. As a result of this comment, the EIS has been revised to include the correct date for the document being referenced.*

Comment: Page No. 4-54; Section No. 4.4.1.5; Line No. 2; Section 4.4.1.5 states" ... Figure 2-23 depicts the road and highway system in the economic impact area." Figure 2-23 only depicts the road and highway system in Salem County, not the entire economic impact area. (**0015-3-1** [Mallon, James])

Comment: Page No. 4-102; Section No. 4.11; Table 4-20; The last bullet under "Socioeconomic Impacts-Physical Impacts" states: "Establish procedures and perform audits to ensure that all waste is disposed of according to applicable regulations such as the Resource Conservation and Recovery Act (42 USC 6901-TN1281)". PSEG does not commit to this anywhere in the ER. This statement should be deleted. (**0015-3-8** [Mallon, James])

Comment: Page No. 9-176; Section No. 9.3.4.5; Line No. 16-19; The sentence "Because Site 7-2 is a greenfield site and would create new infrastructure in previously undisturbed rural areas, and new infrastructure would affect previously undisturbed WMAs, the review team expects the physical impacts from building and operations to be noticeable and locally destabilizing" indicates that physical impacts would be LARGE. However, lines 20 to 23 on page 9-179 say "The review team expects the cumulative effects of most of the physical impacts to be SMALL with the exception of a LARGE impact to aesthetics. The LARGE aesthetic impact is because Site 7-2 is a greenfield site and would create new infrastructure in previously undisturbed rural areas, and new infrastructure would affect previously undisturbed WMAs." To avoid confusion, the discussion on page 9-176 should be expanded to distinguish between physical impacts and aesthetic impacts, as on page 9-179. (**0015-6-14** [Mallon, James])

Comment: Page No. 9-216; Section No. 9.3.5.5; Line No. 37-39; The sentence "Because Site 7-3 is a greenfield site, it would create new infrastructure in previously undisturbed rural areas and WMAs. Consequently, the review team expects the physical impacts from building and operations to be noticeable and locally destabilizing" indicates that physical impacts would be LARGE. However, lines 7 to 9 on page 9-221 say "The review team expects the cumulative effects of most of the physical impacts to be SMALL with the exception of a LARGE impact to aesthetics because Site 7-3 is a greenfield and would create new infrastructure in previously undisturbed rural areas and WMAs." To avoid confusion, the discussion on page 9-216 should be expanded to distinguish between physical impacts and aesthetic impacts, as on page 9-221. (**0015-6-16** [Mallon, James])

Comment: Page No. 9-86; Section No. 9.3.2.5; Line No. 37-40; The sentence "Because Site 4-1 is a greenfield that would have infrastructure in previously undisturbed rural areas and a rail spur crossing the New Jersey Highlands, the review team expects the physical impacts from building and operations to be noticeable and locally destabilizing" indicates that physical impacts would be LARGE. However, lines 26 to 29 on page 9-95 say "cumulative impacts of building and operations activities on physical resources would be SMALL, with the exception of a LARGE impact to aesthetic resources. The LARGE impact to aesthetic resources is because Site 4-1 is a greenfield that would have infrastructure in previously undisturbed rural areas and a rail spur crossing the New Jersey Highlands." To avoid confusion, the discussion on page 9-86 should be expanded to distinguish between physical impacts and aesthetic impacts, as on page 9-95. (**0015-6-8** [Mallon, James])

Comment: Page No. 10-7; Section No. 10.2.1; Table 10-1; Table 10-1 should be revised to clearly identify a "SMALL to LARGE (beneficial)" impact for Economic and Tax Socioeconomic Impacts. This change would make it consistent with Exhibit H of the Reader's Guide. (**0015-7-5** [Mallon, James])

Response: *These comments identify errors in the language of the EIS. Changes have been made to the EIS at the locations indicated in the comments.*

Comment: Page No. 4-56; Section No. 4.4.2; Line No. 2; Change "PSEG estimates" to "PSEG assumes" to more accurately reflect this phrase. Change similar phrases throughout the document. (**0015-3-3** [Mallon, James])

Comment: Page No. 4-61; Section No. 4.4.3.1; Line No. 8; Suggest revising to read: "The dual unit AP1000 has the largest . . ." (**0015-3-4** [Mallon, James])

Response: *These comments offer suggested revisions to the text in the EIS. Because the changes would not be substantive, no revisions were made to the EIS as a result of these comments.*

Comment: Page No. 10-14; Section No. 10.2.2; Table 10-2 should be revised to clearly identify a "SMALL to LARGE (beneficial)" impact for Economic and Tax Socioeconomic Impacts. This change would make it consistent with Exhibit H of the Reader's Guide. (**0015-7-10** [Mallon, James])

Response: *This comment indicates that Table 10-2 should be changed to indicate economic impacts would be beneficial. Table 10-2 is for unavoidable adverse impacts, and revision of the text would not be appropriate. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 4-55; Section No. 4.4.1.7; Line No. 25-38; The DEIS concludes that the physical impacts on aesthetic resources are MODERATE. PSEG recommends that the impact level be changed to SMALL for the reasons discussed in the Environmental Report and particularly because there would not be a change from existing aesthetic impacts due to the already-existing cooling tower and the low profile of the causeway. Please make conforming changes throughout the DEIS. (**0015-3-2** [Mallon, James])

Comment: Page No. 4-76; Section No. 4.4.4.6; Line No. 2-16; The DEIS concludes that certain impacts to recreational activities are MODERATE. PSEG recommends that the impact level be changed to SMALL for the reasons discussed in the Environmental Report and particularly because there would not be a change from existing aesthetic impacts due to the already-existing cooling tower and any impacts to infrastructure and community services would be minor. Please make conforming changes throughout the DEIS. (**0015-3-5** [Mallon, James])

Comment: Page No. 5-48; Section No. 5.4.1.7; Line No. 12-20; The DEIS concludes that the physical impacts on aesthetic resources are MODERATE. PSEG recommends that the impact level be changed to SMALL for the reasons discussed in the Environmental Report and particularly because there would not be a change from existing aesthetic impacts due to the already-existing cooling tower and the low profile of the causeway. Please make conforming changes throughout the DEIS. (**0015-3-14** [Mallon, James])

Comment: Page No. 5-61 to 5-62; Section No. 5.4.4.6; Line No. 27-4; The DEIS concludes that certain impacts to recreational activities are MODERATE. PSEG recommends that the impact level be changed to SMALL for the reasons discussed in the Environmental Report and particularly because there would not be a change from existing aesthetic impacts due to the already-existing cooling tower and any impacts to infrastructure and community services would be minor. Please make conforming changes throughout the DEIS. (**0015-3-15** [Mallon, James])

Response: These comments recommend revisions to the MODERATE impacts *in* the EIS with regard to aesthetics and recreation. While the NRC staff uses the applicant's ER as the starting point of its environmental review, the staff performs an independent assessment and is not required to agree with the findings of the applicant. *In regard to aesthetic and recreation impacts, the staff* reached a different conclusion based on their own professional experience and opinion. No changes were made to the EIS as a result of these comments.

Comment: New transmission lines will lower tax ratables across every community that they cross, so locating another power plant on Artificial Island will negatively impact every community that is the recipient of these new lines. These new transmission lines will likely have an impact on literally hundreds of miles of land in New Jersey. (**0020-4-18** [van Rossum, Maya])

Response: *The assessment of benefits and costs related to transmission lines are outside the scope of the EIS. Transmission line impacts are discussed as cumulative impacts in Chapter 7 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 9-136; Section No. 9.3.3.5; Line No. 24-27; The sentences "Because Site 7-1 is a greenfield site, it would create new infrastructure in previously undisturbed rural areas and a transmission line passing through an NWR. Consequently, the review team expects the physical impacts from building and operations to be noticeable and locally destabilizing" indicate that physical impacts would be LARGE. However, lines 29 to 32 on page 9-139 say "cumulative impacts of building and operations activities on physical resources would be SMALL, with the exception of a LARGE impact to aesthetic resources. The LARGE impact to aesthetic resources is because Site 7-1 is a greenfield and it would create new infrastructure in previously undisturbed rural areas and a transmission line passing through an NWR." To avoid confusion, the discussion on page 9-136 should be expanded to distinguish between physical impacts and aesthetic impacts, as on page 9-139. (**0015-6-11** [Mallon, James])

Response: *The comment is confusing the incremental impacts at Site 7-1 (as described on page 9-136 of the draft EIS) with the cumulative impacts (as described on page 9-139 of the* *draft EIS). The statements in the EIS are accurate as written. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 10-14; Section No. 10.2.2; Table 10-2; Demography impacts-DEIS Table 5.4 states that Salem County, NJ would experience a population increase of 0.04 percent. Table 10-2 states that Salem County, NJ would experience a 0.39 percent increase in population. (**0015-7-9** [Mallon, James])

Response: *The entry of 0.39 percent in Table 10-2 is correct; however, the entry of 0.04 percent in Table 5-4 is in error. Therefore, the entry for the population increase in Salem County, NJ, in Table 5-4 has been revised in the EIS to show 0.39 percent as the correct numerical value.*

E.2.12 Comments Concerning Environmental Justice

Comment: I also just, in closing, wanted to bring up the fact that they said there was no -- you said there was no environmental justice impacts, on page 17 [in the Reader's Guide]. Right across the river, in emergency response planning area D, there is an increased cancer incidence, otherwise known as a cancer cluster. And I believe that this would qualify as an environmental justice area, and I believe they will be impacted. (**0007-12-4** [Bucic, Sarah])

Comment: There are some concerns I have with the communities, and I already saw, on the report, that there are no expected impacts to EJ communities. I think there are some problems with that, particularly, if you do have an accident. I think there are some serious impacts particularly to the lower end border communities in the rural areas around the plant in Delaware. (**0007-2-5** [Carter, David])

Comment: I'm horrified by the NRC's assessment of the impacts on environmental justice communities. I would say that within the ten mile zone, that you used, that is in Delaware, it is almost entirely environmental justice communities, as identified by the EPA and the census tract, and the health, the cancer clusters identified by the census tract. I know that you are using the 2000 census, and not the 2010 one. But, certainly, those were environmental justice communities in 2000, as well. (**0007-5-5** [Herron, Stephanie])

Comment: And I would ask that the Final Environmental Impact Statement include, specifically, how this proposal complies with President Obama's Executive Order 13650, which is all about reducing vulnerability, and increasing chemical safety, and environmental justice. So I would ask that, that specifically be included in the final statement. (**0008-4-12** [Herron, Stephanie])

Comment: I am extremely, extremely disturbed by the NRC's finding that this would not have any environmental justice impact, and would not have any impact on low income or minority communities. I simply feel that that is not the case. And, additionally, environmental justice is not only based on income level and/or being a minority. There is also, certainly, the concern, as somewhat noted in your presentation of cumulative impacts and within the ten mile zone of this nuclear power plant, there are numerous other extremely polluting facilities. So I don't understand how you could have possibly taken into account cumulative impacts of multiple environmental and health stressors, and have found that this is not an environmental justice concern. The census track that the ten mile evacuation zone, in Delaware, of the plant is a census chart of high cancer, as noted repeatedly in the census. (**0008-4-3** [Herron, Stephanie])

Comment: Your "Environmental Justice" impacts statement does not even consider the thousands of residents of Delaware only 6 miles away directly across the Delaware River, only those "located 8 miles north of the site in the City of Salem." Won't Delawareans be affected as well? (**0013-3** [Oppelt, John])

Comment: Page No. 9-180; Section No. 9.3.4.6; Line No. 8-22; This discussion concludes that there is no potential for disproportionate impacts on Environmental Justice populations, but it does not mention the fact that the pipeline corridor and rail spur corridor both cross census block groups with higher than average EJ populations, as discussed in ER Section 9.3.2.3.8. It is not clear why these potential impacts are not discussed. (**0015-6-15** [Mallon, James])

Response: *No Environmental Justice (EJ) communities were excluded or overlooked in the NRC staff's EJ investigations. The process used by the NRC staff to identify all of the potential EJ populations of interest is discussed in Section 2.6.1 of the EIS. The health consequences of normal operations and accidents are discussed in Sections 5.8, 5.9, and 5.10. The NRC staff's EJ process is described in NUREG–1555 Sections 2.5.4, 4.4.3 and 5.8.3. Accident-related health risks do not constitute an environmental justice pathway. No changes were made to the EIS as a result of these comments.*

Comment: But if you look at the whole life cycle of how is the uranium mined, where is it coming from? A lot of it is coming from, I believe, it is Navajo land, Native American land. It has a lot of negative effects on their land, there is radioactivity in the soil. There is radioactivity in the water. They have health effects. That is an environmental justice impact. It is a bigger picture than what is within our local radius. (**0007-13-6** [Purcell, Leslie])

Response: *Consideration of the EJ impacts of mining uranium is outside the scope of this EIS. The EJ impacts of mining may be found in the EIS for each mining permit. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 5-129; Section No. 5.13; Table 5-33; The DEIS, on page 5-124 states: "Impact category levels are denoted in the table as SMALL, MODERATE, or LARGE as a measure of their expected adverse impacts." On page 5-129, the Impact Category Level for Environmental Justice is listed as "None". (**0015-11-12** [Mallon, James])

Response: *In response to this comment, a new footnote has been added to the entries for the EJ category in Table 4-21 in Section 4.12 [Table 4-22 in the final EIS] and in Table 5-33 in Section 5.13 to clarify and explain the entry "None."*

E.2.13 Comments Concerning Historic and Cultural Resources

Comment: Page No. 2-165; Section No. 2.7.2; Line No. 25-26; Suggest changing: "The staff determined that there is no ..." to "Based on the lack of evidence for paleosols and the use of historic era hydraulic dredge spoils to construct the island, the staff determined that there is no ..." (**0015-2-2** [Mallon, James])

Comment: Page No. 2-166; Section No. 2.7.2; Line No. 22-23; The DEIS states: "The Phase I archaeological survey conducted by the applicant for the proposed causeway identified six archaeological sites." An archaeological Phase I survey was not conducted for the entire causeway, only a small portion not located in the salt marsh. (**0015-2-3** [Mallon, James])

Comment: Page No. 4-103; Section No. 4.11; Table 4-20; In Table 4-20, Line for Historic Properties and Cultural Resources change "Conduct Phase II survey and consult with the New Jersey State ..." to "Conduct Phase II survey of upland lands and consult with the New Jersey State ..." (**0015-3-9** [Mallon, James])

Comment: Page No. 9-101; Section No. 9.3.2.7; Line No. 27-31; The DEIS states: "Based on the reconnaissance-level information collected for this EIS, the review team concludes that the cumulative impacts on historic and cultural resources of building and operating new nuclear units at Site 4-1 would be LARGE. Building and operating a new nuclear power plant at Site 4-1 would not be a significant contributor to the impacts." The sentences appear to conflict. (**0015-6-9** [Mallon, James])

Response: *The text in Sections 2.7.2, 4.11 and 9.3.2.7 of the EIS has been revised in response to these comments.*

Comment: The HPO concurs with the NRC's Environmental Impact Statement for an Early Site Permit (ESP) at the PSEG Site (EIS) that the Phase II archaeological survey for the barge facility and water intake area has been completed with a finding of no historic properties affected. The HPO agrees Phase I archaeological survey for Money Island access road identified archaeological sites 28-Sa-179, 28-Sa-180, 28-Sa-182, and 28-Sa-186. Phase II archaeological survey will be completed during the Combined Construction and Operating License Application (COLA) as needed depending on the final APE. The visual impact of the proposed Money Island access road is on-going. (**0021-3-9** [Foster, Ruth])

Comment: The HPO concurs with the NRC's Environmental Impact Statement for an Early Site Permit (ESP) at the PSEG Site (EIS) that the Phase II archaeological survey for the barge facility and water intake area has been completed with a finding of no historic properties affected. The HPO agrees Phase I archaeological survey for Money Island access road identified archaeological sites 28-Sa-179, 28-Sa-180, 28-Sa-182, and 28-Sa-186. Phase II archaeological survey will be completed during the Combined Construction and Operating License Application (COLA) as needed-depending on-the final APE. The visual impact of the proposed Money Island access road is on-going. (**0049-2** [Saunders, Daniel])

Response: *New Jersey State Historic Preservation Office (New Jersey SHPO) concurrence on the Phase II archaeological survey for the barge facility and the Phase I archaeological survey for the Money Island access road is noted in Section 2.7. The on-going consultation for the Money Island access road is discussed in Section 7.5 and is part of the USACE Section 106 consultation. No changes were made to the EIS as a result of these comments.*

Comment: The HPO looks forward to reviewing the NRC's assessment and analysis by a geomorphologist that the soil boring program for Artificial Island determined no presence exists for prehistoric soils below the former river bed encapsulated below Artificial Island. (**0021-3-10** [Foster, Ruth])

Comment: The HPO looks forward to reviewing the NRC's assessment and analysis by a geomorphologist that the soil boring program for Artificial Island determined no presence exists for prehistoric soils below the former river bed encapsulated below Artificial Island. (**0049-3** [Saunders, Daniel])

Response: *An examination of the potential for intact prehistoric soils was included in a 2009 PSEG report (ML101660320; MACTEC 2009-TN4370). Based on soil cores done for the study, the report found that there was a very low potential for intact prehistoric archaeological deposits to be present under Artificial Island. The New Jersey SHPO acknowledged receipt of the report at the January 9, 2015, site visit and consultation meeting and concurred with the findings (ML15268A481; NRC 2015-TN4368). No changes were made to the EIS in response to these commentst.*

Comment: Based upon AKRF's April 20, 2012 addendum historic properties visual impact assessment report, as the Deputy State Historic Preservation Officer for New Jersey, I find the following properties eligible for listing on the National Register of Historic Places under Criterion C for 18th century pattern-brick architecture: (1) John Maddox Denn House (112 Popular Street, Lower Alloways Creek Township) (2) Sarah Mason House (349 Fort Elfsborg Road, Elsinboro Township). In consequence, this is a new SHPO opinion of eligibility. (**0021-3-11** [Foster, Ruth])

Comment: Based upon AKRF's April 20, 2012 addendum historic properties visual impact assessment report, as the Deputy State Historic Preservation Officer for New Jersey, I find the following properties eligible for listing on the National Register of Historic Places under Criterion C for 18th century pattern-brick architecture: (1) John Maddox Denn House (112 Popular Street, Lower Alloways Creek Township), and (2) Sarah Mason House (349 Fort Elfsborg Road, Elsinboro Township). In consequence, this is a new SHPO opinion of eligibility. (**0049-4** [Saunders, Daniel])

Comment: Through earlier consultation, the HPO agreed that permitting a new energy station through the ESP process would not be have the potential to effect historic properties and that HPO comment on visual impacts would be conducted during the COLA when more specific, detailed construction information was available. A review of the EIS suggests HPO has failed to make this point clear to NRC (EIS Sections 2.7.1, 4.6, and 7.5). While more specific HPO comment on visual impacts will be forthcoming through section 106 consultation during the COLA, the cumulative effects of introducing two additional cooling towers, 76 feet higher than the existing, with vapor columns will adversely affect the viewshed of the Abel and Mary Nicholson House National Historic Landmark. (**0021-3-12** [Foster, Ruth])

Comment: Through earlier consultation, the HPO agreed that permitting a new energy station through the ESP process would not be have the potential to effect historic properties and-that-HPO comment on visual impacts would be conducted during the COLA when more specific, detailed construction information was available. A review of the EIS suggests HPO has failed to make this point clear to NRC (EIS Sections 2.7.1, 4.6, and 7.5). While more specific HPO comment on visual impacts will be forthcoming through section 106 consultation during the

COLA, the cumulative effects of introducing two additional cooling towers, 76 feet higher than the existing, with vapor columns will adversely affect the viewshed of the Abel and Mary Nicholson House National Historic Landmark. (**0049-5** [Saunders, Daniel])

Comment: This new SHPO Opinion finds the John Maddox Denn House and the Sara Mason House are eligible for inclusion on the National Register of Historic Places under Criterion C for 18th century pattern-brick architecture. While the process to identify all historic properties and affects assessment has not yet been completed, construction of the new, larger cooling towers will adversely affect the viewshed of the Abel and Mary Nicholson House National Historic Landmark. (**0021-3-8** [Foster, Ruth])

Comment: This new SHPO Opinion finds the John Maddox Denn House and the Sara Mason House are eligible for inclusion on the National Register of Historic Places under Criterion C for 18th century pattern-brick architecture. While the process to identify all historic properties and affects assessment has not yet been completed, construction of the new, larger cooling towers will adversely affect the viewshed of the Abel and Mary Nicholson House National Historic Landmark. (**0049-1** [Saunders, Daniel])

Response: *In acknowledgement of the new New Jersey SHPO opinion for the PSEG ESP DEIS, the NRC met with representatives from the New Jersey SHPO, USACE, local interested parties and PSEG in Salem County, New Jersey, in January 2015 to re-assess the potential for an adverse effect on historic properties resulting from the proposed project. Several of the properties identified in the revised NJ SHPO opinion were visited. As a result of that meeting, PSEG asked their contractor, AKRF, to conduct additional studies to examine which buildings in the indirect area of potential effect (4.9 mi from proposed plant site) were eligible for listing on the National Register of Historic Places. The NRC conducted five publicly noticed meetings and teleconferences with the NJ SHPO, interested parties and the Advisory Council on Historic Preservation between January and May 2015 to discuss potential effects and mitigation strategies for any effects resulting from the proposed project. During the consultation, the NJ SHPO proposed a new Alloway Creek Rural Historic District which contained some of the historic properties being analyzed in the indirect APE. Between February and May a Memorandum of Agreement (MOA) was drafted to address any potential adverse effects resulting from the proposed project.*

A meeting between the NRC, PSEG, the NJ SHPO, the ACHP, and the National Park Service was held in Salem County, NJ in May 2015. At that meeting, AKRF discussed the results of their research and recommended that the property at 116 Mason Point Road should be considered eligible for listing on the National Register of Historic Places and that the property would be visually affected by the introduction of two additional natural draft cooling towers. AKRF also found the property at 349 Fort Elfsborg-Hancock Bridge Road to be historically significant and that the proposed natural draft cooling towers would also be visible from this property. On June 24, 2015, the NRC acknowledged its finding of an indirect (i.e. visual) adverse effect to the Abel and Mary Nicholson House National Historic Landmark, and the properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road should natural draft cooling towers be chosen as the cooling system for a new plant. The NRC in consultation with the NJ SHPO, ACHP and interested parties developed a draft MOA to resolve the adverse effect from the proposed project. The draft MOA was issued for public comment via a Federal

Register notice 80 FR 53579 on September 4, 2015 for a 30 day comment period and was executed on October 14, 2015 (NRC 2015-TN4377).

The text in Sections 2.7, 4.6, 5.6, and 7.5 of the EIS has been revised to include a description of the activities undertaken since publication of the DEIS (August 2014) by the NRC to identify historic properties and any potential effects to historic properties from activities analyzed. The impact finding for historic and cultural resources has been revised from "SMALL" to "SMALL to MODERATE" for the Final EIS. This range reflects that no impacts to historic and cultural resources would result if the applicant were to select mechanical draft cooling towers because these towers would not be visible from historic properties. Noticeable impacts to historic resources could result if the applicant were to select natural draft cooling towers because, although the visual landscape is already industrial, these towers would be periodically visible from the Abel and Mary Nicholson House National Historic Landmark, and the properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road.

E.2.14 Comments Concerning Meteorology and Air Quality

Comment: Since the use of nuclear power began millions, and millions of tons of carbon dioxide and other air pollutants have not entered the atmosphere. (**0004-13-1** [Miller, Lynn])

Comment: I also mentioned that PSEG's new nuclear unit will provide power for more than three million homes each day. And, as compared to fossil fuel power plants, there will be no greenhouse gas emissions, such as CO2 or methane. There also will be no SO2 or NOX emissions, that would contribute to acid rain, or nitrification of our waterways. There also will be no mercury emissions that could detrimentally affect the aquatic life in the Delaware River and the bay. (**0004-16-5** [Molzahn, Robert])

Comment: As we need the power to be clean power. By law New Jersey must reduce CO2 emissions to 1990 levels, by 2020, and must meet a much tougher target of 80 percent reduction, below 2006 levels, by 2050. New Jersey is on track to meet the 20 target. A big reason is because more than half of the electricity used by New Jersey customers is generated by nuclear plants which produce no greenhouse gas emissions. They also produce no NOX, no SOXs, and no particulates. As much as New Jersey, and PSEG are committed to renewable energy and energy efficiency, I don't believe that there is any way that we can meet the 2050 target without additional nuclear power. Solar and other sources of renewable energy are great for New Jersey. Members of Local 94 built some PSEG solar power plants. But solar is not a substitute for round the clock baseload power. And the only clean source of that is nuclear. (**0004-18-4** [Hufsey, Moe])

Comment: While there has been considerable public dialogue and debate, about the use and benefits of nuclear power, no one can argue that nuclear power is the largest source of electricity that does not emit any air pollution. While emitting no carbon, or other pollutants, nuclear generation provides tremendous economic and job benefits. The new plant will offset the potential generation of nearly 15 million tons of CO2 in a given year. (**0004-2-7** [Egenton, Michael])

Comment: The issue of climate change and anthropogenic carbon dioxide is considered important enough that the review team devoted two pages to its discussion, in Section 9.2.5. In addition to mentioning CO2 emissions throughout the DEIS. The Maryland Conservation Council (MCC) believes that climate change is among the most serious threats to both modern civilization, as well as the natural world. And it is that world, which is the MCC's mission to protect. Table 9.5 compares the smaller CO2 emissions, from the proposed reactor, with those expected from a selected combination of alternatives, which includes renewables. They differ by about three orders of magnitude. Meaning that nuclear power is significantly more effective in stabilizing climate, than any practicable combination of alternatives that would be available in the foreseeable future. (**0004-6-3** [Meadow, Norman])

Comment: The issue of climate change in anthropogenic carbon dioxide is considered important enough that the review team devoted two pages to its discussion, in section 9.2.5., in addition to mentioning carbon dioxide emissions throughout the draft statement. The Maryland Conservation Council believes that climate change is among the most serious threats, both to modern civilization, as well as the natural world. And, as I said, it is our mission to protect that world. Table 9.5, or 9-5 compares the smaller carbon dioxide emissions from the proposed reactor, with those expected from a selective combination of alternatives, which includes renewables. They differ by about three orders of magnitude, meaning that nuclear power is significantly more effective in stabilizing climate, than any practicable combination of alternatives available in the foreseeable future. (**0007-6-4** [Meadow, Norman])

Comment: To add to the environmental benefits of the proposed plant, nuclear power produces no greenhouse gas emissions. Nuclear plants produce no Nox, no Sox, and no particulates. In fact the new plant will offset the potential generation of about 10 million tons of carbon dioxide per year. (**0007-8-6** [Spiese, Steve])

Response: *These comments express support for nuclear power plants in general and/or a new nuclear plant at the PSEG Site, particularly in regard to the emissions of greenhouse gases (GHGs) and other gaseous and particulate pollutants from such facilities. No changes were made to the text in the EIS as a result of these comments.*

Comment: A third option was a re-examination of nuclear power generation. A technology not considered a part of the package while we taught the course. But, evidently, back on the table, as evidenced by the current PSEG exercise. We recognize the value of generating usable energy without increasing greenhouse gases. (**0004-4-2** [Applegate, Jim])

Comment: The scientific finding that bears most critically on climate policy, is the recent understanding that emission of carbon dioxide, to the atmosphere is, essentially, an irreversible process, when compared to relevant human time scales of decades or centuries. The Academies estimate that a slug of carbon dioxide, emitted today, will be reduced by half, or only half, in a thousand years. And that one fourth will still be present in 10,000 years. And that 100,000 years would be required to remove it all. (**0004-6-5** [Meadow, Norman])

Comment: So three critical questions, conclusions, can be drawn from this understanding. The first is that we must reach zero carbon dioxide emissions as soon as possible. Because what is emitted this year is going to be with us for a good millenium, or more. We don't have time to wait for ancillary technologies, like energy storage and a number of other things to be developed. Nuclear power can do that right now. Second, at the current state of technology wind and solar installations require backup by a fast responding power source. And the only available, today, is carbon dioxide emitting natural gas turbines. And that conflicts with the first conclusion, that we have to end CO2 emissions as quickly as possible. (**0004-6-7** [Meadow, Norman])

Comment: The following quotes are from a number of books that Norman mentioned, on climate change, published by the National Academy of Sciences. Written citations have already been handed in to the NRC. (1) Emissions reduction, larger than 80 percent, are required to approximately stabilize carbon dioxide concentration for a century, or so, at any chosen target level. (2) Even greater reductions, in emissions, would be required to maintain stabilized concentrations in the longer term. (3) The warming induced by added carbon dioxide is expected to be nearly irreversible for, at least, a thousand years. (4) Longer term stabilization requires nearly one hundred percent reduction. (5) Even if CO2 emissions become close to zero, the decrease in atmospheric concentration may, however, occur very slowly over centuries. (**0004-7-1** [Meadow, Karen])

Comment: Many of our programs focus on, or incorporate, global climate change, and the ocean acidification into education efforts. We believe it is imperative that people understand the concepts associated with increasing carbon dioxide levels, associated with industrial activities, and the need to develop alternative means of producing electrical power. (**0006-8-5** [Duvau, Bryan])

Comment: Also, the new unit, nuclear unit, will provide power with more than three million homes. But without, compared to fossil fuel, no greenhouse gases, no SOXs, no NOX, no CO2, and other items that contribute to acid rain, no mercury emissions or particulates. (**0007-16-4** [Palmer, Dennis])

Comment: The scientific finding that bears most critically on climate policy, is the recent understanding that emission of carbon dioxide, to the atmosphere, is essentially an irreversible process, when compared to relevant human time scales of decades or centuries. The National Academies estimate that slug of carbon dioxide emitted today will be reduced by only half in 1,000 years. That a fourth will still be present in 10,000 years, and that 100,000 years would be required to remove it all. And this is shown in a written document that I have handed in. (**0007-6-6** [Meadow, Norman])

Comment: The new plant is proposed to have supporting equipment, such as cooling towers, auxiliary boilers, and emergency generators that emit air pollutants. These equipment items are subject to Federal and State air pollution control regulations. PSEG Nuclear would be required to submit an operating permit modification application to incorporate these equipment items and the associated emissions in the existing Title V operating permit for Salem and Hope Creek Generating Stations. (**0021-5-12** [Foster, Ruth])

Response: *No changes were made to the EIS as a result of these comments.*

Comment: [W]e conclude that the review team has done an excellent job in producing the DEIS, but we think that its conclusions to approve the Early Site Permit, for the reactor, can and should be strengthened regarding concern about climate change. (**0004-6-2** [Meadow, Norman])

Comment: The consumption of all these nonrenewables has set this planet on a course of global warming, and climate change. And the EIS, by the NRC, fails to acknowledge, let alone mention, its importance. (**0006-4-4** [Brook, David])

Comment: We think that the conclusion of the staff, to approve the Early Site Permit, for the reactor, can and should be strengthened regarding the concern about climate change. (**0007-6-3** [Meadow, Norman])

Response: *As described in Council on Environmental Quality (CEQ) guidance, GHG emissions from a proposed project can be used as a proxy to describe climate change impacts. The GHG emissions from the proposed reactor are described in EIS Sections 4.7, 5.7, and 7.6 along with Appendix K, which considers the lifecycle of nuclear power generation. GHG emissions from the power generation associated with the project are estimated to be negligible when compared with state or national GHG emission totals, and are far less than those produced by alternative energy sources that could provide baseload power, as shown in Table 9-5. No changes were made to the EIS as a result of these comments.*

Comment: Climate and energy policy have been discussed, in great detail, by the U.S. National Academy of Sciences, and National Academy of Engineering, in a series of about 100 book-length reports, published over the past 30 years. The Academy is one of the most respected scientific organizations in the world, and has been the official advisor to the U.S. government on technical matters, since its establishment, by the Lincoln Administration, during the civil War. It is puzzling that neither the news media, nor the nuclear industry, have given the conclusions reached, by this prestigious organization, the attention that they merit. (**0004-6-4** [Meadow, Norman])

Comment: We respectfully request that the major findings of the National Academies [in regard to climate change and carbon dioxide emissions] be mentioned in the final DEIS, or the final EIS. (**0004-6-9** [Meadow, Norman])

Comment: Climate and energy policy have been discussed in great detail by the United States National Academy of Sciences, and the National Academy of Engineering, in a series of about 100 book-length reports, published over the past 30 years. The Academy is one of the most respected scientific organizations in the world, and has been the official advisor to the U.S. government on scientific and technical matters, since it was established by the Lincoln Administration, during the Civil War. It is puzzling that neither the news media, nor the nuclear industry, have given the conclusions reached by this prestigious organization, the attention they merit. (**0007-6-5** [Meadow, Norman])

Comment: And these are also summarized, some of the quotations, from about 9 or 10 of their books, are included in what I have handed in. We respectfully request that the major findings, from the National Academies, be mentioned in the Final Environmental Impact Statement. (**0007-6-8** [Meadow, Norman])

Response: *The staff based its assessment of climate change impacts on the 2014 GCRP report, Climate Change Impacts in the United States, because the GCRP is a Federal agency with a mandate to evaluate the effects of climate change. The GCRP report synthesizes the work of the Federal government on climate change. The GCRP reports and peer-reviewed assessments from GCRP were suggested as sources of the best scientific information available on the reasonably foreseeable climate change impacts in the 2010 CEQ Draft NEPA Guidance on Consideration of the Effects of Greenhouse Gas Emissions and Climate Change. The work of the National Academy of Sciences (NAS) is important, and as such, NAS reports and proceedings are used as references in the GCRP report, and the introductory letter to the 2014 GCRP report says that the report was reviewed by a special panel of the National Research Council of the NAS. No changes were made to the EIS as a result of these comments.*

Comment: The one thing that I haven't seen is anyone come up with a suggestion of how we prevent carbon monoxide pollution on our atmosphere, and the damage that we are causing to our environment, on a daily basis, and the legacy that we are giving to our children, and acting like we can stick our heads in the sand, and let that go on. You are a fool if you believe that is going to occur. (**0008-10-3** [Deschere, Mark])

Response: *The incomplete combustion of fossil fuel (e.g., oil, gasoline, or natural gas) results in the emissions of carbon monoxide (CO). CO exists everywhere but is typically higher along busy highways/roadways or enclosed spaces such as parking garages or homes. CO emissions associated with construction and operation of a nuclear power plant are small and thus CO levels are typically well below the National Ambient Air Quality Standards (NAAQS) at the property boundary. Outdoor CO pollution is not an issue in the United States because there are no nonattainment areas (any area that does not meet the NAAQS) per EPA's Green Book on Nonattainment Areas (http://www.epa.gov/airquality/greenbook/cindex.html). Carbon dioxide and other GHG emissions as a result of the proposed project are discussed in EIS Sections 4.7, 5.7, and 7.6 along with Appendix K, which considers the lifecycle GHG emissions from nuclear power generation. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 2-177; Section No. 2.9.2; Line No. 22; Suggest adding the following sentence at the end of the paragraph: "Impacts from GHG emissions from plant operations are not expected to be noticeable (Section 5.7)." (**0015-2-4** [Mallon, James])

Response: *Section 2.9.2 discusses the Affected Environment for the proposed project. As this chapter provides information on the area that could be affected, conclusions are not drawn in Chapter 2. Operational impacts and conclusions are discussed in Chapter 5. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 4-83; Section No. 4.7.1; Line No. 15-16; The DEIS states: "No vegetation would be disposed of by burning." What is the basis for this statement? ESPA ER Chapter 4 does not make this commitment. Recommend deleting statement. (**0015-3-6** [Mallon, James])

Response: *As stated in Section 4.2.1.1.2 of the ER, construction debris will be recycled, reused, or transported off-site to a permitted disposal facility. The ER does not mention open burning of vegetation, as the comment notes. Control and prohibition of open burning is described in New Jersey Administrative Code, Title 7, Chapter 27, Subchapter 2 (available at* *http://www.nj.gov/dep/aqm/Sub2.pdf). Per this rule, "No person shall cause, suffer, allow or permit the disposal of rubbish, garbage, trade waste, buildings or structures by open burning," and the New Jersey Department of Environmental Protection may issue a permit for the open burning. Section 4.7.1 of the EIS has been modified to delete the sentence.*

Comment: Page No. 7-37 to 7-39; Section No. 7.6.2; As discussed in Section 8.5 of the DEIS, the construction and operation of a new plant on the PSEG ESP site would reduce emissions from fossil fueled plants that would otherwise be needed to supply the demand for power. Section 7.6.2 should give credit for such a reduction. (**0015-4-10** [Mallon, James])

Response: *The staff agrees with the commenter's note. Section 7.6.3 has been revised to reflect the changes in this comment.*

Comment: Page No. K-2; Table K-2; The "Commuting Days (days per year)" for the Preconstruction/Construction Workforce, Operational Workforce, and SAFSTOR Workforce categories appear to overestimated. None of these workforces will be working 365 days per year. (**0015-7-18** [Mallon, James])

Response: *Detailed assumptions and rationales for Table K-2 are presented in Chapman et al. (2012-TN2644). They noted that, although an individual employee is assumed to work 250 days per year, preconstruction/construction, operations, and SAFSTOR phases at a nuclear facility usually occur 7 days a week. The average workforce estimates for each phase thus must be scaled by a factor of 250/365 to determine the average daily onsite workforce, and then divided by the assumed carpooling value to obtain the estimated daily number of commuting round trips. In other words, commuting trips for preconstruction/construction, operations, and SAFSTOR workforces in Table K-2 were presented in terms of 365-day basis. Chapman et al. (2012-TN2644) noted further that decommissioning work is more likely to be conducted during a 5-day/40-hour workweek. Thus, use of a 250 work-days per year conversion factor during decommissioning is logical. No changes were made to the EIS as a result of this comment.*

Comment: EPA also reminds the NRC that this project is within the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE non-attainment area for the ozone National Ambient Air Quality Standard. Any Federal action within a non-attainment area must undergo a general conformity applicability analysis (see 40 CFR 93.153) to ensure that the action will not (1) cause or contribute to any new violation of any air quality standard, (2) increase the frequency or severity of any existing violation of any air quality standard, or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area. While the NRC will not authorize any construction under the ESP, please note that a General Conformity Applicability Analysis will need to be performed when the combined license to construct a new reactor is evaluated by the Commission staff. (**0017-3** [Mitchell, Judy-Ann])

Comment: This comment concerns the General Conformity provisions of the U.S. Clean Air Act along with its implementing USEPA regulations. Section93.150 (a) (Prohibition) of the Federal General Conformity regulation states, "No department, agency or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan." The Federal General Conformity regulation requires that the direct and indirect emissions resulting from project activities that require a permit, license, approval etc. by a Federal agency, must be assessed through an Applicability Analysis to determine if a Conformity Determination is necessary. Section 93.153 (b) (Applicability) of the Federal General Conformity regulation states, "a conformity determination is required for each criteria pollutant or precursor where the total of direct and indirect emissions of the criteria pollutant or precursor in a nonattainment or maintenance area caused by a Federal action would equal or exceed any of the rates in paragraphs (b) (l) or (2) of this section." The Draft Environmental Impact Statement (EIS) for an Early Site Permit (ESP) at the PSEG Site indicates that the Federal agencies that have jurisdiction for this project are the NRC, US Army Corps of Engineers (USACE) and the U.S. Coast Guard (USCG) (Page 4-12 and Page H-2). A General Conformity Applicability Analysis for ozone (Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NOx)) is needed for this project, and, if necessary, a Conformity Determination may also be subsequently needed for this project. When preparing the analysis, the direct and indirect air emissions associated with project activities covered by the Federal permits, license, approvals etc., from the NRC, USACE and the USCG project activities must be included in the analyses. (**0021-5-6** [Foster, Ruth])

Comment: Section 93.150 (b) (Prohibition)of the regulation requires that an action must conform to a State Implementation Plan (SIP) before the action is taken. New Jersey is in nonattainment of the 8-hour ozone National Ambient Air Quality Standard (NAAQS), therefore, the project must conform to the SIP prior to any preliminary activities/preconstruction activities are undertaken. (**0021-5-7** [Foster, Ruth])

Response: *The review team agrees that a General Conformity Applicability Analysis and possibly a General Conformity Determination will need to be performed pursuant to regulations implementing Section 176(c) of the Clean Air Act when a license application for a new nuclear reactor(s) at the PSEG Site is submitted to the NRC and prior to NRC authorizing any action. It is expected that the activities permitted by any Department of the Army permit would not occur simultaneously, but rather would occur over a much longer period of time. Many activities authorized by the USACE include varying seasonal restrictions which result in more lengthy overall construction periods. Based upon the overall length of time to complete the activities regulated by the USACE, it is expected that the activities authorized by any Department of the Army permit would not exceed de minimus levels of direct emissions of criteria pollutants or their precursors and would be exempt by 40 CFR 93.153. Any later indirect emissions would not generally be with the USACE continuing program authority and cannot be practicably controlled by the USACE. No changes were made to the EIS as a result of these comments.*

Comment: Section 4.4.1.3 Air Quality, Page 4-52, 5th Paragraph, Lines 38-40. Page 4-53, 1st Paragraph, Lines 1-2: In addition, it is not known at this time if an air mitigation plan will be required in order for this project to conform to the SIP. (**0021-5-8** [Foster, Ruth])

Response: *The staff agrees with the commenter’s note. Section 4.4.1.3 was revised in response to this comment.*

Comment: Section 4.7.1 Construction and Preconstruction Activities, Page 4-83, 3rd Paragraph, Lines 20-24: In addition to the NRC and the USACE, please include the [U.S. Coast Guard] USCG in the statement. (**0021-5-9** [Foster, Ruth])

Response: *The staff agrees with the commenter's note. Sections 4.7.1 and 4.10.3 were revised as a result of this comment.*

Comment: Section 4.7.1 Construction and Preconstruction Activities, Page 4-83, 3rd Paragraph, Lines 27-31: [T]his statement indicates that an ESP with no Limited Work Authorization for the PSEG Site will not directly or indirectly cause any emissions. However, [text in Section 1.1.2] states that" ... the holder of an ESP without an LWA may only perform preliminary activities not requiring NRC authorization, as enumerated in 10 CFR 50.10(a)(2). These preliminary activities can include clearing and grading, excavating, erection of support buildings and transmission lines, and other associated activities." These activities will produce air emissions. Please explain the discrepancy in the two statements. (**0021-5-10** [Foster, Ruth])

Response: *Section 4.7.1 has been modified to clarify that there are no direct or indirect emissions according to the definitions in 40 CFR 93.152. The preliminary activities listed in 10 CFR 50.10(a)(2) do not fall under NRC regulatory authority, and therefore do not fit into the definitions of direct and indirect emissions outlined in 40 CFR 93.152. Section 4.7.1 has been revised to provide this clarification as a result of this comment.*

Comment: Section 5.7.1.1 Criteria Pollutants. The Draft EIS for the ESP states, "Table 5-13 presents PSEG's estimated annual non-radiological emissions associated with operating a new nuclear power plant at the PSEG Site. The estimated annual NOx emissions in Table 5-13 are 52.5 tpy, well below the 100 tpy de minimis rate... The estimated annual VOC emissions are 202 tpy, significantly larger than the 40 CFR 93.153(b) (1) de minimis rate (40 CFR 93, Subpart B, 40 CFR 93-TN2495) ... If, at the combined construction permit and operating license (COL) stage, the estimated VOC emission rate remains above the de minimis rate, NRC staff will need to demonstrate conformity with the applicable state implementation plan (SIP) according to 40 CFR 93.150 to comply with the General Conformity Rule (40 CFR 93, Subpart B, 40 CFR 93-TN2495). Because the ESP does not authorize the activities that would lead to these emissions, the General Conformity Rule is not addressed at this time." Comment: Modifications to the SGS and HCGS Title V Operating permit will be required for a new nuclear plant, the air emissions associated with the operation of a nuclear plant are exempt from the Federal General Conformity regulation. Section 93.153(d)(I) of the Federal General Conformity regulation states that a conformity determination is not required for "the portion of an action that includes major or minor new or modified stationary sources that require a permit under the new source review (NSR) program (Section 110(a) (2) (c) and Section 173 of the Act) or the prevention of significant deterioration program (title I, part C of the Act)." (**0021-5-11** [Foster, Ruth])

Response: *The staff agrees with the commenter's note. Section 5.7.1 was revised to clarify that emissions covered by the New Source Review (NSR) or Prevention of Significant Deterioration (PSD) are not part of the General Conformity Determination.*

Comment: Why do I say this? All of us are destroying this planet by our fixation with consuming non-renewable resources, and nuclear energy is also a non-renewable resource. In fact, nuclear energy is a carbon intensive technology. And only when it is operating, is it less so. Only when it is operating, and generating the electricity, that is. (**0006-4-3** [Brook, David])

Comment: It is also important to note that nuclear power is not carbon-free, it is on the contrary rather carbon intensive when you include the cost to mine, refine, safely transport uranium fuel, the energy involved in constructing a nuclear power plant, the safe storage of high level radioactive waste for thousands of years, and the energy involved in dismantling and decommissioning the plant. Also, the energy cost and carbon utilized to refine uranium is increasing as the available uranium ore concentrations continue to decrease. The only time that nuclear is low-carbon is when it is operating. The DEIS is deceptive, particularly Table 9-5, since it only includes carbon emission during plant operations. The NRC should calculate carbon emissions over the life cycle of all power plants, from cradle to grave as doing so would result in a dramatic change in these numbers. (**0020-4-15** [van Rossum, Maya])

Response: *These comments refer to the GHG footprint of a nuclear power plant. Total GHG emissions over the lifecycle of a nuclear power plant, which includes preconstruction/construction, operations, decommissioning, and SAFSTOR along with uranium fuel cycle, are presented in Tables 7-3 and K-3. In general, emissions from the uranium fuel cycle account for most of the total lifecycle emissions associated with a nuclear power plant and emissions from operations would contribute minimally to total lifecycle emissions. Appendix K and Section 6.1.3 also discusses the conservatisms in the uranium fuel-cycle emissions estimate, namely that the estimate is based on gaseous diffusion enrichment technology, which is being replaced with gas centrifuge or laser separation technologies that use less electricity and emit less GHGs. In Appendix K, the review team's lifecycle estimate of approximately 10,500,000 MT CO_2e for the reference 1,000-MW(e) nuclear plant is equal to about 37.5 g CO_2e/kWh, which falls between the 50th and 75th percentile values of the Intergovernmental Panel on Climate Change (IPCC) estimates (IPCC 2012-TN2648). In addition, the IPCC report includes lifecycle estimates for other forms of energy generation, including those discussed in Table 9-5. The Appendix K lifecycle estimate is somewhat comparable to lifecycle estimates for renewable energy sources but about an order of magnitude lower than those for fossil-fuel-based resources. The text in Section 9.2.5 of the EIS acknowledges that adding fuel-cycle and transportation emissions for a nuclear power plant still results in a lower emissions footprint than the forms of energy generation discussed in Table 9-5 (i.e., coal, natural gas, and a combination of alternatives). No changes were made to the EIS as a result of these comments.*

E.2.15 Comments Concerning Nonradiological Health

Comment: Let me conclude my remarks by pointing out that eminent Scientist James Hanson recently wrote, that the world's existing nuclear reactors have prevented 1.8 million premature deaths from respiratory diseases. Consequently the Maryland Conservation Council concludes that significantly more respiratory diseases could have been prevented, and considerably less CO2 would be in the atmosphere, today, if construction of new nuclear reactors had not been virtually stopped after 1980. (**0004-7-3** [Meadow, Karen])

Comment: A very eminent climate scientist, whose name is James Hanson, you may have heard of, he is outspoken, and has incurred the wrath of the fossil fuel industry. As published, recently, in the New York Times, an article that claims that the existing nuclear reactors on this planet, have prevented 1.8 million premature deaths from respiratory diseases. (**0007-6-13** [Meadow, Norman])

Response: *The declarative statements regarding respiratory disease are noted. No changes were made to the EIS as a result of these comments.*

Comment: Page No. 2-185; Section No. 2.10.1.1; Line No. 29-30; While exhaust emissions from plant operations and commuter traffic may affect local air quality, the causal link between these activities and local impacts on health have not been established. This sentence should be reworded to exclude "human health". (**0015-2-5** [Mallon, James])

Response: *The review team agrees that a causal link is not established between exhaust emissions—associated with onsite vehicles and equipment and with commuter traffic during normal plant operations—and human health effects. The reference to human health has been removed from the text in the EIS.*

Comment: Page No. 2-187; Section No. 2.10.1.3; Line No. 2-6; The relevance of the CDC Workgroup reference is questionable; if maintained the reference should be to the lack of findings for the question at hand for the geography or source. (**0015-2-6** [Mallon, James])

Response: *The National Institute of Allergy and Infectious Diseases lists Naegleria fowleri as Category B priority human pathogen and, along with its preferred habitat of thermophilic waters, establishes the relevance of this pathogen to areas associated with water-cooled nuclear power plants. However, as of 2012, no cases of primary amebic meningoencephalitis have been associated with areas surrounding the Delaware River. The text in Section 2.10.1.3 has been revised to include these latest statistics.*

Comment: Page No. 5-80; Section No. 5.8.5; Line No. 31-32; Suggest removing asphyxiation as an example of dominant nonfatal occupational injuries and correcting the statement: overexertions and bodily reactions, contact with object or equipment and falls, slips and trips are the most commonly encountered injuries associated with lost time (BLS, November 26, 2013 News Release). For 2013, the most common fatal injury for construction includes trips and falls, struck by object or equipment and roadway (BLM, Economic News Release, Census of Fatal Occupational Injuries September Summary (September 11, 2014) (**0015-3-17** [Mallon, James])

Response: *For the reasons stated in the comment, the review team agrees that asphyxiation can be deleted from the dominant nonfatal occupational injury description. The text in Section 5.8.5 has been revised to incorporate the changes recommended in this comment.*

Comment: Page No. 7-41; Section No. 7.7; Line No. 29-30; The use of the phrase "their relationship to" is unclear. If the intent of the sentence is to discuss the effect of climate change on operation of the nuclear plant, the quoted phrase should be changed to "impact on". If the intent of the sentence is to discuss the effect of the nuclear plant on the consequences of climate change, the sentence should be changed to indicate that the nuclear power plant will have no appreciable impact on such consequences. (**0015-4-11** [Mallon, James])

Response: *The phrase "their relationship" refers to effect of the nuclear plant on the consequences of climate change. The text in Section 7.7 has been revised to provide the clarification requested in the comment.*

Comment: Page No. 5-76; Section No. 5.8.1; Line No. 36; The relevance of the CDC Workgroup reference is questionable; if maintained the reference should be to the lack of findings for the question at hand for the geography or source. (**0015-3-16** [Mallon, James])

Response: *The National Institute of Allergy and Infectious Diseases lists Naegleria fowleri as Category B priority human pathogen and, along with its preferred habitat of thermophilic waters, establishes the relevance of this pathogen to areas associated with water-cooled nuclear power plants. The CDC reference is acceptable, and the text does not need to be revised. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 10-16; Section No. 10.2.2; Table 10-2; Actions to mitigate Nonradiological Health impacts identified in the table are not clearly identified in the discussion in Chapter 5. (**0015-7-11** [Mallon, James])

Response: *Chapter 5 of the draft EIS adequately describes actions to mitigate nonradiological health impacts from etiological agents, plant operations, noise, emissions, and transportation accidents due to compliance with Federal, State, and/or local regulations or permits, as well as PSEG operating policies and procedures. No changes to the nonradiological health entries in Table 10-2 are needed. Likewise, no changes to the EIS text in Section 5.8 are needed in response to this comment.*

E.2.16 Comments Concerning Radiological Health

Comment: I am also here as a cancer patient who is awaiting radium 131, of 100 millicuries, in less than two weeks, for thyroid cancer recurrence. I saw a flier posted, earlier, that talked about the risks of nuclear medicine and radiation. However, the difference is undergoing nuclear medicine, I have been given a lot of instructions about what to do. For example, I will have to stay away from my family for two to four days. I have a six year old daughter. I will have to stay away from her for nine days. This is very hard to explain to her. I can't hug, cuddle, nap, or hold an infant for nine days. I certainly can't have children for six months to a year, or be breast feeding. If I was a man with a pregnant wife I couldn't sleep next to her for 13 days. I can actually sleep next to my husband after I have nuclear medicine treatment. I bring all this up because I'm troubled by page 19 [in the Reader's Guide], and the exhibits F and G, in the document, the Impact Statement, talk about the radiological health impacts. There is a diagram, exhibit F and G [in the Reader's Guide], that talks about how during the construction of this plant, there will be radiation getting into vegetables, fish. These are all listed on pages 20 and 21. We know radiation is most destructive at a young age. I actually can't even absorb a lot of radiation, at this point, because I don't even have a thyroid. So it is more concerning for the younger children at this point. And I'm wondering, you talk about small dose, small dose, small dose, about the bioaccumulation effects of this. (**0007-12-2** [Bucic, Sarah])

Comment: Will there be tests, or have there been tests about how this [exposure to radiation] will impact children 30 years from now, since we know that radiation takes about 30 years, at small doses, to show its effects? (**0007-12-3** [Bucic, Sarah])

Comment: But we, ourselves, are exposed from routine operation, from what I have heard, to as much radioactive fallout, as the Hiroshima blast, every year, for every operating nuclear power plant. This stuff is bio accumulative. It doesn't leave the body. In fact it increases, it causes premature aging, it causes arthritis, it causes degenerative disease, it causes genetic mutations that are permanent, and will go down for succeeding generations. (**0007-4-3** [Campion, Mary])

Comment: And not only that, but who this [nuclear radiation] affects is most radically children. Because the cesium doesn't just come routinely through the air, even at every level, but it is denser where the children live and play. So children, when they are in their most vulnerable developmental years, are highly exposed. I know, personally, a woman who was in utero during Three Mile Island. Her mother came very close to being evacuated. And she is now experiencing infertility problems. I know the statistics about California, how many miscarriages, of the same type, of genetic disorder, that my friend has experienced, have occurred since Fukushima on the West Coast. This is what we are looking at. It is very insidious, it doesn't happen in a single state, in a single place. And we don't have epidemiology. I remember when we lived in Colorado there was a public health employee who was doing epidemiology in the area around Rocky Flats. He lost his job. (**0007-4-7** [Campion, Mary])

Comment: Let me also mention, finally, that the Maryland Conservation Council has done a thorough study of the epidemiologic effects of exposure to radioactivity. And we acquired our data from the primary literature, which are papers published mostly from cancer researchers at the U.S. National Academy of Sciences, and from Japanese researchers, who have been studying the effects of the nuclear weapon bombings on the survivors in Hiroshima and Nagasaki. These studies have allowed, led us to conclude that the threat from radioactivity has been exaggerated. And, as I said, this comes from the primary literature. (**0007-6-12** [Meadow, Norman])

Comment: I gather from the hearing that the site is already toxic and workers will need protection. And yes waste. Ionizing radiation alters the continuity of healthy life in ways that may take generations to reveal. The damage is cumulative and passed to new generations. Rosalie Bertell struggled for years to bring the dangers of x-rays to attention. This is even more opaque and long lasting. (**0047-3** [Campion, Mary])

Comment: My spiritual friends, the pacifist Buddhist monks, who have prayed at nuclear sites all over the world, identified Salem as the most lifeless (toxic) they had experienced. They asked the young people to quickly leave if they wished to have children. We, and all life, may pay a sad price for this facility. (**0047-7** [Campion, Mary])

Response: *These comments concern potential human health effects (e.g., cancer) from radiation exposure. The NRC's mission is to protect the public health and safety and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. The NRC's regulatory limits for radiological protection are set to protect workers and the public from the harmful health effects (i.e., cancer and other biological impacts) of radiation on humans. The limits are based on the recommendations of standards-setting organizations. The NRC actively participates in and monitors the work of these organizations to keep current on the latest trends in radiation protection.*

Radiation standards reflect extensive scientific study by national and international organizations. The NRC actively participates in and monitors the work of these organizations to keep current on the latest trends in radiation protection. If the NRC determines that there is a need to revise its radiation protection regulations, it will initiate a rulemaking. The models recognized by the NRC are for use by nuclear power reactors to calculate dose incorporate conservative assumptions to ensure that workers and members of the public are adequately protected from radiation. In addition, NRC dose calculation methods have always included age-specific dose factors for each radionuclide, because they may be used differently by infant, child, and teen bodies, which are also generally smaller than adult bodies recognizing that the diets (amounts of different kinds of food) of infants, children, and teens are different from those of adults (NRC 1977).

Radioactive materials can be helpful to diagnose and treat illnesses or in medical research. The NRC or an Agreement State regulates these uses with the aim to assure radioactive materials are used properly and in a way that protects patients, medical workers, the public, and the environment. Federal, State and local agencies share responsibility for overseeing the uses of radiation in medicine. In developing and implementing these regulations, the NRC follows its Medical Use Policy Statement (65 FR 47654-TN4337). The policy says the NRC will:

- *regulate the uses of radionuclides in medicine to provide for the safety of workers and the public;*
- *not intrude into medical judgments affecting patients, except as necessary to provide for the safety of workers and the public;*
- *regulate radiation safety primarily to ensure that the doctor's directions are carried out, when justified by the risk to the patient; and*
- *consider industry and professional standards for acceptable approaches to radiation safety.*

The NRC and Agreement States license facilities; authorize individuals to administer radioactive materials; and develop regulations and guidance. The regulations also provide for inspections, investigations and enforcement programs to ensure the safety of medical uses. Please see the NRC Fact Sheet on the medical use of radioactive materials for additional information (NRC 2014-TN4338).

Although radiation may cause cancers at high doses, currently no reputable, scientifically conclusive data unequivocally establishes the occurrence of cancer following exposure to low doses (i.e., below about 10 rem [0.1 Sv]). However, radiation protection experts conservatively assume that any amount of radiation may pose some risk of causing cancer or a severe hereditary effect and that the risk is higher for higher radiation exposures. Therefore, a linear, no-threshold, dose response relationship is used to describe the relationship between radiation dose and adverse impacts such as incidents of cancer. Simply stated, in this model, any increase in dose, no matter how small, results in an incremental increase in health risk. This theory is accepted by the NRC as a conservative model for estimating health risks from radiation exposure, recognizing that the model probably overestimates those risks. Based on this theory, the NRC conservatively establishes limits for radioactive effluents and radiation exposures for workers and members of the public. Although the public dose limit in 10 CFR 20 is 100 mrem (1 mSv) for all facilities licensed by the NRC, the NRC has imposed additional *constraints on nuclear power reactors. Each nuclear power reactor has enforceable license conditions that limit the total annual whole body dose to a member of the public outside the facility to 25 mrem (0.25 mSv). The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small. The doses of radiation that are received by members of the public as a result of exposure to nuclear power facilities are so low (i.e., less than a few millirem) that resulting cancers attributed to the radiation have not been observed and would not be expected. Such low levels of radiation are not going to have a noticeable effect on the long-term health of children (i.e., most likely result in zero excess health effects).*

In addition to NRC's requirements to monitor radioactive effluents (routine and inadvertent) discharged into the environment, each nuclear power plant is required to have a radiological environmental monitoring program (REMP). The REMP quantifies the environmental impacts associated with radioactive effluent releases from the plant. The REMP monitors the environment over time, starting before the plant operates to establish background radiation levels and continuing throughout its operating lifetime to monitor radioactivity in the local environment. The REMP provides a mechanism for determining the levels of radioactivity in the environment to ensure that any accumulation of radionuclides released into the environment will not become significant as a result of plant operations. The REMP also measures radioactivity from other nuclear facilities that may be in the area (e.g., other nuclear power plants, hospitals using radioactive material, and research facilities).

Finally, although a number of studies of cancer incidence in the vicinity of nuclear power facilities have been conducted, to date, no studies accepted by the scientific community show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public. Specific studies that have been conducted include:

- *In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study covered the period from 1950 to 1984 and evaluated the change in mortality rates before and during facility operations. The study concluded that there was no evidence that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby.*
- *In June 2000, investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at the Three Mile Island power plant and cancer deaths among nearby residents. Their study followed 32,000 people who lived within 5 mi of the plant at the time of the accident.*
- *In January 2001, the Connecticut Academy of Sciences and Engineering issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded that radiation emissions were so low as to be negligible.*
- *The American Cancer Society in 2001 concluded that although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence that links strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled and involve negligible levels of exposure for nearby communities.*

- *Also in 2001, the Florida Bureau of Environmental Epidemiology reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations on which the claims were based, Florida officials were not able to identify unusually high rates of cancers in these counties compared with the rest of the state of Florida and the nation.*
- *In 2000, the Illinois Public Health Department compared childhood cancer statistics for counties with nuclear power plants to similar counties without nuclear plants and found no statistically significant difference.*

No changes were made to the EIS as a result of these comments.

Comment: The water [from the Fukushima plant in Japan] is running in the Pacific, and it is destroying the Pacific watershed. Whatever you do, don't go to Red Lobster for the Alaskan king crab special, because the shit is contaminated. They are letting food, into this country, from Japan that is 1,000 times allowable, that the Japanese would not even permit in their own country. So be careful where you are buying your food. (**0008-9-6** [August, Bernard])

Comment: But the Fukushima accident, Chernobyl, and Three Mile Island, have contaminated this planet, already, with high levels of radiation, and the cancer clusters are going to be showing up. Already the coast of California, the medical, the public health service has determined that there have been 10,000 children, that have died from that accident. (**0008-9-9** [August, Bernard])

Comment: The cumulative threat to life and fertility is subtle and widespread. There may be nothing to see or taste, not even a metallic trace, so without citizens monitoring (and even with counts) it may be difficult to locate the source. It seems to me that fallout from Fukushima was arriving here in snow -- what else could explain the high readings near Philly; like random spikes? (**0047-5** [Campion, Mary])

Response: *Given the great distances between Fukushima and the United States and the large amount of dilution and dispersion that would occur over this distance, only a trace amount of radioactivity was detected in the United States from this event. Based on the environmental measurements made to date by government agencies and non-government organizations, the Fukushima Dai-ichi accident has had no detectable impact on human health in the United States. In particular, EPA's air monitoring data have not shown any radioactive elements associated with the damaged Japanese reactors since late 2011, and even then, the levels found were very low—always well below any level of public health concern (EPA 2015-TN4217). Therefore, attributing any deaths in the U.S., especially a large number such as 10,000 deaths, as a result of radioactivity released from the Fukushima reactors is false and contrary to validated environmental monitoring data.*

The U.S. Food and Drug Administration (FDA) has systems in place to help ensure that our food supply is wholesome, safe to eat, and produced under sanitary conditions. To date, the FDA has no evidence that radionuclides from the Fukushima incident are present in the U.S. food supply at levels that would pose a public health concern. This is true for both FDA-regulated food products imported from Japan and U.S domestic food products, including seafood caught *off the coast of the United States. Consequently, the FDA is not advising consumers to alter their consumption of specific foods imported from Japan or domestically produced foods, including seafood. The FDA continues to closely monitor the situation at and around the Fukushima Dai-ichi facility, as it has since the start of the incident and will coordinate with other Federal and State agencies as necessary, standing ready to take action if needed, to ensure the safety of food in the U.S. marketplace (FDA 2014-TN4218).*

No changes were made in the EIS as a result of these comments.

Comment: [O]ysters are filter feeding bivalves that are known to accumulate, and in some cases bioconcentrate, radionuclides typically found in effluents from nuclear power plants such as cobalt-58, cobalt-60, zinc-65, and silver-110. Effluent specific radionuclides have been found in oysters as far as 7.5 miles from the point of discharge of nuclear power plants (McLean, R.I., J.K. Summers, K.A. Rose, and S. L. Domotor, 1987. Silver 110, Cobalt-58, and Zinc-65 Concentrations in the American Oyster, Crassostrea Virginica (Gmelin), Near the Calvert Cliffs Nuclear Power Plant, Maryland Power Plant Research Program, December 1987). The proximity of some of the Delaware Bay oyster beds to the PSEG Site, and the practice of transplanting large numbers of oysters from beds near the site to downstream beds that support a significant commercial fishery, make oyster consumption an important potential exposure pathway to man. As such, that pathway should be monitored as part of an effective Radiological Environmental Monitoring Program (REMP) for the proposed facility. (**0021-1-4** [Foster, Ruth])

Comment: Section 7.3.2.5 "Climate Change", Page 7-29, Lines 1-16: This section of the EIS references a 2011 report by the Partnership for the Delaware Estuary that examines the potential impacts of climate change on marine bivalve shellfish populations in the Delaware Estuary (PDE 2011-TN2190). According to that report, the combined effects of climate change, rising sea level, channel deepening, and increasing demands for freshwater from the Delaware River and nearby aquifers will result in a significant increase in the salinity of Delaware Bay. As a result, it is expected that the oyster population will expand further up the estuary, towards the PSEG Site. In that scenario, the populations located in down bay areas that currently support most of the commercial fishery (Direct Market Beds) would be depleted by the diseases that are more prevalent in high salinity conditions. The oyster populations in the upper bay, located just downstream from the PSEG Site, and that currently serve primarily as a source of transplants to replenish the down bay Direct Market beds, would then become the center of the commercial oyster harvest. The location of a large commercial oyster fishery just downstream from three existing nuclear power plants, and potentially one or two additional units, would result in a significant increase in the frequency of occurrence and concentration of effluent specific radionuclides in oysters that are sold for human consumption. Therefore, that exposure pathway should be monitored as part of an effective Radiological Environmental Monitoring Program (REMP) for the proposed facility. (**0021-1-8** [Foster, Ruth])

Response: *Consistent with the NRC's mission of protecting the public health and safety, NRC regulations require radiological monitoring to ensure that dose limits for workers and the public are not exceeded. In Section 6.2 of the ER, PSEG indicated that the existing PSEG REMP will serve as the new plant operational radiological monitoring program with additional onsite* *thermoluminescent dosimetry. Therefore, what is sampled under the current REMP would also be applied to a proposed new reactor if it was eventually built and operated.*

A licensee's REMP is subject to periodic NRC inspections in order to validate the effectiveness of the radioactive gaseous and liquid effluent release program which would include inspecting sample collection, monitoring, and dose measurement stations. The latest integrated inspection report which includes the inspection of PSEG's REMP was issued on January 30, 2015 (see ADAMS Accession No. ML14212A656). The staff understands that representatives from the NJDEP have observed prior inspections including the integrated inspection discussed in the January 30, 2015 report.

Due to the nature of the comment regarding the current and future REMP for the existing reactors, the appropriate staff in the Office Nuclear Reactor Regulation and Region I who have responsibility with oversight of the SGS and HCGS were notified of the comments for any appropriate actions or discussions with PSEG and the State of New Jersey on this matter.

No changes were made to the EIS based on these comments.

Comment: Page No. 5-89; Section No. 5.9.3.2; Line No. 20-23; The DEIS states: "The annual collective dose to the populations projected to live within 50 mi of PSEG in the year 2081 was not considered because, as stated in Section 5.9.1, direct dose contributions from the PSEG Site would be bounded by the ABWR design." What is the basis for this statement? PSEG does not state anywhere in the ER that the public dose for the year 2081 was not performed because the ABWR is the bounding technology from a radioactive release perspective. (**0015-3-18** [Mallon, James])

Response: *The NRC staff acknowledges this comment and has replaced this sentence with the following: "The estimated collective dose to the same population from natural background radiation is estimated as approximately 2,531,000 person-rem/yr. The dose from natural background radiation was calculated by multiplying the 50-mi radius population estimate (8,138,635) for the year 2081 by the annual background dose rate (311 mrem/yr) (NCRP 2009)."*

Section 5.9.3.2 was revised in the EIS as a result of this comment.

Comment: Section 2.11 "Radiological Environment", Page 2-191, Lines 2-3: As part of the discussion of the groundwater contamination caused by the spent fuel pool leak at SGS Unit 1, the NRC states that "No contamination is believed to have migrated to the unrestricted area." The direction of groundwater flow in the area of concern however, is towards the nearby Delaware River, and the licensee's groundwater monitoring data indicate that at least some of the contaminated groundwater has migrated into the river and therefore into the unrestricted area. Monitoring Well AG-S for example, is a shallow monitoring well (24.2 ft. below ground surface) located approximately 360 ft. down gradient from the source of contamination (seismic gap) and only 40 ft. from the bank of the Delaware River. Tritium concentrations as high as 33,200 pCi/L have been observed in groundwater samples from this well (January 2005). In addition, although the spent fuel pool leak was discovered in 2002, it was not until June of 2013 that the licensee determined that the contamination had reached the deeper Vincentown Aquifer as well as the shallow, water bearing unit. Well AA-V was installed in the Vincentown Aquifer (85 ft. below ground surface) in May of 2013 and is located approximately 130 feet from the river bank. Tritium concentrations in groundwater samples from Well AA-V have ranged from 7,000 to 13,000 pCi/L, several times higher than the tritium concentrations observed at the same location in the shallow, water bearing unit (Well AA). The installation of additional monitoring wells will be required in order to properly characterize the extent of the contamination in the Vincentown Aquifer. However, the available data suggest that at least some of the contaminated groundwater in this deeper formation has discharged or will discharge into the Delaware River. In fact, the licensee has performed a mass flux estimation of the quantity of tritium reaching the Delaware River. They estimated that 0.011 curies per year could reach the Delaware River from the shallow, water bearing unit, and 0.066 curies per year could reach the river from the deeper groundwater (Mass Flux Estimation Memo, PSEG Nuclear LLC, Salem and Hope Creek Nuclear Generating Stations, Hancocks Bridge, New Jersey, Prepared by ARCADIS U.S., Inc., Project No. NP000571.2013, dated October 29, 2013). (**0021-1-5** [Foster, Ruth])

Response: *The unrestricted area noted by the comment is in relation to PSEG's evaluations not identifying any immediate health and safety consequences of members of the public living nearby or who maybe on the Delaware River nearby the PSEG Site. The staff has reviewed the cited report along with quarterly remedial action plan reports regarding groundwater mitigation actions for the SGS reactors and tritium mass flux estimation into the Delaware River. As noted by PSEG in the 2013 annual effluent release report that "[t]he GRS [groundwater recovery system] is fully discussed in the quarterly Remedial Action Progress Reports (RAPR) provided to the State and the U.S. Nuclear Regulatory Commission by PSEG. Some of the wells on the plant perimeter have detectable tritium: PSEG has conservatively assumed that the tritium has reached the Delaware River, calculated the resultant exposure and included the results in the liquid effluent data reported earlier in this document." (see page 115 in PSEG 2014-TN4219). The resulting annual quantity of tritium conservatively estimated to have reached the Delaware River from this tritium plume of approximately 0.08 Ci is a small fraction of the annual radioactive liquid effluent release of tritium of approximately 700 Ci from SGS Unit 1 and 2 and HCGS for 2013 (PSEG 2014-TN4219 and PSEG 2014-TN4220). The text in Section 2.11 of the EIS has been revised to clarify between the potential for exposure from tritium in the groundwater to members of the public offsite along with clarification on tritium carried by groundwater likely reaching the Delaware River. Because a portion of the comment concerns installation of additional monitoring wells for the existing remedial actions, the appropriate staff in the Office Nuclear Reactor Regulation and Region I who have responsibility with oversight of the SGS and HCGS were notified of the comments for any appropriate actions or discussions with PSEG and the State of New Jersey on this matter.*

E.2.17 Comments Concerning Nonradiological Waste

Comment: Page No. 10-9; Section No. 10.2.1; Table 10-1; The table states that there is a minor decrease in capacity of waste treatment and disposal facilities as an unavoidable adverse impact associated with non-radiological waste. This is not discussed/identified elsewhere in the DEIS (**0015-7-6** [Mallon, James])

***Response:** In response to this comment, the text in Table 10-1 has been revised to state that an unavoidable impact of construction and operation is the minor increased consumption of landfill space for disposition of nonradiological wastes.*

E.2.18 Comments Concerning Design Basis Accidents

Comment: As you know about 80 percent of the people within the affected zone, if there is an accident, live here in Delaware. That is based on, I believe, your 2008 numbers. Just this week the new census neighbor numbers came out of the American Community Survey. I would ask that you update it to use that data, because Southern New Castle County has expanded considerably, particularly along the Route 9 corridor, which is where I live, and where the other things are. (**0007-2-3** [Carter, David])

***Response:** As discussed in Section 5.11.2.1 the accident calculations have been performed with the population projections for the year 2081. Therefore, this comment has already been addressed in the EIS. No changes have been made to the EIS as a result of this comment.*

Comment: There are some concerns I have with the communities, and I already saw, on the report, that there are no expected impacts to EJ communities. I think there are some problems with that, particularly, if you do have an accident. I think there are some serious impacts particularly to the lower end border communities in the rural areas around the plant in Delaware. (**0007-2-4** [Carter, David])

***Response:** Section 5.11 describes the environmental impacts of postulated accidents, both design basis accidents (DBAs) and severe accidents. The impacts to minorities or low-income communities would not be different than the impacts to other communities. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: Page No. 5-101; Section No. 5.11.1; Line No. 24-26; The DEIS states: "These evaluations used a set of surrogate DBAs representative for each of the reactor designs being considered for the PSEG Site and site-specific meteorological data." This statement is not accurate. SSAR Section 15.1, page 15.1-1, states: "Although PSEG is using the plant parameter envelope (PPE) approach discussed in Chapter 1, each technology is evaluated individually within this chapter. The analysis is performed for a broad spectrum of representative postulated design basis accidents (DBA) to determine the bounding radiological consequences that affect the safe design and siting of an advanced light-water reactor. The selected accidents are based on the LWR technologies being considered for development and the regulatory guidance for performing DBA analysis." (**0015-3-19** [Mallon, James])

***Response:** The statement in the EIS is accurate and consistent with the text in the SSAR. The DBAs are selected as described in the PSEG SSAR (Section 15.1) and in the PSEG ER (Section 7.1). The new nuclear reactor designs considered at this site are either certified or under design certification review. Therefore, their design parameters are well established and the word "surrogate" for the DBAs is not needed. To make the text of the EIS and the SSAR more consistent, the word "surrogate" has been deleted in Section 5.11.1 of the EIS.*

Comment: Page No. 7-45; Section No. 7.10; This section states that consideration was given to nuclear plants within a 50-mile radius of the PSEG ESP site, and it refers to Oyster Creek, TMI, and Calvert Cliffs. However, all of those plants are more than 50 miles from the PSEG ESP site, as discussed on page 7-3 of the DEIS. Therefore, either reference to those plants should be deleted, or the reference to the 50-mile radius should be deleted. (**0015-4-12** [Mallon, James])

Response: *Section 7.10, Postulated Accidents, of the EIS, third paragraph, states: "The cumulative analysis considers risk from potential severe accidents at all other existing and proposed nuclear power plants that have the potential to increase risks at any location within 50 mi of the PSEG Site. The 50-mi radius was selected to cover any potential overlaps from two or more nuclear plants." Therefore, nuclear plants that are located less than 100 mi from the PSEG Site need to be considered, since there will be overlaps of the 50-mi radius of the PSEG Site with the 50-mi radii of the surrounding nuclear plants. No changes have been made to the EIS as a result of this comment.*

Comment: Finally, the proposed site puts Delawareans at RISK. The three existing reactors, Salem reactors 1 & 2 and Hope Creek, are built in the Delaware River. While the address of the artificial island is in NJ, over 80% of the population living with the 10 mile "plume exposure pathway" lives in Delaware. (**0036-3** [Cornelia, Jared])

Response: *The risks and consequences of accidents at the PSEG Site are addressed in detail in Sections 5.11.1 and 5.11.2. The calculated environmental risks for a new reactor or reactors at the PSEG Site are very small, in fact, smaller than the risks of current reactors already operating at this site or at near sites (in Tables 5-30 and 5-31). The proposed new reactors are advanced reactor designs with reduced risks when compared to current reactor designs. The presence of a new reactor (or reactors) at the PSEG Site does not significantly change the overall environmental risk in the area. This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

E.2.19 Comments Concerning Severe Accidents

Comment: And for all the jobs that may be created by this plant, there is a significant risk if we get this wrong, of the job loss of making an area inhabitable. We cannot trade the prospect of a few thousand jobs with the loss of a livelihood of an entire area, if we get this wrong, particularly on nuclear waste. (**0007-11-7** [Spencer, Scott])

Response: *Section 5.11 describes the environmental impacts of postulated accidents, both DBAs (Section 5.11.1) and severe accidents (Section 5.11.2). The environmental risks associated with adding a reactor (or two reactors) at the PSEG Site are very small and well below NRC safety goals (addressed in Section 5.11.2.1 and Table 5-30 of the EIS). This comment provides no new information for consideration, and therefore, no changes were made to the EIS as a result of this comment.*

Comment: These plants are nothing more but staged nuclear weapons. Three Mile Island, Chernobyl, and Fukushima, have proved that. You have four core meltdowns going on down, right now, and China Syndrome, and they can't do anything about it, because they don't have the technology. You can't get close enough to those reactors without robots. They don't even have robots designed to fix it. (**0007-3-19** [August, Bernard])

Comment: This power plant, across the river, has every bit of nuclear waste, from the time that it began to operate. If there were a crisis, there, it would not be another Fukushima. It would be six times Fukushima. At Fukushima, within 88 miles, they have already found that this land is toxic, it is toxic in perpetuity. All of that farmland in New Jersey, toxic in perpetuity. Philadelphia, toxic in perpetuity. (**0007-4-6** [Campion, Mary])

Comment: And if you saw what happened in Japan, people right now are voluntarily evacuating out of Tokyo because of the explosions that happened at Fukushima. They don't even have the technology to stop the China Syndrome that is going on right now. They don't. They are in a technological shift, to make robots to go in, because human beings can't be exposed for no longer than five minutes, to some of the stuff that they have to get near of. They have been hit with two typhoons in the last two weeks. (**0008-9-5** [August, Bernard])

Comment: [The EIS] tries to mitigate concerns of a nuclear catastrophe by pointing to the recent catastrophe at Fukushima and "lessons learned" from that event. I wonder if the people living near Fukushima were given similar assurances when that facility was being proposed? I wonder if the people living in the shadow of Chernobyl were given assurances that this was good for them and what happened at Three Mile Island in the United States could never happen in Russia. No matter how remote or unlikely, not to consider the ramifications of such an event would be irresponsible and should weigh heavily on granting approval. After all, we don't want the PSEG Salem Nuclear site be someone else's reference for "lessons learned?" (**0012-7** [Magyar, David])

Response: *Section 5.11 of the EIS describes the environmental impacts of postulated accidents, both DBAs and severe accidents. The NRC, in its entirety, takes seriously its role for ensuring adequate protection of the public's health and safety. To this end, the NRC has taken various actions and is continuing to evaluate ways for enhancing the safety at U.S. reactors based on specific lessons learned from the event at Japan's Fukushima Dai-ichi nuclear power plant to address the concerns raised by the commenters. The additional measures to be implemented after the Fukushima accident are also described in Section 5.11. Basically, they include additional protection against severe natural phenomena (e.g., earthquake and flooding), improved mitigation of the effects of such events (e.g., restore and maintain long-term cooling of the reactor core and the spent fuel pool), better coping with emergencies, and improving the effectiveness of NRC programs. In its final SER, the applicant will address the additional safety measures taken from the lessons learned from the Fukushima accident.*

The NRC does not expect that the cited accidents will occur again, but the possibility cannot be entirely eliminated. No death or fatality attributable to nuclear power operation will ever be acceptable in the sense that the Commission would regard it as a routine or permissible event. NRC Fact Sheets that summarize the major accidents cited can be found at: http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/chernobyl-bg.html, http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-japan-events.html, and http://www.nrc.gov/japan/japan-info.html.

These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.

Comment: Similarly if there was an incident at the nuclear plant, what would happen to the other facilities that are very dangerous, that need to be constantly staffed, to make sure that an emergency, another emergency at one of those does not happen. (**0008-4-5** [Herron, Stephanie])

Response: *Other chemical/industrial facilities have their own emergency plans in case of a general evacuation of the area (due to weather or other industrial accidents)—their emergency plans are not within the scope of this EIS. Emergency preparedness for the new proposed nuclear plant will be addressed by the applicant in the SER. No changes have been made to the EIS as a result of this comment.*

Comment: After attending the public meeting on the evening of October 23, 2014, in Middletown, DE and having the opportunity to ask a question and after reviewing the information provided in the U.S.NRC's DEIS for an ESP at the PSEG site Readers Guide, I have come away with the following concerns: that neither the presentation nor the EIS documentation address local/national economic, social, or health issues that might arise as a result of a severe or catastrophic event that would result in the release of significant amounts of radioactive materials into the environment. (**0012-1** [Magyar, David])

Comment: Information presented in the EIS chapter 5.11 regarding the impact of a nuclear accident focused mainly on measures taken to prevent such an event and provided little or no information on the actual economic, social and health implications of such an event. What little information there was in the 31 pages of the 1500 page report, that addressed the consequences of a major release of radiation, was much too technical and the summary did nothing to put into context the overall effect of such an event. In fact the summary minimized the impact such an event would have by categorizing the impact level as "small." The report blatantly overlooks the potential impact to a region that is critical to the security and well being of the country. It overlooks the consequences of aggregating as many as five reactors in one location. When one takes into account the areas included in the 50 mi impact zone, one must consider that the sites proximity to major centers of commerce, population, transportation and national defense facilities make it a prime target for anyone seeking to have a major impact on our country. (**0012-4** [Magyar, David])

Response: *The risks of severe accidents at the PSEG Site are addressed in EIS Section 5.11.2. The Commission's policy statement on "Nuclear Power Plant Accident Considerations Under the National Environmental Polley Act of 1969" (45 FR 40101-TN4270) directs the NRC staff to discuss the environmental impacts of severe accidents in probabilistic terms (i.e., risk). Economic, health, and social risks are addressed in this section with results provided in Tables 5-26, 5-27, 5-28, and 5-29. The cumulative effects of several nuclear plants interacting in the same area are also considered and addressed in Section 7.10, by adding the risks from potential severe accidents from any existing and proposed nuclear power plants that have the potential to increase the risk at any location within 50 mi of the PSEG Site. Any nuclear plant (either existing or future) located less than 100 mi from the PSEG Site is considered for cumulative risks. After all those risks from interacting nuclear power plants are added, the overall risk impact at the PSEG Site is categorized as SMALL. Comments related to security* *and terrorism are safety issues that are not within the scope of the NRC staff's environmental review and are regulated by 10 CFR 73, "Physical Protection of Nuclear Power and Materials." These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

Comment: I think it is really important to think that, that this is not something that will only affect us, and only benefit us. But once this -- if there is an accident, once it is out, it is there forever. (**0007-4-10** [Campion, Mary])

Comment: If an event should occur that required the evacuation of and possible abandonment of the 50 mi. impact zone, virtually the entire state of Delaware, most of southern New Jersey, most of the Philadelphia and parts of the Baltimore metropolitan areas would have to be evacuated; the Northeast transportation corridor would have to be abandoned; both the Delaware and Chesapeake bays would be contaminated closing them to shipping as well as a source of food and water; millions of people would lose their homes, their jobs and their health. How this could be considered a "small" level of impact is beyond reason. (**0012-5** [Magyar, David])

Comment: When one weighs the potential for catastrophic impact one has to consider that there may not be any good place to put a nuclear reactor in the state of New Jersey or for that matter, anywhere else along the northeast coast. (**0012-8** [Magyar, David])

Comment: Why use an energy source that has such disastrous consequences if something goes wrong? (Human error, natural disaster or a terroristic strike for example.) Delaware residents make up the majority of the population who live within the current 10-mile evacuation zone. (**0024-3** [Doyle, Kathy])

Comment: I am concerned that, if built, this would be the largest nuclear facility in the US, and would be close to population, business, and government centers, with potentially catastrophic effects if something were to go wrong in a worst case scenario. (**0032-11** [Purcell, Leslie])

Comment: Regarding the future of my granddaughter and the other children of the area in the event of a big problem at Salem, in the aftermath of past disasters (Hiroshima, Nagasaki, Chernobyl, Fukushima), once a person is branded as a "survivor," they face many social stigmas. They become undesirable marriage partners. Many people at the public meetings in NJ and DE expressed their thankfulness for the jobs provided them, but at whose expense are these jobs? Possibly their children's. (**0046-2** [Campion, George])

Response: *The risks of severe accidents at the PSEG Site are addressed in detail in Section 5.11.2. The calculated environmental risks for a new reactor or reactors at the PSEG Site are very small, in fact, smaller than the risks of current reactors already operating at this site or at near sites (in Tables 5-30 and 5-31). The proposed new reactors are advanced reactor designs with reduced risks when compared to current reactor designs. The presence of a new reactor (or reactors) at the PSEG Site does not significantly change the overall environmental risk in the area. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

E.2.20 Comments Concerning the Uranium Fuel Cycle

Comment: We worried about safety issues and, even more, about the lack of a long-term safe repository for nuclear waste. We were not experts but we believe our concerns were real. (**0004-4-3** [Applegate, Jim])

Comment: I'm not here to debate the safety of nuclear power. I have great confidence in what has been done with the industry so far. But to build on a point of the official from PSEG, no new good nuclear without old good nuclear. Well, we haven't solved the problems of old good nuclear, if we still have waste piling up at these plants. (**0007-11-10** [Spencer, Scott])

Comment: And I would submit, if you look at the financials of PSEG, that they are not putting the proper set-asides, and reserves, for the cost of the removal and long-term storage of that waste. I don't believe many across the country are doing this. (**0007-11-11** [Spencer, Scott])

Comment: But I really would call on a moratorium on licensing renewals, and expansion, until the current waste issue is removed and solved. No debate. I was promised this back in the '70s. I was told, by these engineers, who are unfortunately dead and gone now, that this issue would be solved by the end of the century. And it is not fair, because now I have children who have been born, and children who will continue to be born, they didn't buy into this risk. And yet they are going to be paying for this risk, particularly, if we get it wrong. So I'm here to urge that today. There is a lot to debate in this EIS process. But the black and white issue here is, until we have a waste disposal and removal, and storage place in place, we are not going to get it done. We should have a moratorium. Because without a moratorium no one is paying attention to it, no one is listening. (**0007-11-13** [Spencer, Scott])

Comment: I will just close by just quoting from these documents, right here, from the document that is provided as a background on radioactive waste. It says, very simply, that on storage and disposal, at this time, there are no facilities for permanent disposal of high-level radioactive waste. And that since the only way radioactive waste finally becomes harmless is through decay, which are -- some isotopes contained in high level waste can take hundreds of thousands of years. The waste must be stored in a way that provides adequate protection for a very long time. I don't want to continue to face that risk in our own back yard. And it says, here, that the Department of Energy is preparing a license, to submit to the NRC, for construction and authorization for a repository of Yucca Mountain in Nevada. Although DOE's earlier plans were to submit the license and the application in December 2004, it has been delayed. That is going to be ten years now. I don't think this should be debated any longer. In all fairness to our current generation, and future generations, let's get this right, and let's get the attention of the industry by having a moratorium on these licensing until the waste is removed, and disposed, properly long-term, with a financing plan in place. (**0007-11-14** [Spencer, Scott])

Comment: The other area that I think the EIS process is significantly deficient is in looking at the current issues of waste storage, removal and disposal. There is a chapter 6, here, for fuel cycle transportation, decommissioning. I don't see any description, up front, other than transportation of radioactive material. (**0007-11-4** [Spencer, Scott])

Comment: What are we doing in terms of the storage issues, the disposal issue? And I would submit that even this summary of the nuclear power plant licensing process is significantly deficient, because there is no detailed discussion about the dangers of the on-site waste storage, and the ultimate fact that we have not solved the long-term waste disposal. (**0007-11-5** [Spencer, Scott])

Comment: In terms of job opportunities I think the unions have made it very clear, it is quite remarkable the job opportunities [for a new nuclear plant]. But there is, also, job opportunities in getting a waste disposal solution in place. (**0007-11-6** [Spencer, Scott])

Comment: I want to say that in terms of nuclear waste removal and storage, I brought this issue up when I was in high school, back in the '70s, at a hearing on Salem, over in New Jersey. And I will never forget, it was my first experience speaking publicly, and I was berated by, I don't know, whether it was someone from the NRC or an official. But they questioned me, what is my knowledge of nuclear power? And I simply brought up that why would we allow this plant to open, when we have no waste disposal solution in sight. We would not allow a suburban development to open without a way for the sewage and the trash removal to take place. I used that as an example. And they assured me, back in the '70s, that this solution was well understood by the engineers, and we would have a solution by the end of the century. Well, we are already in the next century, and now we are talking about expanding nuclear power. (**0007-11-8** [Spencer, Scott])

Comment: I really believe that we should not have a double standard here. When we require hotels, factories, retail establishments, restaurants, office complexes, housing developments, to all have a waste disposal system in place, before they are permitted, we should not continue to kick this problem down the road for nuclear power. (**0007-11-9** [Spencer, Scott])

Comment: I actually believe you should be required to model for sea level rise, based on the half-life of the 50 years of radioactive waste you are storing on that site, with no solution in site, of how we are going to deal with it. If you get Yucca Mountain, or someplace else, we can revisit that. And then you can deal with the environmental justice issues out there, which I think are part of it. (**0007-2-7** [Carter, David])

Comment: And with the processes of global warming occurring, and global flooding, and all of the problems of the waste storage, which will be around for 100,000 years, if you can supply electricity to it, to make it safe, then maybe. But you are not. You have totally unproven that you can even store nuclear waste. (**0007-3-14** [August, Bernard])

Comment: The nuclear waste is already being used in wars as depleted uranium. If you look at statistics, if you look at the images, you will see how horrible this waste is. You will see the horrible product of this. (**0007-4-2** [Campion, Mary])

Comment: This power plant, across the river, has every bit of nuclear waste, from the time that it began to operate. (**0007-4-5** [Campion, Mary])

Comment: So are you going to get all of the waste out that has ever been generated now, and will be generated in the future, before 2100, out of the Salem Hope Creek complex by 2100?

Because otherwise I don't understand how you can only use that 1.5 meters projection [for sea-level rise]. Of course, that doesn't include storm surge, and track events like storms. (**0007-5-7** [Herron, Stephanie])

Comment: Nuclear power is one of the few fuel sources that we have. And when people sit there and say we don't have a way of disposing of waste, well I hate to tell you, you are wrong. It has been around for a long time. And the only question is do we have the political will to do it? (**0008-10-2** [Deschere, Mark])

Comment: Nuclear waste remains a huge, huge problem. Since the inception of using nuclear power this has continued to be a problem, and it has never been addressed. I haven't seen it addressed here. It is my understanding that all the nuclear waste ever generated at the Salem Hope Creek facility is stored at that facility, which is right on our Delaware River, which is extremely concerning. Particularly given that we would like to add another reactor which would, presumably, store all its waste at that same location, which is on an artificial island, again, very vulnerable to sea level rise. (**0008-4-8** [Herron, Stephanie])

Comment: And they [the National Academies of Science/National Research Council] do have a voluminous, several books, out on the problems of disposal of used and spent nuclear materials and nuclear waste. And that problem has not been solved. This is, probably, the only industry, or the only construction project I can think of, for a major industry, that we are looking at moving ahead, and continuing to approve, who do not have any idea yet, or any approved way, to deal with their waste stream. We have almost 50 years of nuclear waste accumulating along the Delaware River. We do not have a clear vision of what to do with that waste. (**0008-8-2** [Carter, David])

Comment: I know that after the meeting, earlier, I spoke with some of the consultants, and staff, for the project. And they explained to me that [nuclear waste] is not a technical problem, it is a political problem. That may be true but I think you need to solve the problem before we continue to build more nuclear power. I actually believe, until we solve that problem, we need to put a moratorium on nuclear power, because this is serious stuff, to keep building up and stockpiling and, particularly, stockpiling it along a water body where, if it does have a problem, it can spread very quickly, and move through the water stream and be very, very problematic. (**0008-8-3** [Carter, David])

Comment: Building of a new plant should be off the drawing board until the storage of the plants used control rods is resolved. It is just ridiculous to even consider the site as a storage area for all this radioactive material. (**0011-7** [Keating, Thomas])

Comment: [Flooding and sea level rise] should be of great concern, especially with regard to the possible on-site storage of nuclear waste. (**0013-2** [Oppelt, John])

Comment: Page No. 6-16; Section No. 6.1.6; Line No. 37-39; Strike the sentence stating that the NRC will not issue an ESP until the court's remand of the Waste Confidence Rule is appropriately addressed. That result is not required as a matter of law. While the NRC may take such action as a matter of discretion, there is no reason to include such a statement in the

EIS. Additionally, the Commission has now issued an order (CLI-14-08) lifting the previous suspension of final licensing actions. (**0015-4-1** [Mallon, James])

Comment: Page No. 6-17; Section No. 6.1.6; Line No. 5; For the reason discussed in the previous comment, change the word "required" to "included". (**0015-4-2** [Mallon, James])

Comment: Page No. 6-17; Section No. 6.1.6; Line No. 6-8; For the reason discussed in the comment related to page 6-16, lines 3739, delete this sentence since it is unnecessary. (**0015-4-3** [Mallon, James])

Comment: Page Nos. 6-16 to 6-7; Section No. 6.1.6; These pages discuss the recent developments related to the environmental impacts of spent fuel storage following operation, commonly referred to as "waste confidence" issues. The discussion, however, ends with the September 2013 proposed rule and the Commission's abeyance on final reactor licensing decisions until these issues are resolved. There have been subsequent developments immediately preceding and following publication of the DEIS that should be addressed in the FEIS. Specifically, the NRC staff sent the draft final rule on continued storage of spent fuel after operation to the Commission in SECY-14-0072 for approval, and that final rule was approved by the Commission for publication with relatively minor revisions in the August 26, 2014 Staff Requirements Memorandum for SECY-14-0072. The Commission also issued Memorandum and Order CLI-14-08 that lifted the abeyance on final reactor licensing decisions as of the effective date of the final rule. The final rule was published on September 19, 2014, and effective on October 20, 2014. The FEIS should discuss these developments, but no further analysis should be necessary because the revised 10 CFR 51.23 states that the environmental impacts of continued storage have been generically and conclusively determined in NUREG-2157, and the impact determinations in NUREG-2157 shall be deemed incorporated into environmental impact statements. (**0015-4-4** [Mallon, James])

Comment: There are three main concerns that I have about your proposal. They are waste disposal; fish and marine creatures kills; and safety. Your waste disposal proposal seems to be more of the same. It makes little sense. (**0019-3** [Passmore, Wills])

Comment: It is possible that the new proposed site may not be decommissioned until 2200. Long term planning must address potential complications as a result sea level rise which may compromise spent fuel storage facilities. (**0023-2-11** [Cooksey, Sarah])

Comment: The radioactive waste keeps piling up in temporary storage facilities. No one has figured out how to deal with this waste. How is this acceptable? (**0024-2** [Doyle, Kathy])

Comment: Disposal of waste - there is no permanent facility or plan. Current on-site storage is a danger to the local environment and surrounding communities, across the Delaware River and along the Eastern seaboard--including Philadelphia and NYC, dense population centers. (**0032-8** [Purcell, Leslie])

Comment: The solution to the safe storage of nuclear waste has been just around the corner since 1970. We are no closer now. One of the main dangers at the Fukushima disaster involved the waste stored on site. I could not build a house without having a plan to deal with the waste I generate. How is the nuclear industry exempt from this requirement? I suggest a moratorium on new plants if not the shutting down of existing sites. (**0046-1** [Campion, George])

Response: *These comments express concerns about certain environmental impacts of the uranium fuel cycle, including the management of radioactive waste. Section 6.1 of the EIS addresses these topics. The analysis in Section 6.1 is based on 10 CFR 51.51(a), Table S–3, Table of Uranium Fuel Cycle Environmental Data.*

Section 6.1.6 has been revised to incorporate the recently issued final rulemaking related to continued storage of spent nuclear fuel. On August 26, 2014, the Commission issued a revised rule at 10 CFR 51.23 and associated Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel (NUREG–2157). The revised rule adopts the generic impact determinations made in NUREG–2157 and codifies the NRC's generic determinations regarding the environmental impacts of continued storage of spent nuclear fuel beyond a reactor's operating license. The NRC staff has considered, in Section 6.1.6, the incorporation of the generic impacts of continued storage in the context of the PSEG environmental review. As directed by 10 CFR 51.23(b), the impacts assessed in NUREG–2157 are deemed incorporated into this EIS.

Several of the comments express concern regarding climate change impacts, such as sea-level rise, on continued storage of spent fuel onsite. NUREG–2157 addresses potential climate change impacts on continued storage of spent fuel in Section 4.18. This section identifies possible corrective actions for radioactive waste and spent fuel storage facilities that could be threatened by rising sea level. In the event of climate change-induced sea-level rise, the NRC would require licensees to implement corrective actions to identify and correct conditions adverse to safety. The NRC requires licensees to take these corrective actions regardless of the mechanism creating the condition adverse to safety. As directed by 10 CFR 51.23(b), the impacts assessed in NUREG–2157 are deemed incorporated into this EIS.

Comment: And where does all the uranium come from, by the way? Last time I checked none of it comes from the United States, or very little. So anybody ever live through the Arab embargo with oil? Have we given that consideration, and the reliability of the uranium? (**0006-4-7** [Brook, David])

Comment: But if you look at the whole life cycle of how is the uranium mined, where is it coming from? A lot of it is coming from, I believe, it is Navajo land, Native American land. It has a lot of negative effects on their land, there is radioactivity in the soil. There is radioactivity in the water. They have health effects. That is an environmental justice impact. (**0007-13-5** [Purcell, Leslie])

Comment: Total energy costs of nuclear energy production must include uranium mining, effects of mining on land/water, tribal territories and populations--this is an environmental justice and health issue as well. (**0032-6** [Purcell, Leslie])

Comment: The nuclear chain is toxic and energy intensive from start to finish. Abandoned mines (near schools) in South Dakota are hotter than the evacuation zone of Chernobyl. We thought the zone would support wildlife, but new generations are weakened. Certainly the bio toxic products of generation could be considered as an environmental impact. (**0047-4** [Campion, Mary])

Response: *Section 6.1 of the EIS addresses the environmental impacts of the uranium fuel cycle, including the supply of uranium used as fuel. The analysis in Section 6.1 is based on 10 CFR 51.51(a), Table S–3, Table of Uranium Fuel Cycle Environmental Data. Sources of uranium are discussed in Section 6.1 of the EIS; as discussed there, there is renewed interest in uranium recovery in the United States. The environmental impact of uranium recovery is addressed in Table S–3. An environmental review is performed in response to an application for a uranium recovery operation. These reviews would address the effects of uranium recovery on land and water, health, and environmental justice. Specific issues associated with individual uranium recovery operations are beyond the scope of this EIS, and no changes were made to the EIS as a result of these comments.*

Comment: We are, then, left with the nuclear industry. While there is the issue of waste which, I hope, the Government and the NRC can begin to reprocess, and recycle back to fuel, I have come to tour plants, and have had hours of discussions with employees and neighbors. (**0004-14-1** [Moscovici, Dan])

Comment: Finally I would be remiss if I didn't add a little interjection, here, on this overarching issue. I would like to add that our New Jersey Congressional Delegation, all of Congress, they need to address the recycling of nuclear fuel. Right now other countries are allowed to do this. We are behind the eight ball. We must have that ability to do this, here in the United States. The federal government must have a stable public policy supporting recycling that enables companies to make long term capital intensive investments. (**0004-2-13** [Egenton, Michael])

Response: *As stated in Section 6.1 of the EIS, assessment of environmental impacts of the fuel cycle as related to the operation of new nuclear units at the PSEG Site is based on the values given in Table S–3. In developing Table S–3, the NRC staff considered impacts from both fuel cycles (no-recycle and uranium-only). The impacts presented in Table S–3 are maximized for both of the fuel cycles; that is, the identified environmental impacts are based on the cycle that results in the greater impact. The current national policy, as found in the Nuclear Waste Policy Act (42 USC 10101 et seq.), mandates that high-level and transuranic wastes be buried at a deep geologic repository. While Federal policy no longer prohibits reprocessing and recycling, additional governmental and commercial efforts would be needed before commercial reprocessing and recycling of spent fuel from U.S. nuclear power reactors would occur. Thus, this assessment is based upon the "no-recycle" option at this time. No changes were made to the EIS as a result of these comments.*

Comment: Page No. 6-10; Section No. 6.1.3; Line No. 10-11; The statement that 750,000 MT of CO2 is less than 3% of New Jersey's annual emissions is much too high, given the statement on page 7-37 of the DEIS that New Jersey's annual emissions are 143 million MT of CO2. (**0015-3-20** [Mallon, James])

Response: *The text in Section 6.1.3 has been changed to read "less than 1 percent of New Jersey's annual emissions."*

E.2.21 Comments Concerning Transportation

Comment: Page No. 6-26; Section No. 6.2.1.1; Line No. 14-16; The DEIS states: "This value slightly exceeds the 2-rem/year DOE administrative control level for individual doses (DOE 2005-TN1235) and is about 40 percent of the 5-rem/year NRC occupational dose limit (see 10 CFR 20-TN283)." This sentence should be deleted. The sentence inappropriately compares individual dose limits to cumulative doses to all inspectors. (**0015-4-6** [Mallon, James])

Response: *The individual dose to vehicle inspectors presented in Section 6.2.1.1 of the EIS is based on an individual inspecting 149 shipments of unirradiated fuel, spent fuel, and radioactive waste per year, and is the cumulative dose over all inspections in a year but is not the cumulative dose to all inspectors. No change was made to the EIS as a result of this comment.*

Comment: The State of Delaware has laws that prohibit the transport, storage, disposal or reprocessing of spent nuclear fuel in the State. Should future national policy allow for the relocation of spent fuel from the PSEG site to a federal repository, the route of transfer may be affected by Delaware law. See the Delaware Authority on Radiation Protection and the Delaware Code Title 16 Chapter 74 for more information. The text of this regulation is available here: http://delcode.delaware.gov/title16/c074/index.shtml. (**0023-2-10** [Cooksey, Sarah])

Response: *Should future national policy allow for the relocation of spent fuel from the PSEG Site to a Federal repository, U.S. Department of Transportation (DOT) regulations allow States to designate preferred routes for radioactive material shipments, which ensures routes for spent fuel transportation avoid locations where unsafe conditions of travel could be encountered. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 6-19; Section No. 6.2; Line No. 37-38; The DEIS states: "However, the ER does not present the transportation impacts for the alternative sites evaluated in this EIS." This statement is inaccurate. In response to RAI Env-12, Question 6.0-4, PSEG revised the ER to address the transportation impacts from the alternative sites. (**0015-4-5** [Mallon, James])

Response: *In Sections 5.7.2.2.1, 5.7.2.2.2, and 5.7.2.2.3 of the PSEG ER, the ER states that the difference in incident-free consequences due to transportation of unirradiated fuel, irradiated fuel, and radwaste to the alternative sites is not significant due to the small differences in mileage between the alternative sites and the assumed fabrication facility, assumed repository, and assumed radwaste repository, respectively. In addition, the ER states that an evaluation of the environmental impact due to transportation of unirradiated fuel, irradiated fuel, and radwaste at alternative sites 7-1, 7-2, 7-3, and 4-1 indicates that the alternative sites are not obviously superior to the PSEG Site (Sections 5.7.2.4 and 7.4.3). However, the ER does not present the transportation impacts associated with these alternative sites as are presented in Section 6.2 of the EIS. No changes were made to the EIS as a result of this comment.*

E.2.22 Comments Concerning Decommissioning

Comment: The EIS fails to intelligently discuss, to discuss these aspects, nor the incredible costs that all of the PSEG customers, like myself, will pay for this plant, and its decommissioning over time. (**0006-4-8** [Brook, David])

Comment: But the continuation of nuclear energy, over there at Salem, with the behemoths that they have there now, that they need to shut down, and decommission, and don't have the money for, because they are not putting the money for the decommissioning costs. (**0008-9-7** [August, Bernard])

Comment: A nuclear power plant decommissioning analysis with associated costs should be included in the DEIS. The DEIS very briefly discusses decommissioning of a future nuclear power plant in Sections 6.3 and 7.11.3. NRC discusses the impacts and concludes they are "small." The level of discussion and consideration of the costs of decommissioning is seriously lacking. They will not be "small." (**0020-4-10** [van Rossum, Maya])

Comment: The NRC should have provided past experiences and information on prior nuclear power plant decommissioning in order to present information for the public to consider as to the costs, the risks, and the wisdom of building a new nuclear reactor. (**0020-4-12** [van Rossum, Maya])

Response: *These comments deal with decommissioning. The PSEG application is for an ESP, and there are variations with how certain aspects of the environmental review are addressed for an ESP versus a COL application. For an ESP, applicants are not required to submit information regarding the process of decommissioning (e.g., the method chosen for decommissioning, the schedule, or any other aspect of planning for decommissioning). However, PSEG did provide information on the environmental impacts of decommissioning in Section 5.9 of its ER—submitted as part of its application. The environmental impacts of decommissioning are based on NUREG–0586, Supplement 1. The GEIS incorporates experience and information from earlier nuclear power plant decommissioning activities. The NRC staff's evaluation of the environmental impacts of decommissioning presented in the GEIS identifies a range of impacts for each environmental issue for a range of different reactor designs, and the staff has no reason to believe that the impacts discussed in the GEIS are not bounding for reactors deployed after 2002.*

If PSEG applies for a license to operate a new nuclear power plant at the PSEG Site, there is a requirement to provide a report containing a certification that financial assurance for radiological decommissioning would be provided per 10 CFR 50.33(k). As part of its review of a license application, NRC would review the financial assurance documentation to assure that all applicable requirements are met.

No changes were made to the EIS as a result of these comments.

E.2.25 Comments Concerning Cumulative Impacts

Comment: And I think the transport, the mining, the transport, all the processing of the fuel, is also an impact that needs to be considered as one of the cumulative impacts. (**0007-13-7** [Purcell, Leslie])

Response: *The NRC staff discusses the uranium fuel cycle, including mining, processing, and transporting, in Sections 6.1 through 6.3 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 7-1; Section No. 7.0; Line No. 2-3; This sentence states that NEPA requires consideration of cumulative impacts. However, NEPA does not mention cumulative impacts. Therefore, this sentence should be revised to state that the CEQ regulations under NEPA require consideration of cumulative impacts. (**0015-4-7** [Mallon, James])

Response: *The text in EIS Section 7.0 has been revised to reflect that NRC regulations implementing NEPA require the consideration of cumulative impacts.*

E.2.26 Comments Concerning the Need for Power

Comment: At the May 6th, and November 20th, 2010 public meetings that the NRC held on this project, I commented on the importance on providing additional electrical generation capacity to meet the energy needs of New Jersey residents and businesses. Those comments are still applicable, especially the need to provide baseload generating capacity, which another speaker talked about, supplemented by renewable energy resources, such as wind and solar, in New Jersey. (**0004-16-3** [Molzahn, Robert])

Comment: The demand for electric continues to increase. Everything is plugged in, these days, and we live in a 24-7 world. For that we need baseload power. The new nuclear plant could provide up to 28 percent of the projected increase in baseload demand. (**0004-18-3** [Hufsey, Moe])

Comment: Back in 2010, in May, November, in previous meetings on this matter, we provided testimony at that time. In fact, we need additional generating capacity to meet the energy needs of New Jersey residents and businesses. Those comments are still applicable today, especially in the need to provide baseloading generation, which can be supplemented by renewable energy, such as wind and solar. (**0007-16-3** [Palmer, Dennis])

Comment: Demand for electricity continued increase, everything is plugged in these days. And we live in a 24-7 world. For that we need baseload power. The new nuclear plant will provide up to 28 percent of the projected increase in baseload demand. (**0007-8-4** [Spiese, Steve])

Response: *These comments express support for the baseload power that would be generated by a new nuclear plant at the PSEG Site, but they provide no new information for additional analysis. No changes were made to the EIS as a result of these comments.*

Comment: We are given a figure as to how much electricity will be needed in the future, but I don't know where that figure comes from. And does that seriously consider real conservation efforts? So I just would like to put that out there, also. (**0007-13-3** [Purcell, Leslie])

Comment: Also, the baseload model that we have been having, for the last 200 years, is going by the way of the Tin Lizzy. I'm a solar producer. I will be able to supply my own electricity, at my own house, with battery, current battery technology, and conservation. (**0007-3-12** [August, Bernard])

Comment: In addition, the NRC and the applicant have not demonstrated a need for this project. (**0020-1-6** [van Rossum, Maya])

Comment: The DEIS fails to identify a real need for power, and thus there is no need for this nuclear power plant. Section 8.0 of the DEIS performs an analysis of whether there is sufficient baseload available or whether the baseload from this plant is needed by the year 2023. The analysis area is New Jersey. There is no stated real need for this plant since there is already capacity to produce this electricity and that any additional needs could readily be met with less expensive, smaller decentralized sustainable generation. Nowhere in this DEIS does NRC identify a shortage of available baseload for the PSEG service area, and nowhere in any analysis does it require NRC to only consider power generation that only comes from within the PSEG service area. Electricity is freely exchanged between all providers and that is specifically why the PJM network has been successful and cost efficient at delivering reliable baseload to the entire region. (**0020-5-2** [van Rossum, Maya])

Comment: Based upon the PSEG's own predictions, its service area might need something under 1 MW of additional supply by 2023, and this need could readily be supplied by less expensive renewable power. It appears that the only justification presented for this new plant in the DEIS is this plant would replace other baseload already available to New Jersey. DRN does not believe that this analysis demonstrates a legitimate need for a power plant that will cause irreparable harm to the environment and might cost upwards of $10 billion or more by the time it is actually completed. (**0020-5-3** [van Rossum, Maya])

Comment: We must question why there is a push to build Salem 4 at this time. Electricity demand is stable and energy efficiency is constantly improving. In 2010 New Jersey passed landmark legislation, signed by Governor Christie, committing the state to building 1,100 Mega Watts of offshore wind generation by 2020. This suggests a real commitment to renewable energy, but approval of Salem 4 may make it less likely that this commitment is honored. (**0022-12** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: The Population growth estimate, upon which the asserted need for future additional power is based, is only a planning projection which may not be fulfilled. (**0032-4** [Purcell, Leslie])

Response: *The NRC staff's methodology and sources for its need for power determination can be found in Chapter 8 of the EIS. These comments provide no new information for additional analysis. No changes were made to the EIS as a result of these comments.*

Comment: [T]he baseload power load, for this area, could be easily met by alternative energies. Reports from the National Energy Research Laboratory has shown that by 2030, if we go with wind, solar, and hydroelectric, and conservation measures, we would not have to be building any power plants, and we could be like Germany, shutting the present ones down. (**0007-3-9** [August, Bernard])

Response: *In Section 9.2 of the EIS, the NRC staff presented an assessment of the viability of renewable energy sources and conservation measures as an alternative to the postulated nuclear plant. This assessment concluded that reliance on renewable energy sources and conservation is not a viable alternative to a baseload generating unit. The comment did not provide new information and will not be evaluated further. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 8-1; Section No. 8.0; A paragraph should be added to Section 8.0 to state that PSEG's Need for Power analysis is based on baseload power forecasts, while the NRC Need for Power analysis evaluated peak load forecasts. A summary sentence should conclude that the two analyses are consistent with each other. (**0015-4-15** [Mallon, James])

Response: *This comment identifies a deficiency in the EIS. Section 8.0 has been revised in response to this comment.*

Comment: Page No. 8-1; Section No. 8.0; Line No. 24-26; These lines say that forecasts "are provided through 2024, 3 years after the planned commercial operation date of 2021". In fact, however, Chapter 8 presents forecasts only through 2023, which is 2 years after the planned commercial operation date. (**0015-4-16** [Mallon, James])

Comment: Page No. 8-1; Section No. 8.0; Line No. 40-41; This sentence is confusing because it incorrectly implies that an AP1000 has a larger electrical output than the other three designs. The first clause of this sentence should be rewritten to state: "Because a two-unit Advanced Passive 1000 plant has a larger net electrical output at 2,200 MW(e) than a single unit of any of the other designs" (**0015-4-18** [Mallon, James])

Comment: Page No. 8-2; Section No. 8.0; Line No. 4-19; The summary of results does not address the need for power. It only addresses the identification of the market area (RSA) as NJ, high power rates in NJ, and the alignment with the NJ Energy Master Plan. (**0015-4-19** [Mallon, James])

Comment: Page No. 8-20; Section No. 8.3; Line No. 22-23; For clarity, the Long-Term Capacity Agreement Pilot Program is currently under litigation and of the three proposed combined cycle gas-fired generating projects that comprise the 1,949 MW of capacity, only may be moving forward independent of the program. (**0015-5-10** [Mallon, James])

Comment: Page No. 8-20; Section No. 8.3; Table 8-6; Table 8-6 shows NJ 2014 installed capacity of 20,808 MW, but Lines 17 and 29 say that 20,808 MW is the 2012 capacity in NJ. It is very unlikely that the 2012 and 2014 numbers should be the same. ER Table 8.3-3 shows that the 2012-13 NJ capacity is 18,126 MW. (**0015-5-11** [Mallon, James])

Comment: Page No. 8-22; Section No. 8.5; Line No. 8-9; These lines say that the PSEG plant would alleviate "about a third of the gap between forecast demand and forecast supply". In fact, the DEIS analysis shows that the PSEG plant would alleviate about half of the gap. (**0015-5-12** [Mallon, James])

Comment: Page No. 8-22; Section No. 8.5; Line No. 11-13; These lines say that the DEIS analysis shows a need for additional capacity "3 years after the commencement of full operations (2023)", but the analysis actually ends 2 years after the commencement of full operations. (**0015-5-13** [Mallon, James])

Comment: Page No. 8-12; Section No. 8.2; Line No. 11; For clarity, the PJM load forecast only provides forecasts of peak load and energy demand. It does not forecast baseload energy as implied in this sentence. (**0015-5-3** [Mallon, James])

Comment: Page No. 8-13; Section No. 8.2.1.1; Line No. 11; Growth rates in Table 8-1 appear to be the growth from the beginning year to the ending year for each period--not the annual growth rate each year during the period as stated in the title of the table. The text immediately preceding the table quotes annual average growth rates similar to those in ER Table 8.2-3. (**0015-5-4** [Mallon, James])

Comment: Page No. 8-16; Section No. 8.2.2; Line No. 1; Reword to state" ..10 year growth rates in summer peak were...." (**0015-5-5** [Mallon, James])

Comment: Page No. 8-17; Section No. 8.2.2; Line No. 23; The reference cited for RFC Reserve Requirements is incorrect -TN3176 is associated with an NJDEP letter referring to rare species for an alternative site. (**0015-5-6** [Mallon, James])

Comment: Page No. 8-19; Section No. 8.3; Line No. 10-11; Based on the stated capacity values for natural gas and coal generation, the percentage stated for 2012 carbon-based fuels should be nominally 73 percent of all generating capacity not 18 percent. (**0015-5-8** [Mallon, James])

Response: *These comments deal with editorial corrections to the EIS, and the EIS has been revised in response to each individual comment.*

Comment: Page No. 8-1; Section No. 8.0; Line No. 28; For clarity, reword to state "In 2010, PSEG developed projections of the need for baseload electricity based on PJM forecasts of electricity demand and information available at that time." (**0015-4-17** [Mallon, James])

Comment: Page No. 8-3; Section No. 8.1.1; Line No. 15; Imported resources serve both baseload and peak demand, therefore, for clarity, reword to state "...rely on imported power to meet growth in electricity demand". (**0015-4-20** [Mallon, James])

Comment: Page No. 8-4; Section No. 8.1.1; Line No. 10; Delete the phrase "only minimal criteria or ". That phrase makes no sense in the context of the sentence. (**0015-5-1** [Mallon, James])

Comment: Page No. 8-12; Section No. 8.2; Line No. 9; For clarity, the estimates of baseload demand were initially developed by PSEG based on the 2008 PJM load forecast and later validated with a baseload demand estimate based on the PJM 2012 load forecast. (**0015-5-2** [Mallon, James])

Comment: Page No. 8-18; Section No. 8.3; Line No. 4-5; The 2013 PJM Load Forecast report is identified as the source for generation resource data, but PJM's Load Forecast report does not address generation resources. (**0015-5-7** [Mallon, James])

Comment: Page No. 8-19; Section No. 8.3; Line No. 13-14; There are currently no Marcellus Shale natural gas fields in New Jersey. (**0015-5-9** [Mallon, James])

Response: *These comments deal with editorial corrections to the EIS; however, upon detailed review of each comment, the NRC staff has determined that no revisions to the EIS are needed. No changes were made to the EIS as a result of these comments.*

E.2.27 Comments Concerning the No-Action Alternative

Comment: Page No. 9-3; Section No. 9.1; This section should include a conclusion. We recommend the following conclusion: "If the ESP were not issued and no additional measures were implemented to generate power, then the need for power discussed in Chapter 8 would not be met. Therefore, the purpose and need of this project would not be satisfied if the no-action alternative was chosen and the need for power was not met by other means." (**0015-5-15** [Mallon, James])

Comment: Page No. 10-22; Section No. 10.5; Line No. 37; See the comment on Section 9.1 about adding a conclusion sentence. Add the same sentence here. (**0015-7-12** [Mallon, James])

Response: *These comments contain recommendations for revisions to the text in the EIS regarding the no-action alternative. The language recommended in the comments describes the potential consequences of not operating a new nuclear power plant at the PSEG Site; however, the NRC's no-action alternative would be to deny the request for an ESP for the site. Because an ESP does not authorize the building and operation of a nuclear power plant, no conclusions can be drawn in regard to not building a new nuclear power plant at the PSEG Site under the no-action alternative. For these reasons, no changes were made to the EIS as a result of these comments.*

E.2.28 Comments Concerning Energy Alternatives

Comment: Page No. 9-7; Section No. 9.2.1.3; Line No. 31-32; Change "The review team concluded in Chapter 8 that there is a justified need for power in the PSEG ROI...." to "The review team concluded in Chapter 8 that there is a justified need for power in the PSEG RSA which covers the same area as the ROI...." (**0015-5-16** [Mallon, James])

Comment: Page No. 9-7; Section No. 9.2.1.3; Line No. 33; For clarity, text should be revised to read "Because PSEG Power only owns generating plants..." (**0015-5-17** [Mallon, James])

Comment: Page No. 9-21; Section No. 9.2.3.1; Footnote; The DEIS states "... IGCC plant in Kemper County, Mississippi, ...and a planned commercial operations date of May 2014." As of September 15, 2014 the planned commercial operations date is May 2015. (**0015-5-20** [Mallon, James])

Comment: Page No. 9-36; Section No. 9.2.4; Line No. 18-20; The DEIS states: "For example, as a result of New Jersey's Long-Term Capacity Agreement Pilot Program, contracts have been awarded for the construction of three natural-gas combined-cycle projects with a total capacity of 1,949 MW(e) (New Jersey 201 1-TN2115)." A federal judge, on October 11, 2013, concluded that the L-CAPP law was unconstitutional. (**0015-6-1** [Mallon, James])

Comment: Page No. 9-38; Section No. 9.2.4; Line No. 20-21; This sentence states that the adverse socioeconomic impacts would be SMALL. That is inconsistent with Tables 9-3 and 9-4, which classify the adverse socioeconomic impacts as MODERATE. (**0015-6-3** [Mallon, James])

Response: *These comments contain recommendations for revisions and/or changes to the text in the EIS. In response to these comments, the EIS has been revised at the locations* *indicated in the respective comments; however, the specific revisions that have been incorporated into this EIS may not exactly match the language contained in the recommendations in each comment.*

Comment: By the way, I object to the appellation of industrial wind plants as wind farms. When they are referred to as wind farms the misconception is of benign bucolic scenes of farms of yesteryear, with a small many bladed wind turbine mill standing nearby. The DEIS should refer to them as industrial wind plants. (**0004-12-6** [Eastman, Alice (Ajax)])

Response: *The objection to the phrase "wind farms" in the comment is noted; however, this phrase is an acceptable description of the industrial wind facilities that would harvest wind energy. In addition, the phrase "wind farms" is understood and recognized by the general public. Because this comment did not provide any specific information relating to the environmental effects of the proposed action, no changes were made to the EIS as a result of this comment.*

Comment: But if we want, for a long term, have a viable society based on an energy source, while we are waiting for the next great hope, of which I heard several of them here, and having worked in fuel cells in DuPont, they are a long, long way off before they become a significant reliable source. (**0008-10-1** [Deschere, Mark])

Response: *Section 9.2.2 discusses sources of energy that could be used for new electric power generation facilities and addresses the issue raised in the comment regarding whether those energy sources are viable for generating the amount of baseload electricity being contemplated under the Proposed Action. Note that the discussion in Section 9.2 includes fuel cells (Section 9.2.2.9). This comment did not provide any specific information relating to the environmental effects of the proposed action; hence, no changes were made to the EIS as a result of this comment.*

Comment: What we are left, then, with is coal, natural gas, hydro, and nuclear, to cover the scale and timing of our energy demand. We have been moving away from coal due to health effects, and devastating impacts, from mountain top removal. Natural gas has become our bridge. However, living in the lower Delaware River watershed I'm really concerned for what will happen in the future with fracking. We need water to survive, and we may see its contamination. I also don't see a renaissance in large scale hydro in this area. (**0004-14-5** [Moscovici, Dan])

Comment: At the May 6th, and November 0th, 2010 public meetings that the NRC held on this project, I commented on the importance on providing additional electrical generation capacity to meet the energy needs of New Jersey residents and businesses. Those comments are still applicable, especially the need to provide baseload generating capacity, which another speaker talked about, supplemented by renewable energy resources, such as wind and solar, in New Jersey. (**0004-16-4** [Molzahn, Robert])

Comment: We also believe that the alternative energy options have not been given fair or due consideration. Truly sustainable energy options, really, are available here in New Jersey, here in the Delaware River region, including solar panels, geothermal, some very interesting water technologies. And there is more opportunities coming out every day. And we do not believe that they have been given due and fair consideration, by the NRC in the Environmental Impact Statement that has been put forth. (**0004-3-10** [van Rossum, Maya])

Comment: A second category of what can we do, bring more renewables energy sources on line. Here we like solar energy, wind energy, and bio fuels. At the time we were discussing these ideas we had only limited experience with these techniques and technologies. Experience, over the past decades, tells us that each of these solutions comes with a cost. We cover fragile desert habitats with solar panels, while ignoring warehouse rooftops, and other existing opportunities that have less impact. Wind energy leaves a construction and service footprint, at the expense of wildlife habitats. And operation has serious impacts on the mortality of migratory birds, and foraging bats. Land growing bio fuels have very limited wildlife habitat value. (**0004-4-1** [Applegate, Jim])

Comment: The alternative analysis, which was discussed before, is terribly flawed, and totally skewed towards selling nuclear. Here is a hint. You can't compare one alternative, at one time, to the plant. The plant is always going to have a higher baseload. But if you took a hybrid mix of alternatives you would begin to find that those would serve as a preferred and safer, and less costly alternative, possibly. But the current alternative analysis doesn't do justice to what really needs to be done. (**0006-4-13** [Brook, David])

Comment: We need to look at renewables, we need to look at a mix of renewables. It is doable if we commit to it. And when I say we I mean our government leaders, and our corporate leaders, and our educators. It is doable and, ultimately, I think will be more cost effective. (**0006-4-18** [Brook, David])

Comment: I wanted to make another point, too. And that is with respect to renewable energy resources. Obviously most of us are aware that there are a number of efforts, under way, to bring solar energy, wind energy, and tidal energy, on-line, particularly here in New Jersey. These are nascent industries. And if you look at the demand that is projected for energy, for the next 10 to 20 years, these alternative, or renewable energy sources, just aren't there yet, to deliver, to meet that demand, nowhere near that. A lot more development needs to occur with respect to that. (**0006-6-5** [DeLuca, Mike])

Comment: In addition to constantly searching for ways to conserve and reduce electrical usage. Clearly, the use of nuclear power stands out as a viable alternative to burning fossil fuels to produce electricity. And it may be the only alternative that produces 24 hour per day baseload power with no carbon missions. Electricity generation represents the single largest category source of carbon emissions in this country. Development of nuclear power resources has a strong environmental component, associated with it, compared to other traditional means of electrical generation. (**0006-8-6** [Duvau, Bryan])

Comment: A substantial percentage, of the environmental community, are outspoken advocates for the use of renewables as a viable means of generating carbon-free energy to meet our nation's needs. They believe that solar and wind energy alternatives are environmentally benign, compared to conventional means of energy generation. Unfortunately many of these proponents are misled, regarding the immense haul, large scale wind and solar installations pose to avian, bat, and terrestrial species, and their habitat. (**0006-9-2** [Wiwel, Kathy])

Comment: And I don't know if anybody from the University of Delaware is here, other than I know David Carter is associated there. But, you know, there are a lot of people that have done a lot of work on alternative energy systems, up there. And I think they possibly could be consulted as to some of these alternatives. Because my understanding is, you know, that there are combinations of alternative energy with conservation that could, possibly, address the purported need. (**0007-13-2** [Purcell, Leslie])

Comment: This is a really important point in time. We have technology that can provide our energy needs without using nuclear or heavy carbon emitters. (**0007-4-9** [Campion, Mary])

Comment: The National Academies make three important observations. First, that we must ultimately reach zero carbon dioxide emissions, because of the very slow rate of removal, which I have mentioned. Second, that at the current state of technology, wind and solar energy installations require backup by fast responding power sources. And the only one available, today, is carbon dioxide emitting natural gas turbines. (**0007-6-14** [Meadow, Norman])

Comment: And we need that [new baseload] power to be clean power. Solar and other sources of renewable energy are great sources of electricity. And were considered in the analysis of the need for a new plant. Members of the IBEW Local 94 built some of PSEG's solar power plants. But solar is not a substitute for around the clock clean baseload power, and would have significantly greater land use impacts than the development of a new nuclear plant on the existing Salem and Hope Creek site. (**0007-8-5** [Spiese, Steve])

Comment: I'm certainly not an expert on energy generation. But there is no question the future of welfare of human society depends on reducing energy use, and developing zero carbon sources of energy. Many experts have indicated that nuclear power represents a viable alternative in the short term, must be part of any mix of conservation, and new energy sources that are being used to make the transition to a zero carbon future. (**0007-9-10** [Wall, Roland])

Comment: The men and women, here tonight, who have said no to everything in the state of Delaware, no to the Data Center, because it uses natural gas. No to the Delaware City Refinery, because it uses crude oil. No to the Port of Wilmington. You have to one day say yes to something. If they want to maintain the standard of living, that we have come to live with, every day. Wind and solar are not the only thing they can say yes to. Yesterday and today are perfect examples of why solar has so many drawbacks. And as far as wind it is mostly made in states at least 1,000 miles away. (**0008-3-3** [Willis, Martin])

Comment: A substantial percentage of the environmental community are outspoken advocates for the use of renewables as a viable means of generating carbon-free energy to meet our nation's needs. They believe that solar and wind energy alternatives are environmentally benign, compared to conventional means of energy generation. Unfortunately many of these proponents are misled regarding the immense toll large scale wind and solar installations pose to avian, bat, and terrestrial species, and their habitat. (**0008-6-3** [Wiwel, Kathy])

Comment: In comparison, the proposed nuclear plant, at the PSEG site, will generate large amounts of carbon-free power, much more reliably, than any renewable power facility. This power generation can take place at a plant occupying a substantially smaller footprint thus minimizing any adverse impact to avian and bat habitat. (**0008-6-5** [Wiwel, Kathy])

Comment: [A] proper combination of renewable resources was not adequately considered. Intermittency is the other reason for not adequately considering renewable resources, however distributed solar and wind turbines placed in various locations throughout New Jersey would help alleviate this problem. Solar and wind are often complimentary-for example, it is windier at night when the sun is not shining. (**0020-5-7** [van Rossum, Maya])

Comment: Alternative energy options have not been given adequate consideration. Solar, geothermal, and new and emerging sustainable energy options, including increased efficiency and conservation, are not being given an appropriate level of consideration. Renewable energy sources based on current and near future technologies are capable of producing the baseload power targeted by PSEG. (**0022-11** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: Alternative energy options have not been given adequate consideration. Solar, geothermal, and new and emerging sustainable energy options, including increased efficiency and conservation, are not being given an appropriate level of consideration. Renewable energy sources based on current and near future technologies are capable of producing the baseload power targeted by PSEG. (**0034-12** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *These comments focus on NRC's analysis of alternative sources of energy in the EIS—including renewable energy sources—and the environmental impacts thereof. Section 9.2.2 and its subsections discuss these alternative sources of energy. Also, Section 9.2.4 addresses combinations of energy sources that could be used for new electric power generation in the State of New Jersey, including renewables such as wind energy, solar energy, and biomass (i.e., facilities burning wood waste, municipal solid waste, and/or methane from landfills) in combination with natural-gas-fired generation facilities. In Section 9.2.4, a mix of such energy sources was identified that would generate as much baseload electricity as a new nuclear plant at the PSEG Site. These comments do not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of these comments.*

Comment: Industrial wind and solar energy are being touted as the best way to reduce greenhouse gases, by our political leaders, most of the environmental organizations, and the general public. I don't believe that those supporters fully understand why their position is false. Aside from the fact that the capacity factor of wind generated electricity averages around 30 percent for land based turbines, and 40 percent for offshore turbines, and that the expected life of the turbines is only 20 years, the supporters are unaware of the many environment downsides of industrial wind. The NRC staff has done a good job of comparing the enormous amount of land required for wind, and solar, installations compared to nuclear. And it is staggering, especially when the reliability, and the amount of energy produced is factored in. (**0004-12-2** [Eastman, Alice (Ajax)])

Comment: NRC's analysis fails to discuss the intermittency of nuclear energy due to planned and unplanned maintenance, and forced shutdowns due to cooling water issues related to warmer ocean temperatures. Forced shutdowns due to cooling water issues from warm ocean temperatures are only predicted to increase in frequency. For nuclear power plants, these "intermittent" maintenance times can last more than a year. When these repairs and unscheduled shut downs are considered, renewables are in fact less intermittent and more reliable than nuclear energy. (**0020-5-8** [van Rossum, Maya])

Response: *The analyses of alternative energy sources in Sections 9.2.2 and 9.2.4 include consideration of the capacity factor for the various sources of energy identified in these comments, including nuclear. The comment regarding the NRC staff's comparison of land-use requirements for various alternative energy sources is noted. These comments do not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of these comments.*

Comment: Going over the slides, under page 19 it has alternative energies. None of the feasible baseload alternatives were being environmentally preferable. That statement, in itself, is a very, very untrue and unsubstantiated comment to make. Has the NRC really taken a look, and PSEG taken a look, at alternative energy? They haven't. (**0007-3-1** [August, Bernard])

Response: *The reference in the comment to page 19 of the slides is in regard to the presentation given by the NRC staff at the public meetings on the draft EIS. The slide summarizes the findings of the EIS in regard to alternative sources of energy; that is, none of the feasible baseload alternatives were found to be environmentally preferable to a new nuclear plant at the PSEG Site. The basis for this conclusion is contained in Sections 9.2.2, 9.2.3, and 9.2.4 and is summarized in Section 9.2.5. None of the feasible baseload energy alternatives analyzed in this EIS was found to offer environmental impacts that are sufficiently less than those of a new nuclear plant to establish it as environmentally preferable. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: You are building a backbone of electrical cords all the way down from Delaware to Virginia, for windmills, for wind generators. And so it is safe to say nuclear energy, there is no alternative feasible, alternative baseload to that is ridiculous. (**0007-3-10** [August, Bernard])

Comment: Already the free market is building, Google is building a backbone for wind mills off the coast of this, from Delaware to Virginia. They have spent billions of dollars. And we are held up, in Delaware, because of the fossil fuel industry, from having windmills, 11 miles off shore, which will replace all the energy that Delaware needs. Safely, no evacuation zones, no bird kills, no effects on the ocean, whatsoever (**0008-9-11** [August, Bernard])

Response: *Section 9.2.1.1 discusses the purchase of electrical power instead of building and operating a new nuclear plant at the PSEG Site. As noted in that section, studies indicate that there will not be surplus electrical generating capacity available from nearby portions of PJM or from the New York Independent System Operator region (which borders on PJM). These studies also indicate that even if such surplus capacity were to become available, there is not likely to be excess electrical transmission capacity available into New Jersey in the timeframe* *when the new nuclear units would become operational. At this time, the offshore transmission line that is being backed by Google is conceptual and construction of the cable has not started. The estimated completion date for the first phase of the project, which would only link southern and northern New Jersey, is currently 2020 to 2021. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: Alternative energy options have not been given adequate consideration. Sustainable energy options such as solar, wind, geothermal, and energy efficiency and conservation measures have not been adequately considered by the NRC. The reasons given for not adequately considering these sources are that renewables require "lengthy new transmission lines" and that they cannot provide base load power because of intermittency issues. This flippant dismissal is unfounded and does not take into account proposed transmission such as the New Jersey Energy Link by the Atlantic Wind Connection-an offshore transmission line that would run along the coast of New Jersey [see http://atlanticwindconnection.com/home]. There appears to be a double standard in that the proposed nuclear project would require lengthy new transmission lines, but this does not seem to be a concern to NRC in that context. (**0020-5-5** [van Rossum, Maya])

Response: *While the analysis of alternative energy sources in Section 9.2.4 mentions the new transmission lines that might be associated with any new electricity generation facilities, neither the existence of any such new transmissions lines nor their length was used as a discriminator to dismiss renewable energy sources from detailed analysis. In fact, Section 9.2.4 includes a detailed analysis of a combination of energy sources—including renewable sources of energy—that could generate the same amount of baseload electrical power as a new nuclear plant. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: Even without such disaster, the federal officials admit that there will most likely be "small to moderate environmental impacts." I'd like to know what research the NRC is citing in today's News Journal article where they say that wind power would have greater environmental downsides? That is absurd. (**0024-4** [Doyle, Kathy])

Response: *The commenter appears to be referencing a Wilmington News Journal article dated December 5, 2014. The characterization of the staff's conclusion regarding wind power reflects the reporter's understanding of the outcome. However, the EIS never says that wind power (nor any of the other alternative energy sources identified and evaluated in Section 9.2 et seq.) would have greater environmental downsides than a new nuclear plant at the PSEG Site. Section 9.2.5 contains the NRC staff's conclusion that none of the feasible baseload alternatives were found to be environmentally preferable to a new nuclear plant at the PSEG Site. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: "Alternative energy supplies, such as wind, are either incapable of meeting electricity needs or would have greater environmental downsides, the NRC concluded." I am trying to wrap my head around this statement. I can see how offshore wind would not provide continuous levels of power to the grid, but how in the world can the NRC compare the deaths of birds hitting turbine blades to the inability of the nuclear industry to provide a means of dealing with nuclear waste for the long term or the very real possibility of a release of radioactive gasses into the air that we breathe here in Delaware? We act as if the only concern for tomorrow is rate of return for investors. Every energy choice we make should take long range consequences into consideration. Has that really been the case with Salem 3? (**0027-1** [Nielsen, Michael])

Response: *The commenter appears to be referencing a Wilmington News Journal article dated December 5, 2014. The characterization of the staff's conclusion regarding wind power reflects the reporter's understanding of the outcome. The comment generally expresses concern about NRC's analysis of alternative sources of energy. Section 9.2.4 addresses combinations of energy sources that could be used for new electric power generation in the State of New Jersey, including renewables such as wind energy, solar energy, and biomass (i.e., facilities burning wood waste, municipal solid waste, and/or methane from landfills) in combination with natural-gas-fired generation facilities. Section 9.2.5 presents the NRC staff's conclusion that none of the feasible baseload alternatives were found to be environmentally preferable to a new nuclear plant at the PSEG Site. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: But the main objection is economic. The use of natural gas is currently much cheaper, partly because the extensive nuclear cooling system represents cost, both as investment and operation/upkeep. But additionally, the use of LNG as a co-generative fuel has not been considered. It will probably be the most efficient source, and has revolutionary potentiality in the development of natural gas in terms of collection, manufacture, distribution, and use. The use concerns both utilities and rail use. (**0033-2** [Clapp, Leonard])

Response: *Section 9.2.3.2 addresses the environmental impacts associated with the construction and operation of a natural-gas-fired power generation facility at the PSEG Site. It is not clear from the comment how the commenter believes the use of liquefied natural gas would differ from the use of natural gas. The impacts of a liquefied-natural-gas-fired facility would be similar to, if not identical with, those of a natural-gas-fired facility. Co-generation is not a consideration for the proposed action in this EIS, because the need is for additional electrical power and not heat or other forms of energy. The comment does not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of this comment.*

Comment: You are also committing the state, also committing this state to failing to reach the 22.5 percent renewable energy goal. We have all set this goal, within the state, to try to begin to produce electricity more reliably using renewables, and building another nuclear power plant will not be helping get this state closer to that goal. In fact, we would really be going the other way. So we are defeating our own goals by allowing this plant to be built. (**0006-4-14** [Brook, David])

Comment: New Jersey has set a goal of each electricity supplier obtaining 22.5% of its electricity from renewable energy sources by 2021. The DEIS fails to consider the importance of this goal. (**0020-5-11** [van Rossum, Maya])

Response: *These comments focus on New Jersey's goals for generating electricity from renewable energy sources. Section 9.2.2 discusses New Jersey's renewable energy portfolio as implemented through the State's renewable portfolio standard regulations. The 22.5 percent goal for power generated from qualifying renewables is discussed in that section. The construction and operation of a new nuclear plant at the PSEG Site would not necessarily contribute to any inability of suppliers/providers serving retail customers in the state to meet the renewable portfolio standard goals. In addition, the enforcement of the renewable portfolio standard regulations lies with the State of New Jersey and not with the NRC. These comments do not provide any specific information relating to the environmental effects of alternative energy sources. No changes were made to the EIS as a result of these comments.*

Comment: PV solar power located on rooftops is a good source of renewable energy because the energy produced does not need to be transported over transmission lines but can, easily, directly applied below, and requires no additional land. Industrial sized solar arrays, on the other hand, require both a great deal of land, and the need for energy produced to be transported over greater distances. One of the enormous arrays of mirrors, in the desert's southwest, has proven to be a huge killer of birds and flying insects. They are attracted to the area, then drawn to their fiery death. The panels and mirrors are, also, in constant need to be washed, to be effective, which poses a problem in the arid desert. (**0004-12-7** [Eastman, Alice (Ajax)])

Comment: While I personally think a system of localized smaller scale generation and distribution would be better in the long term, that is not the system we are living in today, given our network and PJM. (**0004-14-3** [Moscovici, Dan])

Comment: Also, the baseload model that we have been having, for the last 200 years, is going by the way of the Tin Lizzy. I'm a solar producer. I will be able to supply my own electricity, at my own house, with battery, current battery technology, and conservation. (**0007-3-11** [August, Bernard])

Comment: So the idea that this plant, that this site is going to be used for a nuclear plant, instead of something that could be like a windmill, to the co-generation systems, or natural gas plant, which is already killed your industry. Fracking and natural gas plants have put you guys out of business. So this is a last grab straw. (**0007-3-15** [August, Bernard])

Comment: The company that owns PSEG Exelon, is vilurently against alternative energy, and wind power, and solar. (**0007-3-2** [August, Bernard])

Comment: Powering New Jersey with one hundred percent renewables could be done through a combination of diverse renewable energy sources and energy efficiency measures. This is another area where NRC's analysis has fallen short-NRC has failed to adequately consider energy efficiency measures. For the abovementioned reasons, NRC has not properly considered renewable energy and energy efficiency as an alternative, and therefore their analysis is deficient. (**0020-5-10** [van Rossum, Maya])

Comment: The NRC has not adequately considered all renewable energy options, such as distributed solar, which would reduce the need for new transmission and reduce the source's intermittency. It appears as though only large solar arrays and large wind farms were considered; however renewable energy sources could be placed closer to demand via distributed generation, reducing land use impacts, intermittency, and transmission costs. Distributed solar can be placed on rooftops and parking garages in cities where the demand centers are located; open fields are not required for renewable energy generation. For these reasons, the cited "land use impacts" of wind and solar are incorrect. (**0020-5-6** [van Rossum, Maya])

Comment: A recent study found that New Jersey has the ability to generate one hundred percent of its power from renewables [see Jacobson et al. (2014) 100% Wind, Water, Sunlight (WWS) All-Sector Energy Plans for the 50 United States. July 17, 2014]. This same study found that renewable energy sources would be cheaper for ratepayers on a time scale that falls within the lifetime of the proposed nuclear plant. (**0020-5-9** [van Rossum, Maya])

Response: *These comments generally indicate that renewable energy alternatives could meet the need for power and that the NRC staff's analysis of energy alternatives did not give sufficient consideration to the renewable energy alternatives. The NRC staff did consider renewable energy sources as alternatives the EIS, which considered such sources both individually (see Section 9.2.2), and as part of a combination of energy alternatives (see Section 9.2.4). The staff concluded that none of the renewable sources could meet the projected need for baseload power generation individually, either because of intermittency of the source or the state of development of the alternative. For the combination of energy alternatives, the NRC staff took into consideration the New Jersey renewable portfolio standard and the energy-demand projections from authoritative sources, such as the U.S. Department of Energy. Based on available information, the combination of energy alternatives—while meeting the need for baseload power generation—would not be environmentally preferable to the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: I want to say that I think that the EIS process overlooks two key issues that I think the NRC needs to address. When it looks at what alternatives are considered, it talks about no-action. It talks about alternative sites, talks about alternative energy sources. I think it should also consider what are the energy conservation opportunities here. Because when you compare U.S. energy consumption to those in western Europe, we are using four times as much energy, per capita, because of our wasteful energy practices. So if you consider energy conservation, alternative energies, there is a significantly less need for nuclear power, and a much lower cost. (**0007-11-3** [Spencer, Scott])

Response: *The comment suggests that energy conservation has been overlooked in the staff's analysis of alternatives to a new nuclear plant. Any alternative energy source must be able to meet the requirement for producing 2,200 MW(e) of new baseload power to supply the future needs of the service region. As discussed in Section 9.2.1.3 of the EIS, the review team concluded that conservation and demand-side management programs can be successful in reducing peak load. As discussed in Section 8.2, the State of New Jersey has established energy-management goals to maximize energy conservation and energy efficiency by reducing energy consumption at least 20 percent by 2020, using 1999 energy consumption as the baseline. However, those energy savings have already been accounted for in power planning, and there is still a demonstrated need for additional baseload capacity, as discussed in*

Chapter 8 of this EIS. Thus, the implementation of conservation and demand-side management programs is not a reasonable alternative for providing baseload power generating capacity. No changes were made to the EIS as a result of this comment.

Comment: Page No. 9-38; Section No. 9.2.4; Line No. 13-15; The assessment of land use for a combination of power sources does not account for the land use associated with wind power, which would be 30,400 acres, not including land use associated with new transmission lines. When the land use of wind power plus its transmission lines is taken into account, the land use for a combination of power sources should be classified as LARGE. (**0015-6-2** [Mallon, James])

Response: *Wind energy is discussed in the context of an offshore wind farm, which would have no land-use impacts. While some land-use impacts associated with transmission lines for such a wind farm would likely occur, it is not possible for the review team to estimate those impacts because the location of the wind farm and transmission lines is unknown. It is unlikely that the transmission lines by themselves would cause LARGE impacts to land use. No changes were made to the EIS as a result of this comment.*

Comment: The new transmission lines should also be discussed in the alternatives analysis in the DEIS, since smaller scale and decentralized power generation alternatives can avoid the large-scale land use disruption that new transmission lines will cause. (**0020-5-1** [van Rossum, Maya])

Response: *As discussed in Section 3.2.2.2 of the EIS, the existing transmission lines that are connected to the existing SGS and HCGS have sufficient capacity to accommodate the power from a new nuclear plant at the PSEG Site. Therefore, no new transmission lines are needed for the purpose of transmitting the power from a new plant. The regional transmission operator has requested bids to build a new line near the site to address grid stability issues; however, that request for bids is independent of any new power plant that might be built at the PSEG Site. Some portions of the combination-of-energy alternatives (e.g., wind and solar), including those portions built at locations other than the PSEG Site, may require new transmission lines, as mentioned in Section 9.2.4. However, the uncertainty regarding any such lines prevented the staff from estimating the associated environmental impacts, and so, these transmission lines, if needed, were not a discriminating factor between the combination-of-energy alternative and a new nuclear power plant at the PSEG Site. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 9-12; Section No. 9.2.2.1; Line No. 24; The conclusion for wind power should mention wind in conjunction with energy storage. Therefore, at the end of line 24, add the following: "(either alone or in combination with CAES or other energy storage technology)" (**0015-5-19** [Mallon, James])

Response: *The rationale for the review team's conclusion regarding wind power is provided in the sentence immediately following the one mentioned in the comment. The revision recommended in the comment is therefore not necessary, and no changes were made to the EIS as a result of this comment.*

E.2.29 Comments Concerning System Design Alternatives

Comment: A new plant will provide an excellent opportunity to incorporate new technology to produce cleaner, safer energy especially if a cooling tower is incorporated to significantly reduce bay water usage, the impingement and entrainment of aquatic biota, and the impact of large quantities of elevated temperature water reentering the estuary. I know of no scientific study that proves that the present cooling process at Salem has had a negative impact on the estuary. (**0009-5** [Locandro, Roger])

Comment: Executive Summary, Page xx (Lines 30-31); Comment: The [NJDEP] Department supports PSEG's proposed plant design that will use either mechanical or natural draft cooling towers to remove waste heat from the water discharge. This is consistent with current Section 316(b) regulations which require new facilities with a design intake flow equal to or greater than 10 MGD to maintain the intake flow of cooling water at a level commensurate with that achievable with a closed cycle, recirculating cooling system. (**0021-5-14** [Foster, Ruth])

Response: *These comments are declarative statements and raise no issues with the conclusions of the draft EIS. No changes were made to the EIS as a result of these comments.*

E.2.30 Comments Concerning Alternative Sites

Comment: The existing PSEG existing nuclear complex is an ideal location for the additional unit, because all of the important conveyance systems are in place, and will not have to be developed, and built, as with a greenfield site. (**0004-16-9** [Molzahn, Robert])

Comment: Locating a new nuclear power plant on disturbed land, adjacent to an area that is already dedicated to nuclear power generation, makes the most sense. Much of the infrastructure inherent in a nuclear generation site can easily be applied to the development of a new facility, rather than locating that new facility on a previously undeveloped site. (**0006-8-7** [Duvau, Bryan])

Comment: The existing nuclear complex is an ideal location for an additional unit because the importance conveyance, or transmission systems are in place, and would not have to be developed, such as it was in the Greenfield site. (**0007-16-8** [Palmer, Dennis])

Comment: Much of the needed science for the ESP should be at hand since the site is contiguous to the Hope Creek and Salem Creek generation stations. Their track record appears to be good. The new site will share the same geology and the use of in place dredge spoils constituting all soils of the area--i.e., an artificial Island. Natural resource impacts must be the same for all sites in this homogeneous environment. (**0009-3** [Locandro, Roger])

Response: *These comments generally support the selection of the PSEG Site for the ESP. Section 9.3 of the EIS describes the process of identifying and evaluating alternative sites in New Jersey for a new nuclear power plant. Three of the candidate alternative sites are greenfield sites. The conclusion in Sections 9.3.6.3 and 9.3.6.3 is that none of the alternative sites is environmentally preferable or obviously superior to the proposed PSEG Site. No changes were made to the EIS as a result of these comments.*

Comment: Page No. 9-229; Section No. 9.3.6; Line No. 39-40; The term "environmentally preferable" is used for the first time here and is used several other times in Section 9.3.6, but it is never defined. It might be useful to add the definition included in NUREG-1555, that an "environmentally preferable site" means a site for which "the environmental impacts are sufficiently less than for the proposed site such that environmental preference can be established." (**0015-6-17** [Mallon, James])

Comment: Page No. 9-233; Section No. 9.3.6.1; Table 9-24; Waste Management is one of the resource areas that has impact ratings in Table 9-24, but Waste Management is the only resource area that does not have an impact discussion in the text for each site. It appears that the general discussion on pages 9-55 and 9-56 is intended to address Waste Management impacts, but there is no clear connection between that discussion and the impact ratings in Table 9-24. In addition, the location of the Waste Management row between Radiological Health and Postulated Accidents suggests that it refers to radioactive waste, but we believe it actually refers to nonradioactive waste. (**0015-6-19** [Mallon, James])

Comment: Page No. 9-44; Section No. 9.3.1; Line No. 31-32; Change "...leading to the selection of alternative sites. The process that PSEG used to select its alternative sites is described in the following sections." to "... leading to the selection of a proposed site and alternative sites. The process that PSEG used to select its proposed site and alternative sites is described in the following sections." (**0015-6-4** [Mallon, James])

Comment: Page No. 9-44; Section No. 9.3.1.1; Line No. 37-39; The DEIS discussion of why PSEG selected New Jersey as the ROI does not mention that NJ provides good diversity of environmental and geographic conditions for potential power plant sites and that any reasonable expansion of the ROI beyond NJ would not significantly improve diversity, as discussed in ER Section 9.3.1.1. This supporting information might be useful in explaining the ROI selection to the public. (**0015-6-5** [Mallon, James])

Comment: Page No. 9-47; Section No. 9.3.1.2; Line No. 32-33; Change "Furthermore, the PSEG quantitative evaluation...." to "Furthermore, the PSEG qualitative evaluation...." This sentence refers to a part of the evaluation that was not quantified. (**0015-6-6** [Mallon, James])

Response: *These comments contain recommendations for revisions and/or changes to the text in the EIS. In response to these comments, the EIS has been revised at the locations indicated in the respective comments; however, the specific revisions that have been incorporated into this EIS may not exactly match the language contained in the recommendations in each comment.*

Comment: Two, do you work with the United States, USGS, on the siting of these plants, and what criteria do they have inputs on, on the siting of the plant? (**0007-3-7** [August, Bernard])

Response: *USGS Data are used in preparing the EIS and the NRC's SER, but the NRC grants the ultimate approval. The PSEG ESP applicant relied on USGS-developed geologic information in its application, including for describing the seismic characteristics of the site as well as the regional geology. In its technical review of the application, the NRC considers that information as well, and may confer directly with the USGS to the extent necessary. The USGS* *information is considered both in the NRC safety evaluation (for determining whether the site safety requirements are met) and in the draft EIS (for describing the affected environment). No changes were made to the EIS as a result of this comment.*

Comment: Page No. 9-232; Section No. 9.3.6.1; Table 9-24; This table shows the cumulative impact rating for each site, but it does not indicate whether building and operating a new nuclear plant would contribute significantly to those impacts or not. Given that the impact contribution of the new plant figures prominently in the discussion in Section 9.3.6.2, it would be useful to include that information in Table 9-24. (**0015-6-18** [Mallon, James])

Response: *As noted in the comment, Table 9-24 does not indicate whether the NRC-authorized activities associated with building and operating a new nuclear plant at the PSEG Site would contribute significantly to the level of impacts shown in the table; however, the text accompanying Table 9-24 (i.e., the text in Section 9.3.6.2) does discuss the contributions of the NRC-authorized activities when it compares the impacts among and between the alternative sites. No changes were made to the EIS as a result of this comment.*

Comment: Page No. 9-234; Section No. 9.3.6.2; Line No. 1-8; The discussion of impacts at Site 4-1 does not mention the fact that building and operating a new nuclear plant would contribute significantly to the MODERATE impact on terrestrial resources, as stated in lines 7 and 8 on page 9-81. The discussion of Site 7-2 impacts (lines 24 to 26 on page 9-234) includes this point, and it should be included for Site 4-1, where the situation is the same. (**0015-6-20** [Mallon, James])

Comment: Page No. 9-234; Section No. 9.3.6.2; Line No. 10-19; The discussion of impacts at Site 7-1 does not mention the fact that building and operating a new nuclear plant would contribute significantly to the MODERATE impact on terrestrial resources, as stated in lines 3 and 4 on page 9-130. The discussion of Site 7-2 impacts (lines 24 to 26 on page 9-234) includes this point, and it should be included for Site 7-1, where the situation is the same. (**0015-7-2** [Mallon, James])

Comment: Page No. 9-234; Section No. 9.3.6.2; Line No. 31-39; The discussion of impacts at Site 7-3 does not mention the fact that building and operating a new nuclear plant would contribute significantly to the MODERATE impact on terrestrial resources, as stated in lines 38 and 39 on page 9-210. The discussion of Site 7-2 impacts (lines 24 to 26 on page 9-234) includes this point, and it should be included for Site 7-3, where the situation is the same. (**0015-7-3** [Mallon, James])

Response: *These comments concern apparent discrepancies in the discussion of impacts to terrestrial resources among and between the alternative sites. The discussions in Section 9.6.3.2 focus on comparing each of the four alternative sites to the proposed PSEG Site. The text therefore does not include any discussion of the situation where there are <u>no</u> differences in impact levels between the alternative site and the PSEG Sites, but rather, focuses on the situation where differences in impact levels do exist. Thus, impacts to terrestrial resources are not discussed in the comparison of sites in Section 9.6.3.2, since building and operating a new nuclear plant at any of the sites would create MODERATE impacts to terrestrial and wetlands resources. No changes were made to the EIS as a result of these comments.*

Comment: Page No. 9-234; Section No. 9.3.6.2; Line No. 6-7; These lines indicate that the LARGE impact rating for historic and cultural resources at Site 4-1 is related to building and operating a new nuclear plant, but this is contradicted by the discussion on page 9-101, which says "Building and operating a new nuclear power plant at Site 4-1 would not be a significant contributor to the [historic and cultural resource] impacts." (**0015-7-1** [Mallon, James])

Response: *The text referenced in the comment on page 9-101 (Section 9.3.2.7) has been revised to state that building and operating a new nuclear plant at Site 4-1 would be a significant contributor to the impacts to historic and cultural resources at that site.*

Comment: Page No. 9-2; Section No. 9.0; Line No. 19; The term "these types of areas" is vague and undefined. A more specific description should be provided. (**0015-5-14** [Mallon, James])

Response: *The commenter is requesting clarification of terminology that is being used as direct language from the cited reference, 40 CFR 230 (76 FR 24479-TN247). No changes were made to the EIS as a result of this comment.*

Comment: Section 9.0 Environmental Impacts of Alternatives: This section does not evaluate on-site alternatives to avoid and minimize impacts to aquatic resources. We recognize that as part of NRC's Early Site Permit process, PSEG has only developed a Plant Parameter Envelope (PPE), or an estimate of the highest potential impacts that could result from the construction of a new nuclear generating station. They have not yet determined if they will build the facility and what technology they will use if they choose to construct the new facility. If NRC issues an ESP, PSEG will have twenty years to make that decision. Because PSEG has not yet determined the actual footprint of the proposed new nuclear generating station, it is not possible to demonstrate compliance with Clean Water Act (CWA) 404 (b) (1) Guidelines. These Guidelines require it to first be demonstrated that potential impacts to aquatic resources have been avoided and minimized to the maximum extent practicable. For non-water dependent activities, such as this, there is a presumption in the CWA that alternatives that do not involve special aquatic sites, including wetlands, exist and that these alternatives would have less impact on the aquatic environment. In this case, it cannot be demonstrated that impacts have been minimized because a plant design has not been chosen. Alternatives may exist that would reduce the amount of dredging and fill currently being proposed. (**0018-1-9** [Chiarella, Louis])

Response: *Prior to the issuance of any Department of the Army authorization, the USACE would require documentation to clearly demonstrate all efforts to avoid, minimize, and compensate for any impacts to waters of the United States, including wetlands.*

E.2.31 Comments Concerning Benefit-Cost Balance

Comment: [T]he people of New Jersey, and the region, have benefitted from the cost competitive electricity generated from the Salem and Hope Creek plants. (**0004-13-2** [Miller, Lynn])

Comment: In terms of the environmental regulation, and the balance, I use the word balance on purpose, because there is that need to balance the socioeconomic impacts, and the environmental impacts, and the need for industry to have affordable and reliable electric. And I think we have had that, seen that happen over at the site, and hope to continue. (**0007-18-3** [Kleinschmidt, Mark])

Response: *These comments provide general support of nuclear power. No changes were made to the EIS as a result of these comments.*

Comment: On top of that we have one of the most expensive costs of energy, not only in this region, but in the United States. And we have made efforts to lower it. This project, itself, has the potential to reduce transmission congestion which, consequently, will lower the cost of energy in our state. (**0004-24-3** [Heffron, Rich])

Response: *The price of electricity is outside the regulatory scope of the NRC's licensing actions; however, the regional socioeconomic impacts of the proposed action, including impacts to the local economy, are addressed in Sections 4.4 and 5.4 of the EIS. No changes were made to the EIS as a result of this comment.*

Comment: Scientists, in my understanding, of nuclear energy, nuclear electrical energy, is that it is a net energy loss. Net energy loss. What do I mean by that? Simply that it takes more energy, in the form of diesel, concrete, all the other forms of energy, to mine uranium, refine it, transport it, construct the plants, safely operate them and, finally, decommission a nuclear power plant, than all of the energy it will ever produce. (**0006-4-6** [Brook, David])

Comment: It would probably cost us less, and produce more electricity, more safely, if we simply took the billions of dollars that it is going to cost, to build this plant, and buy solar panels, and wind turbines, for everyone in New Jersey. (**0006-4-9** [Brook, David])

Comment: So this idea that we should, as rate payers and stakeholders, should be paying billions of dollars, and costs of our tax money, to subsidize this industry, which is what we have been doing, and taxing, and going to our local PS, public service commissions, and asking for rate increases for products we are not even going to be able to see finished in about 15 years. (**0007-3-13** [August, Bernard])

Response: *These comments express opposition to nuclear power and the nuclear power industry and raise no issues with the conclusions in the discussion of benefit-cost balance in Section 10.6 of the EIS. The NRC is an independent regulatory agency that does not promote nuclear or other types of energy. No changes were made to the EIS as a result of these comments.*

Comment: Page No. 10-25; Section No. 10.6.1; Given the substantial reduction in GHG attributable to nuclear, the benefits to air quality improvements should be rated as MODERATE. (**0015-7-13** [Mallon, James])

Response: *This comment suggests revising the air-quality impact of the proposed project based on the low GHG contribution of a nuclear plant. The NRC staff considered this revision but made no change to the EIS.*

Comment: At the end of the life cycle of this 2200 MW plant, huge volumes of low-level radioactive waste will need to be disposed. New Jersey has no low-level radioactive waste disposal facility but has a fifty year contract to dispose of low-level radioactive waste in Barnwell, South Carolina. All of the decommissioned low-level radioactive waste and intermediate level waste volume will need to be trucked to Barnwell, South Carolina at a distance of about 661 miles. This will be a very expensive disposal operation, and may equal a significant percentage of the actual cost to construct the plant. (**0020-4-11** [van Rossum, Maya])

Response: *This comment provided no new information. Decommissioning is discussed in Chapter 6 of the EIS. No change was made to the EIS as a result of this comment.*

Comment: Page No. 10-31; Section No. 10.6.2; Footnote (f) of Table 10-4 states that the conclusion is conditional on the results of the ongoing rulemaking to update the Waste Confidence Decision and Rule. See above comment on updating this topic in Section 6.1.6 to address the final rule. This footnote should be deleted accordingly. (**0015-7-15** [Mallon, James])

Response: *The issue has been resolved by revisions and additions made to Section 6.1.6 of the EIS. Footnote "f" has been deleted from Table 10-4 as a result of this comment.*

Comment: We hope that the concerns pointed out by the Delaware Riverkeeper, the environmental damage inherent in extracting and purifying uranium, the difficulties in ensuring that nuclear waste can be safely contained for thousands of years and the well-documented pattern of cost-overruns in nuclear plant construction will encourage the NRC to subject this proposal to the same rigorous cost/benefit analyses applied to offshore wind and other renewable energy projects. (**0022-13** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Response: *This comment offers no new information. No changes were made to the EIS as a result of this comment.*

Comment: Total energy costs also include transport and processing of uranium, hazardous, and radioactive fuels. Additional associated costs of water usage, potential accidents, waste handling, should factor into feasibility studies. (**0032-7** [Purcell, Leslie])

Response: *The items described in this comment fall outside the NRC's process for conducting an environmental review for an ESP as set forth in 10 CFR 51 and 52. Because this comment does not provide new information relevant to the environmental impacts of the proposed action, no changes were made to the EIS as a result of this comment.*

Comment: Page No. 10-30; Section No. 10.6.2; To be consistent with Section 10.2, the impacts to cultural resources should be SMALL. (**0015-7-14** [Mallon, James])

Response: *The revision recommended in the comment has been incorporated into Table 10-4 in Section 10.6.2 of the EIS.*

E.2.32 General Comments in Support of the Licensing Action

Comment: So not only do we thank them for their consideration, we are encouraging them for this consideration. I just want to say that I'm in total support of this action. (**0004-10-4** [Acton, Julie])

Comment: I, therefore, hardily endorse the conclusions in support of the NRC's DEIS, for the proposed PSEG new facilities. (**0004-12-9** [Eastman, Alice (Ajax)])

Comment: I believe nuclear power has, and is, a necessary part to play in our nation's energy future. New Jersey and our nation, like France, is being well served by nuclear power. The issuance of PSEG's Early Site Permit is an important step to that end. (**0004-13-5** [Miller, Lynn])

Comment: Therefore we need a solution as many plants begin to close. You have already approved new nuclear sites on Green field locations in this country. And while there may be some NIMBY talk today, Salem is designed to be safe from hurricanes, tornadoes, earthquakes, tidal surges, and they constantly train and test to avoid human error. Salem has reactors, it holds waste, it is a nuclear brown field site. Therefore I think it is a good place to continue the nuclear industry. (**0004-14-4** [Moscovici, Dan])

Comment: I have reviewed the Draft EIS for this Early Site Permit and if it is determined, if it is determined, that this site has to be used for a new plant, at some point in the future, I'm confident that PSEG will work to avoid as many impacts as it can. And for those that are unavoidable, like those impacts associated with the footprint of the buildings, and we have heard about the access road, or the causeway, or the grid stability transmission lines, I'm confident that they will go above and beyond to mitigate for these impacts. My confidence stems from their track record, and the excellent working relationships that they have with environmental professionals of the agencies, like the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, NOAA and, of course, DEP. And also the professionals that are within the environmental group community here in New Jersey. (**0004-15-3** [McHugh, Martin])

Comment: PSEG Power, and PSEG Nuclear, have proposed to add a fourth nuclear plant on this site, one that could add up to another 2,200 megawatts of clean, safe, reliable baseload power, to meet the increasing demand for electricity in New Jersey. I'm here to support that proposal. (**0004-18-2** [Hufsey, Moe])

Comment: For all those reasons, to meet growing demand, to help clean the air, and to provide good high quality jobs, I support PSEG's new safe, clean, and reliable nuclear power plant. (**0004-18-6** [Hufsey, Moe])

Comment: Sitting there in the audience, and listening to the comments, it occurs to me that those in favor of this project, which I am one, are very analytical. (**0004-19-1** [Bobbit, John])

Comment: We have an opportunity to support an extraordinary neighbor. PSEG has been an extraordinary neighbor since they have arrived in Salem County. They support us, they employ us, they protect us, and they do it in the most humble, soft-spoken way, that makes it astonishingly, that they are such a large and powerful company. I am here, once again, as a resident, as a father, as a husband, to support moving forward with the permit. NRC, I'm very glad you are here to regulate them, but please do not get this wrong. (**0004-19-3** [Bobbit, John])

Comment: Again, on behalf of the business community, the New Jersey State Chamber of Commerce is proud to provide its support for the new power plant. (**0004-2-14** [Egenton, Michael])

Comment: I'm here, today, to express the State Chamber's support for the prospect of having PSEG build and operate an additional nuclear generating plant, on a site adjacent to PSEG's existing Hope Creek and Salem Nuclear facility in Salem County. (**0004-2-2** [Egenton, Michael])

Comment: I'm here today because I certainly support the opportunity for PSEG to apply for the site permit for another nuclear reactor here in Salem County. (**0004-23-2** [Helder, Jason])

Comment: About 30 percent of the energy that we use comes from this nuclear plant. So we, obviously, support this project, and we would like to see it move as quickly as possible. (**0004-24-4** [Heffron, Rich])

Comment: I have had the opportunity to observe PSEG's environmental policy actions over 20 years, and the restoration and mitigation activities in support of the environment. I know of no company that has such a stellar environmental record, well beyond what has been required of them. Their environmental restoration activities are a model for other states, and other countries. And I have read the Environmental Report, and given what I know about their past performance, in habitat enhancement, I'm confident that PSEG will carry out their plans and create much more habitat than is compromised by the new development. Further, the land that will be used for siting the new facility is not currently natural high quality habitat. But it is already degraded. But, in contrast, I feel confidence that the mitigation habitat will be functioning high quality habitat. I encourage the NRC to approve the Early Site Permit and lend my support to PSEG for its community minded ecosystem conscious approach to restoration and mitigation. (**0004-5-1** [Burger, Joanna])

Comment: So we recognize that this Early Site Permit would give us the possibility to go ahead and build another nuclear power plant. The importance of it to us, though, is that the window would remain open for 20 years. And even though today, the economics of it are fairly tough, we really don't know what the next ten years, or the next 20 years will bring, in the impacts on carbon. (**0004-8-6** [Joyce, Tom])

Comment: And we are in full support of their expansion, their application, and their remaining as a key stakeholder, and leader to not only this county, but this region. (**0006-11-1** [Bailey, David])

Comment: On the matter of expanding I'm definitely in favor. It would be great for our town, and it would be great for our town, from the pizza guy on the corner, to the service station down the road, even to the resident who has a spare room to rent, to supplement some income, during these times. So the way I see things, it is pretty clear, everyone will benefit from more jobs, from my township, to our county, and to our state. (**0006-2-2** [Bradway, Timothy])

Comment: I visited the plant, I have no concerns. And I look forward to the opportunity of expansion, and the jobs that it will provide this community. PSEG, as a company, and its employees are community assets. And they are vital to the economic development of this county. (**0006-3-2** [Baillie, Joan])

Comment: Again, there are no surprises, including our plans to explore the construction of a new nuclear power plant. We know that a new nuclear plant would have a significant impact on the local community. We have met with the County Freeholder Board, and the local municipalities. And we will continue to work with the communities throughout this process. We recognize that this Early Site Permit, and a possible new plant, would not be possible without the community's continued support. (**0006-5-2** [Braun, Bob])

Comment: In light of the ability for this project to replace a significant percentage of polluting fossil energy sources, in our region, with reliable, carbon-free, generation at minimal impact on the environment, I support the efforts of PSEG to expand nuclear generation in souther New Jersey. (**0006-9-5** [Wiwel, Kathy])

Comment: PSEG has been a great corporate neighbor, from my perspective. And certainly, for the reasons mentioned, I fully support this project, with a great deal of confidence that they will continue to act, as I have experienced, over the last 20 years. (**0007-1-4** [Cathcart, Richard])

Comment: I support the Draft Environmental Impact Statement that the NRC is presenting here today. And I'm a -- I'm actually very glad for the choice that PSEG made for the location. And I live closer because I'm confident in the technology, and I'm confident in the people that are in the plants. (**0007-10-2** [Clancy, James])

Comment: Many of the environmental professionals, both government and private, have looked at this project inside and out. And you have heard a lot of testimony today, or opinions, that it seems to be -- not seems, but is feasible, makes sense, to move forward, and the Chamber is of a similar belief. (**0007-18-4** [Kleinschmidt, Mark])

Comment: So in conclusion, you know, we support the Draft EIS and we, also, support moving forward with the approval of the PSEG site. (**0007-18-8** [Kleinschmidt, Mark])

Comment: PSEG Power, and PSEG Nuclear, have proposed to add a fourth nuclear plant on the existing site, which could add another 2200 megawatts of clean, safe, and reliable baseload power to meet the increasing demand for electricity. I'm here, today, to support that proposal. Members of my family are here, today, to support that proposal, as well as my union brothers. (**0007-8-3** [Spiese, Steve])

Comment: I'm here to speak in support of PSEG in their effort to license and, ultimately, construct a new nuclear plant. (**0008-6-1** [Wiwel, Kathy])

Comment: I'm here to support the Environmental Impact Statement and the Early Site Permit for the new nuclear plant. (**0008-7-1** [Shaffer, Mark])

Comment: I am pleased to offer my comments to support the approval of the ESP requested by PSE&G for construction of a new, nuclear energy power plant adjacent to the two in-service reactors at Salem Creek. (**0009-1** [Locandro, Roger])

Comment: A new plant will provide an excellent opportunity to incorporate new technology to produce cleaner, safer energy especially ifa cooling tower is incorporated to significantly reduce bay water usage, the impingement and entrainment of aquatic biota, and the impact of large quantities of elevated temperature water reentering the estuary. I know of no scientific study that proves that the present cooling process at Salem has had a negative impact on the estuary.

After reviewing the EPS request-I find no scientific reason to deny the requested permit. (**0009-7** [Locandro, Roger])

Response: *These comments express general support for PSEG's ESP application. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.33 General Comments in Support of the Licensing Process

Comment: First of all I just want to thank you for having this public forum. (**0004-10-1** [Acton, Julie])

Comment: And I would like to extend my appreciation for our ability to provide our comments and insight. (**0004-2-15** [Egenton, Michael])

Comment: We commend the NRC's efforts, to date, for its thorough analysis in consideration of this potential new nuclear power plant at the PSEG site. (**0004-2-3** [Egenton, Michael])

Comment: I want to thank the NRC for the opportunity to speak this afternoon, and to give an opportunity for community members to voice their opinion, and any concerns they may have. (**0004-23-1** [Helder, Jason])

Comment: I'm president of the Delaware State Chamber of Commerce. I'd like to thank the NRC for this opportunity. (**0004-24-1** [Heffron, Rich])

Comment: I'm also first vice president of the Maryland Conservation Council, and on behalf of the group I would like to thank you for the opportunity to speak, here, today. (**0004-6-1** [Meadow, Norman])

Comment: On behalf of PSEG I really do look forward to all of the comments today, so that we get a better understanding of the community's outlook on what it is that we are proposing to do. (**0004-8-1** [Joyce, Tom])

Comment: Thank you very much for this opportunity to speak. (**0004-9-1** [Weinstein, Michael])

Comment: On behalf of PSEG we look forward to this evening's public meeting and the opportunity to continue working with the Nuclear Regulatory Commission, and the public, on our application for an Early Site Permit, as we explore the possibility of building a new nuclear plant here in Salem County. (**0006-5-1** [Braun, Bob])

Comment: And I have to say, in looking over the EIS statement prepared by NRC, and the Army Corps of Engineers, does a really nice job of identifying the environmental impacts, and potential environmental impacts, of the PSEG project. (**0006-6-1** [DeLuca, Mike])

Comment: I appreciate the opportunity to comment on the Draft Environmental Impact Statement being discussed this evening. (**0006-9-1** [Wiwel, Kathy])

Comment: Thank you for the opportunity to participate in this public meeting today. (**0007-10-1** [Clancy, James])

Comment: I want to thank the NRC for the opportunity to take in this public testimony. (**0007-11-1** [Spencer, Scott])

Comment: So thank you, again, for having this today. And thank you for letting me comment. (**0007-12-5** [Bucic, Sarah])

Comment: I thank you, today, for this opportunity to comment on the environmental and water related impacts, and the Early Site Permit application submitted by Public Service. (**0007-16-12** [Palmer, Dennis])

Comment: So I have reviewed the Draft EIS, particularly with respect to environmental impacts and, especially, wetland impacts. And I do believe that the potential and obvious wetland impacts have been addressed in a very satisfactory manner. (**0007-17-2** [DeLuca, Mike])

Comment: But thank you for the opportunity to speak and thanks to the NRC for taking the time to come here to Delaware to let folks hear, be able to express their opinions. (**0007-18-1** [Kleinschmidt, Mark])

Comment: The approval process for the expansion at the Hope Creek site, or any nuclear site, is very extensive. And I don't think there is any industry, or any activity, that is more regulated and looked at, in more detail, than the siting and the permitting of a nuclear power plant. A lot of the issues, with the siting, have been taken care of, because the plant has been there for a number of years. (**0007-18-2** [Kleinschmidt, Mark])

Comment: Thank you for the opportunity to speak. (**0007-2-1** [Carter, David])

Comment: So thank you for the opportunity to comment. (**0007-5-13** [Herron, Stephanie])

Comment: Well, on behalf of the Maryland Conservation Council, I want to thank you for the opportunity to speak here today. (**0007-6-1** [Meadow, Norman])

Comment: We concluded that the review team has done an excellent job in producing the Draft Environmental Impact Statement, especially by thoroughly describing the great disparity between nuclear power and the renewables, in the relative area of habitat that they will impact. (**0007-6-2** [Meadow, Norman])

Comment: On behalf of PSEG Nuclear, we look forward to today's public meetings, and the opportunity to continue to work with the Nuclear Regulatory Commission, and the public, on our application for an Early Site Permit, as we explore the possibility of building a new nuclear plant. (**0007-7-1** [Eilola, Ed])

Comment: Again, we welcome today's meetings. Thank you for the opportunity to speak with you this afternoon. (**0007-7-5** [Eilola, Ed])

Comment: Thank you for giving me the opportunity to speak to you today. (**0007-8-1** [Spiese, Steve])

Comment: I know, first-hand, that the same rigor went into the data collection, the detailed technical reviews, and analyses that have led to the NRC's Draft EIS, and that we are talking about today. As I was involved with managing that effort, as well. We considered and evaluated the potential impacts and benefits, to Delaware residents, as the NRC has document in the Draft EIS. And I know, firsthand, that the advice, guidance, and inputs from the Delaware Department of Natural Resources and Environmental Control, the other Delaware regulatory agencies, the regulatory professionals and citizens, were considered, and are considered, to be as important as those in New Jersey or elsewhere. (**0008-1-7** [Pantazes, Jeff])

Comment: Thanks for taking the time to come out tonight. (**0008-1-9** [Pantazes, Jeff])

Comment: Thanks, again, for allowing me to provide my opinion. (**0008-2-14** [Evans, Brenda])

Comment: I'd like to thank all the people involved in setting up this public comment session about any future building of a new nuclear power generating station in Salem County, New Jersey. This is an opportunity for the people of Delaware to get some facts about nuclear power, and how it involves their everyday lives. (**0008-3-1** [Willis, Martin])

Comment: Thank you for the opportunity to comment. (**0008-4-13** [Herron, Stephanie])

Comment: On behalf of PSEG we look forward to the opportunity to continue working with the Nuclear Regulatory Commission, and the public, on our application for an Early Site Permit, as we explore the possibility of building a new nuclear plant. (**0008-5-1** [Eilola, Ed])

Comment: Again, we welcome today's public meetings, and I thank you for the opportunity to speak to you this evening. (**0008-5-5** [Eilola, Ed])

Comment: I appreciate the opportunity to comment on the Draft Environmental Impact Statement being discussed this evening. (**0008-6-2** [Wiwel, Kathy])

Comment: Thank you again, for your time, and the opportunity to comment on this necessary project. (**0008-6-7** [Wiwel, Kathy])

Comment: Thank you for providing an opportunity to bring my comments forward. (**0009-10** [Locandro, Roger])

Comment: The Department has no comment on the DEIS at this time. Thank you for the opportunity to review and comment on this DEIS. (**0014-1** [Raddant, Andrew])

Comment: PSEG appreciates the opportunity to comment on the PSEG Site ESP DEIS and commends the NRC staff on the thorough analysis presented and the timely publication of the DEIS. (**0015-1-1** [Mallon, James])

Comment: Thank you for the opportunity to comment. (**0017-5** [Mitchell, Judy-Ann])

Comment: Thank you for the chance to comment. (**0019-1** [Passmore, Wills])

Comment: Thank you again for consideration of our comments (**0020-5-19** [van Rossum, Maya])

Comment: The Delaware Coastal Management Program (DCMP) appreciates the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for an Early Site Permit at the PSEG Site. Staff from the DCMP attended the 1 October public meeting in Salem County, New Jersey as well as the 23 October meeting in Middletown, Delaware. (**0023-1-1** [Cooksey, Sarah])

Response: *These comments express general support for the NRC's early ESP and/or the public participation aspect of that process, including the opportunity to provide comments via letters, e-mail, etc. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.34 General Comments in Support of Nuclear Power

Comment: While I am not an expert in energy generation, there is no question that the future welfare of human society depends on reducing energy use and developing zero carbon sources of energy. Many experts have indicated that nuclear power represents a viable alternative in the short term and must be part of any mix of conservation and new energy sources that are used to make the transition to a zero carbon future. (**0001-10** [Velinsky, David])

Comment: While I'm not an expert in energy generation, there is no question that the future welfare of human society depends on reducing energy use, and developing zero carbon sources of energy. Many experts have indicated that nuclear power represents a viable alternative, in the short term, and must be part of the mix of conservation, and new energy sources that are used to make transition to a zero carbon future. (**0004-11-10** [Velinsky, David])

Comment: I was, formerly, a staunch opponent of nuclear power, especially following the Three Mile Island episode. But that position changed after I became an intervenor in the proposed wind installations along the ridges of the Appalachian Mountains in Western Maryland. I learned the truth about the many down sides of industrial wind. And, at the same time, learned that my opposition to nuclear energy was based on my ignorance of it. Dr. Norman Meadow, and William Biggley both helped to dispel that ignorance. And I have, since, become a strong supporter of nuclear energy, as the most environmentally sensitive solution to our energy needs. (**0004-12-1** [Eastman, Alice (Ajax)])

Comment: These and many other problems of unreliability, non-firm production electricity, the enormous amount of land and sea required, greater costs, shorter life spans, in comparison with nuclear energy are why I'm committed to favoring nuclear energy. (**0004-12-8** [Eastman, Alice (Ajax)])

Comment: I believe nuclear power has, and is, a necessary part to play in our nation's energy future. New Jersey and our nation, like France, is being well served by nuclear power. (**0004-13-4** [Miller, Lynn])

Comment: I have been a big fan of nuclear power, since I started working at Westinghouse, back in the mid early '70s, I worked at the, right over, just on the other side of the river, on the condensers, feedwater heaters, water coolers, moisture separator reheaters, all the heat transfer equipment on fossil nuclear plants. I became convinced, after visiting a lot of fossil and nuclear plants, that nuclear is the only way to go. Coal is so dirty, natural gas is better, but it is not the long term solution. (**0004-17-2** [Osborn, Sam])

Comment: Nuclear energy continues to be an important part of America's, and New Jersey's diverse energy portfolio, providing reliable baseload electricity around the clock. Nuclear generation provides nearly 20 percent of our country's electricity and more than half of the electricity used in New Jersey. (**0004-2-4** [Egenton, Michael])

Comment: While there has been considerable public dialogue and debate, about the use and benefits of nuclear power, no one can argue that nuclear power is the largest source of electricity that does not emit any air pollution. (**0004-2-5** [Egenton, Michael])

Comment: Additionally, the business community recognizes that the first commercial nuclear power plant, in the United States, located here in New Jersey, Oyster Creek, is now scheduled to be decommissioned and retired in 2019, making the urgency of a new nuclear generating facility that much more critical. (**0004-2-8** [Egenton, Michael])

Comment: How safe is it to work at PSEG Nuclear? I get asked that question from my family and friends. And also the question, are you scared to work there? Being an environmentalist, and an outdoor enthusiast, having environmental science degree and a civil engineering degree, I can honestly answer it is safe to work at a nuclear generating stations. (**0004-20-1** [Timberman, Tanya])

Comment: So three critical questions, conclusions, can be drawn from this understanding. The first is that we must reach zero carbon dioxide emissions as soon as possible. Because what is emitted this year is going to be with us for a good millenium, or more. We don't have time to wait for ancillary technologies, like energy storage and a number of other things to be developed. Nuclear power can do that right now. (**0004-6-6** [Meadow, Norman])

Comment: The third conclusion, that the National Academies of Science reached is that nuclear power must be used as an essential component for producing carbon free primary energy. Nuclear power can also be used for industrial process heat, as well as heat for buildings, whereas wind cannot, and solar installations, in deserts, cannot supply heat to industrial or population centers. (**0004-6-8** [Meadow, Norman])

Comment: The following quote is from the National Academy of Sciences, referred to the need for nuclear power to combat global warming. (1) U.S. nuclear power plants were responsible for, approximately, 70 percent of the greenhouse gas free electricity production in the United States. The existing plants are likely to continue to contribute significantly. However, after 2035 if significant new construction has taken place, during the preceding 15 years, the greenhouse gas emissions reduction could be substantial. (2) We thus conclude that is an urgent need for U.S. action to reduce greenhouse gas emissions. In response to this need for action we recommend policies to, among other things, establish new generation nuclear technologies. (3) Nuclear power is one of the key options for meeting large scale electricity demand without producing greenhouse gases. (4) Nuclear power is an established technology that could meet a significant portion of the world's energy needs. France obtains, roughly, 79 percent of its electricity from nuclear sources. About 20 percent of U.S. electricity comes from nuclear reactors, by far the largest source of greenhouse gas-free energy. (**0004-7-2** [Meadow, Karen])

Comment: Therefore we feel building more nuclear reactors, as quickly as possible, is essential to the long-term viability of human society, and the biological world. (**0004-7-5** [Meadow, Karen])

Comment: I would recommend this industry to anyone and I do. I feel like I'm getting valuable skills in an important industry, and look forward to coming to work, every day, because I know that I can take pride in my work, and that it is appreciated. (**0006-10-2** [Barch, Alexander])

Comment: Therefore we feel building more nuclear power reactors, as quickly as possible, is essential to the long-term viability of human society, and the biological world. (**0007-6-11** [Meadow, Norman])

Comment: And, third, that nuclear power must be used as an essential component for producing carbon-free energy. This is the National Academy saying this. (**0007-6-7** [Meadow, Norman])

Comment: We believe, therefore, that the best course to reach zero emissions, as soon as possible, because carbon dioxide emitted this year will still be having an effect on climate for several millennia.It is clear that carbon dioxide, from gas turbines, will have to end. Electricity accounts for only about 40 percent of our carbon dioxide emissions.But nuclear power can and, also be used for industrial process heat, and heating buildings, whereas wind power cannot. And solar installations in deserts cannot supply heat to industrial or population centers. (**0007-6-9** [Meadow, Norman])

Comment: Nuclear power is the only clean fuel that I know that we have, that we can rely on, today and tomorrow. And if you don't think that nuclear fuel, nuclear power hasn't been around for a long time, then you have a big problem, in that are breathing the oxygen in the air, that is being held here, by the magnetic fields, because we stand on top of a nuclear power plant. It is the reason that we have a molten core in our world, and it is the reason that we have magnetic fields, and the Vanallen belts, and we have maintained an environment here. (**0008-10-4** [Deschere, Mark])

Comment: But if we don't go forward with these things, we are selling our grandchildren down the road. And that is not something that I consider acceptable. So, do I support nuclear power? Absolutely. Am I steeped in nuclear power? Yes, I am. Did I start out that way? No, I didn't. But I have been close to this industry. This is an industry that really does take what they are doing seriously. (**0008-10-5** [Deschere, Mark])

Comment: For those of you that continue to have reservations about new nuclear power plant, or nuclear energy in general, I encourage you take advantage. PSEG operates an energy and environmental resource center over in Salem, New Jersey. And there you can find a wealth of information about nuclear power, and other energy sources. (**0008-2-12** [Evans, Brenda])

Comment: I strongly support nuclear power as a safe, reliable, source of energy. (**0008-2-4** [Evans, Brenda])

Comment: I believe we need nuclear power. As of today 20 percent of all electricity, generated in this nation, comes from the 100-plus nuclear reactors spread out among the continental United States. If you want this nation to have all of the above energy profile, nuclear power has to be included. If you want to have reduced greenhouse gases, in the future, nuclear power must be included. For, as I know, there are no emissions from nuclear power. (**0008-3-2** [Willis, Martin])

Comment: We need nuclear power and from what I'm hearing tonight, I'm very encouraged, and thank you for letting me have my comments. (**0008-3-5** [Willis, Martin])

Comment: I believe nuclear power is an extremely important resource if we are going to meet the climate change requirements, if we are going to stop the greenhouse gas emissions. (**0008-7-2** [Shaffer, Mark])

Comment: Nuclear energy now supplies over 50% of our state's energy needs and it is recognized as an efficient, clean, low carbon form of energy production. We are pleased to see the change to an efficient, clean, low carbon form of energy production, as needs for energy continue to grow in the State of New Jersey. (**0009-2** [Locandro, Roger])

Response: *These comments express support for nuclear power in general. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.35 General Comments in Support of the Applicant and/or the Existing Plant

Comment: For over 20 years the Academy [of Natural Sciences of Drexel University] has acted in an advisory capacity to monitor and evaluate the impact of various PSEG projects on the Delaware Estuary. In that role we have done extensive research on the physical and biological characteristics of the Delaware Estuary, including components of the PSEG Estuarine Enhancement Program. We have had the opportunity to observe PSEG make substantive steps to reduce their environmental impact and to operate within the constraints of the local ecosystem. They are a very responsible partner in the study and use of the Delaware estuary. (**0001-1** [Velinsky, David])

Comment: Let me conclude by saying that I have had the opportunity to observe PSEG's operations for a number of years, and I'm impressed by their willingness to respond to environmental constraints in their planning. They have embraced ecological science as a planning tool for engineering and have been proactive in seeking the guidance of experts to reduce their environmental impacts. The EEP represents a long term commitment to the region and its natural resources, and I would expect that commitment to continue with the proposed new construction. (**0001-11** [Velinsky, David])

Comment: The Academy [of Natural Sciences of Drexel University] commends PSEG on its demonstrated initiative and long term commitment to restoring the critical wetlands of the Delaware Estuary. The Delaware Estuary Enhancement Program has had numerous positive impacts on the ecology and biodiversity of the region, and has made important contributions to the recreational and educational opportunities available to the local communities. The scale and scope of the effort has supported large scale scientific research and has improved our understanding of the process of environmental restoration. (**0001-5** [Velinsky, David])

Comment: Having worked with PSEG personnel since 1994 on various aspects of the Estuary Enhancement Program, and witnessed first-hand, a willingness and commitment to doing the "right thing", and to be diligent and rigorous in their efforts to avoid and minimize impacts of the project on natural resources. More than 50 specialists in ecology, design and construction of coastal wetlands have participated in implementing and/or evaluating the EEP during the last two decades. This is EcoSocietal Restoration at its best -- Rigorous science and a very meaningful and practical outcome! (**0002-7** [Weinstein, Michael])

Comment: For over 20 years the Academy [of Natural Sciences of Drexel University] has acted in an advisory role to monitor and evaluate the impact of the various projects, of PSEG, on the Delaware Estuary. In that time we have had the opportunity to observe PSEG make substantive steps in reducing their environmental impact, and to operate within the constraints of the local ecosystem. They are a very responsible partner in the study and use of the Delaware Estuary. (**0004-11-1** [Velinsky, David])

Comment: Let me conclude that I have had the opportunity to observe PSEG's operations for a number of years. And I'm impressed by their willingness to respond to environmental constraints in their planning. They have embraced ecological science as a planning tool for engineering, and have been proactive in seeking the guidance of experts, and to reduce their environmental impacts. The Estuary Enhancement Program represents a long-term commitment to the region, and its natural resources. And I would expect the commitment to continue with the proposed new construction. (**0004-11-11** [Velinsky, David])

Comment: The Academy [of Natural Sciences of Drexel University] commends PSEG on its demonstrated initiative, and long-term commitment in restoring the critical wetlands to the Delaware Estuary. The Delaware Estuary Enhancement Program has had numerous positive impacts on the ecology and biodiversity of the region, and has made important contributions to the recreational and educational opportunities available to local communities. The scale and scope of this effort has supported large scale scientific research, as outlined from Mike, and has improved our understanding of the process of environmental restoration. (**0004-11-5** [Velinsky, David])

Comment: The Water Resources Association of the Delaware River Basin (WRA) recognizes that PSEG has demonstrated a long-standing commitment to the environment, and to their credit, they have been a national leader in the electric utility industry for emphasizing environmentally sustainable solutions for operations. (**0004-16-12** [Molzahn, Robert])

Comment: So it was said earlier, to hold PSEG's feet to the fire and they will come through. I would even amend that to say that they've always been true community partners and you don't even need to hold their feet to the fire, you engage them in conversation, and they will willingly work with you to improve the situation for all. Just to make the point of how this isn't an aloof industry, this is a true industry that always engages with its community. I can tell you, over the past -- a little over ten years, Joe Barton, Joe DelMar, Mike Coil, we know them by name. And that is not always the case. So I'm here to just commend a tremendous community partner in PSEG. (**0004-21-2** [Pierson, Helene])

Comment: And with their support we have brought almost 700 students, from Southern New Jersey, through these programs. Many of whom now are looking and seeing that the first group of these students are now coming through Rowan as engineering students, as well as enrolling in a number of engineering schools throughout the region. So we are very happy to have that support. And, certainly, without that support, we wouldn't be able to offer that program nearly free of cost, to any student who wants to attend in the region. And with their support we hope to double the number of students that we have been bringing through these programs. So while a lot of the companies in the region have spoken the right words, and said we are going to support it, we need these future students to become our workforce down the road, they really put their money where their mouth is. (**0004-22-1** [Lowman, Anthony])

Comment: And they sponsor our clinic projects, no matter if it is something of interest to their company, or not, it is for the training of our students. These projects range from some that have been of interest to their program, such as using an engineering design team to help solve a flooding problem in their parking lot, to wetlands restoration, to remediation. We use money for remediation after hurricane Sandy. To students working on projects related to peripheral nerve growth for developing artificial medical devices. So their support has gone a long way to helping us train engineers. I think last I would just like to say, you know, I think it is important to have a partner like that in the region, as an engineering school. They help us train our students, they help us drive the directions of our programs, and it is -I think they are great for our region. And certainly what they do, going forward, is going to be a benefit to all. (**0004-22-2** [Lowman, Anthony])

Comment: PSEG not only stops at the college level, but they have been absolutely instrumental in preparing students, at a high school level, for careers in nuclear engineering, and for a multitude of jobs down at PSEG. They were instrumental in the creation of an Academy for Nuclear Applications and Energy Applications at the technical high school. And when I say instrumental, not jus that there was an idea, and they proposed it to us, and we put together our program. They helped us write a curriculum, and build a program that is rooted in safety, that is rooted in benefit to high school students. And it is a great program. We have produced students in each of the last two graduating classes, that are now engineering students at Rowan University, taking part in some of the programs that were just mentioned. (**0004-23-4** [Helder, Jason])

Comment: They have also been very impactful to the program that is now offered, right here, on campus here at Salem Community College, in a nuclear engineering program, to prepare students. PSEG is very thoughtful in how they go about this. They have an energy resource center that is available to students of all ages, here in Salem County. Its doors are always open. It is presented in a way that makes energy conservation, and safety, very real to young children, elementary, middle, and high school. (**0004-23-5** [Helder, Jason])

Comment: At PSEG we understand our obligation to the local community, the environment, and our friends, families, coworkers, to provide safe, reliable, economic and green energy. We operate our plants with a culture of safety and transparency. We encourage all of our employees to raise issues, and to be open, on how we can do things better. It seems like when we really look at it, no matter what it is that we do, there are always lessons learned so that tomorrow we can do it just a little bit better. There are no surprises, not in our operations and, certainly, not with our stakeholders. There is no nuclear, no new nuclear, without good old nuclear. Every time that there is an upset condition, in the nuclear industry, it is really going to impact the ability to build any new power plants. (**0004-8-2** [Joyce, Tom])

Comment: Having worked with PSEG personnel since 1984, in various aspects of the EEP, and witnessed first-hand, a willingness and commitment to do the right thing, and to be diligent and rigorous in their efforts to avoid and minimize impacts of the project, on natural resources. More than 50 specialists in ecology, design, and construction of coastal wetlands have participated in implementing and/or evaluating the EEP, still on an ongoing basis, during the last two decades. I had the quote about ecological, ecosocietal restoration, and I just will say that this is one of the best examples I can cite of ecosocietal restoration. (**0004-9-8** [Weinstein, Michael])

Comment: PSEG and the Lower Alloway's Creek Township, have a great relationship, and we strive to keep it this way. We are always kept, well-informed, by PSEG employees, at our monthly township meetings, in the emergency management room, and numerous phone calls, in between times. During these meetings, and phone calls, there was at no time that I have ever felt that PSEG was not being transparent, with me, or the township. PSEG does a very good job explaining everything, to the committee members, and myself and in a respectful way. In my opinion PSEG has done so much for our town. Just to name a few things, the countless number of residents that are currently, and past, employees of PSEG. The community outreach, training, and awareness, is above and beyond all the rest. Not only the jobs at PSEG, but the jobs our township currently has, we can thank PSEG for playing a part in creating. For example, our police department, our municipal fire department, and several other small businesses, as well. I definitely feel PSEG has made a positive impact on our town. (**0006-2-1** [Bradway, Timothy])

Comment: We have been involved, the Division has been involved with that program, has been observing it, has made comment on it from the time that it was originally started. And the one thing we have seen, time and again, is that PSEG has done a very good job of doing what is right, for the environment, in those situations. And they have brought in people who can do the job right. I have witnessed, many cases, where there were arguments, with some of the people that PSEG had hired. And once that became, went out into the public, they soon moved that person to another job, in order to make sure that things would move smoothly. They hired some of the best people they could get. And those people have made sure that the project has gone along well. (**0006-7-5** [Widjeskog, Lee])

Comment: We have worked with PSEG for many years taking advantage of the huge marsh restoration program they've put in place, along the shores of Delaware Bay. We used the restored marsh habitats as living classrooms for field programs we present to a wide array of audience. PSEG has supported our access, to these sites, and worked together with us to facilitate our ability to conveniently use these habitats for education purposes. We have programs, in place, that engage under-served teams in water quality monitoring activities, upstream, in the urbanized parts of the Delaware River watershed. And it is great to be able to compare these urban environments to productive salt marsh habitats further downstream. (**0006-8-1** [Duvau, Bryan])

Comment: I believe that PSEG is a good steward of the environment, as well as the electric resource needs of the regions. They have demonstrated strong leadership, in support of restoration programs, throughout the state, and have collaborated with a large group of environmental organizations to preserve and improve coastal resources. I look forward to continuing to work with them to create opportunities for impactful education programming for the benefit of the region as a whole. (**0006-8-10** [Duvau, Bryan])

Comment: PSEG has consistently demonstrated their commitment to environmental stewardship through programs like these. In addition PSEG plays an important leadership role in the Federal Coastal America Program, which is dedicated to improving coastal and estuarine habitats throughout the country. (**0006-8-3** [Duvau, Bryan])

Comment: In New Jersey PSEG plays a major leadership role in the corporate wetlands restoration partnership, and the New Jersey CWRP is consistently held up as a model of a successful application of this type of collaboration within coastal America. There is no way this would be the case if not for PSEG's strong leadership of the effort. (**0006-8-4** [Duvau, Bryan])

Comment: In all of my interactions, with the officials at PSEG, I have always found them willing to work closely with the State of Delaware and, just recently, the City of Delaware City. These interactions include a program that improved the estuary, by restoring sites, and installing some fish ladders. They have always provided real dollars to help other habitat and wetland restorations. It is my experience that PSEG understands the importance of its Delaware neighbor, and they strive to ensure that the Delaware Emergency Management Agency, as well as the Delaware Department of Natural Resources and Environmental Control, the City of Delaware City, state and federal officials, are well informed about the operations of their existing nuclear units. (**0007-1-1** [Cathcart, Richard])

Comment: When we worked with PSEG, and I remember PSEG more than any others, because I worked with them for such a long time. And the fact that they were more unique than all the other ones. When it came to working with them, as far as getting the permits done, and doing it right, they were always there to make the changes that were necessary. (**0007-14-1** [Widjeskog, Lee])

Comment: I started back well over 20 years ago, we started working on the Estuary Enhancement Program. They came to the state and said, here, we would like to do this as an alternative to doing actually hard construction. The Department of Environmental Protection in New Jersey decided that was a reasonable alternative, and put New Jersey Fish and Wildlife, and the Marine Fisheries, basically in charge of overseeing what was going on with PSEG. As we worked with them we found out that they were paying close attention to what it was going to do to the environment. And their proposals were, basically, very positive for the environment. (**0007-14-2** [Widjeskog, Lee])

Comment: As a result we have had, now, well over 20 years that we have been working on the Estuary Enhancement Program that PSEG has worked on. This program has ended up providing thousands of acres of wetland enhancement for fish, wildlife, and for the general public here in Delaware and New Jersey. And when I discussed this issue with some of the people who have been involved, for years, as permit reviewers, the one thing that comes out is that this project was the one project that they would look at, and they could look back at their career and say, this is a project that we actually did something positive for the environment. (**0007-14-3** [Widjeskog, Lee])

Comment: [I]f you happen to do environmental impact reviews, people who are applying these already know they are going to get something. It is very seldom that they come in there that they don't have most of their Is dotted and Ts crossed. They may not get all of what they want, but they are going to get something. Yet the reviewers have taken this job on, from the beginning, figuring that they were actually going to provide some protection for the environment. And what they found was that all they are doing is putting off. And what wasn't developed today comes back a couple of years later. We have had some that came back 15 years later. And they would find, you would hear their little comments like, oh it is the same guys that are still here. Which meant we turned them down the first time. And we turned them down again. But with PSEG we didn't have that problem. And all of these reviewers that were involved in the PSEG program say that this project has been one of the best, as far as getting something actually positively done for the environment. So when it comes to commitment, I'd like to point out that PSEG has always been, and it looks like it will continue to be committed to doing the best for the environment. (**0007-14-4** [Widjeskog, Lee])

Comment: The Water Resources Association of the Delaware River recognizes that PSEG has demonstrated a long-standing commitment to the environment, and to their credit has been a national leader, in the electric utility industry, for emphasizing environmentally sustainable solutions to their operations. (**0007-16-11** [Palmer, Dennis])

Comment: And I, generally, don't testify on behalf of permit applications. I do this very rarely. I've only done it a few times. And each time that I have done it has been on behalf of the same company, PSEG. And that is what compelled me to be here today. I do believe the company has a very strong environmental ethic. And this is a key part of the corporate culture at PSEG, something you just don't see in the corporate community very often. (**0007-17-1** [DeLuca, Mike])

Comment: Also, as previous speakers have mentioned, PSEG has a lot of expertise with respect to wetlands, wetlands restoration, mitigation of impacts on wetlands. And this comes, most notably, from the Estuary Enhancement Program, which was instituted in the mid-1990s, perhaps one of the largest restoration programs undertaken for wetlands in our nation, on the order of 20,000 acres. That was a very, very strong success, and led to increased productivity in a variety of fin fish, and restored tidal function to a great vast expanse of wetlands in the Delaware estuary system. So no one disputes that there will be impacts. But, certainly, I believe this company has the capacity, and the expertise, to deal very effectively with these. (**0007-17-3** [DeLuca, Mike])

Comment: At PSEG Nuclear we understand our obligation to the local community, the environment, our friends, and coworkers, and to provide safe, reliable, and economical, and green energy. We operate our plants in a culture of safety and transparency. We encourage our employees to raise issues, and to be open in how we can do things better. There are always lessons to be learned. Our success is made possible by our employees. There are no surprises, not in our operations and, certainly, not with our stakeholders. There is no new nuclear without good old nuclear. (**0007-7-2** [Eilola, Ed])

Comment: For over 20 years the Academy [of Natural Sciences at Drexel University] has acted in an advisory capacity, to monitor and evaluate the impacts of various PSEG projects on the Delaware estuary. In that role we have done extensive research on the physical and biological characteristics of the Delaware estuary, including components of the PSEG Estuary Enhancement Program. We have had the opportunity to observe PSEG make substantial steps, or substantive and substantial steps, to reduce the environmental impact and operate within the constraints of the local ecosystem. (**0007-9-1** [Wall, Roland])

Comment: The Academy [of Natural Sciences at Drexel University] commends PSEG for its demonstrated initiative, and long term commitment, to restoring the critical wetlands of the Delaware estuary. The Estuary Enhancement Program has had numerous positive impacts on the ecology, and biodiversity of the region, and has made important contributions to recreational, and educational opportunities available to the local communities. The scale and scope of the effort has supported large scale scientific research, and has improved our understanding of the processes of environmental restoration. (**0007-9-5** [Wall, Roland])

Comment: I wanted to focus on, and shed some, what I call insider's light, in how PSEG conducts their day to day environmental business. One example of that was the implementation of the Estuary Enhancement Program in both New Jersey and Delaware. During the planning for this program, and the field work, over the last 20 years, the PSEG team I managed focused on making sure that there was a sound scientific basis for our decisionmaking. Whether that was in the design of the many aquatic biological monitoring programs, that we conducted, where the challenge was always on assuring that the sampling frequency, and sampling locations, selected, provided a strong statistical basis for conclusions. And also making sure that those conclusions were based on facts and data. (**0008-1-1** [Pantazes, Jeff])

Comment: Another example of that is the site selection process for the various restoration projects that we undertook. Again, looking to find the best restoration sites, regardless of which state they were in, as opposed to the easiest or least cost sites. (**0008-1-2** [Pantazes, Jeff])

Comment: Similarly, working directly with the Delaware Department of Natural Resources and Environmental Control's marsh and aquatic professionals, including Bill Meredith from mosquito section, Roy Miller, Bill Jones, Bob Meadows, and others, PSEG assisted with, and funded the restoration of well over 5,000 acres of degraded marsh in Delaware. That totals to about eight square miles of improved aquatic habitat that is in existence, and functioning very well, today. (**0008-1-4** [Pantazes, Jeff])

Comment: PSEG funded the land that Delaware Department of Natural Resources and Environmental Control (DNREC) bought for the Mispillion Harbor Nature Center, that DNREC now operates. It is one of the best crab viewing areas in the region, and something to be very proud of. To sum all this up, the basis for PSEG's environmental decisionmaking has been, for my 30-plus year tenure, and remains to this day, focused on sound and defensible science. (**0008-1-6** [Pantazes, Jeff])

Comment: I know in my day to day interactions with Delaware, I never forgot that people mattered. And I worked to make sure that I could always say that we were open, honest, and forthright, about our environmental actions. (**0008-1-8** [Pantazes, Jeff])

Comment: The working relationships we have developed with the local residents, scientists, and regulators, have helped the Estuary Enhancement Program achieve its success. I appreciate the assistance and cooperation from the Delaware Department of Natural Resources and Environmental Control's (DNREC's) Division of Fish and Wildlife, while performing regulatory activities at the Cedar Swamp, and the Rocks Wetland Restoration sites, which are along the Delaware Bay, just south of Odessa. (**0008-2-10** [Evans, Brenda])

Comment: Like many folks, when I first graduated from college, I had very little knowledge of the nuclear industry. With my degree in environmental science my main objective was to find a job with a company that really had a commitment to the environment. And I found that in PSEG Nuclear. (**0008-2-7** [Evans, Brenda])

Comment: While working with the Estuary Enhancement Program we have remained committed with working with federal, state, and local agencies. And seeking and implementing input, that we receive from those agencies, and local residents, and other stakeholders. I have been very fortunate to work with residents, local officials. We have community involvement committees in three counties in New Jersey, as well as stakeholders from New Castle and Kent counties, in Delaware. (**0008-2-9** [Evans, Brenda])

Comment: We take great pride in being a good neighbor. We are proactive and engage the community, when a challenge arises, so they understand the challenge, and have their questions answered. Again, there are no surprises, including our plans to explore building a new nuclear plant. (**0008-5-3** [Eilola, Ed])

Comment: More importantly, as a veteran, I was in the Navy for eight years, I appreciate the way PSEG treats veteran employees. I was in the United States New York and those employees are still supporting the military today, work at PSEG. When duty calls I know every PSEG employee that has been called up feels that when they return they are going to have an equal, or better, job when they return. (**0008-7-6** [Shaffer, Mark])

Response: *These comments express general support for the Applicant. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: I am absolutely certain that a satisfactory effort to replace these lost wetlands will be undertaken by the Company to the vast satisfaction of the majority of the public, resource and regulatory agencies, both Federal and State, and a broad array of decision makers. They have done this admirably before, involving a multidisciplinary group of the nation's best scientists, and quality engineers to design and implement their marsh restoration plan. I see no reason that they will not do the same again, inviting in the top technical talent to achieve their mitigation objectives. (**0002-9** [Weinstein, Michael])

Comment: I just want to thank PSEG for their consideration to locate a fourth reactor in Salem County. They have always been a good neighbor, a good partner. They are involved in the community. They are always open and transparent. I think their motto is safety, safety, safety, train, train, train, and educate, educate, educate. Which, in essence, helps our community out better. Because it educates our residents. So we thank them for that. They are totally involved in our community, in a lot of different aspects, through non-profits, through our community college, just every aspect of our community. So we thank them for that, too. (**0004-10-2** [Acton, Julie])

Comment: In all of my time, working in New Jersey, it has been my experience that PSEG, the largest state utility, with its commitment to the environment, has set a very high bar for utilities, both in and out of the state, on how to reduce and prevent environmental impacts, on how to responsibly address environmental conservation issues that arise as part of their operations and how to be an effective environmental steward. (**0004-15-1** [McHugh, Martin])

Comment: And since I know, first hand, the dedication and commitment, of many of these folks, that PSEG will be working with, I bet that working together, they will find ways to go beyond just mitigating these impacts. And they will look to achieve a net benefit for our natural resources in this state. There are many new and exciting cutting edge approaches, and best management practices, that can be implemented to achieve those net benefits. And I know I do not have to urge PSEG, or our state and federal agency professionals, to look at these BMPs, as they already are doing so, elsewhere, in many different arenas. Green infrastructure, and nature based approaches, like living shorelines, rain gardens for storm water management, thin layer application of dredge material to restore wetlands, while keeping precious sediment resources in our estuaries. These are just a few of the examples that can be implemented at this site, to address the water quality issues, restoration, and the loss of CDF space. (**0004-15-4** [McHugh, Martin])

Comment: While this may be a particularly challenging time for considering any new power generating facilities, because of sea level rise, climate change, and ongoing loss of habitat, there are many new forward looking programs, and research projects, under way that are piloting new approaches, like green infrastructure. And that these will inform the future for PSEG at this site. I'm sure, based on PSEG's stewardship record, that they will work together with our state and federal agencies to be on that cutting edge, as they go down this road, and to continue to be a steward. (**0004-15-5** [McHugh, Martin])

Comment: It is also noteworthy that PSEG's an industry leader in practicing responsible environmental stewardship. That same commitment will extend to the new plant, in its planning, construction, and ultimate operation, if approved by the NRC. The Salem generation station, in response to the New Jersey Pollutant Discharge Elimination System, an acronym we know in Trenton and NJPDES permit, embarked on an unprecedented effort to help restore a portion of the Delaware Estuary, by establishing the Estuary Enhancement Program in 1994. Today the EEP is recognized as the largest privately funded program, of its kind, in the country and, perhaps, the world with more than 20,000 acres of salt marsh and adjacent uplands being restored, enhanced, or preserved. (**0004-2-12** [Egenton, Michael])

Comment: I can't tell you how happy I am to be here today, to be supporting PSEG, whose operations led to clean air in its operations. One of the things, that has astounded me the most, in coming to Salem City, is that I, and it was said earlier, that you might hear NIMBY comments. I have never heard, in Salem City, in interacting with many community people, any adverse comments against PSEG from its residents. I have seen no NIMBY in Salem City. And that amazes me. (**0004-21-1** [Pierson, Helene])

Comment: The plans, proposed by PSEG, can be viewed in light of their past mitigation, and restoration activities. They have one of the largest and most successful mitigation projects in the country, where they control phragmites to produce high quality salt marsh with its attendant mud flats and inter-tidal habitat that is used extensively by thousands of shore birds, and other species. Thus their estuary enhancement program is one of the most successful in the country, has received a variety of state and national awards. And unlike many such programs, it is sustainable. Thus it is my professional opinion that they are capable of and will deliver on their environmental mitigation and restoration plans. The company's integrity, and environmental vision, to ensure that there is little environmental impact, and that the restoration and mitigation plans will result in a far more high quality habitat than is presently on that site. (**0004-5-7** [Burger, Joanna])

Comment: We take great pride in being a good neighbor. We are proactive, and engage the community when there are issues with our operations, to make sure that they have an understanding of the challenges that we face, and how we are answering, or how we are dealing with those when they occur. Again, no surprises. And that means no surprises in our plans to explore the opportunity to build another nuclear power plant down here at Artificial Island. And when I stop and I think back on the -- originally this site was licensed for four reactors. And I think, since then, the world of science has even progressed from there, and I feel very good about the Environmental Impact Statement that has been generated by the NRC with help from the Army Corps. I'm not going to go into the impacts of what would a new nuclear power plant do. I think Mike did that very well in his opening remarks. But that these impacts, as well as many others, will affect our community. And we have met with the County Freeholders, in all of the local municipalities, and we intend to keep up that relationship as we go down this path. (**0004-8-4** [Joyce, Tom])

Comment: I'm absolutely certain that a satisfactory effort to replace these lost wetlands, will be undertaken, by the company, to the vast satisfaction of the majority of public resource, and regulatory agency personnel, both federal and state, and a broad array of decisionmakers. They have done this admirably before, involving a multi-disciplinary group of the nation's best scientists, and quality engineers to design and implement their marsh restoration program. I see absolutely no reason why they will not do the same again, inviting in the top technical talent to achieve their mitigation objectives. (**0004-9-10** [Weinstein, Michael])

Comment: And, in fact, as a member of a scientific organization I, typically, don't come out to public hearings and speak on behalf of a permit, or a permit applicant. I have only done it three times. This is the third time. And each one of those times it has been on behalf of PSEG. And that is why I drove several hours to be here tonight to, again, speak on behalf of their track record with respect to the environment. (**0006-6-2** [DeLuca, Mike])

Comment: And, finally, I will just close with a statement about PSEG in terms of their value as a community asset. I believe President Baillie mentioned this in her remarks. I really think that they are an asset to the environment. They really contribute a great deal to our state. They continue to do that. They have done things that they haven't had to do, they've gone above and beyond. And I just feel, very strongly, that they are capable and have the expertise, and can bring the expertise to bear, on mitigating the impacts of this proposed project. (**0006-6-6** [DeLuca, Mike])

Comment: So in summary I just want to say that I'm very comfortable and confident that PSEG has the capacity and expertise to address the environmental impacts that are being considered, and will happen, as a result of the proposed project. (**0007-17-5** [DeLuca, Mike])

Comment: We take great pride in being a good neighbor. We are proactive and engage the community when a challenge arises, so that they understand the challenge, and have their questions answered. Again, there are no surprises, including our plans to explore building a new nuclear plant. (**0007-7-3** [Eilola, Ed])

Comment: I was glad when I heard that we had applied for an Early Site Permit. Salem Hope Creek nuclear plants have been an important source of electrical power here, in the Delaware valley. And, more importantly, they are an employer who provides numerous, stable, good paying jobs for people in both sides of the river. During the recent financial crisis, that we have been through for the last couple of years, PSEG looked for ways to save money so that they could save employee jobs. They didn't do it the other way, they didn't look for ways to cut jobs, so that they could save money for the company. (**0008-7-4** [Shaffer, Mark])

Response: *These comments express general support for the applicant, as well as general support for a new nuclear plant at the PSEG Site. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: I represent nearly 800 members who work at PSEG's existing nuclear generating stations, Salem One, Salem Two, and Hope Creek. Those three plants have provided safe, clean, and reliable electric power to the people of New Jersey for 38 years. (**0004-18-1** [Hufsey, Moe])

Comment: I worked in the environmental field for 15 years now, and I'm very familiar with the tough environmental rules and regulations in the state of New Jersey. The state is one of the few that has such strict regulations. And having worked in the environmental department at the stations, I can assure you that the plants at PSEG perform very well in meeting our state's regulations. (**0004-20-2** [Timberman, Tanya])

Comment: It is very clean, and green energy. And being a local, this is very important to me, and my family. So, no, I'm not afraid to work there. (**0004-20-3** [Timberman, Tanya])

Response: *These comments express general support for the existing nuclear units at the PSEG Site. These comments do not provide any specific information relating to the* *environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: What I found is a commitment to safety, quality, and environmental stewardship. Unlike the coal and gas industries, these companies are transparent in their practices. And while they still ultimately are accountable to their shareholders, the scrutiny that comes with nuclear has created educational partnerships, in local communities, environmental stewardship like PSEG's Estuary Enhancement Program, that you have heard mentioned numerous times today. Openness with regard to public relation, and lots of baseload energy we can count on for decades. (**0004-14-2** [Moscovici, Dan])

Comment: PSEG's commitment to conservation programs has made it an industry leader for our environment, in our state. And I can list a number of projects that illustrate PSEG's commitment. Of course the Estuary Enhancement Program which is restoring upwards of 20,000 acres of coastal marsh, is the largest. But, in my own direct experience, I saw the utilities, and PSEG's staff commitment to environment on many occasions, in much smaller projects. Like the cleanup of historic operations, the protection of osprey nests on PSEG facilities, the restoration of important habitat on its power line right of ways. In many of these matters I saw the staff's commitment to not only doing the right thing, but to go above and beyond what was required. And New Jersey's environment has benefitted, and will continue to benefit from that kind of stewardship commitment. (**0004-15-2** [McHugh, Martin])

Comment: My husband was born and raised there, so he has lived there 60 years. We live ten miles, within 10 miles of the plant, and we have never had a concern about safety. Probably that is because, like the person who spoke before me, we know many people. Many of them are my neighbors, that work, continue to work at PSEG. These people are involved in our community. I serve on many communities with representatives of this company, as well as some of their high level executives. (**0006-3-1** [Baillie, Joan])

Comment: I do know that PSEG takes seriously their corporate responsibilities to protect the health and safety of all residents, both in New Jersey, and Delaware. They are dedicated to reduce the environmental impact of our environment, as a result of their operations. (**0007-1-3** [Cathcart, Richard])

Comment: I support the Draft Environmental Impact Statement that the NRC is presenting here today. And I'm a -- I'm actually very glad for the choice that PSEG made for the location. And I live closer because I'm confident in the technology, and I'm confident in the people that are in the plants. (**0007-10-3** [Clancy, James])

Comment: In my current job it is my responsibility that my engineers follow and apply all the processes and procedures, that are in place, to ensure an event free operation. I can guarantee you that the workforce, at PSEG Nuclear, is one that is qualified and fully engaged with the safety of themselves, and the public, and the neighbors of PSEG Nuclear. Every process that PSEG Nuclear has is built with several defenses in their players, from the qualification to the training, and executions, and housekeeping on each one of the jobs that we do. We ensure quality, and safe work is performed across the whole organization. As a matter of fact I'm part of the team that reviews and investigates events that challenge the operation of the plant.

There are scrutinies and reviews on those products, and I take a lot of pride on the products and investigations that we create. (**0007-15-1** [Torres, Katherine])

Comment: PSEG, itself, is an active community member. And when I say community I mean that in three areas, business, education, civic, and also in the environmental community. I think the last speaker talked a little bit about their involvement in the environment. And the gentleman who was in the regulatory area, that PSEG, they get it. They are involved with the community, all four of those communities. In terms of them working with the business community, here in New Castle County, they understand their impact, and they have reached out and worked directly with the Chamber to help small business programs, and help them grow and thrive. (**0007-18-5** [Kleinschmidt, Mark])

Comment: PSEG has worked very closely with the State of Delaware since 1977, including economic support, environmental protection, and emergency planning. PSEG takes its responsibility to protect the health and safety of the public, and the environment, seriously. And works, every day, to ensure that our operations do not adversely impact people with the land, waters, and air, that are near our facilities, regardless of which state they are in. (**0007-8-2** [Spiese, Steve])

Comment: Let me conclude by saying I have had the opportunity to observe PSEG's operations, for a number of years. I'm impressed by their willingness to respond to environmental constraints in their planning. They have embraced ecological sciences as a planning tool for engineering, and have been proactive in seeking the guidance of experts to reduce their environmental impacts. The Estuary Enhancement Program represents a long-term commitment to the region, and its natural resources. I would expect that commitment to continue with the proposed new construction. (**0007-9-11** [Wall, Roland])

Comment: Public Service puts a strong emphasis on safety. And it is not only personal safety, but nuclear safety as well. (**0008-2-2** [Evans, Brenda])

Comment: Environmental compliance, another big emphasis with PSEG. PSEG holds its employees to very high standards, and integrity, and expects all employees to continue to strive for personal, as well as operational improvements and excellence, and to be accountable for all their actions. (**0008-2-3** [Evans, Brenda])

Comment: I was also cautious of, and curious, of how safe working in a nuclear plant would be. Through my training and work experience, I quickly learned that nuclear facility was a clean and a safe place to work. I also learned just how strongly PSEG was committed to maintaining that safe work environment through continued training, procedures, and programs. While working at Hope Creek, and the Estuary Enhancement Program, strict adherence to regulatory policies, be they environmental or nuclear, it is not an option, it is an expectation. (**0008-2-8** [Evans, Brenda])

Comment: At PSEG we understand our obligation to the local community, the environment, our friends, families and coworkers, to provide safe, reliable, economic and green energy. We operate our plants within a culture of safety and transparency. We encourage our employees to raise issues, and to be open on how to do things better. There are always lessons to be learned. Our success is made possible by employees. There are no surprises, not in our operations and, certainly, not with our stakeholders. There is no new nuclear without good old nuclear. (**0008-5-2** [Eilola, Ed])

Comment: I believe that living inside the ten mile emergency planning zone is safe. I believe the training, I'm an instructor at PSEG Nuclear. I teach the operators how to operate the nuclear power plant, and what to do in an emergency. I believe the training they receive, the operators at a nuclear plant are trained more than, perhaps, any other worker in the entire world. They get seven weeks of training every year, a week of training every seven weeks, essentially. So they are one of the highest trained, most proficient, most drilled employees in the world, operating nuclear plants in the United States. (**0008-7-3** [Shaffer, Mark])

Comment: We believe in operating the reactor safely, and protecting the environment, and protecting the health and safety of the public are guiding principles for how we work. And we incorporate that in everything we do, in the upgrades that we made to the plant, in the way that we train our operators, and the way we train our chemistry technicians, and in the way we operate our cooling tower systems. The way we treat that water so that when we return it to the environment, it is clean, it is safe, and it doesn't have an environmental impact that would adversely affect conditions in the area. (**0008-7-5** [Shaffer, Mark])

Comment: In closing I would like to say that I support the building of an additional nuclear power plant at the PSEG site New Jersey. I believe it makes good environmental sense to build this kind of clean electrical generating capacity. I believe it makes sense to have a company like PSEG that promotes diversity, supports veterans, supports the community, and a company that has good financial history, and a safe operating history, build that plant. And I hope they move forward and actually eventually build it. (**0008-7-7** [Shaffer, Mark])

Response: *These comments express general support for the applicant, as well as general support for the existing nuclear units at the PSEG Site. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: This power plant must be expanded, it must move forward. There are risks, of course there are risks. If they had told me what the risks were, before my children were born, I probably would have made a whole other set of decisions regarding raising children. But we must move forward, or we must resign ourselves to going home and cooking our dinner on campfires. (**0004-19-2** [Bobbit, John])

Comment: So, you know, for all those reasons, the vocational school is happy to see a project like this on the horizon, with the opportunity for creation of jobs, and for our students who are learning about these many areas, to put those learning experiences into action. (**0004-23-6** [Helder, Jason])

Comment: Overall what PSEG is planning to do is going to be beneficial to the environment, given the constraints that you have, if you are going to put in a roadway. (**0006-7-9** [Widjeskog, Lee])

Comment: In comparison, the proposed nuclear plant, at the PSEG site, would generate large amounts of carbon free power, much more reliably than any renewable power facility. This power generation can take place at a plant occupying a substantially smaller footprint, thus minimizing any adverse impact to avian and bat habitat. (**0006-9-4** [Wiwel, Kathy])

Comment: What a new power plant means for me, for Women in Nuclear (WIN), it means that I can complete my career here. I can stay living in Delaware, which I like. It is also beneficial to our WIN members who want to continue and retire, working in this area, working for this great company, which has been my experience. (**0007-15-2** [Torres, Katherine])

Comment: As a regional player PSEG employs a lot of people. You have heard the employment stats here in Delaware. And that will only grow if and when the plant does get to be expanded. (**0007-18-6** [Kleinschmidt, Mark])

Comment: A potential new plant would have a very positive impact on our community. We have met with elected officials, in New Jersey and Delaware, and will continue to work with the community throughout this entire process. We recognize that this Early Site Permit, and possible new plant, will not be possible without the community support. (**0007-7-4** [Eilola, Ed])

Comment: For all those reasons, to meet the growing electric demand, to help clean the air, and to provide good, high quality jobs, I support PSEG's new safe, clean, and reliable nuclear power plant. (**0007-8-8** [Spiese, Steve])

Comment: I appreciate the opportunity to come here, tonight, to express my support for the potential new power plant in Hancock's Bridge, New Jersey. (**0008-2-1** [Evans, Brenda])

Comment: Should a new nuclear power plant be constructed I believe it would be a big asset to the local communities, and provide clean energy to meet the future's needs. (**0008-2-13** [Evans, Brenda])

Comment: A new nuclear facility would not only provide this reliable energy for the region, but high paying jobs, and fulfilling careers. (**0008-2-5** [Evans, Brenda])

Comment: Potential new plant would have a very positive impact on our community. We have met with elected officials in New Jersey and Delaware, and will continue to work with the community throughout the process. We recognize this Early Site Permit, and possible new plant, will not be possible without the community's support. (**0008-5-4** [Eilola, Ed])

Comment: In light of the ability for this project to replace a significant percentage of polluting fossil energy sources in our region, with reliable carbon-free generation, and minimal impact on the environment, I support the efforts of PSEG to expand nuclear generation in southern New Jersey. (**0008-6-6** [Wiwel, Kathy])

Comment: I support more Nuclear Reactors here in Salem County, N.J. I believe it is a safe method of electric generation as proved by the many safe years of PSEG operations here in Salem County. The economy here needs a boost badly. Jobs are hard to find. Real estate is at a standstill, and construction of a new Nuclear Reactor would give our economy a much needed boost. Also, the added generation would be a boost to the whole east coast. (**0048-1** [Johnston, Clarence])

Response: *These comments express general support for a new nuclear plant at the PSEG Site. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.36 General Comments in Opposition to the Licensing Action

Comment: The Delaware Riverkeeper Network is opposed to proposed Salem 4. (**0004-3-1** [van Rossum, Maya])

Comment: This proposal, to build another nuclear plant, and the EIS, the Draft EIS, are both, in our opinion, failures. (**0006-4-16** [Brook, David])

Comment: So I would appreciate that, A, you back off this. B, save our wetlands and not pollute them any more with the river dredgings, so we can get our bay back. Because the Delaware Bay, and I'm a fisherman, and an outdoorsman, is a liquid desert. (**0007-3-16** [August, Bernard])

Comment: So we are in a crisis here. And they keep building these plants without proper safety and it is proven that you can't do it, is absurd. So that is all I'm saying about this. And I am going to fight this tooth and nail. (**0007-3-20** [August, Bernard])

Comment: But if a facility is seemingly not competent to run the three reactors they already have, I don't understand why we are even considering allowing them to build a fourth one, or potentially more. (**0007-5-11** [Herron, Stephanie])

Comment: And in the long run I think that [renewable energy] is a much more viable solution. Those things are being addressed very well. I think sometimes we jump too quickly, for our energy needs, to move with things without really thinking them through. I know it has been done in the past in some of the areas for wind energy. I fear we may be doing it here. (**0008-8-5** [Carter, David])

Comment: And to continue on to building this site, for another nuclear plant is a waste of your money, and a stakeholdership. Fifteen years from now that plant will be overrun, like the plants they are building now. And the technology they are using is unproven, it is hypothetical, especially when it comes to the small modular reactors. It is vapor ware. It is done on computer models, it is unproven science. (**0008-9-10** [August, Bernard])

Comment: I strongly oppose the building of an additional nuclear reactor at Salem as proposed. (**0010-1** [Cannon, John])

Comment: I am against the construction of another nuclear plant at the PSEG site in Salem, New Jersey. (**0011-1** [Keating, Thomas])

Comment: I am against the construction of another nuclear plant at the PSEG site in Salem, New Jersey , for the following reasons: 1. When this plant was first built it was placed there because it was one of the least populated areas in NJ. Today it is heavily populated on both sides of the river, with dozens of new suburban areas. (**0011-2** [Keating, Thomas])

Comment: We request that the Atomic Safety and Licensing Board (ASLB) conduct a contested hearing due to the environmental concerns about the ESP and that NRC not grant this ESP due to the significant adverse environmental impacts associated with the possible future use of the PSEG site to construct and operate a new nuclear power plant. (**0020-1-2** [van Rossum, Maya])

Comment: Since the DEIS concludes that there is no actual demonstrated need for this power plant, the NRC should now conclude that the granting of an ESP is not appropriate at this time. The NRC should also conclude that the "no action" alternative should be selected as the best choice for the environment and the people of New Jersey. (**0020-5-4** [van Rossum, Maya])

Comment: The [NJDEP Bureau of Marine Fisheries] would recommend "NO ACTION" on this Early Site Permit. (**0021-2-14** [Foster, Ruth])

Comment: Building any more nuclear reactors is unconscionable. (**0024-6** [Doyle, Kathy])

Comment: DON'T DO IT!!! (**0025-1** [Killian, Lynn])

Comment: It is transparent that the nuclear reactor proposal is a threat to ecology of public health and safety and that the PSEG also is working with a company on designs for a new type of "small, modular reactor" with fewer parts, a simpler design, deep underground containment and waterless cooling features; and that this effort be accelerated with a postponement of the proposed nuclear reactor construction. (**0028-2** [Prescott, James])

Comment: As a resident of Delaware, a neighbor of New Jersey, and a concerned citizen, I strongly oppose PSE & G's proposed new nuclear site. (**0030-1** [Riddle, Frances])

Comment: We are concerned about the hazards of nuclear power on the Delaware River, and oppose any expansion at the Salem/Hope complex. We live close to the river (Edgemoor/Bellefonte area) just north of the evacuation zone. Our concerns include increased deleterious impact on the environment and marine life, and on the health of people from routine operations or catastrophic failure, as well as the massive impact and costs of hazardous nuclear waste and its management into the infinite future of earth. (**0031-1** [Windle, Judy and Randy])

Comment: We disagree with the expansion of nuclear power and believe that energy conservation and low impact renewable energy should be developed to provide the best benefit with least harm to ecosystems, resources and all life on earth. (**0031-2** [Windle, Judy and Randy])

Comment: For the above reasons and concerns, I find that it is not in the public's best interest to grant the proposed early site permit, nor to construct future nuclear reactors in this area. (**0032-12** [Purcell, Leslie])

Comment: Once the missing information is evaluated, it should be apparent that NRC should not grant this ESP due to the significant adverse environmental impacts associated with the possible future use of the PSEG Site to construct and operate a new nuclear power plant. (**0034-2** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Comment: NO MORE REACTORS ON MY DELAWARE RIVER. I AM A DELAWARE RESIDENT AND I DON'T WANT ANYMORE REACTORS. (**0035-1** [O, Nancy])

Comment: I urge you to REFRAIN from providing an early site permit to PSEG Nuclear for adding on to what is already the second largest nuclear complex in the United States. (**0036-1** [Cornelia, Jared])

Comment: I strongly oppose the PSEG plan to add new nuclear reactors to a man-made island in the Delaware River. (**0037-1** [Wasfi, Ellen])

Comment: I am saying NO to adding more nuclear reactors to the Delaware River!! (**0038-1** [Slijepeevic, Aleksandra])

Comment: OPPOSE REACTOR. (**0039-1** [Collins, Carol])

Comment: Please do not begin this endeavor. It is soooooo old school, inefficient and unnecessary. Wake up to the new world!!! (**0042-1** [Haggerty, Diane])

Comment: I strongly oppose providing an early site permit for PSEG at the Salem location. I also strongly oppose additional nuclear reactors at the Salem location. (**0044-1** [Slack, Gary])

Comment: There are many reasons why Salem should not get this permit and should not open additional nuclear reactors. I hope that you will consider these and decide not to issue this permit. (**0044-5** [Slack, Gary])

Comment: No new reactors at Salem! (**0045-1** [Durnan, Alexander])

Comment: It is important to me that human beings in the future know that some spoke out against expanding nuclear power facilities at Hope Creek/Salem. (**0047-1** [Campion, Mary])

Response: *These comments express general opposition to the PSEG ESP application and/or a new nuclear plant at the PSEG Site. These comments do not provide specific information related to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.37 General Comments in Opposition to the Licensing Process

Comment: The proposal, this proposal is complex. And, unfortunately, so complex that it is often left to the experts, like yourselves, and consultants, to tell us what we should do. To build, or not to build? That is the question. We suggest that leaving this question to the experts, and their high-priced paid consultants, is the biggest mistake we could all make. (**0006-4-1** [Brook, David])

Comment: This proposal, to build another nuclear plant, and the EIS, the Draft EIS, are both, in our opinion, failures. (**0006-4-15** [Brook, David])

Comment: After attending the public meeting on the evening of October 23, 2014, in Middletown, DE and having the opportunity to ask a question and after reviewing the information provided in the U.S. NRC's DEIS for an ESP at the PSEG site Readers Guide, I have come away with the following concerns: . . . that the information presented to the "public" was too technical for the average person to comprehend thus minimizing the public's ability to make informed commentary. (**0012-2** [Magyar, David])

Response: *These comments express general opposition to the NRC's ESP application review process. These comments do not provide specific information related to the ESP process or the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: The average nuclear power plant in this country has been given a license way past their day of shutting down, like a normal chemical process. Some of these plants are able to license now for 120 years, which is practically impossible. It is like what they used to do during the elections, say putting lipstick on the pig. It is a money sucker, it is going to get us nowhere. We are going to be behind. It is depriving us of a decent quality of life. (**0008-9-4** [August, Bernard])

Comment: The DEIS works backwards from a predetermined outcome. . . . This review, as detailed below, can generally be summarized by the belief that the NRC has worked backwards on the DEIS by starting with a conclusion that a nuclear power plant should be built and then justifying it through the use and analysis of the information presented in the DEIS. This justification DEIS, i.e. the proposed construction of Salem 4, is the opposite of what the NRC should have conducted, and virtually guarantees the outcome in a way that violates the intent and purpose of NEPA. If the NRC conducted an objective analysis, including consideration of the information in this comment regarding the project's significant and irreversible environmental impacts, it would be clear that the "no build" alternative should be selected. (**0020-1-5** [van Rossum, Maya])

Response: *These comments express general opposition to the NRC's licensing process for nuclear power plants, but do not provide specific information related to the ESP process or the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

Comment: We believe that this DEIS needs to be redone. (**0016-8** [Tittel, Jeff])

Comment: DRN believes that the DEIS is inadequate in assessing the potential environmental impacts and additional information, data, and analyses should be evaluated. Furthermore, DRN believes that a substantially different alternative meets the purpose and need statement rather than building and operating a new nuclear power plant at this site especially since there is potential for significant environmental degradation. (**0020-1-3** [van Rossum, Maya])

Comment: We believe that this DEIS is inadequate to properly assess the potential environmental impacts of constructing and operating a new nuclear power plant at this site and that additional information, potentially involving new research, needs to be provided and evaluated. (**0022-1** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: We believe that the draft EIS is inadequate in assessing the potential environmental impacts and that additional information, research, and data should be evaluated. (**0034-1** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Response: *These comments express general dissatisfaction with the NRC's EIS but do not provide specific information related to revising the EIS. No changes were made to the EIS as a result of these comments.*

Comment: After attending the public meeting on the evening of October 23, 2014, in Middletown, DE and having the opportunity to ask a question and after reviewing the information provided in the U.S. NRC's DEIS for an ESP at the PSEG site Readers Guide, I have come away with the following concerns: . . . there was no effort to explain the significance of the 50 mi. impact area designated on several maps. (**0012-3** [Magyar, David])

Response: *The "region" of impact is assumed to be a 50-mi radius around the PSEG Site because almost all of the impacts of building and operating a new nuclear power plant would be confined to that area. The text in Section 2.2.3 of the EIS has been revised to clarify this point.*

Comment: A change was made to the original ESP regulations in 2006 so that now they are promoting "segmentation" of the environmental review, by only looking at the site for the issuance of a permit and then looking at the reactor design later. This approach of segmentation of the overall project violates NEPA. (**0020-1-10** [van Rossum, Maya])

Comment: Since the ultimate use of this property will be for a nuclear reactor, the current process segments out this review and allows for investments, time and resources to be committed to this location by the federal government and the applicant. ESP not only allows for preconstruction investments but also preconstruction work on the site. All of these investments of time and money will likely later be used as an attempt to justify the ultimate approval of the nuclear reactor when an application is made, and this approach violates the spirit and the requirements of NEPA. (**0020-1-11** [van Rossum, Maya])

Comment: Since the DEIS uses segmentation as its underlying approach, DRN requests the NRC to withdraw the DEIS, as it promotes arbitrary and capricious agency actions in violation of NEPA. (**0020-1-12** [van Rossum, Maya])

Comment: The Early Site Permit process violates NEPA through the improper establishment of a NRC sponsored segmentation process. The DEIS makes no mention of the basis and background for the creation of the ESP process that is in fact driving this entire application. (**0020-1-7** [van Rossum, Maya])

Comment: DRN maintains that issuance of an ESP and building a nuclear power plant are connected actions and that all four of the above requirements apply to the ultimate use of this property. Therefore, the NRC has acted in an arbitrary and capricious fashion; first by modifying the original regulations implementing the ESP permit to no longer look at the design of a power plant and second by not preparing one comprehensive EIS in order to properly analyze the true impacts associated with the site and a proposal to build a nuclear power plant. Preparing an EIS for only the ESP and not the power plant violates NEPA by segmenting the review of one project into two. (**0020-1-9** [van Rossum, Maya])

Response: *As explained in the response to Comment 20-1-8 in Section E.2.1 on the ESP process, the cited modification to the regulations was to move the quoted text, not delete it. Therefore, the "effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters" are still considered in NRC draft EISs for ESPs. The NRC has not changed the level of design information it requires applicants to submit in ESP applications since it created the ESP process with its promulgated 10 CFR 52 in 1989. See 54 FR 15372 (Apr.18, 1989).*

Further, the NRC has not engaged in unlawful segmentation. The EIS has considered the environmental impacts of construction and operation of a nuclear power plant, using the plant parameters described in the ESP application. If, in the future, an applicant submits an application for a CP or COL referencing the PSEG ESP, the NRC will prepare a supplement to the EIS prepared for the PSEG ESP to consider whether there are any substantial changes and significant new circumstances or information that were not evaluated in the ESP EIS. This approach ensures that the agency's decision regarding construction and operation of a facility will continue to be informed by the NEPA-required hard look at the environmental impacts of the proposed action. No changes to the EIS were made as a result of this comment.

E.2.38 General Comments in Opposition to Nuclear Power

Comment: This proposal, to build another nuclear plant, and the EIS, the Draft EIS, are both, in our opinion, failures. Neither is solving the problem that we are burdening future generations with. The people here, from the NRC, and the people here from PSEG, know that your job is nuclear. But our future is not, and should not, be nuclear. (**0006-4-17** [Brook, David])

Comment: So, if each of us leaves behind the company, PSEG, and its biased one-sided analysis, and all of you at the NRC, with your seemingly potentially mono-minded approach of I never saw a nuclear power plant that I didn't like, we are left with one conclusion. One conclusion. In this day and age, building another nuclear power plant is the stupidest decision anyone could ever make, since all we are doing is hurting the chance that our children, and our grandchildren, will ever have the opportunity for a sustainable and livable future, on this planet. (**0006-4-2** [Brook, David])

Comment: So we need to look at these issues more seriously. And I think we can create a better future, for our children, again I think that is one of the most important factors lost in this EIS, and the livability of the planet. And the last time I checked, we are not going in the right direction there either. So my advice, to the NRC, is an old slogan, and I say it simply this way, just say no. No to this nuclear power plant. And watch, watch how PSEG will find other, less damaging ways, to produce our electricity in a way that will protect us all. (**0006-4-20** [Brook, David])

Comment: So we must start making different energy decisions, and not maintain the status quo. Nuclear energy is not a solution, it is actually part of the problem. (**0006-4-5** [Brook, David])

Comment: So I think we could sit here and debate, you know, the environmental implication of nuclear power, and many other things, in the EIS statement. But I really would call on a moratorium on licensing renewals, and expansion, until the current waste issue is removed and solved. No debate. (**0007-11-12** [Spencer, Scott])

Comment: And then the big picture, as a couple of people have talked about, I think we need to look at where are we going, as a culture, as a regional area, and as a country. And this proposed nuclear facility would add at least one, and it sounds like there could be more than one, nuclear reactor proposed on this site. And if they are built, or if even one is built, my understanding is that it would be the largest nuclear production facility in the country. And I find that shocking. That in this day and age we are not talking about retiring nuclear. I know they are doing it in Vermont, they are retiring the plant up there, they are retiring a plant in California. And I think that that is the way we should be thinking, not adding more nuclear generation. I don't believe it is green, it has some attributes that are green. (**0007-13-4** [Purcell, Leslie])

Comment: I was at the meeting across the river. And it seemed like it was really full of people who were very happy with PSEG, for reclaiming the marshes. And I had just spent the last two winters walking with friends from New England, including people from Fukushima, for peace. And had heard the stories of survivors of Fukushima. And while I was walking I encountered people who told me a little bit more about the nuclear power industry, the nuclear weapons industry, and the risks that we are facing. The technology that we are now using to nuclear power, is related to nuclear weapons. It was not the only technology available. This technology was chosen, as far as I understand, because it dovetailed neatly with nuclear weapons. As long as we produce nuclear power, as long as we have this industry, we will be at risk from nuclear weapons. (**0007-4-1** [Campion, Mary])

Comment: I remember Jaczko, who was working with the NRC, and how he left shortly after he was the single person who said he didn't want to see a new plant built. Was it in Georgia? There was an -- he said, after Fukushima, how could he sign off on that? (**0007-4-8** [Campion, Mary])

Comment: I think that is most of what I have to say. Think about who you are, think about your family, think about your daughter, think about your grandchildren, think about what will happen seven generations from now. And remember that the choices that we make will also affect them. (**0007-4-11** [Campion, Mary])

Comment: As we heard tonight all about the positives of nuclear energy, and I cannot see any positives about it. It is a massive destructive technology. In order to exist around it you have to have an evacuation zone and planning. (**0008-9-1** [August, Bernard])

Comment: In my opinion, nuclear power is inherently dangerous, excessively costly, and potential devastating to our environment. (**0010-2** [Cannon, John])

Comment: I cannot understand why you would consider building any more nuclear power plants when there is still no effective, sustainable method of waste storage, far cleaner energy sources are available, and the damage that has already been done is real. (**0024-1** [Doyle, Kathy])

Comment: As a resident of New Castle County and our planet, I do not want to see more nuclear power plants, near me or anywhere. I do not believe there is such a thing as "safe" nuclear power plant. I would much rather see phasing out of existing nuclear plants and development of sustainable power sources such as solar (and wind, if wisely sited). (**0026-1** [Blair, Kathy])

Comment: Nuclear energy is neither safe nor environmentally friendly. What should be expanded are energy sources such as solar and wind, not nuclear power. PSEG's slogan is, "We make things work for you." This proposal runs counter to that promise. (**0030-2** [Riddle, Frances])

Comment: Alternative fuels for energy production are preferable for the future health of populations and of the planet, rather than investing in at least 40-50 years more of nuclear technology. For example, the University of Delaware Energy Institute has expertise and is a resource for collaborative efforts for energy efficiency, alternative and emerging energy technologies. (**0032-10** [Purcell, Leslie])

Comment: Conservation, energy efficiency, and sustainability of energy resources are preferable. Nuclear technology poses health and safety risks in perpetuity. Alternative energies are safer and are more widely used in several other countries. (**0032-5** [Purcell, Leslie])

Comment: Concerned scientist with respect for the environment. As regards nuclear power, a student of why we should not rape the earth when the problem of waste has still not been solved. (**0040-1** [Roberts, Debra])

Comment: Although nuclear energy will add less pollution to the atmosphere, it poses a serious danger of radiation contamination. Technology to contain the waste materials is not sufficient. (**0043-1** [Cassling, Margaret])

Comment: Spending public and/or private money in the billions of dollars on this old technology is misguided. All efforts should be focused on renewables. Wind power, solar, and water power can provide what we need. Investing in these new technologies will also produce more jobs and economic prosperity. Renewables also would provide real energy independence. Not the temporary fix, but a constant source of energy. These sources also provide resilience in times of crisis, since the energy is produced close to where it is consumed. (**0043-2** [Cassling, Margaret])

Comment: Our children's future depends on choosing the right energy source now. Short term profits should not cloud the issue. The choice is clear--no new nuclear power plants. (**0043-3** [Cassling, Margaret])

Comment: Nuclear power may seem clean, but rarely do people factor in the spent radioactive rods that have to be stored for decades and decades, and are extremely hazardous. There's also the chance of a partial or full meltdown, which would be a catastrophe given the large population in the Wilmington/Philadelphia region. Trying to evacuate the region would be a nightmare and there would be great loss of life. (**0044-2** [Slack, Gary])

Comment: The states of New Jersey, Delaware, and Pennsylvania can have a needed power supply other than nuclear, they just have to support and invest in solar, wind, and water power. Even natural gas would be an easily obtainable source for power needs. It may seem easier to just keep with nuclear or coal power, but these are not acceptable sources for the near or distant future. (**0044-3** [Slack, Gary])

Comment: After the disaster in Fukishima, the insanity of nuclear power has been exposed. We can not continue down this path any longer. Doing so is inviting disaster. The existing plants should be shut down as well. (**0045-3** [Durnan, Alexander])

Response: *These comments express opposition to nuclear power in general. These comments do not provide any specific information relating to the environmental effects of the proposed action. No changes were made to the EIS as a result of these comments.*

E.2.39 General Comments in Opposition to the Existing Plant

Comment: We believe that, before PSEG should be allowed to construct another burdensome facility on Artificial Island, or anywhere within the Delaware Estuary before it is even considered, they must be forced to minimize the adverse environmental impact their existing facilities already have. Including their fish kills, their harmful imprint on our wetlands, the water quality impacts they have on the Delaware Estuary waters, and more. (**0004-3-5** [van Rossum, Maya])

Comment: And how about the impact to the environment? The Delaware Riverkeeper Network works to protect and enhance the Delaware River, and the lands that drain into it. We take that role very seriously. You could say that we speak for the fish. Well, if the fish could speak, right now, they would tell you that another nuclear power plant would not be good for their future. Already, already, millions of fish are being constantly killed, by PSEG, and its cooling water intakes used for the existing plants. Some of those fish are endangered species. And it will only get worse with one more nuclear plant sucking ever more water, and ever more fish. (**0006-4-12** [Brook, David])

Comment: But if a facility is seemingly not competent to run the three reactors they already have, I don't understand why we are even considering allowing them to build a fourth one, or potentially more. (**0007-5-12** [Herron, Stephanie])

Comment: And I would like to point out Salem's troubled past. I appreciate all the folks who work there who, I'm sure, are very responsible. But this is a facility that has repeatedly had incidents, as recently, major incidents, as recently as May of this year. At least 15 bolts, at least 15 broken bolts were found in this facility, during a routine fuel change. And I'm not exactly sure how long those bolts were broken. I don't think anyone is sure of that. But I do know, from what I read in the paper, that they've known that since at least the mid-1990s that those bolts could present a problem. And that, obviously, wasn't addressed since they were still in there, in 2004. So I'm concerned that if this facility has such great safety record, things like that continue to happen. Adding another doesn't necessarily seem like the most wise, until we get the current problems, like that, straightened out. (**0008-4-11** [Herron, Stephanie])

Comment: Now, the gentlemen here who want work, they could take those [two existing PSEG] plants, for 25 years, and tear them down and guarantee the safety of the public, that we all so love, and this world. (**0008-9-8** [August, Bernard])

Comment: PSEG has not upgraded the original water cooling systems installed in the 70s on Salem #1 and #2. This system just takes in millions of gallons of water and discharges waste heat back into the river. This is the least efficient cooling system used in power plants. How can a company with this type of planning be trusted with another plant? (**0011-4** [Keating, Thomas])

Comment: Only the most blindered view could consider adding to a complex which has not been operated to the highest possible standard for safety. The massive and unexplained (pipe, underneath) tritium leak is one example. The recent, but long unattended failure of unsafe bolts is also revealing. (**0047-2** [Campion, Mary])

Response: *These comments express opposition to the existing units at the PSEG Site. Cumulative impacts, including the continued operation of the existing SGS and HCGS, are addressed in Chapter 7 of the EIS. The assessment includes consideration of the issues mentioned in the comments, including water consumption and impacts to fish and other aquatic ecological resources. These comments provide no new information for consideration, and therefore, no changes were made to the EIS as a result of these comments.*

E.2.40 Comments Concerning Issues Outside Scope - Emergency Preparedness

Comment: And, also, preventing the ability of emergency services, and equipment, to arrive at the site if, in fact, we do have a catastrophic event and we need those services provided. (**0004-3-7** [van Rossum, Maya])

Comment: So we have this heightened risk of, again, catastrophic event, and an inability of emergency services to appropriately respond. And we think that, that has not been appropriately addressed in the NRC review. (**0004-3-9** [van Rossum, Maya])

Comment: From a safety issue I'm also deeply concerned that, you know, we've made this assumption that no one in Delaware cares, we can't get people to come out for evacuations. Well, it takes some time and effort to engage them, when you have cut them out for five decades, as we have done in Delaware. When I go through developments like Odessa National, Odessa Chase, and I talk to residents, they see a tower there, they don't even know what is over there. You know, you have the alarm thing go off every now and then. Well, what is that thing going off, when you have your periodic testing that we can't even speak to each other out in that area. (**0007-2-16** [Carter, David])

Comment: And then they get really confused when they get this thing that says come get your iodine tablets. I speak to these people all the time. And this is because of a complete failure to do an effective outreach program with these communities, to let them know what is going on.

And the same way that we had to fight so hard to get this group to come over here and speak about this issue. (**0007-2-17** [Carter, David])

Comment: Even issues like coordination with the new Route 301, that is going to drive hordes of people, if we have an evacuation, towards the fallout zone, instead of to a safety zone, if you live in Middletown, and Southern New Castle County, up over the Roth Bridge, and not away from it. It all needs to be evaluated. Do we have other routes to get out to 213, will the roads handle it, how are we going to handle that? (**0007-2-18** [Carter, David])

Comment: When I heard about the possible safety, when I heard that there would be no socioeconomic discrepancy or risk, I was thinking about the evacuation report that I read this morning, that said that people without motor vehicles will go out and wait at the nearest available bus stop, for public transportation, to bring them out of the danger zone, of this power plant. (**0007-4-4** [Campion, Mary])

Comment: The impacts of sea level rise, and flooding, are compounding with the impacts of environmental justice. In the event of a bad storm, that could cause a power outage, or some kind of emergency at the nuclear plant, there would also be an emergency, here in Delaware, because of the floodwater. The people who live most adjacent to the nuclear reactor, in New Jersey, end up here in Delaware, are already living in an extremely vulnerable area to flooding from sea level rise and, even, just from regular storms. In the event of a storm, bad enough to cause an emergency over at the nuclear reactor, those people would almost, one hundred percent, I'm sure be flooded into their communities, which several of them only have one or two roads in and out, and they are very flood prone. So that is assuming, again, that they even have a car to get in and drive if the roads aren't flooded. The ten mile evacuation zone, I think, is inadequate, as is the 50 mile suit safety zone, as we have seen with Fukushima. (**0007-5-9** [Herron, Stephanie])

Comment: What if, I'm also concerned that if there were an emergency at one of the dangerous facilities, for lack of a better word, than dangerous, I think there is a more technical term that isn't coming to me. If there were an incident at one of the facilities, within the ten mile zone, say the Delaware State Refinery, or the Sulfuric Acid Regeneration Plant, that could cause evacuation of the area, who would be running the nuclear power plant, what would happen with that, to prevent a disaster if the area that the power plant is in, had to be evacuated. (**0008-4-4** [Herron, Stephanie])

Comment: And that the impacts of environmental justice, and sea level rise, are compounding in that the communities living within ten miles of the facility, also live in an extremely vulnerable area to sea level rise, and would not necessarily be able to get out in the event of an emergency. Particularly if that emergency was caused by a weather disaster that also caused flooding. That is even assuming that they did have a car to get out. If they didn't have a car they would really be out of luck. And that is a relatively large assumption that everybody has a car. (**0008-4-7** [Herron, Stephanie])

Comment: I think that the ten mile evacuation area is grossly inadequate, as we have seen with Fukushima, where at least 88 miles around that incident are totally unlivable, and unusable. (**0008-4-9** [Herron, Stephanie])

Comment: They have to have evacuation drills. They blow horns, every six months or so, to test if the system works. (**0008-9-3** [August, Bernard])

Comment: The crucial planning will come not with the Early Site Permit but with the actual details of the plant design. My questions would include: concern for extreme floods and adequate entrance and egress systems, maintaining a good, continuous dialog with the community and an insistence that only the best science be incorporated in planning and construction. (**0009-9** [Locandro, Roger])

Comment: The maps show Artificial Island becoming a true island by 2050, surrounded by water with only the current location of Salem 1 and 2 and Hope Creek Generating stations above ground, likely due to associated fill. The same would most certainly become true with construction of a new facility, placing this fourth nuclear plant out of reach from emergency response personnel during foreseeable high hazard periods when emergency response capabilities would be an obvious potential need. (**0020-5-14** [van Rossum, Maya])

Response: *These comments deal with emergency preparedness and/or emergency response actions and, as such, are outside the scope of the environmental review that is the subject of this EIS. An evaluation of emergency preparedness issues will be included as part of the staff's SER (see 10 CFR 52.18). No changes were made to the EIS as a result of these comments.*

E.2.41 Comments Concerning Issues Outside Scope - Miscellaneous

Comment: Executive Order 13547 was issued from the President's office in July 2010 to establish a *National Policy for Stewardship of the Ocean and Coasts*, as well as the formulation of the National Ocean Council (NOC) to advance policy in a *Strategic Action Plan* for resiliency and adaptation to climate change; all of this using Ecosystem-Based Management (EBM) strategies; and recognizing that climate change exacerbates existing stresses and negatively impacts communities that rely on natural resources for their livelihood and economic prosperity. As part of this effort, the Federal government is developing a *National Fish, Wildlife, and Plants Climate Adaptation Strategy*, and Congress called for this strategy to be co-Led by U.S. Fish and Wildlife Service (USFWS), NOAA, CEQ, and *State wildlife agencies*. (**0002-3** [Weinstein, Michael])

Comment: [W]hether it is the federal actions for a climate resilient nation, President Obama's Executive Order 13547, or the National Ocean Council's Strategic Plan, Strategic Action Plan for Resiliency and Adaptation, all of these documents, and federal, state, and local efforts, recognize that climate change exacerbates existing stresses, and negatively impacts communities that rely on natural resources for their livelihood and economic prosperity. (**0004-9-4** [Weinstein, Michael])

Response: *The NRC is not responsible for establishing policies related to global warming or climate change. While it is recognized that these issues are of national importance, setting policy for global warming or climate is outside the scope of the review in this EIS. No changes were made to the EIS as a result of these comments.*

Comment: [Nuclear power plants] is staged nuclear weapons, as well, that is all it is. That is where they get nuclear weapons from. It has been used in the military, it is a military science.

And it is now dated science. You can't even use nuclear weapons. The present administration has just decided to sign off on another 1.3 trillion dollars, are rebuilding the nuclear arsenal, for weapons they can't use, which should be used for various societal purposes. (**0008-9-2** [August, Bernard])

Response: *While this comment is outside the scope of the review in this EIS, the NRC disagrees with the commenter's statement regarding nuclear power plants as producers of material for nuclear weapons. In part to help ensure non-proliferation of nuclear material, the NRC regulations require strict control, management, and accountability of all nuclear fuel, whether new fuel or spent fuel, at a nuclear power plant site as a matter of law. The NRC's key regulations in this area (10 CFR 73, 74, and 95) provide comprehensive requirements governing the control of, and access to, information, physical security of materials and facilities, and material control and accounting. Completely separate from the NRC's regulatory authority, the U.S. Department of Energy has legal authority for maintaining and managing the U.S. nuclear weapons. Additionally, the length of time a fuel bundle is used to produce electricity is typically 2 or 3 cycles of approximately 18 to 24 months per cycle of electrical power production. The isotropic makeup of the plutonium (Pu) within the spent nuclear fuel from such time in a nuclear core results in relatively high isotropic concentrations of non-Pu-239 nuclides (e.g., Pu-238 and Pu-240). The high levels of Pu-238, Pu-240, and heavier isotopes of plutonium in the spent nuclear fuel from U.S. commercial nuclear power plants would make the plutonium, if extracted from the spent nuclear fuel, not usable for nuclear weapons. No changes were made to the EIS as a result of this comment.*

Comment: I wish to state that the following opinion is not directed at you or your co-worker who are trying to figure this mess out. I think I express the opinion of many of my fellow citizens when I say that the nuclear industry and regulatory agencies have a strong record of not being straight with the public. They only tell half-truths when their lips are moving. This goes back to before the Manhattan Project. Not straight with the people of the Marshall Islands, not straight with Army personnel involved in bomb tests, not straight with people downwind of tests, the list is endless. (**0046-3** [Campion, George])

Response: *No changes were made to the EIS as a result of this comment.*

Comment: Additionally, in its transmission [line] analysis, PSEG should examine the transmission loss between the source and end users when transporting electricity over such a great distance. (**0020-4-19** [van Rossum, Maya])

Response: *The proposed action before the NRC is the issuance or denial of an ESP for the PSEG Site, and as such, it does not include the construction and operation of new transmission lines to support a new nuclear power plant at the PSEG Site. Thus, any technical assessment of new transmission lines by PSEG is beyond the scope of this EIS. No changes were made to the EIS as a result of this comment.*

Comment: We believe that the Army Corps is ignoring President Obama's Executive Order on climate change. (**0016-2** [Tittel, Jeff])

Response: *Executive Order 13653 directs Federal agencies to facilitate infrastructure improvements in response to climate change-related events Neither the NRC nor the USACE is ignoring the President's Executive Order. No changes were made to the EIS as a result of this comment.*

E.2.43 Comments Concerning Issues Outside Scope - Safety

Comment: Finally, although this does not relate directly to the environmental impacts of the new plant, I would add these thoughts on the prospects of global climate change. As an environmental scientist, I believe it is no exaggeration to say that climate change represents the singular environmental threat of the coming century. Even for the development of the new plant, the reality of sea level rise is a factor that must be and is being taken into account into the new facility. (**0001-9** [Velinsky, David])

Comment: [W]hile this does not directly relate to the environmental impacts of the new plant, I would add these thoughts on the prospects of global climate change. As an environmental scientist, and geochemist, I believe it is no exaggeration to say that climate change represents a singular environmental threat of the coming century. Even for the development of the new plant, the reality still is factor that is must be and is being taken into account for in the new facility. (**0004-11-9** [Velinsky, David])

Comment: Sea level rise and storm surge are, also, a concern at the proposed facility. Critical structures should be elevated, or water proofed, at an appropriate elevation, to ensure their protection. The NRC should review these design plans to confirm that they are protected for sea level rise. (**0004-16-11** [Molzahn, Robert])

Comment: But I did want to raise one issue for the record, today. And that is the concern we have about the location being proposed for construction of this new nuclear plant. They are proposing to construct Salem 4 in a reach of the river that already is well recognized to be increasingly impacted by climate change, sea level rise, and storm surge, in the coming years. We already have two facilities located in this area that we know, based upon existing and emerging science, is going to be subject to dangerous inundation by flood waters, or surrounded by flood waters, raising the potential for catastrophic events. (**0004-3-6** [van Rossum, Maya])

Comment: So when one looks at all of the inundation maps that are coming out, from the credible scientific research, we see that already, by 2050 when we have sea level rise, and we have storm events, where these nuclear facilities are going to be located, on Artificial Island will genuinely, and literally, be an island if they are not inundated. (**0004-3-8** [van Rossum, Maya])

Comment: Oh, and how about safety? It can't happen here, you have heard this. That is what the Japanese said, that is what other places have said, it can't happen here. But think about it, four nuclear power plants sitting right next to each other is really not too smart. Considering that, right now, 52 percent or more of New Jersey's electricity is being relied upon, on them, one bad burp from one of those plants, and half of New Jersey could be plunged into darkness for a very long time. For those of us who have experienced Sandy it will make those weeks, without power, seem like a nanosecond in time, for the 52 percent of the state seeking to replace that power. (**0006-4-10** [Brook, David])

Comment: Sea level rise and storm surge is also a concern at the proposed facility. Critical structures should be elevated, or waterproofed, in an appropriate elevation. NRC should review the designs. (**0007-16-10** [Palmer, Dennis])

Comment: In addition sea level rise is another concern. This has come up before, too, with some of the previous speakers. Certainly this has to be taken into account. It has been taken into account. And one of the keys here is elevation and, certainly, that is being considered as this proposal moves forward. (**0007-17-4** [DeLuca, Mike])

Comment: But some of the really big problems that seem to be overlooked, it is a very low-lying area. We are concerned about sea level rise. Our governor has issued an executive order that all state agencies review impacts of sea level rise for all plants. They recently did a study, and they only modeled it to 1.5 feet rise. Short-sighted, totally inadequate, and just plain wrong. It is bad science, based on what is coming out of the new NOAA reports, the UPCC reports that are coming out, completely inadequate. Particularly in light of the fact that you've extended the life of this facility for 60 years, and another 60 years coming in, that is 120 years from now. You have a responsibility to look at where that water is going to be long-term. And the modeling that was done was completely inadequate. I actually believe you should be required to model for sea level rise, based on the half life of the 50 years of radioactive waste you are storing on that site (**0007-2-6** [Carter, David])

Comment: I agree one hundred percent with Dave Carter about the concerns about sea level rise, the short-sightedness of using only 1.5 meters. I realize that that is what, generally, is used when scientists talk about sea level rise, by the year 2100. But given that it is now 2014, 2100, in the scope of nuclear half life is really not that far away. (**0007-5-6** [Herron, Stephanie])

Comment: Finally, although this doesn't relate directly to the environmental impacts of the new plant, I would add these thoughts on the prospect of global climate change. As someone who works in the interface of science and policy, I believe it is no exaggeration to say that climate change represents the singular environmental threat in the coming century. Even for the development of the new plant, the reality of sea level rise hasn't been mentioned, it is a factor that must be, and is being taken into account. (**0007-9-9** [Wall, Roland])

Comment: I, and the environmental justice groups are extremely concerned about sea level rise, and feel that the seal level rise projects, taken into account in the Draft Environmental Impact Statement, are extremely short-sighted. (**0008-4-6** [Herron, Stephanie])

Comment: Salem nukes are built on a sandbar and with rising sea levels, it's destined to go under. What then? (**0010-3** [Cannon, John])

Comment: The plant sits on nothing but mud and is sinking. It has always been a low lying swampy area, and still is. With rising water levels, it is ridiculous to even consider this area. High tides and storm surges will flood the area in years to come. (**0011-6** [Keating, Thomas])

Comment: In all the literature I received, there was no mention of the possible effects of flooding or rising sea level on this low-lying land where the new reactor would be located. One of the speakers, Mr. David Carter, brought this topic to your attention, but it was not addressed by anyone. (**0013-1** [Oppelt, John])

Comment: The New Jersey Sierra Club is concerned that the Draft Environmental Impact Statement has not taken into account climate change. We believe that the DEIS does not look sufficiently at the impacts from flooding, sea level rises, and storm surges. Storm and storm surges are becoming worse and more frequent because of climate change. The Delaware Bayshore is already seeing the impacts of climate change with the erosion of coastal wetlands and areas flooding during normal high tides. The Delaware Bayshore is eroding by 11 feet a year, which is almost 4 times faster than it was ten years ago. The Bay itself has risen a foot in the last century, with most of it happening in the last 20 years. It is projected to rise by another foot and half, which is a conservative estimate, by 2050. This is an area where climate change impacts will continue to get worse. We believe the DEIS does not address the impacts of storm surges and flooding being made even worse by a rising sea. (**0016-1** [Tittel, Jeff])

Comment: The DEIS is woefully inadequate because it does not address climate change, sea level rise and storm surges. This is a very vulnerable area. (**0016-3** [Tittel, Jeff])

Comment: Building a facility of this type in an area that is subject to increasing sea level rise and storm surges is not only bad for the environment, but dangerous. Heavy River flooding along with a storm surge could cause a catastrophic event. We believe the DEIS in adequate and wrong because it does not address these issues. (**0016-5** [Tittel, Jeff])

Comment: The impacts of sea level rise are not adequately addressed within the DEIS especially considering the site is located in a region that will be consistently under or surrounded by water raising the potential for a catastrophic nuclear event and inhibiting the ability of emergency services to reach the facility at times when it will most likely be needed. Although the NRC indicates that PSEG will"...provide the necessary flood hazard analysis ... consistent with present-day guidance and methodologies", and "PSEG will need to demonstrate and the NRC staff will confirm that the hazards from flooding are acceptable at the PSEG Site" (p 5-99), there is no analysis or evaluation of climate change when addressing the Environmental Impacts of Postulated Accidents in Section 5.11. The potential impacts of climate change are mentioned in reference to cumulative impacts to aquatic organisms and habitat and quickly dismissed as "inconclusive" (p 7-29). However, the impacts of sea level rise are consistently predicted.to be greater within the Delaware Bay and Estuary than elsewhere in the Mid-Atlantic, thus raising the concerns for placement of a new nuclear plant on wetlands at the water's edge. (**0020-5-12** [van Rossum, Maya])

Comment: Inundation maps for future decades consistently show that with sea level rise, the proposed location of the new nuclear facility will be inundated and/or surrounded by water; with, at best, the nuclear plant (because of fill) being located on an island surrounded by water thus impeding emergency response that is a foreseeable need in the wake of future storm events. A 2008 study [see UPenn Department of City and Regional Planning. 2008. Climate Change: Impacts and Responses in the Delaware River Basin] by the University of Pennsylvania Department of City and Regional Planning mapped lands predicted to be inundated in 2050 and

2100 with sea level rise. The maps show Artificial Island becoming a true island by 2050, surrounded by water with only the current location of Salem 1 and 2 and Hope Creek Generating stations above ground, likely due to associated fill. (**0020-5-13** [van Rossum, Maya])

Comment: According to the University of Pennsylvania study and ongoing research by others, storm surges will make matters even worse in the Delaware Estuary and watershed with storms becoming more intense, having higher wind speeds as well as heavier precipitation; Nor'easters becoming more frequent; an increasing probability of severe hurricanes in the mid-Atlantic region; and the combination of storm surge and sea level rise moving the zone of impact further inland. (**0020-5-15** [van Rossum, Maya])

Comment: An April 2014 study [see Strauss et al. (2014). "New Jersey and the Surging Sea: A Vulnerability Assessment With Projections for Sea Level Rise and Coastal Flood Risk." Climate Central Research Report. pp 1-43] released by Climate Central also talks about sea level rise and its impacts on New Jersey, including Salem County which is among the areas in the State the report predicts will experience high impacts from flooding due to sea level rise. According to the Surging Seas Risk Finder website [see http://scalevel.climatecentral.org/ssrf/new-jersey], analysis associated with the Climate Central report, there is a greater than 50% chance of at least one flood of 6 feet in the New Jersey area by the year 2050 and a 99% risk of at least one flood exceeding 9 feet by the year 2100. At these levels, and even far lower, this analysis shows water cutting off the existing and proposed power plant areas, increasing the likelihood of hazard. At 7 feet, one of the nuclear plants on Artificial Island is below 7 feet and therefore directly at risk from flooding, with both plants being below 9 feet and so at direct risk when the waters reach those levels. (**0020-5-16** [van Rossum, Maya])

Comment: Due to the effects of climate change, including sea level rise, the frequency of what is now considered a 100 year flood event will increase substantially. In fact, whether considering low or high emission scenarios, the frequency of today's 100-year flood event is expected to occur, on average, every four years in Atlantic City [see Frumhoff et al. 2007, Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions. Synthesis report of the Northeast Climate Impacts Assessment (NECIA). Cambridge, MA: Union of Concerned Scientists (UCS)]. These new and future scenarios need to become part of the consideration in decision-making included for a new nuclear facility. The NRC should not issue an ESP for a location in an area that will most likely flood and be inundated by sea level rise. At a minimum, climate and sea level modeling should be evaluated as part of the decision-making process instead of basing the analysis on "present-day" flooding characteristics and dismissing the likelihood and risk associated with future climate models as "inconclusive." (**0020-5-17** [van Rossum, Maya])

Comment: The impacts of sea level rise are not adequately addressed within the Draft EIS especially considering the site is located in a region that will be consistently under or surrounded by water raising the potential for a catastrophic nuclear event and inhibiting the ability of emergency services to reach the facility at times when it will most likely be needed. The NRC should not issue an early site permit for a location in an area that will most likely flood and be inundated by sea level rise in the foreseeable future as is the case at this location. (**0022-10** [Butch, Kerry Margaret] [King, Charlotte] [Pryde, Coralie])

Comment: Overall, the document does not adequately address the likely impacts of climate change (sea level rise, increased temperature and increased precipitation) over the lifespan of the proposed facility. Although climate change and sea level rise are mentioned several times within the text of the DEIS, it is unclear the extent to which future sea levels have truly been taken into consideration. No future planning scenarios are provided to understand the assumptions that were made in site selection, alternatives evaluations and cumulative impact assessments. (**0023-2-12** [Cooksey, Sarah])

Comment: The final EIS should provide the following information in regards to climate change and sea level rise: (1) The sea level rise projection used in the site selection and design for this project. (2) The maximum storm surge used in site selection and design. (3) The current Mean Higher High Water (MHHW) level in the river and adjacent tributaries, and the elevation above MHHW of the land surface as well as the facility. (4) Explain if sea level rise and storm surges were considered in combination. For example, information should be provided that explains the implications of a 2 meter sea level rise coupled with a 2 meter storm surge. (5) Sea level rise will impact depth to groundwater and cause saltwater intrusion into surface and groundwater. Information should be provided that explains the implications of rising water tables and saltwater intrusion on this site and the facility. An analysis of thresholds for the site should be included that establish the point at which the site would no longer function as designed. Additionally, discussion should be included on how site specific modeling will be conducted to ensure future operational issues have been evaluated. (6) A discussion on the measures developed for the site to mitigate the potential for flooding during the entire life-span of this facility. (7) In light of increasing sea levels, and lack of permanent storage for spent fuel, explanation is needed on how the facility will ensure protection of human and ecological health during and after decommissioning. (**0023-2-14** [Cooksey, Sarah])

Comment: The proposed nuclear reactor(s) are sited in a low lying coastal area, only slightly above sea level, and subject to potential flooding. (**0032-2** [Purcell, Leslie])

Comment: Sea Level Rise is a recently identified factor because of climate change--do Flood Maps show potential risk of flooding under conditions of such sea level rise? Such flooding could be disastrous as in Fukushima, Japan. (**0032-3** [Purcell, Leslie])

Comment: The impacts of sea level rise are not adequately addressed within the Draft EIS especially considering the site is located in a region that will be consistently under or surrounded by water raising the potential for a catastrophic nuclear event and inhibiting the ability of emergency services to reach the facility at times when it will most likely be needed. The NRC should not issue an early site permit for a location in an area that will most likely flood and be inundated by sea level rise in the foreseeable future as is the case at this location. (**0034-11** [Carter, David] [DePaul, Shelly] [Furst, Charles] [Hvozdovich, Steve] [McNutt, Richard] [Nolan, Christine] [Owens, Caroline] [Pringle, David] [Roe, Amy] [Tittel, Jeff] [van Rossum, Maya])

Comment: The existing nuclear complex is already vulnerable to sea level rise and especially storm surge. The complex is built on a man-made island in the Delaware River and issues during storms are already well documented. The NRC's used 1.5 meters maximum sea level rise in their EIS and risk projections. While 1.5m is considered by scientists to be a reasonable level of increase by the year 2100, neither the NRC nor PSEG have given any indication that they would plan to decommission the existing and/or possible new reactor by that time. In fact, given the extensive life of a nuclear reactor permit (Salem was recently permitted for another 60 years) and the extreme difficulty / high cost associated with decommission and moving decades of lethal nuclear waste, there is no reason to believe that these reactors would be closed or the waste moved by 2100. Therefore only projecting sea level rise out to that level is shortsighted and potentially very dangerous. (**0036-2** [Cornelia, Jared])

Comment: The existing nuclear complex is already vulnerable to sea level rise and especially storm surge. The complex is built on a man-made island in the Delaware River and issues during storms are already well documented. The NRC's used 1.5 meters maximum sea level rise in their EIS and risk projections. While 1.5m is considered by scientists to be a reasonable level of increase by the year 2100, neither the NRC nor PSEG have given any indication that they would plan to decommission the existing and/or possible new reactor by that time. In fact, given the extensive life of a nuclear reactor permit (Salem was recently permitted for another 60 years) and the extreme difficulty / high cost associated with decommission and moving decades of lethal nuclear waste, there is no reason to believe that these reactors would be closed or the waste moved by 2100. Therefore, only projecting sea level rise out to that level is shortsighted and potentially very dangerous. (**0037-2** [Wasfi, Ellen])

Comment: The existing nuclear complex is already vulnerable to sea level rise and especially storm surge. The complex is built on a man-made island in the Delaware River and issues during storms are already well documented. The NRC's used 1.5 meters maximum sea level rise in their EIS and risk projections. While 1.5m is considered by scientists to be a reasonable level of increase by the year 2100, neither the NRC nor PSEG have given any indication that they would plan to decommission the existing and/or possible new reactor by that time. In fact, given the extensive life of a nuclear reactor permit (Salem was recently permitted for another 60 years) and the extreme difficulty / high cost associated with decommission and moving decades of lethal nuclear waste, there is no reason to believe that these reactors would be closed or the waste moved by 2100. Therefore only projecting sea level rise out to that level is shortsighted and potentially very dangerous. (**0041-1** [Erlich, Marion])

Comment: Also needing to be factored in are rising sea levels. Salem is along the Delaware River, and vulnerable to future flooding as climate change raises sea levels. (**0044-4** [Slack, Gary])

Comment: This plant is already subject to unstoppable sea level rise due to global warming. The area is prone to flooding and the flooding is severe during storm surges and hurricanes. (**0045-2** [Durnan, Alexander])

Comment: And rising tides and storms from climate change pose extreme risk which we've already witnessed. This will not change, but will increase for years as systems lose stability. (**0047-6** [Campion, Mary])

Response: *The issues raised in these comments (including sea-level rise, storm surge, and co-location of a new nuclear plant in close proximity to existing nuclear reactor units) are safety issues, and as such, are outside the scope of this environmental review. A safety assessment for the proposed licensing action was provided by PSEG as part of the application for the early* *site permit. Separate and distinct from the environmental review documented in this EIS, the NRC is developing an SER that will analyze all aspects of reactor and operational safety related to a new nuclear plant at the PSEG Site. No changes were made to the EIS as a result of these comments.*

Comment: Third, over the years a healthy relationship between the regulators and the plant operator, has strengthened the safety and operation of the facilities. And fourth, the development of a safety culture, over the years, that has been anchored by results oriented and effective corrective action program. (**0004-13-3** [Miller, Lynn])

Comment: Now that I have worked, at Salem, for almost two years I have noticed some of the subtle changes my new job is having on me. We take safety to a level I wouldn't have thought existed before I started this job. Even off the clock I find myself practicing the habits that we discuss, every morning, at work. (**0006-10-1** [Barch, Alexander])

Comment: I am concerned, very much, about the history and the safety issues of this plant. We recently had some issues with some bolts and water pumps, and other things that give us some serious concerns. And before we spend, I'm not yet convinced that those have been properly evaluated. (**0007-2-15** [Carter, David])

Comment: I have been to the plant, over there, many times with them. I have taken tours, I know what it is. They have a terrible operational record. The NRC has fined them millions of dollars, over the last 20 years, from security to the breaches that have happened there, in the operations of it. So you are not pulling anything, any wool on the eyes over here. (**0007-3-17** [August, Bernard])

Comment: Now, we are talking about baseload. Nuclear power plants have to have a constant supply of electricity. And when the electricity goes out they have backup generators. These have to be constantly tested. And they have to at least operate for eight hours to get the plant to a point of safety in a hot shutdown, in a cool shutdown. (**0007-3-3** [August, Bernard])

Comment: Now, during hurricane Sandy, or superstorm Sandy, we had a storm surge that came up this Delaware River, and knocked out five of the six cooling pumps going into Salem. And, also, we were lucky that Tom's River Site, which is a Fukushima GE Mark 1 plant, was off-line, and they were refueling it. But they lost electricity, and they had to bring generators in to circulate, and put fire trucks for about three or four days, to circulate the storage pools. (**0007-3-4** [August, Bernard])

Comment: And, just finally, I would like to also point out Salem Hope Creek's complexes troubled past. They repeatedly had incidents. You don't have to be an expert, you can read about them in the paper, all the time. They had the missing bolts, they didn't even realize how long the bolts were missing until they went down, just incidentally, for refueling. What kind of emergencies could have happened? Who knows. In that time, thankfully, they didn't. (**0007-5-10** [Herron, Stephanie])

Comment: And I would like to point out Salem's troubled past. I appreciate all the folks who work there who, I'm sure, are very responsible. But this is a facility that has repeatedly had incidents, as recently, major incidents, as recently as May of this year. At least 15 bolts, at least

15 broken bolts were found in this facility, during a routine fuel change. And I'm not exactly sure how long those bolts were broken. I don't think anyone is sure of that. But I do know, from what I read in the paper, that they've known that since at least the mid-1990s that those bolts could present a problem. And that, obviously, wasn't addressed since they were still in there, in 2004. So I'm concerned that if this facility has such great safety record, things like that continue to happen. Adding another doesn't necessarily seem like the most wise, until we get the current problems, like that, straightened out. (**0008-4-10** [Herron, Stephanie])

Comment: Salem nuclear was recently ranked the worst nuclear site in the country. On May 7th of this year one of the Salem plants tripped for the 3rd time in 30 days, a sign of poor reliability, and poor operation. The NRC is supposed to shut them down after 3 trips and investigate all problems. The history of this plant should not warrant another chance. (**0011-3** [Keating, Thomas])

Comment: There are three main concerns that I have about your proposal. They are waste disposal; fish and marine creatures kills; and safety . . . . As to safety, the bolts breaking do not increase confidence in the structural soundness of nuclear power plants. (**0019-5** [Passmore, Wills])

Comment: I recently read of the bolts shearing off the fan blades in a back-up cooling unit at Salem. Wrong bolts used in spite of manufacturer's warning. Bolts on the fan blades in a cooling unit in a nuclear reactor! The operator's response to the public was "that is never posed" a problem. That's all the explanation you get. Once can only ask "What kind of fools do they take us for?" The answer is "First Class." (**0046-4** [Campion, George])

Response: *The items discussed in these comments relate to the operational safety of the existing SGS and/or the existing HCGS. The issues raised in the comments are outside the scope of the environmental review, and will not be addressed in the EIS. That said, the following are examples of how NRC addresses operational safety issues at existing nuclear power plants. NRC maintains resident inspectors at each reactor site. These inspectors monitor the day-to-day operations of the plant and perform inspections to ensure compliance with NRC requirements. In addition, the NRC has an operational experience program that ensures that safety issues that are found at one plant are properly addressed at the others, as appropriate. No changes were made to the EIS as a result of these comments.*

Comment: And, as we learned in Japan, recently, we need to be aware of this. We may, like Japan, think that we are not vulnerable. But if you are going to do something like this you really do need to address the serious, serious concerns. (**0007-2-8** [Carter, David])

Comment: Now, all of the knowledge base, on lessons learned, from Three Mile Island, on operation of these plants, from the Fukushima lessons learned, have not been applied to any plant in this country, yet. And they are still wanting to build nuclear power plants. (**0007-3-5** [August, Bernard])

Comment: Two, do you work with the United States, USGS, on the siting of these plants, and what criteria do they have inputs on, on the siting of the plant? Because, right now, Salem Nuclear Power Plant is sitting on what is called the Townsend formation. And I had to go to

Denver, Colorado, to the USGS map service, to get the map. It is sitting on 900 feet of mud with no rock bottom, as being held up by about 1,200 pilings and it is sinking. So the idea of putting another power plant out there, that is already on a site that is sinking, is ridiculous. (**0007-3-8** [August, Bernard])

Comment: The crucial planning will come not with the Early Site Permit but with the actual details of the plant design. My questions would include: concern for extreme floods and adequate entrance and egress systems, maintaining a good, continuous dialog with the community and an insistence that only the best science be incorporated in planning and construction. (**0009-8** [Locandro, Roger])

Response: *The items discussed in these comments relate to the operational safety of a new nuclear plant at the PSEG Site, and as such, are outside the scope of this environmental review. A safety assessment for the proposed licensing action was provided by PSEG as part of the application for the early site permit. Separate and distinct from the environmental review documented in this EIS, the NRC is developing an SER that will all aspects of reactor and operational safety related to a new nuclear plant at the PSEG Site. No changes were made to the EIS as a result of these comments.*

Comment: NRC should therefore withdraw the DEIS since PSEG presently does not have adequate legal authority to seek this ESP approval since it does not own the land or have other legal power over all of the land upon which this nuclear power plant is proposed. (**0020-1-19** [van Rossum, Maya])

Response: *The NRC is addressing this issue as part of the safety review of the ESP application by requiring a permit condition that will require PSEG to obtain legal authority from the USACE to either allow PSEG and its surrogates to determine all activities including exclusion or removal of personnel and property from the area or require that the USACE exercise control in a specified manner. The agreement will specify that no residences are allowed within the exclusion area. Some public uses of the land may be allowed, but PSEG will acquire the ability to remove and subsequently exclude people. The staff finds the proposed permit condition, acceptable because they ensure that PSEG will have appropriate authority to determine or control access and exclusion to areas within the exclusion area boundary. Prior to issuance of a COL, PSEG, or other COL applicant referencing the ESP, shall complete the activities called for in the permit condition and submit notification of their completion to the NRC for staff verification.*

E.2.44 Comments Concerning Issues Outside Scope - Security and Terrorism

Comment: Furthermore, the report does not address the possibility of a deliberately caused event designed to maximize damage, though in this day and age it should. It only considers the likelihood of "accident" events that are due to natural, design or human error causes. It tries to mitigate concerns of a nuclear catastrophe by pointing to the recent catastrophe at Fukushima and "lessons learned" from that event. (**0012-6** [Magyar, David])

Response: *Comments related to security and terrorism are safety issues that are not within the scope of the staff's environmental review. The NRC is devoting substantial time and attention to* *terrorism-related matters, including coordination with the U.S. Department of Homeland Security. As part of its mission to protect public health and safety and the common defense and security pursuant to the Atomic Energy Act, the NRC staff is conducting vulnerability assessments for the domestic utilization of radioactive material. In the time since September 2001, the NRC has identified the need for license holders to implement compensatory measures and has issued several orders to license holders imposing enhanced security requirements. Finally, the NRC has taken actions to ensure that applicants and license holders maintain vigilance and a high degree of security awareness. Consequently, the NRC will continue to consider measures to prevent and mitigate the consequences of acts of terrorism in fulfilling its safety mission. There are requirements for the physical protection of spent nuclear fuel in transit as set forth in 10 CFR 73. Recent proposed revisions to 10 CFR 73 would provide additional security enhancements in several areas including communications, procedures and training, armed escorts, and deadly force. Additional information about the NRC staff's actions regarding physical security since September 11, 2001, can be found on the NRC's website (http://www.nrc.gov). No changes were made to the EIS as a result of this comment.*

E.2.45 General Editorial Comments

Numerous comments (not listed here) were received on the draft EIS identifying general editorial errors (e.g., misspellings, punctuation, subject-verb agreement, capitalization, and other typographical errors) and/or offering alternate language for existing EIS text. Where appropriate, these revisions have been incorporated into this final EIS, and the locations of such corrections are indicated by change bars (vertical lines) in the margin beside the affected text.

E.3 References

10 CFR Part 50. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities." Washington, D.C. TN249.

45 FR 40101. June 13, 1980. "Nuclear Power Plant Accident Consideration Under the National Environmental Policy Act of 1969." *Federal Register*, U.S Nuclear Regulatory Commission, Washington, D.C. TN4270.

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76 FR 24479. May 2, 2011. "EPA and Army Corps of Engineers Guidance Regarding Identification of Waters Protected by the Clean Water Act." *Federal Register*, U.S. Environmental Protection Agency and U.S. Army Corps of Engineers, Washington, D.C. TN247.

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Dames and Moore. 1988. *Final Report: Study of Ground-water Conditions and Future Water Supply Alternatives, Salem/Hope Creek Generating Station, Artificial Island, Salem County, New Jersey*. Cranford, New Jersey. Accession No. ML14093A481. TN3311.

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FDA (U.S. Food and Drug Administration). 2014. "Public Health Focus: FDA Response to the Fukushima Dai-ichi Nuclear Power Facility Incident." Silver Spring, Maryland. Accession No. ML15239A602. TN4218.

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IPCC (Intergovernmental Panel on Climate Change). 2012. *Renewable Energy Sources and Climate Change Mitigation—Special Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom. TN2648.

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PSEG (PSEG Power LLC). 2009. *Report of Phase I Archaeological Survey for Selected Portions of Two Access Road Alternatives, PSEG Early Site Permit Application, Salem County, New Jersey* [Redacted]. MACTEC Engineering and Consulting, Inc., Knoxville, Tennessee. Accession No. ML101660320. TN4370.

PSEG (PSEG Power LLC). 2013. Letter from J. Mallon to NRC, dated July 17, 2013, regarding "Response to Request for Additional Information, No. Env-06S, ESP EIS 2.5—Socioeconomics." Salem, New Jersey. Accession No. ML13214A165. TN2525.

PSEG (PSEG Power LLC and PSEG Nuclear LLC). 2014. *PSEG Site Early Site Permit Application;* Part 3, "Environmental Report." Revision 3, Newark, New Jersey. Accession No. ML14093B256. TN3452.

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PSEG (PSEG Nuclear LLC). 2014. *2013 Annual Radioactive Effluent Release Report for the Salem and Hope Creek Generating Stations*. Hancocks Bridge, New Jersey. Accession No. ML1413A040. TN4219.

PSEG (PSEG Nuclear LLC). 2014. *Quarterly Remedial Action Progress Report, First Quarter 2014*, *PSEG Nuclear, LLC, Salem Generating Station*. Hancocks Bridge, New Jersey. Accession No. ML14289A524. TN4220.

USACE (U.S. Army Corps of Engineers). 2014. Letter from W. Jenkins to G. Bickle, dated February 24, 2014, regarding "CENAP-OP-R 2009-157 (JD): PSEG Nuclear Request for Verification of a Jurisdictional Delineation." Philadelphia, Pennsylvania. Accession No. ML14085A121. TN3282.

USACE (U.S. Army Corps of Engineers). 2014. *Draft Environmental Assessment for U.S. Army Corps Of Engineers Land Exchange of Properties at Artificial Island, Salem County, New Jersey for Properties in Oldmans Township, Salem County and Logan Township, Gloucester County, New Jersey; Development of Confined Disposal Facility*. USACE Philadelphia District, Philadelphia, Pennsylvania. Accession No. ML15239A610. TN4229.

APPENDIX F

KEY CONSULTATION CORRESPONDENCE

APPENDIX F

KEY CONSULTATION CORRESPONDENCE

Consultation correspondence sent and received during the environmental review of the early site permit application for the PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) Site near Salem, New Jersey, is identified in Table F-1. The correspondence can be found in the Nuclear Regulatory Commission's (NRC's) Agencywide Document Access and Management System (ADAMS), which is accessible from the NRC website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room) (note that the URL is case sensitive). ADAMS accession numbers also are provided in Table F-1.

A copy of the correspondence received from the U.S. Army Corps of Engineers (USACE) is on display in Section F.1, and copies of correspondence received regarding historic and cultural resources are on display in Section F.2.

Section F.3 contains copies of correspondence from Federal agencies regarding threatened, endangered, and sensitive species and their habits, and it also includes full copies of the National Marine Fisheries Service (NMFS) Biological Assessment (BA) (see Section F.3.1), the NMFS Essential Fish Habitat Assessment (EFHA) (see Section F.3.2), and the U.S. Fish and Wildlife (FWS) BA (see Section F.3.3).

Table F-1. Key Early Site Permit Consultation Correspondence Regarding the PSEG Site

Source	Recipient	Date and Accession Number
Correspondence with Native American Tribes		
U.S. Nuclear Regulatory Commission (NRC) (Mark Notich)	Eastern Lenape Nation of Pennsylvania (Doris Pieschel)	October 26, 2010 ML102990155
NRC (Mark Notich)	Cherokee Nation of New Jersey (C. W. Longbow)	October 26, 2010 ML102850579
NRC (Mark Notich)	Nanticoke Tribe Association (Larry Jackson)	October 26, 2010 ML102990090
NRC (Mark Notich)	NJ-US Taino Tribal Affairs Office (Taino Tribal Council of Jatibonicu)	October 26, 2010 ML102990045
NRC (Mark Notich)	Ramapough Mountain Indians (Doreen Scott)	October 26, 2010 ML102990059
NRC (Mark Notich)	Delaware Tribe of Indians (Jerry Douglas)	October 26, 2010 ML102990185
NRC (Mark Notich)	The Delaware Nation–Delaware Tribe of Western Oklahoma (Kerry Holton)	October 26, 2010 ML102990210
NRC (Mark Notich)	Eastern Delaware Nation (Mollie Eliot)	October 26, 2010 ML102990165
NRC (Mark Notich)	Powhatan Renape Nation (Curtis W. Diggs)	October 26, 2010 ML102990071

Table F-1. (continued)

Source	Recipient	Date and Accession Number
NRC (Mark Notich)	Nanticoke Lenni-Lenape Indians of New Jersey (Mark Gould)	October 26, 2010 ML102990114
Correspondence with the U.S. Army Corps of Engineers (see Section F.1)		
NRC (Gregory Hatchett)	U.S. Army Corps of Engineers (William Jenkins)	November 5, 2010 ML102930260
Department of the Army (Frank J. Cianfrani)	NRC (Gregory Hatchett)	January 24, 2011 ML110380482
Correspondence Regarding Historic and Cultural Resources (see Section F.2)		
NRC (Mark Notich)	New Jersey State Historic Preservation Office (Vincent Maresca)	October 26, 2010 ML102850545
NRC (Mark Notich)	Advisory Council on Historic Preservation (Reid Nelson)	October 26, 2010 ML102850562
State of Delaware Historical and Cultural Affairs (Timothy Slaven)	NRC (Jack Cushing)	September 25, 2013 ML13275A113
New Jersey State Historic Preservation Office (Daniel Saunders)	NRC (Jack Cushing)	December 9, 2013 ML13358A139
New Jersey State Historic Preservation Office (Daniel Saunders)	NRC (Cindy Bladey)	December 4, 2014 ML15005A040
New Jersey State Historic Preservation Office (Daniel Saunders)	NRC (Jennifer Davis)	March 13, 2015 ML15078A131
NRC (Jennifer Dixon-Herrity)	ACHP (Reid Nelson)	June 24, 2015 ML15154B631
NRC (Jennifer Dixon-Herrity)	New Jersey State Historic Preservation Office (Daniel Saunders)	June 24, 2015 ML15155B300
NRC (Jennifer Dixon-Herrity)	U.S. Department of the Interior (Sally Jewell)	June 24, 2015 ML15155B711
New Jersey State Historic Preservation Office (Daniel Saunders)	NRC (Jennifer Dixon-Herrity)	July 20, 2015 ML15223B089
Advisory Council on Historic Preservation (John M. Fowler)	NRC (Chairman Burns)	July 21, 2015 ML15204A219
Advisory Council on Historic Preservation (Charlene Dwin Vaughn)	NRC (Jennifer Dixon-Herrity)	July 31, 2015 ML15223B035
NRC (Francis M. Akstulewicz)	*Federal Register* 80 FR 53579	September 4, 2015 ML15239B224
NRC (Jennifer Davis)	NRC (Allen Fetter)	September 24, 2015 ML15268A481

Table F-1. (continued)

Source	Recipient	Date and Accession Number
NRC (Francis M. Akstulewicz)	New Jersey State Historic Preservation Office (Daniel Saunders); Advisory Council on Historic Preservation (John M. Fowler); PSEG Power, LLC and PSEG Nuclear, LLC (Joseph M. Sindoni); and consulting parties	October 14, 2015 ML15267A763
Correspondence Regarding Threatened, Endangered, and Sensitive Species and their Habitats (see Section F.3)		
NRC (Mark Notich)	U.S. Fish and Wildlife Service (Marvin Moriarty)	October 26, 2010 ML102860150
NRC (Mark Notich)	N.J. Department of Environmental Protection (NJDEP) (David Chanda)	October 26, 2010 ML102850556
NRC (Mark Notich)	National Marine Fisheries Service (Peter Colosi)	October 26, 2010 ML102860101
National Marine Fisheries Service (Stanley Gorski)	NRC (Gregory Hatchett)	December 9, 2010 ML103570197
NRC (Samuel Lee)	National Marine Fisheries Service (Louis Chiarella)	July 31, 2013 ML13206A180
National Marine Fisheries Service (Mary Colligan)	NRC (Samuel Lee)	October 25, 2013 ML13319A998
NRC (Samuel Lee)	U.S. Fish and Wildlife Service (Wendi Weber)	December 13, 2013 ML13346A667
NRC (Samuel Lee)	NJDEP, New Jersey Natural Heritage Program (Larry Miller)	October 4, 2013 ML13275A623
NJDEP, New Jersey Natural Heritage Program (Robert Cartica)	NRC (Allen Fetter)	October 24, 2013 ML14154A451
NJDEP, New Jersey Natural Heritage Program (Robert Cartica)	NRC (Allen Fetter)	October 24, 2013 ML14142A004
NJDEP, New Jersey Natural Heritage Program (Robert Cartica)	NRC (Allen Fetter)	October 24, 2013 ML14154A448
NJDEP, New Jersey Natural Heritage Program (Robert Cartica)	NRC (Allen Fetter)	October 24, 2013 ML14154A439

F.1 Copy of Correspondence Received from the U.S. Army Corps of Engineers, Philadelphia District

DEPARTMENT OF THE ARMY

PHILADELPHIA DISTRICT CORPS OF ENGINEERS
WANAMAKER BUILDING, 100 PENN SQUARE EAST
PHILADELPHIA. PENNSYLVANIA 19107-3390

REPLY TO
ATTENTION OF

JAN 24 2011

Regulatory Branch
Applications Section I

SUBJECT: CENAP-OP-R-2009-157
PSE&G NUCLEAR, LLC

Mr. Gregory P. Hatchett, Branch Chief
Environmental Projects Branch 1
Division of Site and Environmental Reviews
Office of New Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Hatchett:

This is in response to your letter dated November 5, 2010, inviting the United States Army Corps of Engineers (Corps), Philadelphia District, to participate as a cooperating agency in the development of an Environmental Impact Statement (EIS) associated with the proposal of the Public Service Electric and Gas (PSE&G) Power, LLC, and PSE&G Nuclear, LLC to construct and operate a new nuclear power plant, along the Delaware River, on the southern part of Artificial Island, in Lower Alloways Creek Township, Salem County, New Jersey.

The Philadelphia District is accepting your invitation to serve as a cooperating agency in the development of the EIS. By participating as a cooperating agency, the Corps can work with the United States Nuclear Regulatory Commission (NRC) to ensure that sufficient information is included in the EIS for the Corps to adopt the environmental document, conduct a timely review of the PSE&G application, and make a final decision and/or project compliance with Section 404 of the Clean Water Act and Section 10 of the River and Harbor Act of 1899.

We are looking forward to working with you as a cooperating agency. If you have any questions regarding this matter, please contact Mr. Bryan P. Bellacima at (215) 656-7632

Sincerely,

Frank J. Cianfrani
Chief, Regulatory Branch

F.2 Copies of Correspondence Received Regarding Historic and Cultural Resources

State of Delaware
Historical and Cultural Affairs

21 The Green
Dover, DE 19901-3611
Phone: (302) 736.7400 Fax: (302) 739.5660

FINDING OF NO ADVERSE EFFECT

September 25, 2013

Mr. Jack Cushing
United States Nuclear Regulatory Commission
Office of New Reactors
Mail Stop T7F7
Washington, D.C. 20555-0001

Project:	**PSEG Early Site Permit Application; Salem County, New Jersey**
Review Code:	2010.01.19.02
Agency:	NRC

Dear Mr. Cushing:

The staff of the State Historic Preservation Office of the Division of Historical & Cultural Affairs has reviewed the above-noted project. Based on our review of the initial *Historic Properties Visual Impact Assessment* (2009, MACTEC) and subsequent *Addendum* (2013, ARKF), we concur with your determination that the proposed project will not adversely affect any properties listed on or eligible for listing on the National Register of Historic Places.

Timothy A. Slavin
State Historic Preservation Officer

Reviewed By:

Jesse Zanavich, Architectural Historian
Jesse.Zanavich@state.de.us
(302) 736-7433

cc: Gwenyth Davis, Deputy State Historic Preservation Officer

HPO Project No. 09-0740-18
HPO-L2013-130

State of New Jersey

MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
PO Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 9, 2013

Mr. Jack Cushing
United State Nuclear Regulatory Commission
Office of New Reactors
Mail Stop: T7F7
Washington, D.C. 20555-0001

Dear Mr. Cushing:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published with amendments in the Federal Register on 6 July 2004 (69 FR 40544-40555), I am providing **Consultation Comments** for the following proposed undertaking:

Salem County, Lower Alloways Creek Township
Salem and Hope Creek Generating Station License Renewal
PSEG Early Site Permit (ESP) Application
United States Nuclear Regulatory Commission

800.4 Identifying Historic Properties

As Deputy State Historic Preservation Officer, I concur with your finding that there are no historic properties affected within the project's area of potential effects for the Early Site Permit (ESP) Application for the above referenced undertaking.

The HPO looks forward to continued consultation during the future Combined Construction and Operating License (COL) Application to evaluate direct and indirect project effects on historic properties pursuant to Section 106 of the National Historic Preservation Act.

Additional Comments

Thank you again for providing the opportunity to review and comment on the potential for the project to effect historic properties. The HPO looks forward to continued consultation and evaluating any direct effects on archaeological sites 28-Sa-179, 28-Sa-180, 28-Sa-182, and 28-Sa-186 along Money Island Road, assessing visual effects, and assessment of effects of any new project elements on historic properties pursuant to Section 106. Please reference the HPO project number 09-0740 in any future calls, emails, submissions or written correspondence to help expedite your review and response. If you have any questions, please do not hesitate to contact Vincent Marcsca of my staff at (609) 633-2395 with questions regarding archaeology or Caroline Scott (609-633-2396) with questions regarding historic architecture, historic districts, or historic landscapes.

Sincerely,

/km

Daniel D. Saunders
Deputy State Historic
Preservation Officer

c. James Mallon, PSEG Power, LLC
Nikki Minnichbach, U.S. Army Corps of Engineers
Daniel O'Rourke, Argonne National Laboratory
Molly McDonald, AKRF

RULES AND DIRECTIVES BRANCH USNRC

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RECEIVED

HPO Project No. 09-0740-20
HPO-L2014-080 PROD

State of New Jersey

MAIL CODE 501-04B
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
PO Box 420
Trenton, NJ 08625-0420
TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

December 4, 2014

Ms. Cindy Bladey, Chief
Rules, Announcements, and Directives Branch
Division of Administrative Services
Office of Administration
Mailstop 3WFN-06-A44MP
United State Nuclear Regulatory Commission
Washington, D.C. 20555-0001

79 FR 49820
8/22/2014
(28)

Dear Ms. Bladey:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published with amendments in the Federal Register on 6 July 2004 (69 FR 40544-40555), I am providing **Consultation Comments** for the following proposed undertaking:

Salem County, Lower Alloways Creek Township
Salem and Hope Creek Generating Station
Request for Comment on the Draft Environmental Impact Statement
PSEG Site Early Permit Application Review
Docket ID NRC-2014-0149
United States Nuclear Regulatory Commission

Summary: This **new SHPO Opinion** finds the **John Maddox Denn House** and the **Sara Mason House** are eligible for inclusion on the National Register of Historic Places under Criterion C for 18th century pattern-brick architecture. While the process to identify all historic properties and affects assessment has not yet been completed, construction of the new, larger cooling towers will **adversely affect** the viewshed of the Abel and Mary Nicholson House National Historic Landmark.

800.4 **Identifying Historic Properties**

SUNSI Review Complete
Template = ADM – 013
E-RIDS= ADM-03
Add= A. Fetter (AHP)

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1

HPO Project No. 09-0740-20
HPO-L2014-080 PROD

Thank you for identifying the area of potential effects (APE) for the cooperating agencies; specifically the Nuclear Regulatory Commission (NRC) responsibilities for Artificial Island (physical and visual impacts) and the U.S. Army Corps of Engineers (USACE) responsible for dredging and the Money Island Access Road APE.

The HPO concurs with the NRC's *Environmental Impact Statement for an Early Site Permit (ESP) at the PSEG Site* (EIS) that the Phase II archaeological survey for the barge facility and water intake area has been completed with a finding of no historic properties affected.

The HPO agrees Phase I archaeological survey for Money Island access road identified archaeological sites 28-Sa-179, 28-Sa-180, 28-Sa-182, and 28-Sa-186. Phase II archaeological survey will be completed during the Combined Construction and Operating License Application (COLA) as needed depending on the final APE. The visual impact of the proposed Money Island access road is on-going.

The HPO looks forward to reviewing the NRC's assessment and analysis by a geomorphologist that the soil boring program for Artificial Island determined no presence exists for prehistoric soils below the former river bed encapsulated below Artificial Island.

Based upon AKRF's April 20, 2012 *addendum historic properties visual impact assessment* report, as the Deputy State Historic Preservation Officer for New Jersey, I find the following properties **eligible** for listing on the National Register of Historic Places under **Criterion C** for 18th century pattern-brick architecture:

1. John Maddox Denn House (112 Popular Street, Lower Alloways Creek Township)
2. Sarah Mason House (349 Fort Elfsborg Road, Elsinboro Township)

In consequence, this is a **new SHPO opinion** of eligibility.

800.5 Assess Adverse Effects

Through earlier consultation, the HPO agreed that permitting a new energy station through the ESP process would not be have the potential to effect historic properties and that HPO comment on visual impacts would be conducted during the COLA when more specific, detailed construction information was available. A review of the EIS suggests HPO has failed to make this point clear to NRC (EIS Sections 2.7.1, 4.6, and 7.5). While more specific HPO comment on visual impacts will be forthcoming through section 106 consultation during the COLA, the cumulative effects of introducing two additional cooling towers, 76 feet higher than the existing, with vapor columns will **adversely affect** the viewshed of the Abel and Mary Nicholson House National Historic Landmark.

Additional Comments

Thank you again for providing the opportunity to review and comment on the potential for the project to effect historic properties. The HPO looks forward to continued consultation to identify historic properties, assess affects, and resolve adverse effects on historic properties. Please

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HPO Project No. 09-0740-20
HPO-L2014-080 PROD

reference the HPO project number 09-0740 in any future calls, emails, submissions or written correspondence to help expedite your review and response. If you have any questions, please do not hesitate to contact Vincent Maresca of my staff at (609-633-2395) with questions regarding archaeology or Michelle Craren (609-984-0176) with questions regarding historic architecture, historic districts, or historic landscapes.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

c. Jack Cushing, NRC
Nichole Minnichbach, U.S. Army Corps of Engineers
Delaware Division of Historical and Cultural Affairs
John Gray, DEP-PCER
Ruth Foster, DEP-PCER
Molly McDonald, AKRF

3

HPO Project# 09-0740-21
HPO-C2015-114-PROD

State of New Jersey
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DEPARTMENT OF ENVIRONMENTAL PROTECTION
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CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

March 13, 2015

Jennifer Davis
Senior Project Manager
U.S. Nuclear Regulatory Commission
Office of New Reactors
Environmental Technical Support Branch
Mail Stop: T-7 F27
Washington, DC 20555-0001

Dear Ms. Davis:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published in the Federal Register on December 12, 2000 (65 FR 77725-77739) and amended on July 6, 2004 (69 FR 40553-40555), I am providing **consultation comments** on the following proposed undertaking:

Salem County, Lower Alloways Creek Township
Salem and Hope Creek Generating Station
PSEG Early Site Permit Application Review
Docket ID NRC-2014-0149
United States Nuclear Regulatory Commission

Summary: This **new SHPO Opinion** finds that the **Alloway Creek Rural Historic District** is eligible for listing on the National Registers of Historic Places under Criteria A, B, and C for its association with the early settlement and continued, unique agricultural history of Salem County, and as a continuously distinguishable landscape, with few modern intrusions.

800.4 Identification of Historic Properties

On January 9, 2015, HPO staff and I conducted a site visit along with the United States Nuclear Regulatory Commission (NRC); United States Army Corps of Engineers (USACE); PSEG (the Applicant); AKRF; and Janet Sheridan (interested consulting party.) Based upon this site visit and subsequent research, it is my opinion that the **Alloway Creek Rural Historic District** is eligible for listing on the National Register of Historic Places.

The Alloway Creek Rural Historic District is characterized by a concentration of 18th century brick farmhouses, several of which display patterned brickwork. Many of these farmhouses remain on large agricultural parcels, which in some cases may approximate the historic boundaries of the farm. In addition, the district contains several early wood-frame houses, and mid-19th century Italianate farmhouses. The later houses demonstrate the continued prosperity of this area through that century. Due to the lack of modern intrusions, the district retains an extremely high level of integrity and ability to convey its historic association with farming both the uplands, and tidal wetlands reclaimed through diking, known as banks.

The Alloway Creek Rural Historic District represents a rare surviving example of an 18th and 19th century agricultural landscape in South Jersey, and is eligible under Criterion A for its association with the early settlement of Salem County and development into a wealthy agricultural center; under Criterion B as the settlement of many of Salem County's earliest and most prominent residents, including John Mason, Richard Darkin, Nathaniel Chambless, Abel Nicholson, George Abbott, William Hancock, Isaac Smart, and William Waddington; and Criterion C as a significant and distinguishable entity consisting of a concentration of patterned brickwork houses, less common wood-frame farmhouses, and farmhouses that were altered or newly constructed throughout the district's history to reflect the changing tastes and continued agricultural prosperity of Alloway Creek.

Among the properties included in, and contributing to, the Alloway Creek Rural Historic District are:

- Abel and Mary Nicholson House, 127 Fort Elfsborg- Hancock Bridge Road, Elsinboro Township. (Individually listed as a National Historic Landmark.)
- Darkin House, 85 Amwellbury Road, Elsinboro Township.
- Samuel and Sarah Nicholson House, 153 Amwellbury Road, Elsinboro Township. (Individually listed on the New Jersey and National Registers of Historic Places)
- Morris Goodwin House, 337 Fort Elfsborg-Hancock Bridge Road, Elsinboro Township. (this HABS-documented house may be contributing if interior fabric remains as the exterior has been heavily altered)
- Sarah Mason House, 349 Fort Elfsborg-Hancock Bridge Road, Elsinboro Township. (SHPO Opinion 12/4/2014)
- Colonel Benjamin Holme House, 410 Fort Elfsborg-Hancock Bridge Road, Elsinboro Township. (Individually listed on NJR and NRHP)
- John Mason House, 63 Money Island Road, Elsinboro Township. (SHPO Opinion 6/21/2013)
- Mason-Waddington House, 130 Money Island Road, Elsinboro Township.
- 116 Mason Point Road, Elsinboro Township.
- Isaac Smart House, 489 Salem-Fort Elfsborg Road, Elsinboro Township.
- Nathaniel Chambless House, 277 Alloway Creek Neck Road, Lower Alloways Creek Township. (COE: 10/28/1985)
- George Abbott House, 120 Abbots Farm Road, Elsinboro Township. (SHPO Opinion 6/21/2013)

- Hancock House, 485 Locust Bridge Road, Lower Alloways Creek Township. (Individually listed on NJR and NRHP)
- John Maddox Denn House, 112 Poplar Street, Lower Alloways Creek Township. (SHPO Opinion 12/4/2014)

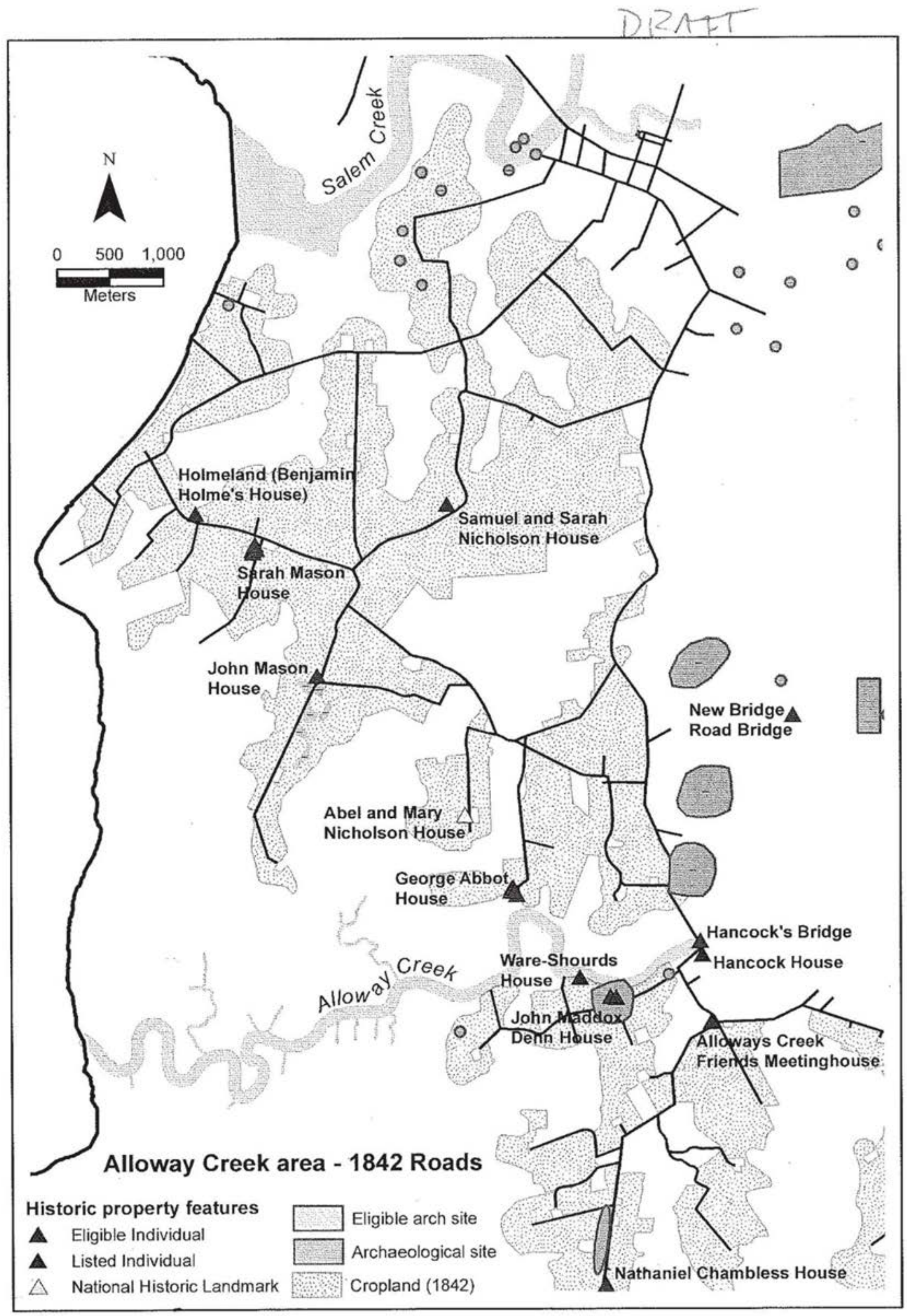
The approximate boundaries (which will be refined upon further research) of the Alloway Creek Rural Historic District are the Delaware River on the west (exclusive of the Oakwood Beach area, an early 20th century riverfront settlement); Salem Creek on the north; the north and south forks of the Alloway Creek on the east; and Hope Creek on the south. These boundaries include land within Elsinboro and Alloways Creek Townships. The period of significance for the district begins with first generation settlement in 1695 (the year in which the John Mason House was constructed) and ends in 1870, marking the declining prosperity of this unique rural landscape.

Thank you for providing the opportunity to review and comment on the potential for the above-referenced project to affect historic properties. Please do not hesitate to contact Michelle Craren of my staff at michelle.craren@dep.nj.gov or (609) 292-0032 with any questions. Please reference the HPO project number 09-0740 in any future calls, emails, or written correspondence in order to expedite our review and response.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

DM/MC/DDS


DRAFT
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0 500 1,000
Meters
Holmeland (Benjamin Holme's House)
Samuel and Sarah Nicholson House
Sarah Mason House
John Mason House
New Bridge Road Bridge
Abel and Mary Nicholson House
George Abbot House
Hancock's Bridge
Hancock House
Ware-Shourds House
Alloway Creek
John Maddox Denn House
Alloways Creek Friends Meetinghouse
Alloway Creek area - 1842 Roads
Historic property features
Eligible Individual
Listed Individual
National Historic Landmark
Eligible arch site
Archaeological site
Cropland (1842)
Nathaniel Chambless House

June 24, 2015

Mr. Reid Nelson
Director, Federal Agency Programs
Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001-2637

SUBJECT: NOTIFICATION OF POTENTIAL ADVERSE EFFECT FROM THE PSEG EARLY SITE PERMIT APPLICATION REVIEW IN SALEM COUNTY, NEW JERSEY

Dear Mr. Nelson:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) for an Early Site Permit (ESP) for a new nuclear power plant site, which is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The proposed site is adjacent to the existing Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2. As part of the review of this ESP application, the NRC has prepared an Environmental Impact Statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 51, the NRC regulations that implement the National Environmental Policy Act (NEPA) of 1969, as amended. Your office was contacted by the NRC on October 10, 2010, informing you that we were coordinating our National Historic Preservation Act (NHPA) Section 106 review with our NEPA review for this application.

The NRC's efforts to address its Section 106 obligations for the project are described in the draft EIS, which was released in August 2014. Briefly, interactions with the New Jersey Historic Preservation Office (NJ HPO), Salem Historical Society, and the Salem Old House foundation began in 2009 when the NRC became aware that an application for an ESP was imminent. Once the application was received, several architectural studies were done by a qualified contractor on behalf of the applicant to identify historic properties in the region and to begin considering effects from the project. The agreed upon visual Area of Potential Effect (APE) was identified as 4.9 miles. NRC staff later met with NJ HPO staff during the environmental site audit in May 2012 prior to the publication of the draft EIS to explain the proposed project, request information on any interested parties, and to inquire if there were any issues that the NRC needed to address during our review. Findings of No Adverse Effect from the project were received from the Delaware and NJ HPOs in September and December 2013 respectively. The draft EIS was released to the public in August 2014, and contained an agency determination of No Adverse Effect to historic properties. The draft EIS contains a description of the information required in 36 CFR 800.11(e)(1)-(4) (see Chapters 2, 4, 5, and Appendices C and F) and is accessible online at http://www.nrc.gov/reading-rm/adams.html.

Based on a revised opinion letter from the NJ HPO dated December 4, 2014, indicating, in the NJ HPO's opinion, that the construction of two new natural draft cooling towers would visually affect the Abel and Mary Nicholson National Historic Landmark (NHL), the NRC revisited its effects determination for the project (Enclosure 1). Four meetings were held with the NJ HPO to

R. Nelson - 2 -

discuss the effects and possible strategies for mitigating any effects resulting from the project (January 9, 2015, in Salem County; February 12, 2015, at NJ HPO offices, April 23, 2015, at NJ HPO offices, and May 19, 2015, in Salem County). In attendance at some of these meetings were representatives from the Advisory Council on Historic Preservation (ACHP), the National Park Service, PSEG as well as interested stakeholders. PSEG also had its contractor, AKRF, do additional research on the potential for visual effects on historic resources found in the region from the project. With this letter, in accordance with 36 CFR 800.6(a)(1), the NRC is notifying the ACHP of an indirect adverse (i.e., visual) effect to the Abel and Mary Nicholson House (127 Fort Elfsborg-Hancock Bridge Road), 349 Fort Elfsborg-Hancock Bridge Road, and 116 Mason Point Drive, in the event that natural draft cooling towers were constructed at the proposed project site. The indirect adverse effect would be cumulative because the current setting already contains a natural draft cooling tower immediately south of the project site. The indirect adverse effects would only occur if natural draft cooling towers were chosen as the cooling system for a new nuclear plant at the proposed site location (the applicant is not obligated to choose its cooling system at the ESP stage). Mechanical draft cooling towers would have no effect on these properties.

The Abel and Mary Nicholson House is a patterned brick house that is both listed on the New Jersey and National Registers and is a NHL. The house at 349 Fort Elfsborg-Hancock Bridge Road is an 18th century pattern brick house that was extensively remodeled during the third quarter of the nineteenth century in the Italianate style. The house at 116 Mason Point Road is a two-story timber-framed house built in the style of the 18th century vernacular architecture of the region. Both houses are *National Register of Historic Places* (NRHP)-eligible structures. The NJ HPO has also proposed, in a letter dated April 13, 2015, that these properties should also be considered as contributing to an Alloway Creek Rural Historic District (Enclosure 2). All affected structures are within the agreed upon visual area of potential effect of 4.9 miles from the proposed project.

An ESP resolves issues involving site safety, environmental characteristics, and emergency preparedness that are independent of a specific nuclear reactor design. This permitting approach provides an applicant with an opportunity to "bank" a site for up to 20 years, reduces licensing uncertainty, and resolves siting issues before construction. The ESP does not license a nuclear power plant to be built. If the applicant decides to build and operate a nuclear power plant, then it has to apply for a combined license (COL). The NRC will issue a supplemental EIS and perform Section 106 consultation for the COL undertaking if and when an application is received. For the supplemental EIS, if there is no new and significant information, then the NRC relies on the final EIS issued for the ESP. For the COL Section 106 review, the NRC would rely on the consultation performed at the ESP stage to inform the required consultation at the COL stage.

For your reference, this letter includes detailed background (see enclosures) on the NRC's activities pursuant to Section 106 of the NHPA to date. Concerns raised by the consulting parties primarily relate to the visual effects from two natural draft cooling towers on the cultural setting. Because of these concerns for the cultural setting, possible mitigation would likely not include visual screening. A draft Memorandum of Agreement (MOA) is currently under development between NRC, interested parties, NJ HPO, PSEG, and potentially the National Park Service and your office. Once a finalized draft is developed, it will be forwarded to your office for review and comment. In addition, the NRC invites your agency to be a signatory to the MOA. The NRC staff requests that you indicate your interest in participating within 15 days of

R. Nelson - 3 -

receipt of this letter and associated materials. If you have any questions or require additional information, please contact Mr. Allen Fetter, NRC Environmental Project Manager, at (301) 415-8556, or via email at Allen.Fetter@nrc.gov.

Sincerely,

/RA/

Jennifer Dixon-Herrity, Chief
Environmental Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket No.: 52-043

cc: Sarah Stokely, ACHP

Enclosures:

1. NJ HPO letter dated December 4, 2014 (ML15005A040)
2. NJ HPO letter dated March 13, 2015 (ML15078A131)
3. Nicholson House NHL Nomination Package (ML15168A985)
4. PSEG Supplemental Information dated May 21, 2015 (ML15146A098)

June 24, 2015

Mr. Daniel D. Saunders
Deputy State Historic Preservation Officer
Historic Preservation Office
Dept. of Environmental Protection
State of New Jersey
P.O. Box 404
Trenton, NJ 08625-0404

SUBJECT: NOTIFICATION OF POTENTIAL ADVERSE EFFECT FROM THE PSEG EARLY SITE PERMIT APPLICATION REVIEW IN SALEM COUNTY, NEW JERSEY

Dear Mr. Saunders:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) for an Early Site Permit (ESP) for a new nuclear power plant site, which is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The proposed site is adjacent to the existing Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2. As part of the 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 (NEPA) of 1969, as amended. Your office was contacted by the NRC on October 26, 2010, informing you that we were coordinating our Section 106 review with NEPA for this review. The draft EIS was issued for public comment in August 2014 and contained an agency determination of No Adverse Effect to historic properties.

Based on a revised opinion letter from your office dated December 4, 2014, indicating that the construction of two new natural draft cooling towers would visually affect the Abel and Mary Nicholson National Historic Landmark, the NRC revisited its effects determination for the proposed project. Four meetings were held with your office to discuss the effects and possible strategies for mitigating any effects resulting from the project (January 9, 2015, in Salem County; February 12, 2015, at NJ HPO offices, April 23, 2015, at NJ HPO offices, and May 19, 2015, in Salem County). In attendance at some of these meetings were the Advisory Council on Historic Preservation, the National Park Service, PSEG and interested stakeholders. PSEG also had its contractor AKRF do additional research on the potential for visual effects on historic resources found in the region from the project. Based on these discussions and the additional research done, the NRC is notifying your office of its determination that the project would have an indirect adverse (i.e., visual) effect to the Abel and Mary Nicholson House (127 Fort Elfsborg-Hancock Bridge Road), 349 Fort Elfsborg-Hancock Bridge Road, and 116 Mason Point Road, in the event that natural draft cooling towers were constructed at the proposed project site. The indirect adverse effect would be cumulative because the current setting already contains a natural draft cooling tower immediately south of the proposed project site. The indirect adverse effect would only occur if natural draft cooling towers were chosen as the cooling system for a new nuclear plant at the proposed site location (the applicant is not obligated to choose its cooling system at the ESP stage). Mechanical draft cooling towers would have no effect on

D. Saunders - 2 -

these properties. The Abel and Mary Nicholson House is a National Historic Landmark, and 349 Fort Elfsborg-Hancock's Bridge Road and 116 Mason Point Road are *National Register of Historic Places,* eligible structures. Your office has also proposed, in a letter dated April 13, 2015, that these properties should also be considered as contributing to an Alloway Creek Rural Historic District. All affected structures are within the agreed upon visual area of potential effect of 4.9 miles from the proposed project.

An ESP resolves issues involving site safety, environmental characteristics, and emergency preparedness that are independent of a specific nuclear reactor design. This permitting approach provides an applicant with an opportunity to "bank" a site for up to 20 years, reduces licensing uncertainty, and resolves siting issues before construction. The ESP does not license a nuclear power plant to be built. If the applicant decides to build and operate a nuclear power plant, then it has to apply for a combined license (COL). The NRC will issue a supplemental EIS and perform Section 106 consultation for the COL undertaking if and when an application is received. For the supplemental EIS, if there is no new and significant information, then the NRC relies on the final EIS issued for the ESP. For the COL Section 106 review, the NRC would rely on the consultation performed at the ESP stage to inform the required consultation at the COL stage.

Pursuant to Section 106 of the National Historic Preservation Act, a draft Memorandum of Agreement (MOA) is currently under development between your office, interested parties, PSEG, and potentially the Advisory Council on Historic Preservation and the National Park Service. Once a finalized draft is developed, it will be forwarded to your office for review and comment. In addition, the NRC invites your agency to be a signatory to the MOA. The NRC staff requests that you indicate your interest in participating within 30 days of receipt of this letter and associated materials. If you have any questions or require additional information, please contact Mr. Allen Fetter, NRC Environmental Project Manager, at (301) 415-8556, or via email at Allen.Fetter@nrc.gov.

Sincerely,

/RA/

Jennifer Dixon-Herrity, Chief
Environmental Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket No.: 52-043

cc: Mr. Ron Magill
Ms. Janet Sheridan

June 24, 2015

Ms. Sally Jewell, Secretary
U.S. Department of the Interior
Department of the Interior
1849 C Street, N.W.
Washington, DC 20240

SUBJECT: NOTIFICATION OF POTENTIAL ADVERSE EFFECT TO A NATIONAL HISTORIC LANDMARK FROM THE PSEG EARLY SITE PERMIT APPLICATION REVIEW IN SALEM COUNTY, NEW JERSEY

Dear Secretary Jewell:

The U.S. Nuclear Regulatory Commission (NRC) is reviewing an application submitted by PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) for an Early Site Permit (ESP) for a new nuclear power plant site, which is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey. The proposed site is adjacent to the existing Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2. As part of the 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* (CFR) Part 51, the NRC regulations that implement the National Environmental Policy Act (NEPA) of 1969, as amended. We are contacting your office and inviting your participation in the project as required under 36 CFR 800.10(c) when there is an adverse effect to a National Historic Landmark resulting from an undertaking.

The draft EIS, which was released to the public in August 2014, contained an agency determination of No Adverse Effect to historic properties. The draft EIS is accessible online at http://www.nrc.gov/reading-rm/adams.html. Based on a revised New Jersey Historic Preservation Office (NJ HPO) opinion on the undertaking received during the comment period for the draft EIS, additional research was undertaken. Four meetings were held with the NJ HPO to discuss the effects and possible strategies for mitigating any effects resulting from the project (January 9, 2015, in Salem County; February 12, 2015, at NJ HPO offices, April 23, 2015, at NJ HPO offices, and May 19, 2015, in Salem County). In attendance at some of these meetings were the Advisory Council on Historic Preservation, the National Park Service, PSEG and interested stakeholders. PSEG also had its contractor, AKRF, do additional research on the potential for visual effects on historic resources found in the region from the project. The NRC has now concluded that an indirect visual effect on the Abel and Mary Nicholson House (Nicholson House), which was nominated as a National Historic Landmark in 2003, would result if a new plant using natural draft cooling was built on Artificial Island. The Nicholson House, constructed in 1722, is 4.9 miles from the project location and is partially screened by vegetation, therefore, the effect to the property is deemed to be indirect. The effect on the Nicholson House would be cumulative as the setting for the Nicholson House already contains the natural draft cooling tower from the existing plant. The effect would only occur if the applicant ultimately puts forth an application that includes this cooling system configuration. The applicant could seek to use a mechanical draft cooling system option, which would not

Secretary Jewell - 2 -

visually affect any historic properties. An ESP does not approve construction nor is the applicant obligated to use the technologies analyzed at the ESP stage.

An ESP resolves issues involving site safety, environmental characteristics, and emergency preparedness that are independent of a specific nuclear reactor design. This permitting approach provides an applicant with an opportunity to "bank" a site for up to 20 years, reduces licensing uncertainty, and resolves siting issues before construction. The ESP does not license a nuclear power plant to be built. If the applicant decides to build and operate a nuclear power plant, then it has to apply for a combined license. The NRC will issue a supplemental EIS and perform Section 106 consultation for the combined license (COL) undertaking if and when an application is received. For the supplemental EIS, if there is no new and significant information, then the NRC relies on the final EIS issued for the ESP. For the COL Section 106 review, the NRC would rely on the consultation performed at the ESP stage to inform the required consultation at the COL stage.

For your reference, this letter includes background (see enclosures) on the NRC's activities pursuant to Section 106 of the National Historic Preservation Act to date. As part of this consultation, a draft Memorandum of Agreement (MOA) is currently under development between NRC, interested parties, NJ HPO, PSEG and potentially the Advisory Council on Historic Preservation. Once a finalized draft is developed, it will be forwarded to your office for review and comment. In addition, the NRC invites your agency to be a signatory to the MOA. The NRC staff requests that you indicate your interest in participating within 30 days of receipt of this letter and associated materials. If you have any questions or require additional information, please contact Mr. Allen Fetter, NRC Environmental Project Manager, at (301) 415-8556, or via email at Allen.Fetter@nrc.gov.

Sincerely,

/RA/

Jennifer Dixon-Herrity, Chief
Environmental Projects Branch
Division of New Reactor Licensing
Office of New Reactors

Docket No.: 52-043

cc: Bonnie Halda, Bill Bolger

Enclosures:

1. NJ HPO letter dated December 4, 2014 (ML15005A040)
2. Nicholson House NHL Nomination Package (ML15168A985)

HPO Project No. 09-0740-24
HPO-G2015-220

State of New Jersey

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
NATURAL & HISTORIC RESOURCES
HISTORIC PRESERVATION OFFICE
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TEL. (609) 984-0176 FAX (609) 984-0578

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

July 20, 2015

Ms. Jennifer Dixon-Herrity, Chief
Environmental Projects Branch
Division of New Reactor Licensing
Office of New Reactors
Mail Stop: T7F7
Washington, D.C. 20555-0001

Received
8/10/2015

Dear Ms. Dixon-Herrity:

As Deputy State Historic Preservation Officer for New Jersey, in accordance with 36 CFR Part 800: Protection of Historic Properties, as published with amendments in the Federal Register on 6 July 2004 (69 FR 40544-40555), I am providing **Consultation Comments** for the following proposed undertaking:

Salem County, Lower Alloways Creek Township
Salem and Hope Creek Generating Station
Notification of Adverse Effect
PSEG Site Early Permit Application Review
Docket ID NRC-2014-0149
United States Nuclear Regulatory Commission

800.6 Resolution of Adverse Effects

Thank you for notifying the New Jersey Historic Preservation Office (HPO) that the United States Nuclear Regulatory Commission (NRC) finds the construction of any new natural draft cooling towers at the Salem and Hope Creek Generating Station will result in an adverse effect on historic properties. The HPO concurs with this assessment and is interested in participating in the process to resolve any adverse effects.

Additional Comments

Thank you again for providing the opportunity to review and comment on the potential for the undertaking to effect historic properties. The HPO looks forward to continued consultation to

HPO Project No. 09-0740-24
HPO-G2015-220

resolve adverse effects on historic properties. Please reference the HPO project number 09-0740 in any future calls, emails, submissions or written correspondence to help expedite your review and response. If you have any questions, please do not hesitate to contact Vincent Maresca of my staff at (609-633-2395) with questions regarding archaeology or Michelle Craren (609-984-0176) with questions regarding historic architecture, historic districts, or historic landscapes.

Sincerely,

Daniel D. Saunders
Deputy State Historic
Preservation Officer

c. Jack Cushing, NRC
Ruth Foster, DEP-PCER

DDS/VM

2

Preserving America's Heritage

July 21, 2015

The Honorable Stephen G. Burns
Chairman
U.S. Nuclear Regulatory Commission
Mail Stop O-16G4
Washington, DC 20555-0001

Dear Mr. Chairman:

In response to a notification by the U.S. Nuclear Regulatory Commission (NRC), the Advisory Council on Historic Preservation (ACHP) will participate in consultation to develop a Memorandum of Agreement for the proposed PSEG Early Site Permit Application Review Project in Salem County, New Jersey. Our decision to participate in this consultation is based on the *Criteria for Council Involvement in Reviewing Individual Section 106 Cases*, contained within our regulations. The criteria are met for this proposed undertaking because it may have the potential to present procedural problems.

Section 800.6(a)(1)(iii) of our regulations requires that we notify you, as the head of the agency, of our decision to participate in consultation. By copy of this letter, we are also notifying Ms. Jennifer Dixon-Herrity, Chief, Environmental Projects Branch, Division of New Reactor Licensing, Office of New Reactors, of this decision.

Our participation in this consultation will be handled by Sarah Stokely who can be reached at 202-517-0224 or via e-mail at sstokely@achp.gov. We look forward to working with your agency and other consulting parties to consider alternatives to this undertaking that could avoid, minimize, or mitigate potential adverse effects on historic properties and to reach a Memorandum of Agreement.

Sincerely,

for John M. Fowler
Executive Director

ADVISORY COUNCIL ON HISTORIC PRESERVATION
401 F Street NW, Suite 308 • Washington, DC 20001-2637
Phone: 202-517-0200 • Fax: 202-517-6381 • achp@achp.gov • www.achp.gov

Preserving America's Heritage

July 31, 2015

Received 8/10/2015

Ms. Jennifer Dixon-Herrity, Chief
Environment Projects Branch
Division of New Reactor Licensing
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Mail Stop T-6 C32
Rockville, MD 20852

Ref: *Proposed PSEG Early Site Permit Application Review*
Salem County, New Jersey

Dear Ms. Dixon-Herrity:

The Advisory Council on Historic Preservation (ACHP) has completed its review of the *Draft Memorandum of Agreement among the United States Nuclear Regulatory Commission, the New Jersey State Historic Preservation Office, PSEG Power, LLC, PSEG Nuclear, LLL (PSEG), the Advisory Council on Historic Preservation (TBD), and the National Park Service (TBD), regarding the PSEG Early Site Permit Application for a site located in Lower Alloways Creek Township, Salem County, New Jersey* submitted to ACHP via email on July 15, 2015. We have developed a summary of comments highlighting the major issues that the U.S. Nuclear Regulatory Commission (NRC) will need to consider as it drafts the next version of the Section 106 agreement document. Our comments should be considered along with those submitted by other consulting parties who are participating in the Section 106 consultation process.

The ACHP recommended that NRC develop a Programmatic Agreement (PA) due to the complexity of the project and the fact that the resolution of adverse effects remains undetermined. At the time of development of this agreement, it remained uncertain if mechanical or natural draft cooling towers would be selected due to the nature of the Early Site Permit (ESP) permitting process. Since NRC remains uncertain which type of cooling towers will be selected, a subsequent 106 consultation may be required before the issuance of the Combined License (COL) if the natural draft cooling tower is selected. Therefore, the ACHP recommends developing a project specific PA in accordance with Section 800.14(b) of our regulations, "Protection of Historic Properties." We have previously shared this recommendation with NRC and believe this is the appropriate manner to conclude this Section 106 review. While the federal agency makes the decision about the type of agreement document that it decides to develop, it must be consistent with our practices and policies in order for us to be a signatory. The current draft agreement commits to preparing two MOAs: one for the ESP and a second for the COL. A PA would cover both these related federal actions under the jurisdiction of NRC. This type of agreement document would also allow NRC to develop the COL agreement as an amendment to the PA, if and when this federal action is implemented.

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Specific Comments

Whereas Section

Scope of the undertaking
NRC should consider including language explaining the entire scope of the undertaking, including the construction of the causeway. This additional language should include the total acreage of the project. The Draft Environmental Impact Statement (DEIS) can be cross-referenced in order to provide this additional information. In particular, NRC could tie the description of the undertaking in this agreement to the Proposed Federal Action (Section 1.2) and Purpose and Need for the Proposed Actions (Section 1.3) sections in the DEIS. Please refer to 36 C.F.R. § 800.3 (a) and 36 C.F.R. § 800.16(y) for the definition of an undertaking.

U.S. Army Corps of Engineers
NRC should consider including language in the Whereas Clause that clarifies that the U.S. Army Corps of Engineers (USACE) has a regulatory action to complete for this undertaking. Further, per our discussion with the Philadelphia District, USACE acknowledges its responsibility to comply with Section 106, and complete the Section 106 consultation prior to the issuance of the Department of the Army permit. The USACE explained to us that it still has additional reviews to complete. Therefore, USACE is not prepared to be a signatory to NRC's agreement.

Area of Potential Effects
NRC should consider including a description of the area of potential effects (APE) that clarifies that it covers direct and indirect effects. The DEIS can be cross-referenced for this additional information, including the Historic and Cultural Resources Section under the Affected Environment Chapter (Section 2.7 and Section 2.7.2). Please refer to 36 C.F.R. § 800.4(a)(1) and 36 C.F.R. § 800.16(d) for the definition of APE.

Identification of historic properties
NRC should consider including more information detailing the historic properties identified in the APE. A list of properties can be provided in an appendix or by cross-referencing the DEIS table listing the historic properties identified in the APE (Table 2-37, page 2-167). Please refer to 36 C.F.R. § 800.5.

National Historic Landmark
NRC should include language referencing 36 C.F.R. § 800.10 in its entirety. In addition, reference should be made to Section 110(f), which is a statutory requirement for effects to National Historic Landmarks (NHLs).

Delaware State Historic Preservation Office
NRC should include a Whereas Clause stating that the Section 106 consultation was conducted with the Delaware State Historic Preservation Office (SHPO) and that the Delaware SHPO concurred with the No Adverse Effect (NAE) finding. The DEIS can be cross-referenced summarizing the NRC Section 106 consultation with the Delaware SHPO (Section 2.7.3).

Adverse effects
NRC should consider including a more detailed description of indirect and cumulative adverse effects. Please refer to 36 C.F.R. § 800.5.

Public involvement
NRC should clarify how it plans to involve the public in the drafting of the MOA. It should be clear how long the public will have for review, i.e. 30 calendar days. Please refer to 36 C.F.R. § 800.6(a)(4).

General Comments
Overall, there are an excessive number of Whereas clauses that are not critical to understanding how NRC has completed the 4-step Section 106 process. Since these clauses are not critical to understanding the who, what, and why as outlined in the ACHP's Guidance on Agreement Documents, perhaps they can be deleted.

Now, Therefore Clause
Please refer to the template MOA agreement provided or insert text provided below.

> NOW, THEREFORE, [Agency abbreviation] and the [SIGNATORIES] agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

Stipulations Section

Unanticipated Discovery of Historic Properties or Inadvertent Adverse Effects
Include a new stipulation with procedures for responding to unanticipated discovery of historic properties or inadvertent adverse effects to identified historic properties during implementation of the agreement. Please refer to the template MOA, 36 C.F.R. § 800.6(c)(6), and/or 36 C.F.R. § 800.13.

Emergency Situations
Please include a new stipulation with procedures for responding to emergency situations during implementation of the agreement. Please refer to sample stipulations found on the ACHP's website page, specifically Guidance on Agreement Documents (http://www.achp.gov/samplestips.html) and 36 C.F.R. § 800.12.

Completion of the MOA
Include text in a stipulation explaining how NRC will notify all the consulting parties when the terms of the MOA are completed.

Anti-Deficiency Act
Update the text in the Anti-Deficiency Act Stipulation from the MOA template or insert text provided below.

> The **[Agency abbreviation]** obligations under this MOA are subject to the availability of appropriated funds, and the stipulations of this MOA are subject to the provisions of the Anti-Deficiency Act. The **[Agency abbreviation]** will make reasonable and good faith efforts to secure the necessary funds to implement this MOA in its entirety. If compliance with the Anti-Deficiency Act alters or impairs the **[Agency abbreviation]** ability to implement the

stipulations of this agreement, the **[Agency abbreviation]** will consult in accordance with the amendment and terminations procedures found at Stipulations **IX** and **X** of this agreement.

We understand NRC's desire to move forward with this agreement. This Section 106 agreement document, therefore, should adhere to our regulations and be comprehensive so as to avoid the potential for subsequent procedural challenges. Accordingly, we urge NRC to consider revising the agreement document to address all comments provided by consulting parties. If you have any questions, please contact Sarah Stokely who can be reached at (202) 517-0224 or via e-mail at sstokely@achp.gov.

Sincerely,

Charlene Dwin Vaughn

Charlene Dwin Vaughn, AICP
Assistant Director
Federal Permitting, Licensing, and Assistance Section
Office of Federal Agency Programs

Enclosure

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

WHEREAS, the U.S. Nuclear Regulatory Commission (NRC) has determined that the issuance of an early site permit (ESP) to PSEG Power, LLC, PSEG Nuclear, LLC (hereafter referred to as PSEG) for the PSEG ESP site located on Artificial Island in Salem County, New Jersey, would be a Federal undertaking for purposes of NRC's compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA, *54 U.S.C. 300101 et. seq*). Pursuant to Title 36 of the *Code of Federal Regulations (*CFR), Section 800.8, the NRC is using its National Environmental Policy Act (NEPA) process for developing the ESP environmental impact statement (EIS) to facilitate compliance with Section 106 of the NHPA; and

WHEREAS, an ESP is a licensing option provided under the NRC's regulations in 10 CFR Part 52 that allows an applicant to obtain approval for a reactor site. The approval of the ESP indicates that there are no environmental issues at the proposed site that would preclude the construction of a nuclear power plant with the characteristics identified in the Plant Parameter Envelope (PPE). Because an ESP is only a site approval and does not authorize the construction or operation of a nuclear power plant, an applicant may obtain an ESP without specifying the design of the reactor(s) that it may separately apply to build and operate at the site. 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. Granting an ESP would result in no effects to historic properties; the ESP EIS review NEPA includes analysis of any potential adverse effect from construction and operation of a postulated plant to support a site suitability determination. An ESP holder would be required to apply for and obtain a combined license (COL) or a construction permit and operating license (CP and OL), which would be another Federal undertaking, before it could construct and operate a nuclear power plant. An NHPA Section 106 consultation would be performed if and when a COL or CP/OL application is submitted; and

WHEREAS, the proposed site analyzed in the ESP EIS is an 819 acre area on Artificial Island where the postulated plant could be built. The tallest structure that PSEG included in its PPE, allowing for a bounding visual impacts analysis for the ESP EIS, is two 590 foot tall natural draft cooling towers. In addition to analyzing impacts from the construction and operation of a nuclear power plant at the ESP site, the ESP EIS also analyzes site preparation activities regulated by the U.S. Army Corps of Engineers (USACE), including potential dredging and/or filling activities and building a new access road and causeway to the site (See ESP EIS Section 1.2); and

WHEREAS, pursuant to NEPA, the USACE is a cooperating agency with the NRC on the development of the ESP EIS, but is not a signatory to this agreement. The purpose of the USACE action, which is analyzed in the ESP EIS, is to provide a decision on a Department of the Army permit application submitted by PSEG to perform work, build structures, and discharge dredged and/or fill material in jurisdictional waters of the United States, including wetlands.

Activities requiring a Department of the Army permit, including building a causeway from Money Island Road to the PSEG Site and potential dredge areas, would support the development of a new nuclear plant at the PSEG site; and

WHEREAS, the NRC and the USACE each have their own areas of regulatory responsibility and are consulting on the areas of the project that are within their regulatory authority. Because of the limited regulatory authority of each agency, neither agency can consult on the entire project. The NRC is consulting on the impact (including visual impacts) of construction and operation of a new nuclear power plant with design parameters falling within the PPE on Artificial Island. The USACE is consulting separately on the activities described above that would be performed under a Department of the Army permit that would impact jurisdictional waters, including wetlands, per 33 CFR 325; and

WHEREAS, PSEG included the option of two natural draft cooling towers (590 feet tall) in the PPE for the ESP EIS (NUREG-2168) analysis. These were the tallest proposed structures analyzed for the bounding visual impact analysis for the ESP EIS. The ESP would not mandate the use of natural draft cooling towers in a subsequent application to construct and operate a plant. Natural draft cooling is one of two cooling system options analyzed in the ESP EIS; and

WHEREAS, the NRC has established that the direct area of potential effect (APE) for the ESP EIS is the area at the PSEG ESP Site and its immediate environs that may be impacted by the land-disturbing activities associated with the construction and operation of a new nuclear unit or units, and the NRC has established the indirect (visual) APE analyzed for the ESP EIS, to be a zone within 4.9 miles of the tallest structures (two natural draft cooling towers) associated with the PPE representing a postulated nuclear power plant located on Artificial Island; and

WHEREAS, the NRC has identified historic properties within the indirect APE. Section 2.7 of the ESP EIS includes a description of the affected environment, identification efforts, and associated consultation efforts; and

WHEREAS, the NRC has consulted with the Delaware State Historic Preservation Office (DE SHPO) and determined that there would be no adverse effects to historic properties in Delaware, and the DE SHPO has concurred with the NRC's determination (see Section 2.7.3 of the ESP EIS); and

WHEREAS, the NRC has determined and the New Jersey Historic Preservation Office (NJ HPO) has concurred that there is no potential for adverse effects to historic properties within the direct APE; and

WHEREAS, the natural draft cooling tower option is the only proposed cooling system analyzed for the ESP EIS that has the potential to visually affect historic properties; and

WHEREAS, the mechanical draft cooling tower option analyzed in the ESP EIS (see ESP EIS Section 5.7.2) at the height of no more than 46 feet tall would not visually affect historic properties; and

WHEREAS, the NRC has identified numerous historic properties within the indirect APE. Section 2.7 of the ESP EIS includes a description of the affected environment, identification efforts, and associated consultation; and

WHEREAS, the Abel and Mary Nicholson House National Historic Landmark (NHL), and the properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road are historic properties within the visual APE for the ESP EIS and are within the NJ HPO proposed Alloway Creek Rural Historic District; and

WHEREAS, the NRC, the NJ HPO, and PSEG agree that the properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road, both in Elsinboro Township, are historic properties eligible for the *National Register of Historic Places* (NRHP) under 36 CFR 60.4, Criteria A, B, and C, that will be indirectly affected (visual intrusion of two new natural draft cooling towers) in the event that the natural draft cooling tower option is selected in the COL or CP/OL application; and

WHEREAS, as required under the NHPA, the NRC has consulted with the NJ HPO, Advisory Council on Historic Preservation (ACHP), National Park Service (NPS), and PSEG, and the parties agree that the Abel and Mary Nicholson House (127 Fort Elfsborg–Hancock Bridge Road) is a NHL on which there would be an indirect adverse effect (visual intrusion of two new natural draft cooling towers) in the event that the natural draft cooling tower option is selected in a COL or CP/OL application; and

WHEREAS, in accordance with Section 110(f) of the NHPA (*54 U.S.C. 306107*), the NRC in consultation with the parties has considered ways to avoid and minimize harm to the NHL; and
WHEREAS, this Memorandum of Agreement (MOA) addresses the potential indirect adverse visual effect from construction and operation of natural draft cooling towers as analyzed in the ESP EIS and would conclude consultation for this undertaking; and

WHEREAS, in accordance with 36 CFR 800.6(a)(1), the NRC, by letter dated June 24, 2015, has notified the ACHP of its determination of effects with specified documentation, and has invited the ACHP to participate in Section 106 consultation and development of this MOA and the ACHP, by letter dated July 21, 2015, has chosen to participate pursuant to 36 CFR 800.6(a)(1)(iii); and will be a Signatory to this MOA; and

WHEREAS, in accordance with 36 CFR 800.10(c), the NRC, by letter dated June 24, 2015, has notified the Secretary of the Interior of its determination of effects with specified documentation and has invited the NPS to participate in the Section 106 consultation and development of this MOA because of the potential adverse effects to a NHL (Abel and Mary Nicholson House); and

WHEREAS, the NRC has consulted with the NJ HPO, PSEG, NPS, and the ACHP, in accordance with Section 106 of the NHPA, and its implementing regulations (36 CFR 800.6(b)(2)) to resolve the indirect adverse visual effect from two natural draft cooling towers on historic properties analyzed for the ESP EIS; and

WHEREAS, PSEG has participated in the development of this MOA, and, pursuant to 36 CFR 800.6(c)(2), the NRC has invited PSEG to sign this MOA. PSEG shall implement the requirements of this MOA; and

WHEREAS, pursuant to 36 CFR 800.6(c)(3), the NRC has consulted with two interested parties regarding the effect on historic properties analyzed for the ESP EIS and has invited them to sign as Concurring Parties in this MOA. The NRC has provided the interested parties and the public with 30 days to review this agreement per 36 CFR 800.2(d); and

WHEREAS, PSEG and the NPS have been invited to sign the MOA as Invited Signatories; and

WHEREAS, the NRC, State of New Jersey, and NJ HPO do not waive their sovereign immunity by entering into this MOA, and each fully retains all immunities and defenses provided by law with respect to any action based on, or occurring as a result of, this MOA; and

WHEREAS, signing of this MOA does not constitute a record of decision or approval of the ESP, by any Federal agency; and

WHEREAS, this MOA, consisting of 14 pages, represents the entire and integrated agreement between the Signatories and supersedes all prior negotiations, representations and agreements; and

NOW, THEREFORE, the Signatories agree that upon the NRC's decision to issue the ESP, the NRC shall confirm that the following stipulations are implemented subject to the scope of the NRC’s regulatory authority, in order to take into account the visual effect of the two potential natural draft cooling towers on historic properties. These stipulations shall govern the ESP until this MOA expires or is terminated.

Stipulations

A. The NRC, consistent with its regulatory authority, shall ensure that the following stipulations would be implemented in the event that a COL or CP/OL application is submitted:

1. Upon receipt of a COL or CP/OL application, the NRC shall notify all Signatories and Concurring Parties in writing that the application was received and initiate Section 106 consultation for the COL or CP/OL. The Section 106 review for the COL or CP/OL would be conducted in accordance with 36 CFR 800 and may include provisions for expediting consultation, as appropriate. In its letter, the NRC will identify the cooling system selected by PSEG in its application and include any new and significant information about the COL or CP/OL application. The NRC will invite the public, including any newly identified consulting parties to participate in the Section 106 review process as required under 36 CFR 800.2(d).

    a. If natural draft cooling towers are selected, the NRC will reconfirm the indirect visual adverse effect to the Abel and Mary Nicholson House (127 Fort Elfsborg-Hancock Bridge Road) NHL and to the NRHP eligible properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road.

b. If mechanical draft cooling towers that are no more than 46 feet in height are selected, as analyzed in the ESP EIS, then the NRC will reiterate that there is no adverse effect to historic properties from this technology because the towers would not be visible from any of the known historic properties.

c. In an effort to identify new and significant information, PSEG will have a qualified contractor, as defined in the Secretary of the Interior's Professional Qualifications and Standards (48 *FR* 22716, September 1983), review the New Jersey State Register and the NRHP for any new historic properties found within the agreed upon APE of 4.9 miles. The contractor will also conduct a review of the NJ HPO site files for any new historic properties that were identified since issuance of the ESP within the 4.9 mile APE.

d. The NRC shall determine if there would be any new indirect visual adverse effects to historic properties from the construction and operation of natural draft cooling towers (not to exceed 590 feet in height). The visual effect from the plumes will not be considered in this analysis because they were determined to be ephemeral and consistent with existing environmental conditions at the ESP stage by the NRC and NJ HPO.

2. The NRC will arrange a meeting to include all Signatories, Concurring Parties, and interested members of the public to evaluate alternatives or modifications to the undertaking that could avoid or minimize adverse effects on historic properties. If, through consultation, the adverse effect cannot be avoided or minimized, then the NRC shall consult with the Signatories, Concurring Parties, and interested members of the public to develop mitigation for the indirect adverse effect to historic properties resulting from the construction of natural draft cooling towers. The mitigation will address the visual effect to the Abel and Mary Nicholson House (127 Fort Elfsborg-Hancock Bridge Road) NHL, to the NRHP eligible properties at 349 Fort Elfsborg-Hancock Bridge Road and 116 Mason Point Road and any historic properties that were identified during the new and significant review.

3. Following the meeting, the NRC will adhere to the provisions in 36 CFR Part 800 in the development of a Section 106 agreement document that is tied to the ESP MOA, as appropriate. The Section 106 agreement will include stipulations for PSEG's unanticipated discoveries of historic properties that may be located on Artificial Island.

4. The public, interested parties, and the Signatories will have 30 days to review and provide comments on the draft Section 106 agreement document. If agreement cannot be reached, then the process identified in Stipulation D will be followed.

5. The Section 106 agreement document must be executed prior to the issuance of a COL or CP/OL and the stipulations completed prior to commencing operation of the plant as described in the COL or CP/OL application. The Signatories and Concurring Parties to this agreement will be notified in writing by PSEG when the mitigation is completed.

B. Amendment and Duration

Any Signatory to this MOA may propose to the other Signatories that this MOA be amended, whereupon the Signatories will consult in accordance with 36 CFR 800.6(c)(7) to consider such an amendment. Such amendment shall be effective upon the signature of all Signatories to this MOA, and the amendment shall be appended to the MOA as an Appendix.

This MOA will remain in effect for the period of the ESP (up to 20 years), pursuant to 10 CFR 52.26, until completion of consultation associated with a COL or CP/OL application, or a Section 106 agreement document is executed. If the terms of the MOA have not been completed within the period of the ESP, pursuant to 10 CFR 52.26, this MOA shall be considered null and void. In such an event, the NRC shall notify the parties and will follow Section 106 for any future undertakings.

C. Anti-Deficiency Act

The stipulations of this MOA are subject to the provisions of the Anti-Deficiency Act (*31 U.S.C. §1341*). If compliance with the Anti-Deficiency Act alters or impairs the NRC's ability to implement the stipulations of this MOA, the NRC will consult in accordance with the amendment and termination procedures found in this MOA.

D. Dispute Resolution

Should any Signatory to this MOA object to any activity pursuant to this MOA, it shall provide notice of its objection within 30 days of the date of the activity. Upon receiving notice of the objection, NRC shall consult with the objecting Signatory to resolve the objection.

If NRC determines the objection cannot be resolved, NRC shall forward all documentation relevant to the dispute to the ACHP. Any comments or recommendations received from the ACHP will be forwarded to the all Signatories for consideration.

Prior to reaching a final decision on the dispute, NRC will prepare a written resolution of the objection taking into account any timely advice or comments regarding the dispute from the ACHP and Signatories and distribute a copy of the written response to all Signatories. If a Signatory fails to respond within 30 days of receipt of the written resolution, concurrence with the resolution will be assumed by the other Signatories and the resolution will go into effect.

If resolution of the objection requires an amendment to the MOA, it will be done per Stipulation B of this MOA.

Nothing in this Section of the MOA shall be construed or interpreted as a waiver of any judicial remedy available to any party of this MOA.

Nothing in this Section shall be construed or interpreted to alter the NRC's enforcement authority related to compliance with the NRC's regulations or license conditions.

E. Termination

A Signatory proposing to terminate this MOA shall notify the other Signatories, explaining the reasons for termination and affording them at least 30 days to consult and seek alternatives to termination. Within 30 days following this notification of termination, any one of the above Signatories shall notify the other Signatories if it will: a) initiate consultation to execute a subsequent MOA that explicitly terminates or supersedes its terms; or b) requests the comments of the ACHP under 36 CFR 800.7(a) and proceed accordingly. Concurring Parties do not have the authority to terminate the agreement.

Execution of this MOA by the Signatories and implementation of its terms, is evidence that the NRC has afforded the ACHP an opportunity to comment on the indirect visual adverse effect on historic properties analyzed for the ESP EIS, and that the NRC has taken into account the effect on historic properties analyzed for the ESP EIS.

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

SIGNATORIES:

U.S. NUCLEAR REGULATORY COMMISSION

By: _______________ Date: 10/6/2015

Mr. Frank M. Akstulewicz, Director
Division of New Reactor Licensing
Office of New Reactors

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

SIGNATORIES:

NEW JERSEY HISTORIC PRESERVATION OFFICER

By:_______________________ Date: 10/9/15

Mr. Daniel D. Saunders
Deputy Historic Preservation Officer

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

SIGNATORIES:

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:____________________________ Date: 10/14/15

For Mr. John M. Fowler
Executive Director

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

INVITED SIGNATORIES:

U.S. DEPARTMENT OF INTERIOR, NATIONAL PARK SERVICE

By:_______________________________ Date:__________

Mr. Frank Hays
Associate Regional Director, Resource Stewardship and Science, Northeast Region

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

INVITED SIGNATORIES:

PSEG POWER, LLC AND PSEG NUCLEAR, LLC

By: ____________________ Date: 10/8/15

Mr. Joseph M. Sindoni
Senior Director Regulatory Affairs

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

CONCURRING PARTIES:

THE SALEM OLD HOUSE FOUNDATION

By: Ronald E. Magill Date: 10/6/2015

Mr. Ron Magill
President

FINAL MEMORANDUM OF AGREEMENT

AMONG THE U.S NUCLEAR REGULATORY COMMISSION, NEW JERSEY HISTORIC PRESERVATION OFFICE, ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND PSEG POWER, LLC, PSEG NUCLEAR, LLC REGARDING THE PSEG EARLY SITE PERMIT APPLICATION FOR A SITE LOCATED IN LOWER ALLOWAYS CREEK TOWNSHIP, SALEM COUNTY, NEW JERSEY

CONCURRING PARTIES:

By: Janet E. Sheridan Date: 10/6/15

Ms. Janet Sheridan
Local Architectural Historian and Preservation Consultant

F.3 Copies of Correspondence Received from Federal Agencies Regarding Threatened, Endangered, and Sensitive Species and Their Habitats

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Habitat Conservation Division
James J. Howard Marine Sciences Laboratory
74 Magruder Road
Highlands, NJ 07732

December 9, 2010

Gregory Hatchett, Branch Chief
Environmental Project Branch 1
Division of Site and Environmental Reviews
Office of New Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Notification and Request for Consultation and Participation in the Scoping Process for the PSEG Early Site Permit Application

Dear Mr. Hatchett:

The NOAA's National Marine Fisheries Service (NMFS), Northeast Region, Habitat Conservation Division is in receipt of your letter dated October 26, 2010 initiating consultation and seeking our involvement in the Scoping Process for the construction and operation of a new nuclear power plant, by PSEG Power, LLC and PSEG Nuclear, LLC (PSEG), on the southern part of Artificial Island and the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey.

A complimentary compact disc containing complementary documents and figures to PSEG's *Site Safety and Analysis Report (SSAR)* for the proposed facility, was also included in the Early Site Permit (ESP) application package for our review.

According to your letter, the Nuclear Regulatory Commission (NRC) is currently preparing an environmental impact statement (EIS) under the provisions of the National Environmental Policy Act of 1969 (NEPA), as amended. In addition, the NRC has requested a list of endangered, threatened and candidate species, and designated critical habitat under the jurisdiction of the NMFS, that may be in the vicinity of the PSEG site. Your letter further requests a list of federally-managed species that have designated essential fish habitat (EFH) in that area as well as any appropriate information under the provisions of the Fish and Wildlife Coordination Act of 1984, as amended.

PSEG currently has three operating nuclear reactors, Salem Units 1 and 2, and Hope Creek Unit 1. The proposed construction site will encompass approximately 819 acres immediately adjacent and to the north of the existing units at the Salem and Hope Creek Nuclear Generating Station (SHCNGS).

Impacts to the quality of surface waters and the alteration of river bottom sediments within the Delaware River and adjacent marsh creeks are expected as a result of the construction and operation of the proposed facility, and will include those associated with the development of shoreline features (intake structure, barge facility, heavy haul road), dredging of sediments from the near-shore area of the Delaware River to provide for water intake and discharge and to provide adequate draft for barge access during construction, and the filling of 9.5 acres of coastal tidal wetlands and shallow open water areas.

The construction of the new intake structure and the new barge unloading facility and mooring area will result in the deepening of the existing river bottom (~10 ft. MLLW) by an average of 4.5 ft. over an area of 31 acres (volume of 150,000 cubic yards), and an area of 61 acres, (a volume of 440,000 cubic yards), respectively. The total area to be dredged is 92 acres extending riverward 1700 ft. from the shoreline. Dredging techniques may include both mechanical and hydraulic dredging methods and the material removed as part of this construction activity will be transported to and placed in an on-site or other approved upland disposal facility.

Increases in turbidity through the resuspension of sediments into the water column from dredging and port operations will degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Sedimentation and wave patterns in the area may be altered as a result of vessels entering and exiting the proposed mooring area also resulting in increased turbidity. Suspended sediments mask pheromones used by migratory fishes, and can smother immobile benthic organisms and demersal newly-settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). As supported above, the project area provides important habitat for striped bass including valuable spawning grounds and nursery habitat. Increases in turbidity will adversely affect striped bass larvae's ability to capture prey (Fay et al. 1983 in Able and Fahay 1998). The decrease in water circulation can also adversely affect striped bass survival as strong current is needed to keep the eggs suspended in the water column and prevent them from being smothered by silt (Bigelow and Schroeder 1953).

Guidelines under Section 404(b)(1) of the federal Clean Water Act require that actions proposed within "waters of the United States," especially those that are not water-dependent, are required to demonstrate that they have considered all appropriate reasonable and prudent measures to avoid and minimize impacts to waters. If all measures to avoid and minimize wetland impacts have been considered and employed to the extent practicable and result in unavoidable impacts, a compensatory mitigation plan should be developed and implemented.

The applicant should undertake a complete analysis of alternatives that complies fully with the Clean Water Act Section 404 (b)(1) Guidelines that documents avoidance, minimization and mitigation for all impacts. Alternate locations as well as a documentation of purpose and need should be provided as part of this analysis. For any unavoidable impacts, a compensatory mitigation plan to offset all of the projects impacts to aquatic resources including EFH should be developed in accordance with the federal standards and criteria for compensatory mitigation for losses of aquatic resources published in the Federal Register on April 10, 2008 (vol. 73 No. 70). This plan should be developed as early in the permit process as possible and in consultation with the applicable federal, state and local resource agencies and will be implemented on and in the immediate area of the PSEG Site to the extent practicable.

In the State of NJ, coastal wetlands are regulated by the state under the Wetlands Act of 1970. Development in coastal wetlands requires authorization of permits from the NJDEP, and requires separate processes to determine a project's value. However, such processes usually fit in within a federal process.

After reasonable measures have been explored to avoid and minimize impacts to wetlands, PSEG will compensate for unavoidable adverse impacts to wetlands by implementing approved wetland restoration and/or rehabilitation measures. PSEG, through their Ecosystem Enhancement Program, has extensive experience and demonstrated success implementing coastal saltmarsh and freshwater wetland restoration and rehabilitation programs. This familiarity with local wetland systems was used to identify appropriate candidate mitigation sites and will be used in developing and implementing the final approved mitigation plan.

Mitigation options mentioned in the NRC's ESP to offset the impacts to NOAA trust resources included the following considerations:

- Minimization of encroachment on coastal wetlands
- Use of previously developed sediment disposal basins for plant development (both PSEG's permitted disposal facility and the USACE's CDF)
- Refinement of the Site Utilization Plan to avoid various wetland areas throughout the PSEG Site

Opportunities for mitigating unavoidable impacts to wetland ecosystems include restoration of natural habitats temporarily disturbed by construction, creation of new habitat types in previously disturbed areas, and enhancement of undisturbed natural habitats.

In general, NMFS does not accept the conversion of one type of aquatic habitat into another habitat as compensatory mitigation when the existing habitat has value to aquatic life. Candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG Alloway Creek Watershed restoration site.

Magnuson Stevens Fishery Conservation and Management Act (MSA)
Section 305 (b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires all federal agencies to consult with NOAA Fisheries on any action, including those proposed by the NRC, that is authorized, funded, or undertaken by that agency and that may adversely affect EFH. Included in this consultation process is the preparation of a complete and appropriate EFH assessment to provide necessary information on which to consult. Our EFH regulation at 50 CFR 600.905 mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The estuarine portions of the Delaware River and its tributaries including the estuarine areas of both Alloway and Hope Creeks have been designated as EFH for a wide variety of species including red hake (*Urophycis chuss*), winter flounder (*Pseudopleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), bluefish (*Pomatomus saltatrix*), Atlantic butterfish (*Peprilus triacanthus*), scup (*Stenotomus chrysops*), summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristis striata*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel *(Scomberomorus maculatus*), cobia (*Rachycentron canadum*), little skate (*Leucoraja erinacea*), winter skate (*Leucoraja ocellata*) and clearnose skate (*Raja eglanteria*). A more detailed listing of EFH and federally managed species and EFH consultation requirements can be found on our website at: www.nero.nmfs.gov/hcd.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as: "any impact which reduces the quality and/or quantity of EFH." The rule further states that:

> "An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions."

The rule also states:

> Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a

major prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH.

In order to initiate consultation pursuant to the MSA, the NRC must submit a full and complete EFH assessment that considers the individual and cumulative and the direct and indirect impacts of the proposed project on EFH, federal managed species and their prey recognizing the definition of adverse impact discussed above. The required contents of an EFH assessment includes: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the NRC's conclusions regarding the effects of the action on EFH; 4) proposed mitigation, if applicable. Given the scope of this project, other information that should be contained in the EFH assessment includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 5) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

Fish and Wildlife Coordination Act

Notwithstanding our mandates under the MSA, the NMFS also has responsibilities under the Fish and Wildlife Coordination Act (FWCA) to provide federal agencies such as the NRC with recommendations to avoid, minimize and to mitigate for direct, indirect and cumulative impacts to any and all NOAA trust resources that are present within the Delaware River Basin.

The Delaware Estuary including its tributaries provides habitat for a wide variety of NOAA trust resources including alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*) American shad (*Alosa sapidissima*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic sturgeon (*Acipenser oxyrinchus*), blueback herring (*Alosa aestivalis*), bluefish, hickory shad (*Alosa mediocris*), spot (*Leiostomus xanthurus*) tautog (*Tautoga onitis*), weakfish, white perch (*Morone americana*), yellow perch (*Perca flavescens*), striped bass (*Morone saxatilis*), hogchoker (*Trinectes maculatus*), killifish, bay anchovy, silversides, mummichog and may others.

Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-1960's, they have been designated as species of concern by NMFS in a Federal Register Notice dated October 17, 2006 (71 FRN 61022). "Species of concern" are those species about which NMFS has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act. The shallow water environment in this section of the Delaware River provides valuable habitat for these species as well as striped bass and American shad.

The New Jersey Department of Environmental Protection (NJDEP) also has sampled the Delaware River and Bay in the project area for nearly 30 years since 1980. This long-term survey documents the use of the this portion of the river by a wide variety of species including blueback herring, alewife, American shad American shad (*Alosa sapidissima*), American eel (*Anguilla rostrata*), Atlantic herring (*Clupea harengus*), Atlantic menhaden (*Brevoortia tyrannus*), bay anchovy, (*Anchoa mitchilli*), blueback herring, gizzard shad (*Dorosoma cepedianum*), hogchoker (*Trinectes maculatus*), striped bass, yellow perch (*Perca flavescens*), white perch (*Morone americana*), Atlantic silverside (*Menidia menidia*), and many others (NJDEP 2010). Many of these species are both commercially and recreationally important and managed by the ASFMC or are valuable prey species for ASFMC or federally managed fish.

Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include *Alosa* species such American shad, blueback herring and alewife as well as bay anchovy, silversides and other fish species. We note that the NJDEP survey data show that federally managed bluefish are present in the project area. This indicates that both the prey species and the predator are present in the Delaware River in and around the project area. Juvenile *Alosa* species have all been identified as prey species for windowpane (*Scophthalmus aquosus*) and summer flounder (*Paralichthys dentatus*) in Steimle et al. (2000). Windowpane and summer flounder are federally managed species whose EFH has been designated in the mixing zone of the Delaware River

Submerged aquatic vegetation (SAV) has historically been absent from Delaware Bay. However, to date, there has been no comprehensive mapping of SAV in the Delaware Estuary to verify its presence or absence. Several species have been observed though in the tidal river since 1970, including: *Vallisneria americana*, *Myriophyllum spicatum*, *Elodea nuttallii*, *Najas flexillis*, *Potamogeton* sp. and others (Schuyler, 1988). Wild celery (*Vallisneria americana*) has been documented in some areas of the Delaware River and its tributaries. SAV provides valuable nursery, forage and refuge habitat for a variety of fish including striped bass, American shad, alewife, and blueback herring. It is also an important food source for waterfowl. As water quality in the Delaware River continues to improve, more areas of SAV may be found within the River.

Native eastern oysters (*Crassostrea virginica)* are an ecologically important species. According to the New Jersey Department of Environmental Protection, an expansive area of oyster habitat has been identified near the SHCNGS . In recent years, efforts have been made to restore oyster beds in Delaware Bay. Since 2004, the Army Corps of Engineers has worked with the States of New Jersey and Delaware to plant shell in portions of natural oyster beds in Delaware Bay (http://www.delawareestuary.org/science_projects_oyster_restoration.asp).

Blue crab (*Callinectes sapidus*) can also be found in the vicinity of the SHCNGS. The crabs can generally be found in the lower salinity areas of the estuary in the summer and higher salinities in the winter. Following mating in the summer, which typically occurs in lower salinity waters, the females move to high salinity waters found in the Delaware Bay to spawn. After spawning, the larvae move toward the lower salinity areas in the Delaware River Estuary to mature.

Endangered and Threatened Species

The Atlantic sturgeon (*Acipenser oxyrinchus*) may be found in the Delaware River in the vicinity of the project area at certain times of the year. On October 6, 2010, NOAA issued a Federal Register Notice (75 FRN 61872). The notice identifies the Hudson River and Delaware River Atlantic sturgeon stocks as a distinct population segment (DPS) called the New York Bight DPS. This DPS has been proposed to be listed as endangered. The Atlantic Sturgeon Status Review Team (ASSRT) identified 15 different stressors that may impact the Atlantic sturgeon populations including poor water quality and habitat loss (2007). Dredging and vessel strikes are also considered to be important stressors on the populations of Atlantic sturgeon (75 FRN 61872 et seq.) According to the ASSRT (2007), Ryder (1888) suggested that juvenile Atlantic sturgeon used the tidal freshwater reach of the Delaware River as a nursery area and Lazzari et al. (1986) frequently captured juvenile Atlantic sturgeon from May - December in the upper tidal portion of the river below Trenton, New Jersey.

Shortnose sturgeon (*Acipenser brevirostrum*) typically occurs in deep water channels although they do occur in the shallower waters while foraging. The abundance of adult shortnose sturgeon is greatest in the tidal river from Trenton to Philadelphia (Hastings et al. 1987; O'Herron et al. 1993). In-water construction activities can affect shortnose and Atlantic sturgeon through direct injury or mortality, displacing species from the area, or by altering the habitat and destroying forage items.

Shortnose sturgeon (*Acipenser brevirostrum*) typically occurs in deep water channels although they do occur in the shallower waters similar to that of the project area while foraging. Any discretionary federal action, such as the approval or funding of a project by a Federal agency, that may affect a listed species must undergo consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. The NRC should submit its determination of effects, along with justification for the determination and a request for concurrence, to the attention of the Endangered Species Coordinator, NMFS, Northeast Regional Office, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930. For additional information on the Section 7 consultation process or shortnose sturgeon, please contact Julie Crocker at (978) 282-8480 or julie.crocker@noaa.gov.

We look forward to continued coordination with the NRC as it moves forward with the development of the EIS and the scoping process. Should you have any questions, need additional information or would like to arrange a meeting to discuss the EFH consultation process or impacts to resources of concern to the NMFS, please contact Brian May at (732) 872-3116 or Karen Greene at 732 872-3023.

Sincerely,

Stanley W. Gorski
Field Offices Supervisor

cf: PRD - J. Crocker
ACOE – Phila. District
FWS – Pleasantville
EPA- Region II
NJDEP
DRFWMC

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UNITED STATES DEPARTMENT OF COMMERCE
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OCT 25 2013

Received 11/13/2013

Re: PSEG Early Site Permit Application

Dear Mr. Lee,

This letter provides updated information on resources under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS) located near the existing Hope Creek and Salem Nuclear Plants in Salem County, New Jersey. The U.S. Nuclear Regulatory Commission (NRC) is preparing an Environmental Impact Statement (EIS) regarding the effects of granting an Early Site Permit (ESP) for construction of a new nuclear power plant site on Artificial Island, New Jersey. PSEG currently has three operating nuclear reactors, Salem Units 1 and 2, and Hope Creek Unit 1. The proposed construction site will encompass approximately 819 acres immediately adjacent and to the north of the existing units at the Salem and Hope Creek Nuclear Generating Station (SHCNGS). We previously provided information on our trust resources to PSEG in 2009 and to NRC in 2010. Below, we provide updated information on trust resources and your consultation responsibilities.

Endangered Species Act

Several species listed by National Marine Fisheries Service (NMFS) occur in the Delaware River where the intake for a new unit would be located. Four species of sea turtles occur seasonally (May – November) in the Delaware River estuary, including the threatened Northwest Atlantic Distinct Population Segment (DPS) of loggerhead sea turtles (*Caretta caretta*), and endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) sea turtles. Additionally, a population of endangered shortnose sturgeon (*Acipenser brevirostrum*) occurs in the Delaware River. Individuals from any of the five listed DPSs of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) also occur in the Delaware River. More information on these species is available on our website (http://www.nero.noaa.gov/protected/section7/listing/index.html).

As you know, consultation pursuant to Section 7 of the ESA between NRC and NMFS on the effects of the operation of the existing Salem and Hope Creek facilities has been ongoing since 1979. Most recently, a Biological Opinion was issued by us on May 14, 1993 concluding the ongoing operation was not likely to jeopardize shortnose sturgeon, Kemp's ridley, green or loggerhead sea turtles. This Opinion was amended by a letter dated January 21, 1999, which modified the Incidental Take Statement. A new Biological Opinion is currently in process and drafts have been reviewed by PSEG and NRC staff. We expect the EIS being prepared for a new nuclear unit to consider effects of construction and operation on all NMFS listed species. Specifically, the EIS should consider the potential for impingement and entrainment of listed species and their prey, discharge of pollutants, including heated effluent, and effects of shoreline construction, including dredging.

As noted in your letter, the ESP will not authorize the construction or operation of a new nuclear unit. Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, states that each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Any discretionary federal action that may affect a listed species must undergo Section 7 consultation. If you determine that the proposed action is "not likely to adversely affect" any listed species (i.e., when direct or indirect effects of the proposed project or its interdependent and/or interrelated actions on listed species are expected to be discountable, insignificant or completely beneficial), you should send us a letter documenting your determination, providing justification and requesting our concurrence. If we concur with this determination, we will reply in a letter that will convey the concurrence, thus completing Section 7 consultation. If you determine the project is "likely to adversely affect" any listed species (i.e., if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effects are not: discountable, insignificant, or beneficial) or we do not concur with your "not likely to adversely affect" determination, then formal Section 7 consultation, resulting in the issuance of a Biological Opinion with an appropriate Incidental Take Statement, may be required. Any effects that amount to the take of a listed species (defined by the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct") are not discountable, insignificant or entirely beneficial. Therefore, if any take is anticipated, formal consultation is required. NMFS staff is available to discuss the proposed project and assist you in determining the likely effects of the proposed action.

Magnuson Stevens Fishery Conservation and Management Act (MSA)
Section 305 (b)(2) of the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires all federal agencies to consult with us on any action, including those proposed by the NRC, that is authorized, funded, or undertaken by that agency and that may adversely affect EFH. Included in this consultation process is the preparation of a complete and appropriate EFH assessment to provide necessary information on which to consult. Our EFH regulation at 50 CFR 600.905 mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

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EFH and federally managed species and EFH consultation requirements can be found on our website at: www.nero.nmfs.gov/hcd.

The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as: "any impact which reduces the quality and/or quantity of EFH." The rule further states that:

> "An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions."

The rule also states:

> "Loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of a species' habitat that are known to cause a reduction in the population of the prey species, may be considered adverse effects on EFH if such actions reduce the quality of EFH."

In order to initiate consultation pursuant to the MSA, you must submit a full and complete EFH assessment that considers the individual and cumulative and the direct and indirect impacts of the proposed project on EFH, federal managed species and their prey recognizing the definition of adverse impact discussed above. The required contents of an EFH assessment includes: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the NRC's conclusions regarding the effects of the action on EFH; 4) proposed mitigation, if applicable. Given the scope of this project, other information that should be contained in the EFH assessment includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 4) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH.

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We also have responsibilities under the Fish and Wildlife Coordination Act (FWCA) to provide federal agencies such as the NRC with recommendations to avoid, minimize and to mitigate for direct, indirect and cumulative impacts to any and all NOAA trust resources that are present within the Delaware River Basin.

The Delaware Estuary including its tributaries provides habitat for a wide variety of NOAA trust resources including: alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrata*), American shad (*Alosa sapidissima*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic sturgeon, blueback herring (*Alosa aestivalis*), bluefish, hickory shad (Alosa mediocris), spot (*Leiostomus xanthurus*) tautog (*Tautoga onitis*), weakfish, white perch (*Marone americana*), yellow perch (*Percajlavescens*), striped bass (*Marone saxatilis*), hogchoker (*Trinectes maculatus*), killifish, bay anchovy, silversides, mummichog and many others.

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The New Jersey Department of Environmental Protection (NJDEP) also has sampled the Delaware River and Bay in the project area for nearly 30 years since 1980. This long-term survey documents the use of this portion of the river by a wide variety of species including: blueback herring, alewife, American shad (*Alosa sapidissima*), American eel (*Anguilla rostrata*), Atlantic herring (*Clupea harengus*), Atlantic menhaden (*Brevoortia tyrannus*), bay anchovy, (*Anchoa mitchilli*), blueback herring, gizzard shad (*Dorosoma cepedianum*), hogchoker (*Trinectes maculatus*), striped bass, yellow perch (*Percajlavescens*), white perch (*Marone americana*), Atlantic silverside (*Menidia menidia*), and many others (NJDEP 2010). Many of these species are both commercially and recreationally important and managed by the ASFMC or are valuable prey species for ASFMC or federally managed fish.

Buckel and Conover (1997) in Fahey et al. (1999) reports that diet items of juvenile bluefish include Alosa species such as American shad, blueback herring and alewife as well as bay anchovy, silversides and other fish species. We note that the NJDEP survey data show that federally managed bluefish are present in the project area. This indicates that both the prey species and the predator are present in the Delaware River in and around the project area. Juvenile Alosa species have all been identified as prey species for windowpane (*Scophthalmus aquosus*) and summer flounder (*Paralichthys dentatus*) in Steimle et al. (2000). Windowpane and summer flounder are federally managed species whose EFH has been designated in the mixing zone of the Delaware River

Submerged aquatic vegetation (SAV) has historically been absent from Delaware Bay. However, to date, there has been no comprehensive mapping of SAV in the Delaware Estuary to verify its presence or absence. Several species have been observed though in the tidal river since 1970, including: *Vallisneria americana*, *Myriophyllum spicatum*, *Elodea nuttallii*, *Najasjlexillis*, *Potamogeton sp.* and others (Schuyler, 1988). Wild celery (*Vallisneria americana*) has been documented in some areas of the Delaware River and its tributaries. SAV provides valuable nursery, forage and refuge habitat for a variety of fish including striped bass, American shad, alewife, and blueback herring. It is also an important food source for waterfowl. As water quality in the Delaware River continues to improve, more areas of SAV may be found within the River.

Native eastern oysters (*Crassostrea virginica*) are an ecologically important species. According to the NJDEP, an expansive area of oyster habitat has been identified near the SHCNGS. In recent years, efforts have been made to restore oyster beds in Delaware Bay. Since 2004, the Army Corps of Engineers has worked with the States of New Jersey and Delaware to plant shell in portions of natural oyster beds in Delaware Bay (http://www.delawareestuary.org/science_projects_oyster_restoration.asp).

Blue crab (*Callinectes sapidus*) can also be found in the vicinity of the SHCNGS. The crabs can generally be found in the lower salinity areas of the estuary in the summer and higher salinities in the winter. Following mating in the summer, which typically occurs in lower salinity waters, the

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females move to high salinity waters found in the Delaware Bay to spawn. After spawning, the larvae move toward the lower salinity areas in the Delaware River Estuary to mature.

Other Comments from NMFS Habitat Conservation Division
The construction of the new intake structure and the new barge unloading facility and mooring area will result in the deepening of the existing river bottom (10ft. MLLW) by an average of 4.5 ft. over an area of 31 acres (volume of 150,000 cubic yards), and an area of 61 acres, (a volume of 440,000 cubic yards), respectively. The total area to be dredged is 92 acres extending riverward 1700 ft. from the shoreline. Dredging techniques may include both mechanical and hydraulic dredging methods and the material removed as part of this construction activity will be transported to and placed in an on-site or other approved upland disposal facility.

Increases in turbidity through the resuspension of sediments into the water column from dredging and port operations will degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Sedimentation and wave patterns in the area may be altered as a result of vessels entering and exiting the proposed mooring area also resulting in increased turbidity. Suspended sediments mask pheromones used by migratory fishes, and can smother immobile benthic organisms and demersal newly-settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). As supported above, the project area provides important habitat for striped bass including valuable spawning grounds and nursery habitat. Increases in turbidity will adversely affect striped bass larvae's ability to capture prey (Fay et al. 1983 in Able and Fahay 1998). The decrease in water circulation can also adversely affect striped bass survival as strong current is needed to keep the eggs suspended in the water column and prevent them from being smothered by silt (Bigelow and Schroeder 1953).

Guidelines under Section 404(b)(l) of the federal Clean Water Act require that actions proposed within "waters of the United States," especially those that are not water-dependent, are required to demonstrate that they have considered all appropriate reasonable and prudent measures to avoid and minimize impacts to waters. If all measures to avoid and minimize wetland impacts have been considered and employed to the extent practicable and result in unavoidable impacts, a compensatory mitigation plan should be developed and implemented.

The applicant should undertake a complete analysis of alternatives that complies fully with the Section 404 (b)(1) Guidelines that documents avoidance, minimization and mitigation for all impacts. Alternate locations as well as a documentation of purpose and need should be provided as part of this analysis. For any unavoidable impacts, a compensatory mitigation plan to offset all of the projects impacts to aquatic resources including EFH should be developed in accordance with the federal standards and criteria for compensatory mitigation for losses of aquatic resources published in the Federal Register on April 10, 2008 (vol. 73 No. 70). This plan should be developed as early in the permit process as possible and in consultation with the applicable federal, state and local resource agencies and will be implemented on and in the immediate area of the PSEG Site to the extent practicable.

In the State of NJ, coastal wetlands are regulated by the state under the Wetlands Act of 1970. Development in coastal wetlands requires authorization of permits from the NJDEP, and requires separate processes to determine a project's value. However, such processes usually fit in within a federal process.

After reasonable measures have been explored to avoid and minimize impacts to wetlands, PSEG will compensate for unavoidable adverse impacts to wetlands by implementing approved wetland restoration and/or rehabilitation measures. PSEG, through their Ecosystem Enhancement Program, has extensive experience and demonstrated success implementing coastal saltmarsh and freshwater wetland restoration and rehabilitation programs. This familiarity with local wetland systems was used to identify appropriate candidate mitigation sites and will be used in developing and implementing the final approved mitigation plan.

Mitigation measures mentioned in the ESP to offset impacts to NOAA trust resources include the following considerations:

- Minimization of encroachment on coastal wetlands
- Use of previously developed sediment disposal basins for plant development (both PSEG's permitted disposal facility and the USACE's CDF)
- Refinement of the Site Utilization Plan to avoid various wetland areas throughout the PSEG Site

Opportunities for mitigating unavoidable impacts to wetland ecosystems include restoration of natural habitats temporarily disturbed by construction, creation of new habitat types in previously disturbed areas, and enhancement of undisturbed natural habitats.

In general, we do not accept the conversion of one type of aquatic habitat into another habitat as compensatory mitigation when the existing habitat has value to aquatic life. Candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG Alloway Creek Watershed restoration site.

Conclusions

My staff looks forward to working with PSEG as you move forward with the ESP process. Should you have any questions regarding this correspondence or would like to arrange a meeting to discuss the effects of the proposed action on NMFS trust resources, please contact Julie Crocker in the Protected Resources Division ((978)282-8480 or Julie.Crocker@noaa.gov) and Karen Greene in the Habitat Conservation Division ((732)872-3023 or Karen.Greene@noaa.gov).

Sincerely,

for

Mary A. Colligan
Assistant Regional Administrator for
Protected Resources

EC: Crocker, F/NER3

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Greene, F/NER4

File Code: Sec 7 NRC PSEG Early Site Permit Artificial Island

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F.3.1 National Marine Fisheries Service Biological Assessment

Two versions of the NMFS BA are on display in this section. The first version (dated June 2014) is the BA originally sent by the NRC to the NMFS for review. This is the same version of the BA that was on display in Section F.3.1 of the draft EIS. Following the issuance of the draft EIS, comments were received from NMFS (see Section E.2.10 of Appendix E) on the June 2014 version of the BA.

The second version of the NMFS BA (dated August 2015) on display in this section is a supplement to the original BA. This supplemental BA incorporates the review team's responses to the comments received from the NMFS on the June 2014 version.

Biological Assessment

National Marine Fisheries Service

PSEG Site

Early Site Permit Application

U.S. Nuclear Regulatory Commission Early Site Permit Application

Docket Number 52-043

Salem County, New Jersey

June 2014

U.S. Nuclear Regulatory Commission

Rockville, Maryland

U.S. Army Corps of Engineers

Philadelphia District

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ABBREVIATIONS/ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
BMPs	best management practices
CDF	confined disposal facility
CFR	*Code of Federal Regulations*
cfs	cubic feet per second
cm	centimeter(s)
COL	combined construction permit and operating license
CP	construction permit
DPS	distinct population segment(s)
DRBC	Delaware River Basin Commission
EEP	Estuary Enhancement Program
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
ESP	early site permit
fps	feet per second
ft	foot (feet)
FWS	U.S. Fish and Wildlife Service
gpm	gallon(s) per minute
HCGS	Hope Creek Generating Station
HDA	heat dissipation area
in.	inch(es)
kg	kilogram(s)
km	kilometer(s)
lb	pound(s)
m	meter(s)
m^3	cubic meter(s)
mi	mile(s)
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
ppt	parts per thousand
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
RKM	River Kilometer

RM	River Mile
SGS	Salem Generating Station, Units 1 and 2
SWPPP	stormwater pollution prevention plan
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area
yd^3	cubic yard(s)

Biological Assessment of the Potential Effects on Federally Listed Endangered or Threatened Species from the Proposed Early Site 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 (SGS), Units 1 and 2, on the eastern shore of the Delaware River Estuary in Lower Alloways Creek Township, Salem County, New Jersey. As part of its review of the ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 51, the NRC regulations that implement the National Environmental Policy Act of 1969, as amended. The EIS includes 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 NRC approval of a site or sites 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 construction permit and operating 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 and can conduct certain site preparation and preliminary construction activities enumerated in 10 CFR 50.10(e)(1) (10 CFR 50-TN249). An ESP does not, however, authorize construction and 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). An applicant for a CP or COL for a new nuclear plant to be located at a site for which an ESP has been issued may reference the ESP, and matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent the identification of new and significant information.

Upon issuance of the draft EIS, PSEG plans to submit a Federal and a State application to the USACE and the New Jersey Department of Environmental Protection (NJDEP) for the Alteration of Any Floodplains, Waterways, or Tidal or Nontidal Wetlands in New Jersey. The USACE application number, the NJDEP Tidal Application number, and the NJDEP Nontidal Application number all will be included in the final EIS. The final EIS will be issued after considering public comments on the draft EIS.

The proposed actions related to the PSEG application are (1) NRC issuance of an ESP for the PSEG Site (10 CFR 52-TN251) and (2) USACE permit action on a Department of the Army permit application pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act; 33 USC 1251-TN662) and Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403-TN660). The U.S. Environmental Protection Agency (EPA) has the authority to review and veto USACE decisions on Section 404 permits. The USACE is participating as a cooperating agency with the NRC in preparing the EIS and participates collaboratively on the review team. The NRC and USACE have prepared this biological assessment to support their joint consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 7(c) of the Endangered Species Act of 1973, as amended (ESA) (16 USC 1531-TN1010). The USACE permit decision will be made following issuance of the final EIS.

By letter dated October 26, 2010 (NRC 2010-TN2203), the NRC initiated Endangered Species Act Section 7 consultation with NMFS 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. NMFS provided the requested information for marine species by letter dated December 9, 2010 (NMFS 2010-TN2171). An update for endangered, threatened, candidate, and proposed species was requested on July 31, 2013 (NRC 2013-TN2805). NMFS provided updated information by letter dated October 25, 2013 (NMFS 2013-TN2804). Based on this correspondence and review of electronic sources from NMFS and the states of Delaware and New Jersey, two fish and five sea turtle species were identified that occur, or have the potential to be present, in the site vicinity and are listed as either Federally endangered or threatened; they are listed in Table 1.

Table 1. Endangered (E) or Threatened (T) Species under the Jurisdiction of NMFS in the Vicinity of the PSEG Site

Species Name	Common Name	ESA Status
Reptiles		
Caretta caretta	Loggerhead sea turtle	T
Chelonia mydas	Atlantic green sea turtle	T
Eretmochelys imbricata	Hawksbill sea turtle	E
Dermochelys coriacea	Leatherback sea turtle	E
Lepidochelys kempii	Kemp's ridley sea turtle	E
Fish		
Acipenser brevirostrum	Shortnose Sturgeon	E
Acipenser oxyrinchus oxyrinchus	Atlantic Sturgeon	E

Source: NMFS 2013-TN2614.

Accordingly, this biological assessment focuses on evaluating the potential effects from building and operating a new nuclear plant at the PSEG Site, adjacent to SGS and HCGS, on the Federally listed species under NMFS's jurisdiction that occur in the Delaware River Estuary.

2.0 DESCRIPTION OF PROPOSED ACTION

PSEG is seeking an ESP for a new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS. Building activities that could directly affect onsite and offsite aquatic ecosystems include site preparation for installation of plant structures and cooling towers, switchyards, temporary laydown area, improvements to the HCGS barge slip, building the barge storage area and unloading facility, installing the cooling water system intake and discharge structures, and building the proposed 5-mi causeway.

2.1 Site Location and Description

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 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 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 PSEG Site would encompass 819 ac. Figure 3 provides aerial plan view of the proposed site layout for a new nuclear power plant at the PSEG Site.

The region within 15 mi (24 km) of the site is used primarily for agriculture. The area also includes numerous parks, wildlife refuges, and preserves such as Mad Horse Creek Wildlife Management Area (WMA) to the east; Cedar Swamp State WMA to the south in Delaware; Appoquinimink, Silver Run, and Augustine State WMAs to the west in Delaware; and Supawna Meadows National Wildlife Refuge to the north (PSEG 2014-TN3452).

2.1.1 Delaware River Estuary

The Delaware River and Delaware Bay are a part of the larger Delaware Estuary and River Basin that extends from headwaters in New York to the coastal plains near Cape Henlopen in Delaware (PDE 2012-TN2191). The Delaware Bay extends from the confluence of the Delaware River with the Atlantic Ocean from Delaware River Mile (RM) 0 to RM 54 (River Kilometer [RKM] 0 to RKM 86.9). The Delaware River Estuary includes the Delaware Bay and extends up the tidal Delaware River, which is characterized by brackish water between Delaware RM 54 and RM 80 (RKM 86.9 and RKM 128.8) and becomes freshwater at Delaware RM 80 (BBL and Integral 2007-TN2126). The PSEG Site near the mouth of Alloway Creek is at Delaware RM 52 (DRBC 2011-TN2412) and is considered to be in the lower estuary watershed unit of the Delaware River Estuary (PDE 2012-TN2191).

Characterization of the region dates back to pre-Revolutionary War times when shipping and trading at developing ports from the mouth of the Delaware River Estuary to inland Delaware, Pennsylvania, and New Jersey increased use of the watershed (Berger et al. 1994-TN2127). Increasing urbanization and industrialization of the region from 1840 to present day have significantly contributed to the degradation of the watershed with habitat alteration, water diversion, and increased pollution of the Delaware Estuary and River Basin ecosystems because no environmental policies were established until the 1960s and later (Berger et al. 1994-TN2127).

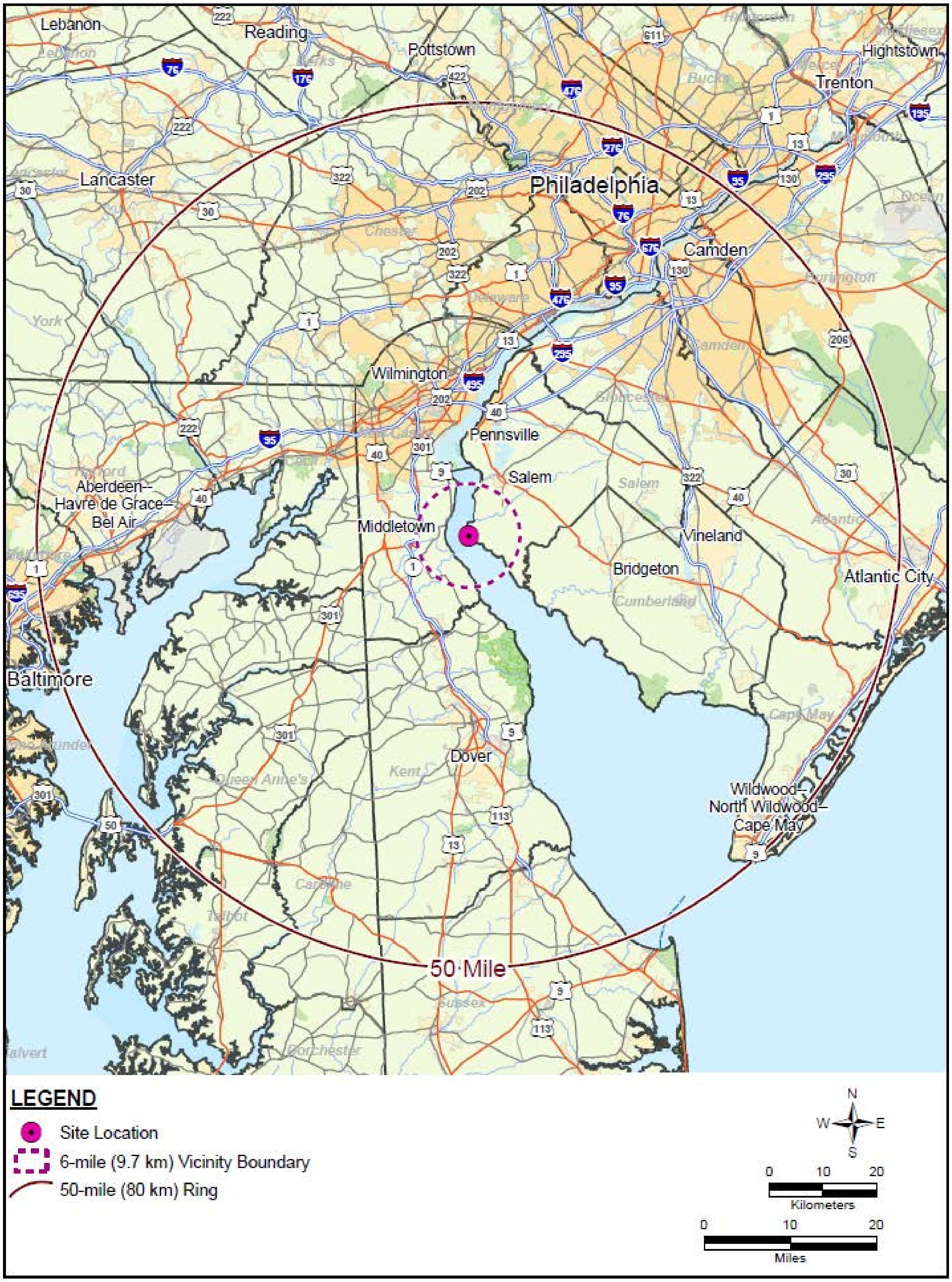

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2014-TN3452)

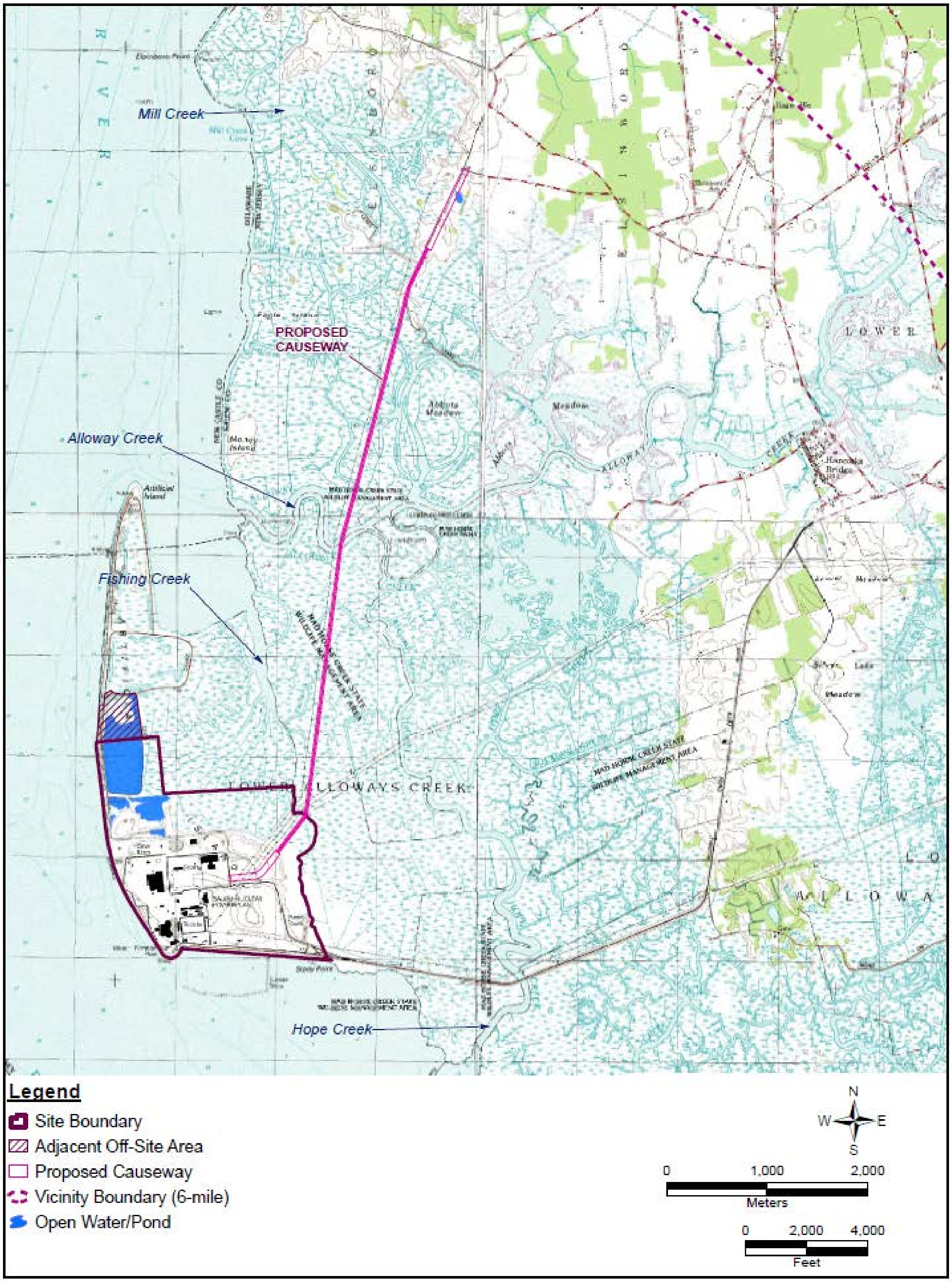

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2014-TN3452).

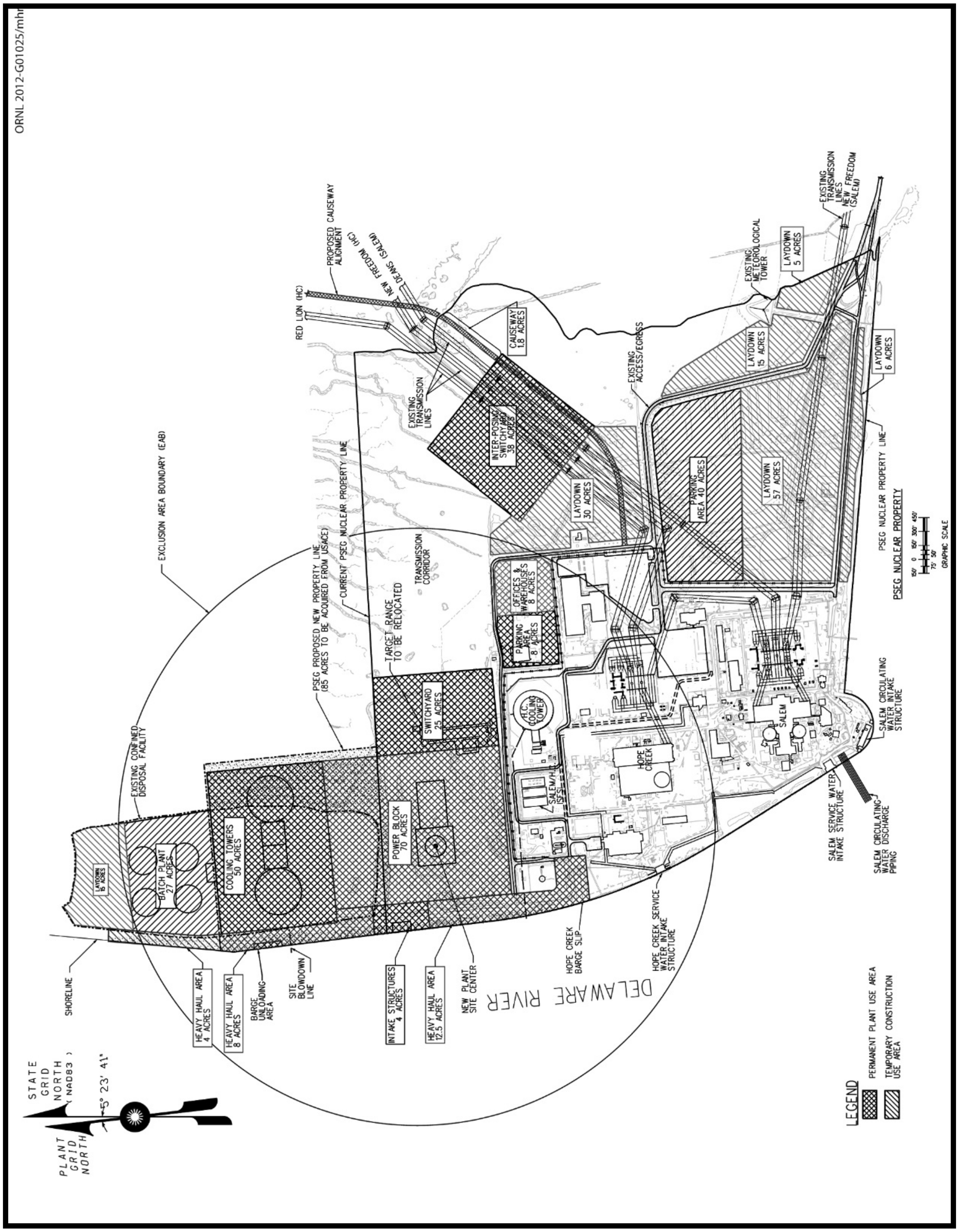

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489)

According to the most recent status report on the Delaware Estuary and River Basin, the region continues to see some decline in environmental health indicators such as removal of estuary sediments and increases in nitrogen and contaminant levels. However, environmental conditions such as technology implementation to increase fish passage and restoration of targeted aquatic habitats have improved the aquatic ecology for the watershed (PDE 2012-TN2191). The Delaware River Basin Commission (DRBC) stated in the State of the Delaware River Basin report for 2013 that increases in temperature and salinity are expected with future sea-level rise and climate change (DRBC 2013-TN2609). These potential changes are likely to result in movement of populations of more marine and euryhaline species further up the Delaware River Estuary.

The boundary of salinity intrusion in the Delaware River Estuary, also known as the salt line, fluctuates with flow changes. The salt line moves in response to the tides and variations in Delaware River Estuary freshwater discharge. During most of the year, the salt line is located between the Commodore Barry Bridge at Delaware RM 82 (RKM 132) and Reedy Island at Delaware RM 54 (RKM 86.9) (DRBC 2008-TN2277). During the drought of record in the 1960s, the salt line moved to its most upstream historically observed location at Delaware RM 102 (DRBC 2008-TN2277). Salinity is an important determinant of biotic distribution in estuaries, and salinity near the PSEG Site varies with river flow. Salinity measurements taken over a number of years between RM 51 and RM 49 report a minimum salinity of 0.1 parts per thousand (ppt) and a maximum of 17.9 ppt (PSEG 2014-TN3452).

At the PSEG Site on Artificial Island, the estuary is tidal with a net flow to the south. The USACE maintains a dredged navigation channel near the center of the estuary about 6,600 ft (2,000 m) west of the shoreline of the PSEG Site. The navigation channel is about 40 ft (12 m) deep and 1,300 ft (400 m) wide; however, starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). On the New Jersey side of the channel, water depths in the open estuary at mean low water are fairly uniform at about 20 ft (6 m). Predominant tides in the area are semi-diurnal, with a period of approximately 12 hours and a mean tidal range of 5.3 ft (1.6 m) at RM 52 (PSEG 2014-TN3452).

The biological communities of the Delaware River Estuary in the area of the PSEG Site are typical of those that exist all along the main reaches of the Delaware Bay system. To mitigate egg and larval fish loss through the cooling system for SGS, PSEG proposed and established an estuary enhancement program (EEP) to restore salt marshes and provide monitoring and other structural enhancements to mitigate losses of aquatic species through impingement and entrainment at SGS (Balletto and Teal 2011-TN2612).

The PSEG EEP was established in 1995 as part of New Jersey Pollutant Discharge Elimination System (NJPDES) requirements for SGS and includes an ongoing biological monitoring program in addition to habitat restoration to track the success of the mitigation actions. Because of the biological monitoring surveys that have been conducted in this area of the Delaware River Estuary since the mid-1980s in support of environmental requirements for the construction and operation of SGS and HCGS, an extensive long-term data set exists on the fishery and benthic macroinvertebrate communities of this area.

Submerged aquatic vegetation has not historically been observed in the Delaware River Estuary primarily because of the high levels of turbidity (Miller et al. 2012-TN2686), and there is little to no submerged aquatic vegetation observed in the sampling areas near the PSEG Site (PSEG 2014-TN3452). Phytoplankton and zooplankton studies between 1973 and 1976 identified over 100 genera of phytoplankton in the area of the site, with three diatom taxa dominating the phytoplankton community: *Skeletonema costatum*, *Melosira* spp., and *Chaetoceros* spp. (IAI 1980-TN2608). The primary production contributed by the phytoplankton community is highest during the warmer months and lowest during the winter. Because estuarine systems are typically characterized by a shallow euphotic zone and high turbidity, contribution of organic carbon to the base of the food web by phytoplankton production is relatively small compared to that supplied by organic detritus and other primary producers such as benthic algae, periphyton, and submergent and emergent macrophytes (IAI 1980-TN2608). Surveys of zooplankton communities in the Delaware River Estuary near the site have identified over 100 taxa of microzooplankton (IAI 1980-TN2608). Dominant taxa consisted of rotifers and copepods (largely nauplii). Macroinvertebrate plankton samples were composed of 46 taxa (32 arthropods), with the dominant groups being amphipods *Gammarus* spp., the mysid shrimp *Neomysis americana*, larvae of the crabs *Rhithropanopeus harrisii* and *Uca minax*, and the isopod *Chiridotea almyra*. Seasonal variations in total density of zooplankton were not as consistent as that observed for the phytoplankton community and were generally related to short-lived differential abundances of a few dominant taxa (IAI 1980-TN2608).

The Delaware River Estuary is a complex ecosystem with many species playing different roles throughout their life cycles. Major assemblages of organisms within the estuarine community include plankton, benthic invertebrates, and fish. Detailed descriptions of these assemblages can be found in Section 2.4.2.3 of the EIS for a new nuclear power plant at the PSEG Site.

2.2 Dredging and In-Water Installation Activities

Before initiating any site preparation or development activities, PSEG would be required to obtain the appropriate authorizations regulating alterations to waters of the United States, including ponds and creeks. Building activities that could directly affect onsite and offsite aquatic ecosystems include site preparation for installing plant structures and cooling towers, switchyards, and the temporary laydown area; making improvements to the HCGS barge slip; building the barge storage area and unloading facility; installing the cooling water system intake and discharge structures; and building the proposed causeway. Aquatic habitats potentially affected include the onsite artificial ponds and small marsh creeks, habitats associated with the Delaware River Estuary, and the interconnected system of tidal wetlands and marsh creeks primarily north of the PSEG Site. Potential direct impacts on aquatic resources as a result of building activities would involve physical alteration of habitat (e.g., infilling, cofferdam placement, dredging, pile driving) including temporary or permanent removal of associated benthic organisms, sedimentation, changes in hydrological regimes, and changes in water quality. Potential indirect impacts include increased runoff from impervious surfaces and subsequent erosion, as well as sedimentation and isolation of marsh creek segments due to infilling (PSEG 2014-TN3452).

Installation activities with the potential to affect the aquatic resources of the Delaware River Estuary include improvements to and use of the existing HCGS barge slip, a new barge storage area and unloading facility, an adjacent heavy haul road, the intake and discharge structures along the eastern shore of the Delaware River Estuary (Figure 3), and installation of a causeway extending from a new plant at the PSEG Site to the north (Figure 2). Shoreline installation and site preparation activities would require a stormwater pollution prevention plan (SWPPP), developed as part of the NJPDES stormwater permit, which would describe best management practices (BMPs) to control sedimentation and erosion and provide stormwater management. Shoreline structures would be hardened to protect from shoreline erosion using placement of concrete or riprap (PSEG 2014-TN3452).

Improvements to the HCGS barge slip would include deepening the existing barge slip by another 2 ft to accommodate equipment-carrying barges (Cook 2009-TN2713). An estimated 1,350 yd^3 of dredged material would be removed within the existing HCGS barge slip to allow for additional clearance of barges carrying equipment that can be delivered to the PSEG Site. If the final plant designs indicate modules larger than 54 ft in width are required, the existing 60 ft-wide HCGS barge slip may be widened an additional 20 ft along the south side of the barge slip and dredged an additional 2 ft below current barge slip depth. A double row of sheet piling would need to be placed before removal of excess earth by dredging. An estimated 5,800 yd^3 of material would be removed, and the existing riprap at the front end of the slip would be removed and then replaced at the widened river end of the slip (Cook 2009-TN2713).

The new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 61 ac (PSEG 2014-TN3452). An additional 0.05 ac of river bottom habitat would be removed for installation of seven 20-ft-diameter barge mooring caissons. Installation of a new intake structure would require dredging of about 150,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 31 ac (PSEG 2014-TN3452). Dredging would also be required for installation of a new discharge structure; however, specific details on the amount of material to be dredged for discharge structure placement likely would depend on final design and placement criteria. Dredged material disposal would be either on the site or in another approved upland disposal facility (PSEG 2014-TN3452).

The installation of the barge storage and unloading facilities as well as the intake and discharge structures would result in temporary disturbances to the aquatic habitat in those portions of the Delaware River Estuary. An increase in suspended sediments could occur during dredging activities; however, PSEG would comply with NJDEP and USACE permitting regulations regarding type of dredge used, timing and duration of dredging, and appropriate BMPs to minimize sedimentation effects as required for Federal and State permitting. Motile invertebrates, fish, and sea turtles might swim into this portion of the Delaware River Estuary, but they would be able to swim away or likely would avoid the area because of vibratory noise from pile-driving activities. Mobile macroinvertebrates in this area might be able to occupy adjacent habitat in the Delaware River Estuary as the species composition and abundance of the macroinvertebrate community in the Delaware River Estuary near the site are similar to those of benthic communities in adjacent benthic areas of southern portion of the Delaware River Estuary. Although permanent alteration of at least 92 ac of river bottom habitat would occur, the impacts to aquatic communities in the vicinity are expected to be minimal.

Offsite, an estimated 2,123 linear ft of marsh creek channels would be crossed by the proposed causeway (PSEG 2014-TN3452). Installation of the elevated causeway would require permanent pier placement for support structures. However, PSEG plans to avoid placement in stream channels (PSEG 2014-TN3452). Runoff from disturbed areas would be temporary and controlled through the use of BMPs required for water quality in compliance with Federal and New Jersey permitting, and runoff is not expected to adversely affect Delaware River Estuary surface waters (PSEG 2014-TN3452).

Vessel use during the dredging or installation of the in-water structures and transportation of large system components to the PSEG Site may affect the aquatic resources of the Delaware River Estuary, particularly the benthos. The main impacts of using vessels would include turbulence from propellers (prop wash) and accidental spills of materials overboard. Vessels would be used during installation of the cooling water discharge pipeline and during offloading of materials from barges (PSEG 2014-TN3452). Vessel operation during building or operation activities may cause short-term, localized impacts on aquatic species in the Delaware River Estuary. These impacts should not affect the general resources in the area of the PSEG Site or the region along this coast of the Delaware River Estuary.

2.3 Cooling Water System Description and Operation

All cooling water for the operation of a new nuclear power plant at the PSEG Site would be withdrawn from the Delaware River Estuary, and impacts associated with operation of the water intake system would be limited to aquatic resources within the Delaware River Estuary. For aquatic resources, the primary concerns are related to the amount of water withdrawn and the amount of water consumed through evaporation and the potential for organisms to be impinged on the intake screens or entrained into the cooling water system. Impingement occurs when aquatic organisms are drawn into the cooling water intake and are trapped against the intake screens by the force of the water passing through the cooling water intake structure (66 FR 65256-TN243). Impingement can result in starvation, exhaustion, asphyxiation, descaling of fish, and other physical injuries (66 FR 65256-TN243). Entrainment occurs when aquatic organisms drawn into the intake structure are small enough to pass through the intake screens and the cooling system. Entrained organisms are usually passively drifting forms (plankton) or small, weakly swimming early life stages of fish and shellfish (66 FR 65256-TN243). As entrained organisms pass through the cooling system for a new nuclear power plant at the PSEG Site, they would be subjected to mechanical, thermal, pressure, and chemical stresses.

A number of factors, such as the type of cooling system, the design and location of the intake structure, and the amount of water withdrawn from the source water body greatly influence the degree to which impingement and entrainment affect aquatic biota. Impingement and entrainment impacts are regulated by EPA or its designees (in this case, the NJDEP) under 316(b) of the Clean Water Act (33 USC 1251-TN662). Section 316(b) “requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.” A new nuclear power plant at the PSEG Site would employ closed-cycle cooling. Depending on the quality of the makeup water, closed-cycle, recirculating cooling water systems can reduce water use by 96 to 98 percent of the amount that the facility would use if it employed a once-through cooling system (66 FR 65256-TN243). This significant reduction in the water withdrawal rate results in a corresponding reduction in impingement and entrainment losses.

The intake design through-screen velocity is another factor that greatly influences the rate of impingement of fish and shellfish at a facility. In general, the higher the through-screen velocity, the greater the number of fish impinged. The EPA has established a national standard for the maximum design through-screen velocity of no more than 0.5 feet per second (fps) (66 FR 65256-TN243). The EPA determined that species and life stages evaluated in various studies could endure a velocity of 1.0 fps; they then applied a safety factor of 2 to drive the threshold of 0.5 fps. PSEG has stated that the proposed intake structure would be located flush with the east shoreline of the Delaware River Estuary and would be designed to have a through-screen velocity of less than 0.5 fps (PSEG 2014-TN3452). The resulting low through-screen velocity would reduce the probability of impingement because most fish can swim against such low flows to avoid the intake screens. The fish protection system, including the traveling screens and fish return, would be designed and operated to comply with the NJPDES permit that would be issued for the cooling system (PSEG 2014-TN3452).

Another factor affecting impingement and entrainment losses is the percentage of the flow of the source water body past the site that is withdrawn by the station. To minimize impacts, the EPA determined that for estuaries or tidal rivers, intake flow must be less than or equal to one percent of the tidal excursion (one tidal cycle of flood and ebb) volume (66 FR 65256-TN243). Makeup water for the cooling system would be drawn from the Delaware River Estuary at an average rate of 78,196 gallons per minute (gpm) (174 cubic feet per second [cfs]), with consumptive use at a rate of 26,420 gpm (59 cfs) (PSEG 2014-TN3452). Tidal flows near the PSEG Site average 400,000 to 472,000 cfs, and the freshwater flow from the Delaware River and its tributaries averages 20,240 cfs. Therefore, the makeup water use rate is less than 0.05 percent of the average flow of the Delaware River Estuary near the PSEG Site (PSEG 2014-TN3452).

2.3.1.1 Impingement

Because of its location on the Delaware River Estuary, a new nuclear power plant at the PSEG Site would impinge a variety of freshwater and marine fish and shellfish. Data from the impingement studies for SGS (once-through cooling) indicate that 50 to 67 finfish species are impinged each year compared to just under 50 species of finfish impinged at HCGS (closed-cycle cooling) between 1986 and 1987. However, the number of sampling events differed dramatically between the two plants with only 46 to 48 sampling events at HCGS over the same years (1986–87) as the more than 530 sampling events per year at SGS (VJSA 1988-TN2564; ECS 1989-TN2572). The species composition in the screen samples also varied between SGS and HCGS during the 1986 to 1987 sampling and varied at SGS between the sampling dates in the 1980s and sampling dates since 2003. Table 2 compares important, most abundant, and total finfish species, as well as blue crab (*Callinectes sapidus*) impinged at SGS and HCGS between 1986 and 1987 and at SGS between 2003 and 2010.

Table 2. Impingement Rate for Important, Most Abundant, and Total Finfish Species and Blue Crab Impinged at SGS and HCGS

Common Name	Scientific Name	Impingement Rate (number of individuals/10^6 m^3) SGS (1986–87)[a]	HCGS (1986–87)[a]	SGS (2003–10)[b]
American Eel	*Anguilla rostrata*	7.6	13.4	4.1
Blueback Herring	*Alosa aestivalis*	49.1	5.0[d]	37.2
Alewife	*Alosa pseudoharengus*	7.6	1.1[d]	8.14
Bay Anchovy	*Anchoa mitchilli*	601.9	521.5	115.4[d]
Atlantic Menhaden	*Brevoortia tyrannus*	31.0	3.7[d]	28.9
Atlantic Silverside	*Menidia menidia*	18.6	15.1	46.7[c]
White Perch	*Morone americana*	359.3	27.9[e]	1,066.4[c]
Striped Bass	*Morone saxatilis*	5.3	0.7[d]	78.8[e]
Weakfish	*Cynoscion regalis*	585.4	143.0[c]	486.4
Spot	*Leiostomus xanthurus*	13.8	2.1[d]	16.6
Atlantic Croaker	*Micropogonias undulatus*	109.8	965.4[d]	636.7[d]
Summer Flounder	*Paralichthys dentatus*	13.0	4.7[c]	4.1[c]
Oyster Toadfish	*Opsanus tau*	16.2	38.3[c]	1.8[d]
Northern Pipefish	*Syngnathus fuscus*	2.1	40.6[e]	4.1
Naked Goby	*Gobiosoma bosc*	2.3	303.2[e]	3.3
Hogchoker	*Trinectes maculatus*	636.4	112.2[d]	152.3[c]
Spotted Hake	*Urophycis regia*	58.6	7.0[d]	83.5
Gizzard Shad	*Dorosoma cepedianum*	14.3	1.7[d]	63.0[c]
American Shad	*Alosa sapidissima*	5.5	0.2	12.3[c]
Black Drum	*Pogonias cromis*	2.8	0.8	3.0
Black Sea Bass	*Centropristis striata*	3.0	2.0	0.4
Butterfish	*Peprilus triacanthus*	0.7	ND	0.6
Channel Catfish	*Ictalurus punctatus*	0.9	1.0	8.2[d]
Conger Eel	*Conger oceanicus*	0.1	0.4	0.1
Northern Kingfish	*Menticirrhus saxatilis*	0.2	ND	12.2[e]
Northern Searobin	*Prionotus carolinus*	3.8	1.8	6.0
Scup	*Stenotomus chrysops*	ND	ND	1.4
Silver Hake	*Merluccius bilinearis*	0.4	0.1	0.1
Windowpane Flounder	*Scophthalmus aquosus*	4.7	2.4	5.2
Winter Flounder	*Pseudopleuronectes americanus*	0.3	0.4	1.1
Total finfish density rate[f]		2,643.6	2,095.4	3,152.5
Blue Crab	*Callinectes sapidus*	1,542.5	2,450.1	690.4[c]
Total finfish and blue crab density rate[f]		4,186.1	4,545.5	3,842.9

Note: ND = not detected.
(a) Sources: VJSA 1988-TN2564; ECS 1989-TN2572.
(b) Sources: PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571.
(c) Differs from 1986–87 SGS impingement rate by more than a factor of 2.
(d) Differs from 1986–87 SGS impingement rate by more than a factor of 5.
(e) Differs from 1986–87 SGS impingement rate by more than a factor of 10.
(f) Includes all finfish impinged, not just those listed in table.

Within the 1986 to 1987 sampling years, species composition differed between SGS and HCGS. Many of the abundant or important species impinged at SGS were either not as abundant at HCGS at similar densities or were noticeably more abundant at HCGS than at SGS. Species that shared similar densities included blue crab, American Eel (*Anguilla rostrata*), Bay Anchovy (*Anchoa mitchilli*), and Atlantic Silverside (*Menidia menidia*). Total density of impinged fish at both SGS and HCGS between 1986 and 1987 was comparable and was calculated using the number of a given species collected per million cubic meters of intake water volume sampled.

Differences in impinged species composition between SGS and HCGS may be attributable to the different physical locations of the intake structures of the two existing sites (i.e., southwest for the SGS cooling water intake structure versus west for the HCGS service water intake structure) and differences in intake screening technology and screen approach velocities (PSEG 2014-TN3452).

The comparison of the SGS 1986–87 impingement data with SGS 2003–10 impingement data shows shifts in specific species abundance. Calculating mean density impinged per volume of water corrects for the difference in number of sampling events as more frequent samples were collected between 2003 and 2010. Interestingly, the total abundance of blue crab, Bay Anchovy, Summer Flounder (*Paralichthys dentatus*), Oyster Toadfish (*Opsanus tau*), and Hogchoker (*Trinectes maculatus)* diminished by a factor of 2 or more since the 1986–87 sampling events. However, increases in Atlantic Silverside, White Perch (*Morone americana*), Striped Bass (*Morone saxatilis*), Atlantic Croaker (*Micropogonias undulatus*), American Shad (*Alosa sapidissima*), Channel Catfish (*Ictalurus punctatus*), Northern Kingfish (*Menticirrhus saxatilis*), and Gizzard Shad (*Dorosoma cepedianum*) are evident since the 1986–87 sampling. Of note, impingement data for SGS from 2008 to 2010 (PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571) were also examined and compared with SGS impingement data from 2003 to 2007 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569) to assess any recent deviation from the previous 2003 to 2007 trend (data not shown in table). Gizzard Shad, Northern Kingfish, Black Drum (*Pogonias cromis*), and Atlantic Menhaden (*Brevoortia tyrannus*) all increased by a factor of 2 in the more recent sampling. However, Blueback Herring (*Alosa aestivalis*), Atlantic Croaker, Butterfish (*Peprilus triacanthus*), Channel Catfish, Scup (*Stenotomus chrysops*), and Spotted Hake (*Urophycis regia*) were all reduced by a factor of 2 in the more recent sampling. These deviations in annual averages may represent changes to environmental conditions at the larger regional scale, such as climate, seasonal weather extremes, and fishing pressure, and do not appear to reflect any longer term trends in abundance.

Impingement mortality was not reported during the HCGS impingement sampling in 1986 or 1987 (VJSA 1988-TN2564; ECS 1989-TN2572). However, sampling at SGS between 1986 and 1987 and between 2003 and 2010 reported between 97 percent and 100 percent live, undamaged blue crab, and live condition for greater than 50 percent of the finfish impinged with the exception of White Perch and Atlantic Croaker juveniles between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572; PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Historical impingement rates for the aquatic community from SGS (2003 to 2010) and HCGS (1986 to 1987) were used to estimate potential impingement losses associated with the operation of a new nuclear power plant at the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; VJSA 1988-TN2564; ECS 1989-TN2572). HCGS is more similar to a new nuclear power plant at the PSEG Site with a closed-cycle cooling system design, versus the once-through cooling system of SGS. SGS withdraws larger volumes of water from the Delaware River Estuary with a faster through-screen velocity (roughly 0.9 fps), and therefore, SGS would be expected to impinge more fish than the closed-cycle cooling systems of HCGS and a new nuclear power plant at the PSEG Site.

PSEG examined the most recent HCGS impingement data from 1986 and 1987 with same year impingement data for SGS and derived a correction factor by dividing the HCGS data by the SGS data to allow comparison between the two plants and normalize the differences in intake volume and velocity (VJSA 1988-TN2564; ECS 1989-TN2572). Examination of 1986 to 1987 density impingement rates for finfish show a total impingement density average of 2,095.4 organisms per million m^3 total water volume for HCGS and 2,643.6 organisms per million m^3 total water volume for SGS. When combining both finfish and blue crab impingement rates, HCGS has a total impingement density average of 4,545.5 organisms per million m^3 total water volume, and SGS has a total impingement density average of 4,189.1 organisms per million m^3 total water volume. The more recent impingement rates for SGS between 2003 and 2010 report a finfish impingement rate of 3,152.5 organisms per million m^3 total water volume and a combined blue crab and finfish impingement rate of 3,842.9 organisms per million m^3 total water volume. Therefore, a correction factor may not be needed to assess total organism impingement, and PSEG used a conservative approach in its environmental report for assessing potential impingement rates for a new nuclear power plant. However, for comparative purposes, PSEG presented in its environmental report both the conservative assumption and the correction factor for estimating potential impingement rates (PSEG 2014-TN3452).

Sampled total finfish density was moderately lower at HCGS relative to SGS using data sets either from 1986 to 1987 or from 2003 to 2010, possibly because of the lower approach velocities to the HCGS screens. The only commercially important invertebrate vulnerable to substantial impingement by the intake structure of a new nuclear power plant at the PSEG Site is the blue crab. Blue crab densities for impingement samples at SGS were 690.4 per million m^3 total water volume between 2003 and 2010 and 1,542.5 per million m^3 total water volume in 1986 to 1987. At HCGS, blue crabs were impinged at a mean rate of 2,450.1 per million m^3 total water volume in 1986 to 1987 (see Table 2). It is possible that the rate of impingement at a new nuclear power plant at the PSEG Site for blue crab may be less than in 1986 to 1987 because there was a significant drop in impingement abundance of blue crab at SGS between the sampling dates in the 1980s and the average of 8 years of more recent sampling.

The applicant estimated impingement rates of finfish at a new nuclear power plant at the PSEG Site by multiplying the more recent SGS impingement densities by a correction factor representing the ratio of the total finfish impingement density at HCGS (1986 to 1987) to that of SGS for the same period. Recent examination of these data sets and impingement rates derives the correction factor to be 0.79 (2,095.4/2,643.6). It is reasonable to use the historical

HCGS impingement rate correction factor for the estimate of impingement rate at a new plant at the PSEG Site because the intake design velocity for a new plant (less than 0.5 fps) is more comparable to HCGS than to SGS (roughly 0.9 fps). Thus, the estimated total impingement rate of finfish due to operation of a new plant is 2,490.5 per million m^3 total water volume compared to the more recent impingement rate of 3,152.5 per million m^3 total water volume for SGS. White Perch, Atlantic Croaker, and Weakfish (*Cynoscion regalis*) are expected to comprise the majority of the impingement total. The proposed maximum rate of water withdrawal for a new nuclear power plant at the PSEG Site is equivalent to 3.7 percent of the intake flow at SGS (PSEG 2014-TN3452). Assuming a constant withdrawal of 78,196 gpm for a new plant, and using the 79 percent correction factor for finfish impingement, a new plant would result in impingement of an estimated 386,526 fish annually. Using the conservative assumption with no correction factor, and a maximum rate of water withdrawal for a new plant of 3.7 percent of the intake flow of SGS, approximately 489,148 fish would be impinged annually at a new plant at the PSEG site (PSEG 2014-TN3452).

The intake structure for a new nuclear power plant at the PSEG Site would contain traveling screens to collect debris and fish. Impinged organic debris and aquatic organisms would be washed from the traveling screens and returned to the Delaware River Estuary. Mixed organic and manmade debris (e.g., wood, plastic) collected from the trash racks would be disposed of offsite.

Details about the screen design, screen wash, and fish return system for a new plant are not available, but PSEG has stated in its environmental report that the screen design would be compliant with EPA 316(b) Phase I requirements specified in 40 CFR 125.84 (40 CFR 125-TN254), would be similar to screens at HCGS, and would include low-pressure screen washes to safely remove impinged organisms and water-filled fish buckets to improve the survival of screen-washed fish and shellfish until they are transported back to the Delaware River Estuary by the fish return system (PSEG 2014-TN3452).

In terms of numbers, the estimated impingement of most fish species is a small percentage of the commercial and recreational harvests of these species in Delaware and New Jersey as described in Section 2.4.2. Blue crab, Weakfish, White Perch, and Atlantic Croaker potentially would have the highest impingement rates at a new nuclear power plant at the PSEG Site. However, it is expected that a large portion of these impinged organisms would survive because of the comparable impingement mortality recorded for SGS with a higher through-screen velocity than would be used for a new plant. Based on the planned low through-screen intake velocity and the use of closed-cycle cooling, the review team concludes that impacts from impingement of aquatic organisms at a new nuclear plant at the PSEG Site would be minor.

2.3.1.2 Entrainment

Small, passively drifting, or weakly swimming aquatic organisms that are drawn into the intake and pass through the openings in the traveling screens would be killed by passage through the closed-cycle cooling system. Some entrained organisms are present year-round, such as phytoplankton and many types of zooplankton. These diverse plant and animal species (often referred to as holoplankton) are abundant throughout the Delaware River Estuary and have short generation times, so they can rapidly replace losses due to entrainment, heat shock, and other stresses. Other entrained organisms, such as the larval stages of fish, crabs, and other bottom-dwelling crustaceans, are present only seasonally near the proposed intake of a new nuclear power plant at the PSEG Site. However, many of these seasonally planktonic organisms (collectively referred to as meroplankton) have longer life spans and generation times, so losses from cooling system effects are not as readily replaced.

The history of entrainment sampling at SGS and analyses of entrainment losses are described in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants—Supplement 45: Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2 Final Report (NRC 2011-TN3131). Most recently, entrainment of fish eggs, larvae, juveniles, and adults in the SGS cooling water system was studied between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Over the 8-year period, between 25 and 38 species were identified each year among the entrained fish (eggs, larvae, small juveniles, and adults). Of these, 92 percent of the entrainment samples were composed of two species: Bay Anchovy (75.3 percent) and Naked Goby (Gobiosoma bosc) (16.7 percent). Additional species that comprised over 98 percent of all entrained species included Atlantic Croaker (3.5 percent), Striped Bass (1.4 percent), Weakfish (0.8 percent), Atlantic Menhaden (0.4 percent), and Atlantic Silverside (0.4 percent). Bay Anchovy was the most abundantly entrained species for the egg (99.7 percent) and adult (57 percent) life stages, while Naked Goby was the most abundantly entrained larval species (49 percent), and Atlantic Croaker was the most abundantly of entrained juvenile species (56 percent) (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Seasonal vulnerability to entrainment is species-specific. For example, eggs, larvae, and juveniles of Bay Anchovy were most numerous in entrainment samples in summer months (June and July), whereas Atlantic Croaker juveniles were most abundant in the fall (October and November) (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). In general, the densities of entrained individuals for most fish species were greatest in the spring and/or summer, corresponding to the spawning periods for these species. Total densities of all fish life stages in the entrainment samples ranged from 54.0/100 m^3 (2003) to 264.2/100 m^3 (2007) and averaged 125.0/100 m^3 (PSEG 2014-TN3452).

PSEG applied estimated annual entrainment rates from SGS directly to calculate entrainment rates for a new nuclear power plant at the PSEG Site. The entrainment rates at SGS were applied to a new plant without a correction factor because entrained organisms are planktonic. Entrainment rates are a function of water withdrawal rates and are not influenced by through-screen velocities. Entrainment rates of holoplankton and meroplankton would be much smaller for a new plant than for SGS because of the smaller volume of water withdrawn by the closed-cycle system at a new nuclear power plant. Based on the small volume of water withdrawn for the closed-cycle cooling water system at a new nuclear power plant at the PSEG Site, the annual entrainment of organisms during operation of the intake system is expected to be minor and average less than 125 organisms per 100 m^3. Bay Anchovy, the likely dominantly entrained species for a new plant at the PSEG Site, is a highly abundant species in the area, with females spawning every 4 to 5 days over the spawning season (Zastrow et al. 1991-TN2670).

2.3.1.3 Cooling Water Discharge Impacts

Blowdown from the cooling towers, service water system, and other aqueous waste streams at a new nuclear power plant at the PSEG Site would be combined and discharged to the Delaware River Estuary at an average flow rate of 50,516 gpm (113 cfs) and a velocity of 9.2 fps, as described in Section 5.2.3.1 of the EIS. The submerged 48-in. diameter discharge pipe would be located 8,000 ft north of the SGS discharge pipe and 4,000 ft north of the HCGS discharge pipe. The outlet of the discharge pipe would be 100 ft from the shoreline, and the discharge point would be at a location 12 ft below mean lower low water and 3 ft above the river bottom (PSEG 2014-TN3452). Relative to the Delaware River Estuary, the discharged water would have an elevated temperature and increased concentration of both natural chemical constituents and chemical contaminants. Because of the tidal nature of the Delaware River Estuary in this area, the direction of the thermal discharge plume would vary with the tidal cycle (PSEG 2014-TN3452).

Thermal Impacts

Potential thermal impacts on aquatic organisms could include heat stress, cold shock, and the creation of favorable conditions for invasive species.

As described in Section 5.2.3.1 of the EIS, the portion of the Delaware River Estuary where discharge would occur is located in Zone 5 between Delaware RM 78.8 and RM 48.2. The DRBC temperature-related standards for Zone 5 require that the discharge-induced water temperature increases above the ambient water temperature in the river outside the permitted heat dissipation area (HDA) may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371) (see Figure 4). Recent trawling of the Delaware River Estuary zone in the vicinity of SGS and HCGS between 2003 and 2010 has not identified significant shifts in species abundances near the SGS and HCGS discharge areas compared with adjacent zones (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). The volume of the thermal discharge from a new nuclear power plant at the PSEG Site (50,516 gpm) is only 2.4 percent of that from SGS (about 2,100,000 gpm circulated through the once-through cooling system) (PSEG 2014-TN3452). As discussed in Section 5.2.3.1, the thermal plume of the discharge from a new plant would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. This thermal plume would be contained completely within the existing SGS HDA and would not be expected to impede fish migration. During flood tide conditions, when the median water temperature exceeds 79.4°F (26.3°C), the review team estimated that a portion of the thermal plume would exceed 86°F (30°C) because of the cumulative effects from SGS, HCGS, and a new nuclear power plant (3.6°F, 1.5°F, 1.5°F, respectively). However, the combination of high velocity discharge, turbulence in the discharge outlet area, and rapid mixing of the discharge effluent would limit the size of the thermal plume.

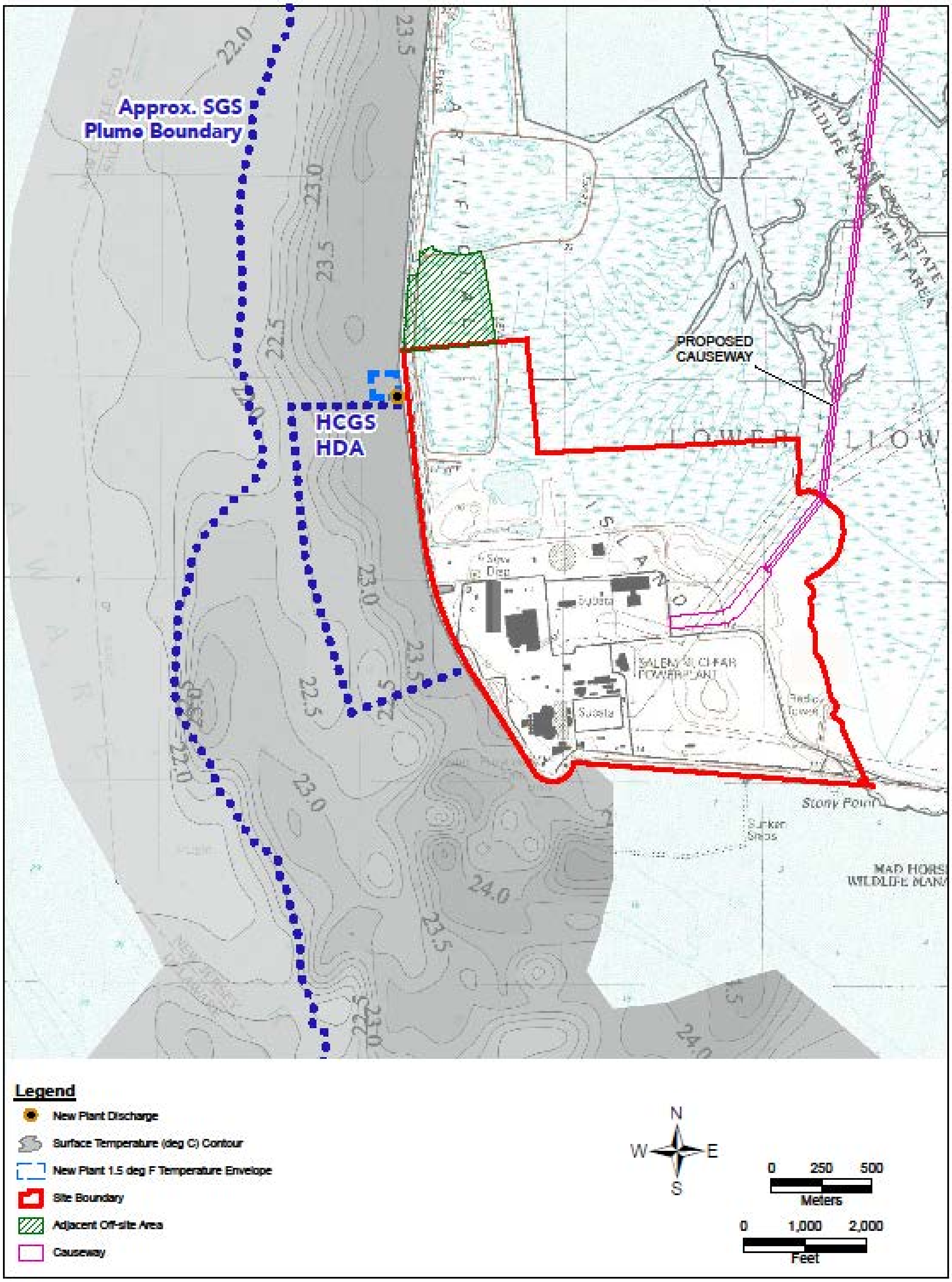

Figure 4. Predicted PSEG Thermal Plume in Relation to HCGS HDA and SGS Plume Boundary Under Flood Tide Conditions (Source: Modified from PSEG 2014-TN3452)

A factor related to thermal discharges that may affect aquatic biota is cold shock, which occurs when aquatic organisms that have been acclimated to warm water are exposed to a sudden temperature decrease. This sometimes occurs when single-unit power plants shut down suddenly in winter, or when an unseasonable cold weather event occurs. Cold shock is less likely to occur at a multiple-unit plant because the temperature decrease from shutting down one unit is moderated by the heated discharge from the units that continue to operate. Based on the foregoing, any thermal impacts on the fish populations due to cold shock would be expected to be minor.

Chemical Impacts

As described in EIS Section 3.2.1.2, the cycles of concentration increase the concentration of total dissolved solids and minerals in the blowdown. In addition, the blowdown would contain chemical additives such as biocides and pH-adjusting chemicals to ensure proper functioning of the cooling towers. Predicted concentrations of dissolved chemical constituents in the discharges from the cooling water and other systems are expected to be compliant and controlled by the terms of the NJPDES permit that would be issued for a new nuclear power plant at the PSEG Site (PSEG 2014-TN3452).

Physical Impacts

Because of the increased temperature and chemical content of the discharged water compared to ambient conditions, the plume is expected to be negatively buoyant (PSEG 2014-TN3452). Due to the high discharge velocity of 9.21 fps, there would be rapid mixing with tidal currents upstream and downstream, with some potential for scouring (erosion) occurring at the point of discharge. To minimize the scouring potential, PSEG would place riprap or other engineered features near the end of the discharge pipe and reduce the possible interactions of the discharge plume with bottom habitats and bottom-dwelling aquatic organisms (PSEG 2014-TN3452).

Barge Traffic

Use of the HCGS barge slip and the new barge storage and unloading facility are expected to be infrequent during operation. However, propeller wash may cause localized scouring and sedimentation within the barge slip. Because this area would be previously disturbed during site preparation and used during transport of building materials, it is unlikely that the temporary habitat disruption would have adverse effects on the aquatic communities in the area (PSEG 2014-TN3452). Adjacent, undisturbed habitat is available, and mobile aquatic organisms would likely avoid the barge slip area.

Maintenance Dredging

Dredging may be required to maintain use of the HCGS barge slip and intake channel, as well as the barge storage and unloading facility during operation. Any effects to water quality, such as siltation, during these infrequent periods would be temporary and would be managed through the use of Federal and State permitting requirements for use of BMPs, and dredged material disposal would be in approved upland disposal areas (PSEG 2014-TN3452). Mobile organisms in the area would avoid activities involved in dredging and could use adjacent, undisturbed habitat during the temporary disruption.

Stormwater Management

As described in EIS section 5.2.3.1, PSEG would develop an SWPPP to minimize stormwater drainage effects to nearby surface waters. The SWPPP would be required to meet NJPDES stormwater discharge requirements.

3.0 FEDERALLY LISTED SPECIES CONSIDERED

NMFS (NMFS 2010-TN2171) identified aquatic species under its jurisdiction that are Federally listed as threatened or endangered and one species that was listed as a candidate species that may occur in the Delaware River Estuary in the vicinity of a new nuclear power plant at the PSEG Site. By 2013, the previously listed candidate species (Atlantic Sturgeon, *Acipenser oxyrinchus oxyrinchus*) was updated to endangered, and an updated list of Federally protected species near the PSEG Site was provided by NMFS (NMFS 2013-TN2804). These species are listed in Table 1 and also are described in detail in the following sections.

3.1 Loggerhead Sea Turtle

3.1.1 Species Description

The Federally threatened loggerhead turtle (*Caretta caretta*) has a slightly elongated, heart shaped carapace that tapers towards the posterior and has a broad, triangular head (NRDC 2009-TN2788). Loggerheads normally weigh up to 450 pounds (lb; 200 kilograms [kg]) and attain a straight carapace length of up to 48 in. (120 cm) (NRDC 2009-TN2788).

Loggerheads reach sexual maturity at about 35 years of age (NMFS 2013-TN2792). Females nest on sandy ocean beaches every other to every third year from April through September along the southeastern coast of the U.S., and nesting usually peaks in late June and July (Dodd 1988-TN354). Females lay 2 to 3 clutches of eggs per nesting year, and each clutch consists of 35 to 180 eggs that hatch in 46 to 68 days (NMFS 2013-TN2792).

3.1.2 Distribution and Habitat

Loggerhead turtles are circumglobal and, in the western Atlantic Ocean, occur from Argentina northward to Newfoundland, including the Gulf of Mexico and the Caribbean Sea. Adult loggerheads occupy oceanic beaches, deepwater ocean, and nearshore ocean habitats during their migration from foraging habitats to nesting beaches (Dodd 1988-TN354). Adult female loggerheads nest above the high-tide line and sometimes in vegetation at the top of sandy beaches. Approximately 90 percent of the loggerhead nesting activity in the United States is in Florida (Meylan et al. 1994-TN2806). Newly emerged turtles immediately crawl toward the sea, probably orienting toward the reflected light of the moon (Dodd 1988-TN354). Those that reach the water swim rapidly offshore. The initial swimming frenzy may take them 13 to 17 mi offshore. They remain offshore for 3 to 5 years (NMFS 2013-TN2792) and are about 1.5 ft long when they return to coastal waters to forage as subadults. Subadult and adult loggerheads are primarily bottom feeders, foraging in coastal waters for benthic mollusks and crustaceans (Plotkin 1995-TN2508).

3.1.3 Population Trends and ESA Status

The U.S. Fish and Wildlife Service (FWS) listed the loggerhead on the Federal List of Endangered and Threatened Wildlife under the ESA on July 28, 1978 (43 FR 32800-TN2753). A 5-year review considered 52 populations throughout the Atlantic, Pacific, and Indian oceans and concluded loggerhead populations could be separated into distinct population segments (DPSs) (NMFS and FWS 2008-TN360). On March 16, 2010, the NMFS published a proposed rule to list nine loggerhead DPSs under the ESA (75 FR 12598-TN2763). The proposed rule identifies the Northwest Atlantic DPS, which includes those loggerheads nesting along the coasts of North America, Central America, northern South America, the Antilles, and the Bahamas, as an endangered DPS. This DPS constitutes the most significant nesting assemblage of loggerheads in the western hemisphere, would include those loggerheads that migrate as far north as New Jersey, and has been reported to show declining numbers of observable nests over the last several decades (75 FR 12598-TN2763). In addition, mortality from fishery bycatch of commercial gillnet, longline, and trawl fisheries throughout the nearshore and offshore Atlantic Ocean is a significant threat to the persistence of this DPS, and increased risk of vessel strike for migrating loggerheads has also become a growing concern (75 FR 12598-TN2763). Despite conservation efforts to protect nesting habitat and improve fishing methods to reduce bycatch, the Northwest Atlantic DPS is currently under consideration to be upgraded from threatened to endangered (75 FR 12598-TN2763). There is no reported loggerhead turtle nesting along Delaware Bay beaches, though they do forage in the bay. Loggerhead turtles are historically the most commonly observed sea turtle species in the vicinity of PSEG (Eggers 1989-TN2778).

3.2 Green Sea Turtle

3.2.1 Species Description

The Federally threatened green sea turtle (*Chelonia mydas*) is the largest of the hard-shelled sea turtles but has a small, nearly oval carapace and a small, rounded head (NRDC 2009-TN2788). Full grown adult green turtles weigh 220 to 330 lb (100 to 150 kg) and attain a straight carapace length of 35 to 40 in. (90 to 100 cm) (NRDC 2009-TN2788).

Green turtles reach sexual maturity at 20 to 50 years of age (NMFS 2013-TN2796). In the southeastern U.S., females nest between June and September, with peak nesting between June and July (NMFS 2013-TN2796). Although males mate annually, females only nest every two to four years (NMFS 2013-TN2796). Mature females may nest an average of 5 times per season at about 14-day intervals. The average clutch size is around 135 eggs, which usually hatch within 60 days (NMFS 2013-TN2796).

3.2.2 Distribution and Habitat

In the western Atlantic, several major assemblages have been identified and studied (NMFS and FWS 1991-TN358). In U.S. Atlantic waters, green turtles are found around the U.S. Virgin Islands, Puerto Rico, and the continental United States from Texas to Massachusetts (NMFS and FWS 1991-TN358). Nesting grounds extend from Texas to North Carolina, as well as in the U.S. Virgin Islands and Puerto Rico, and important feeding ground within the U.S. Atlantic and

Gulf of Mexico includes the Indian River Lagoon, the Florida Keys, Florida Bay, Crystal River, and St. Joseph Bay (NMFS 2013-TN2796). Critical habitat is designated in waters around Isla Culebra, Puerto Rico (NMFS 2013-TN2796).

Green turtles occupy three habitat types at different stages in their life cycle. For nesting, females require the high-energy (wave active), sandy beaches of barrier islands and mainland shores above the high-water line. Upon emergence, hatchlings immediately seek out the shore and open water. Juvenile green turtles drift with the prevailing surface-water currents until they reach a size of 12 to 16 in., at 1 to 3 years, and then return to shallow coastal waters. Juvenile green turtles and adults spend most of their lives in shallow benthic feeding grounds. Foraging habitats for juvenile and adult green turtles are primarily pastures of seagrasses or macroalgae in less than 66 ft of water. A favorite seagrass food of green turtles throughout the Caribbean and south Florida is turtle grass (*Thalassia testudinum*). *Thalassia* is a highly productive seagrass and can support as many as 138 adult female green turtles per hectare. However, juvenile green turtles often are found over shallow hard-bottom habitats, such as coral and rocky reefs (NMFS and FWS 1991-TN358). During feeding, subadult green turtles do not wander far but rather remain within a small area of 0.4 mi^2 or less. A typical dive cycle during feeding in Florida lasts about 33 minutes, of which 1 minute is spent at the surface between dives and 30 minutes is spent on the bottom foraging on seagrass or algae. Thus, green turtles are hard to monitor in their feeding grounds because they spend more than 50 minutes of each hour submerged (Nelson 1988-TN2808).

3.2.3 Population Trends and ESA Status

The FWS listed the green sea turtle on the Federal List of Endangered and Threatened Wildlife under the ESA on July 28, 1978 (43 FR 32800-TN2753), and the NMFS and FWS published a recovery plan for the U.S. green turtle population in 1991 (NMFS and FWS 1991-TN358). In 2007, the NMFS and FWS published a 5-year review of the green sea turtle (NOAA and FWS 2007-TN1587) and reported that four of the six major nesting rookeries had shown population increases, and data for the other two nesting rookeries indicated that the populations were stable. NMFS and FWS (NOAA and FWS 2007-TN1587) recommended that the green sea turtle remain listed under the ESA but that a review of the species should be conducted to determine the applicability of the 1996 DPS policy (61 FR 4722-TN2756) to the species.

Most sources of mortality for sea turtles in U.S. coastal waters, including green turtles, are human activities, such as incidental take in bottom trawls, particularly shrimp and summer flounder nets; coastal gill net and pound net fisheries (Witzell and Cramer 1995-TN2809); ingestion of marine debris (Witzell and Teas 1994-TN2509); and channel dredging (NMFS and FWS 1991-TN358).

Collisions with boats, particularly boat propellers, also are an important cause of the death of green turtles found stranded on the shore. Oil pollution from spills and tank cleaning may kill some green turtles and other marine turtles through tarball ingestion or fouling of the body with oil from surface slicks. Three Atlantic green sea turtles were reported at the SGS intake between 1980 and 1992 (PSEG 2014-TN3452), but none have been reported at the SGS intake since 1992 (NRC 2010-TN2811).

3.3 Hawksbill Sea Turtle

3.3.1 Species Description

The Federally endangered hawksbill (*Eretmochelys imbricata*) is a medium-sized tropical and subtropical species that inhabits the warm waters of the Atlantic, Pacific, and Indian oceans (NMFS and FWS 2013-TN2507). The hawksbill is the most tropical of the sea turtles and is restricted primarily to warmer waters more than the other four sea turtles found in the Gulf of Mexico. In U.S. territorial waters, hawksbills occur along the U.S. coast of south Texas and along the Gulf and Atlantic coasts of Florida, although adults may migrate farther up the Atlantic coast as opportunistic foragers. Adult nesting females have a carapace length of about 34 in. and weigh about 176 lb. The largest hawksbill on record weighed 276 lb. Hatchlings are about 1.7 in. long and weigh 0.5 to 0.7 ounce (NMFS and FWS 2013-TN2507). Hawksbills are believed to reach reproductive age in 20 years, and females nest approximately every other year (NMFS and FWS 2013-TN2507). Newly hatched hawksbill turtles occupy oceanic habitats associated with sargassum mats and other floating vegetation. Once juveniles reach 20 to 30 cm in carapace length, they switch to neritic habitats and feed on algae and small crustaceans (NMFS and FWS 2013-TN2507).

3.3.2 Distribution and Habitat

Much more is known about hawksbill nesting sites than habitat usage during non-reproduction life histories. Hawksbills show a high fidelity to their nesting beaches and return to the same or a nearby beach year after year (Meylan 1989-TN2163). There have only been a few verified reports of hawksbill turtle nesting in south Florida, mostly on the east coast (NMFS and FWS 2013-TN2507). Juveniles and subadults tend to remain and feed on coral reefs near their natal beaches. Like other species of sea turtles, hatchling hawksbills congregate in sargassum rafts to feed and grow for a year or more after emerging from the nest (NMFS and FWS 2013-TN2507). While in the sargassum rafts, they consume pelagic fish eggs and larvae, small invertebrates associated with the floating algae, and the sargassum itself. Subadults and adults are omnivorous scavengers. They seem to prefer benthic invertebrate prey, particularly sponges and biofouling organisms. Because of their food preferences, they tend to be most abundant in shallow coral and rocky reef habitats.

3.3.3 Population Trends and ESA Status

First listed as endangered in 1970 (35 FR 8491-TN2751), the status of the hawksbill was reviewed for status potential in 1995 (Plotkin 1995-TN2508). A 5-year review published in 2013 indicates that numbers of adults, subadults, and juveniles are increasing in the Caribbean and Florida foraging areas (NMFS and FWS 2013-TN2507). In the U.S. Caribbean and the Florida Keys, overexploitation severely depleted hawksbills during the 20th century. At present, since banning the sale of turtle shell products, they may be no longer in decline in the Atlantic region.

Hawksbill turtles are subjected to and share many of the natural and anthropogenic disturbances as the other sea turtles in Atlantic waters. The two main concerns that affect hawksbills are climate change and commercial fishery activities. Climate change through increased sea temperatures, changes in circulation patterns, and sea-level rise may result in reproductive behaviors and temperature-dependent sex determination, beach erosion, and reduced availability of foraging resources (IPCC 2007-TN2801). Hawksbills are also susceptible to nearshore fishery practices such as drift netting, trawling, and long-lining (NMFS and FWS 2013-TN2507). Strandings of hawksbills are restricted almost exclusively to Florida, Puerto Rico, and the U.S. Virgin Islands. Hawksbills appear to be unusually vulnerable to ingestion of marine debris, particularly plastics. Nearly 90 percent of the debris ingested by hawksbills is plastic bags, plastic and Styrofoam particles, and tar (Witzell and Teas 1994-TN2509). There have been no formal documented reports of hawksbill sea turtles in the vicinity of the PSEG Site.

Hawksbill turtles do not nest along Delaware Bay beaches, have not been documented in Delaware Bay water, and have not been taken at SGS since preoperational and operational monitoring studies were initiated. The review team concludes that building and operation of a new nuclear power plant at the PSEG Site would have no effect on hawksbill sea turtles, and this species will not be discussed further.

3.4 Kemp's Ridley Sea Turtle

3.4.1 Species Description

The Federally endangered Kemp's ridley (*Lepidochelys kempii*) is the smallest of living sea turtle species. Adults weigh up to 90 lb (42 kg) and attain a straight carapace length up to 27 in. (70 cm) (NRDC 2009-TN2788).

Kemp's ridleys reach sexual maturity between the ages of 10 and 15 years (IUCN-MTSG 2013-TN2800). During the nesting season, females aggregate onshore in large groups to lay 2 to 3 clutches of about 100 eggs each between May and July along the coast near Rancho Nuevo, Tamaulipas, Mexico (NMFS 2013-TN2795). Kemp's ridley eggs hatch in 45 to 70 days, and 1.5-in. (3.8-cm) hatchlings emerge 2 to 3 days later (NMFS 2013-TN2795). Those hatchlings that reach the water quickly move offshore and remain in the open sea until maturity.

3.4.2 Distribution and Habitat

The Kemp's ridley has the most restricted geographical range of the sea turtle species because it is only known to primarily nest in one main beach area—Rancho Nuevo, Tamaulipas, Mexico (NMFS and FWS 2007-TN2793). Females occasionally use two additional nesting grounds in Padre Island, Texas, and Veracruz, Mexico (TEWG 2000-TN2784). Adults migrate through the Gulf of Mexico, the Caribbean, and the northwest Atlantic Ocean.

Hatchlings migrate rapidly down the beach and out to sea, where they spend a period of perhaps 2 years in the pelagic zone. They are about 8 in. long at the end of the pelagic period. Little is known about the feeding behavior and food preferences of hatchling Kemp's ridley turtles during their pelagic stage; they presumably feed on zooplankton and floating matter, including sargassum weed and the associated biotic community. Following a pelagic feeding stage shortly after hatching and lasting for several months, the juvenile ridleys move into shallow coastal waters to feed and grow. The young subadults often forage in water less than 3 ft deep, but they tend to move into deeper water as they grow. Juvenile to adult ridleys prey on crabs, particularly blue crabs; mollusks; and small fish. Because of their preference for crabs and other primarily shallow-water demersal prey, juvenile and adult ridley turtles concentrate in coastal waters less than 30 ft deep throughout their range. They make long dives to the bottom and may feed on the bottom for an hour or more at a time (TEWG 2000-TN2784).

3.4.3 Population Trends and ESA Status

The FWS listed the Kemp's ridley on the Federal List of Endangered and Threatened Wildlife under the ESA on December 2, 1970 (35 FR 18319-TN2752), and NMFS and FWS published a recovery plan for the species in 1992 (NMFS and FWS 1992-TN2798). The major factors in the historic decline of ridley turtles are thought to be predation (animal and human) of eggs on the major nesting beach and incidental take in commercial fisheries in the U.S. and Mexican Gulf of Mexico and western North Atlantic. Current impacts include anthropogenic disturbance, entanglement in fishing gear (e.g., monofilament fishing line or discarded fishing nets), and marine debris ingestion (e.g., plastic bags and plastic particles). Under some circumstances, chemical pollution may be a threat to ridley turtles. Recovery efforts have made progress in the protection of this species, and the current Kemp's ridley recovery plan (NMFS et al. 2010-TN1691) predicts that, assuming current survival rates remain constant, the Kemp's ridley population will grow between 12 and 16 percent per year and could reach 10,000 nesting females per season by 2015. Kemp's ridley sea turtles are known to occur in Delaware Bay waters near the PSEG Site (Eggers 1989-TN2778).

3.5 Leatherback Sea Turtle

3.5.1 Species Description

The Federally endangered leatherback sea turtle (*Dermochelys coriacea*) is the largest living sea turtle and the only sea turtle that does not have a hard, bony shell. It has a leathery, blue-black shell composed of a thick layer of oily, vascularized, cartilaginous material, strengthened by a mosaic of thousands of small bones. Leatherbacks can weigh up to 2,000 lb (900 kg) and attain a straight carapace length of 55 in. (140 cm) (NMFS 2013-TN2794; NRDC 2009-TN2788).

Leatherbacks reach sexual maturity at the age of 12 to 15 years. Leatherbacks mate in waters adjacent to nesting grounds, and the species nests around the world, including along the coasts of northern South America, west Africa, the U.S. Caribbean, the U.S. Virgin Islands, and southeast Florida (NMFS 2013-TN2794). Females nest from late February or March through September; during the season, they nest 1 to 9 times at about 9- to 17-day intervals. Females lay between 50 and 170 eggs, which hatch within 50 to 75 days (NMFS 2013-TN2794).

3.5.2 Distribution and Habitat

Leatherbacks are circumglobally distributed and occur in the Atlantic, Indian, and Pacific oceans. Leatherback turtles are a largely oceanic, pelagic species, but they also forage in coastal waters. Juveniles and adults feed throughout the water column to depths of at least 3,900 ft, consuming jellyfish and other gelatinous zooplankton, such as salps, ctenophores, and siphonophores (NMFS 2013-TN2794). Most feeding dives average about 200 ft but frequently extend from 985 to 1300 ft (Eckert 2002-TN3359). In the past, the leatherback's seasonal inshore movements off south Texas have been linked to inshore movements of their preferred jellyfish prey. Only a small fraction of the Gulf of Mexico and North Atlantic leatherback populations nest on beaches of the continental United States, mostly in Florida and the U.S. Virgin Islands, where nesting occurs from April to July (Meylan et al. 1994-TN2806). Because leatherback turtles are a largely oceanic, pelagic species, estimates of their population status and trends have been difficult to obtain. In addition, nesting females do not have the nest-site fidelity exhibited by other turtles and tend to move to different beaches in different years (NMFS 2013-TN2794). Therefore, it has been difficult to estimate temporal trends in population size.

3.5.3 Population Trends and ESA Status

The FWS listed the leatherback on the Federal List of Endangered and Threatened Wildlife under the ESA on June 2, 1970 (35 FR 8491-TN2751). In the 2007 5-year review of the species, NMFS and FWS (NMFS and FWS 2007-TN1690) indicated that the Atlantic population within Florida has shown an increase in nests from 98 in 1988 to 800 to 900 in the early 2000s. Nesting also increased in Puerto Rico, the U.S. Virgin Islands, and the British Virgin Islands from the 1980s to the 2000s (NMFS and FWS 2007-TN1690). Leatherbacks are especially susceptible to entanglement in fishing gear and plastic debris (Witzell and Teas 1994-TN2509). Because they are adapted to a pelagic existence, they have trouble maneuvering in tight places, swimming backward, and avoiding obstructions in shallow waters. The large front flippers of leatherbacks often bear cuts or chafing marks or are severed altogether, possibly because of entanglement. Because of their preferred diet of gelatinous zooplankton, particularly jellyfish, leatherback turtles often ingest floating plastic debris, mistaking it for food (Wallace 1985-TN2810). The leatherback turtle does not nest along Delaware Bay beaches and has not been documented in Delaware Bay waters. Like the hawksbill turtle, leatherback turtles have not been taken at the SGS since preoperational and operational monitoring studies were initiated. Therefore, the review team concludes that building and operating a new nuclear power plant at the PSEG Site would have no effect on leatherback sea turtles, and this species will not be discussed further.

3.6 Shortnose Sturgeon

3.6.1 Species Description

The Shortnose Sturgeon (*Acipenser brevirostrum*) is an anadromous, primitive bony fish that can be differentiated by other sturgeon species by its smaller size and shorter and blunter nose than other sturgeon species. Shortnose Sturgeon grow to a length of 4.7 ft (1.4 m) and typically weigh up to 50.7 lb (23 kg) (NMFS 2013-TN2791). Juveniles mature into adults at a fork length of 18 to 22 in. (45 to 55 cm), which, in the Delaware River Estuary, coincides to about 3 to 5 years of age in males and 6 to 7 years of age in females (NMFS 2013-TN2791). The Shortnose's lifespan varies from 30 years (males) to 67 years (females). The Shortnose Sturgeon migrates earlier in the year than other Atlantic Sturgeon species. Adults begin to migrate upstream to freshwater in the winter, spend most of the winter in deep waters of rivers and estuaries, and spawn between January and mid-May (Dadswell et al. 1984-TN2780). Water temperature is a major determining factor of spawning time, and Shortnose begin to spawn when water temperatures reach 46 to 48°F (8 to 9°C) (Gilbert 1989-TN2149), which in the Delaware River Estuary is early to mid-April (NOAA 2013-TN2790). Females produce 40,000 to 200,000 dark brown to black-colored eggs each spring and lay their eggs in fast flowing waters over rock, rubble, or hard clay substrate (Gilbert 1989-TN2149). Eggs are separate when spawned but become adhesive within 20 minutes of being fertilized and adhere to hard substrates on the river bottom (Dadswell et al. 1984-TN2780). Eggs hatch in 4 to 15 days with incubation time being inversely correlated with water temperate; eggs hatch in 8 days at 63°F (17°C) and in 13 days at 50°F (10°C) (Gilbert 1989-TN2149). Larvae consume their yolk sac and begin feeding in 8 to 12 days, as they migrate downstream and away from the spawning site (Gilbert 1989-TN2149). Juveniles feed on benthic insects and crustaceans and remain in freshwater until the following winter, at which time they migrate to brackish estuaries, where they remain for 3 to 5 years. As adults, they migrate to the nearshore marine environment, where their diet consists of mollusks and large crustaceans (Shepherd 2006-TN2785).

3.6.2 Distribution and Habitat

Shortnose Sturgeon inhabit rivers, estuaries, and nearshore marine environments. The species spawns in coastal rivers along the Atlantic coast from St. John River, New Brunswick, Canada, south to St. Johns River, Florida (NMFS 2013-TN2791). Shortnose occur in most major river systems along the Atlantic coast, including the Savannah River, Georgia; the Chesapeake Bay system; the Delaware River; the Hudson River, New York; the Connecticut River; and the lower Merrimack River, Massachusetts (NMFS 2013-TN2791). Surveys of Shortnose Sturgeon movement in the Delaware River Estuary revealed an overwintering population of about 6,000 to 14,000 fish in the upper tidal portion of the Delaware River Estuary near Trenton at RKM 211.8 (RM 131.6) (Hastings et al. 1987-TN2260). Shortnose Sturgeon move upstream into the non-tidal reach of the Delaware River in late March presumably to spawn before traveling downstream to lower tidal waters near Philadelphia (O'Herron et al. 1993-TN2261). Hastings et al. (Hastings et al. 1987-TN2260) observed upstream movement to non-tidal water as far as Lambertville at RKM 238 (RM 147.9), and there are some records that indicate Shortnose Sturgeon occur as far upriver as Frenchtown near RKM 263.5 (RM 163.7) (NJDEP 2013-TN2722).

Shortnose Sturgeon larvae hatch in freshwater, and juveniles migrate from freshwater riverine environments to brackish estuarine environments between the ages of 3 and 5 years. Adults inhabit nearshore marine areas and are not believed to travel long distances offshore during their annual migration routes (NMFS 2013-TN2791).

3.6.3 Population Trends and ESA Status

No historical population estimates are available for the Shortnose Sturgeon. Though never widely commercially fished, the species was often incidentally taken in fishing gear, and by the 1950s, the lack of recorded Shortnose landings led the FWS to conclude that the species was in danger of extinction (NMFS 2013-TN2791). The FWS listed the Shortnose Sturgeon on the Federal List of Endangered and Threatened Wildlife under the ESA on March 11, 1967 (32 FR 4001-TN2750). A Recovery Plan was developed for the species in 1998, which recognized 19 DPSs along the Atlantic Coast because Shortnose Sturgeon return to their natal rivers to spawn each year, resulting in minimal genetic intermixing (NMFS 1998-TN2783). NMFS initiated a status review of the Shortnose Sturgeon on November 30, 2007 (72 FR 67712-TN2759). NMFS expected to complete the status review in 2009; however, the deadline for providing comments pertaining to the review was extended on January 29, 2008 (73 FR 5177-TN2760), and to date, this status review has not been published. Shortnose Sturgeon are known to occur in waters near the PSEG Site.

3.7 Atlantic Sturgeon

3.7.1 Species Description

The Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) is an anadromous bony fish that can grow to 14 ft (4.3 m) and weigh up to 800 lbs (370 kg) (Gilbert 1989-TN2149; NMFS 2012-TN2797). Atlantic Sturgeon are similar in appearance to Shortnose Sturgeon—bluish-black to olive brown dorsally with pale sides and underbelly—but are larger in size and have a smaller and differently shaped mouth (NMFS 2012-TN2797). Females reach maturity at 7 to 30 years of age, and males reach maturity at 5 to 24 years of age, with those fish inhabiting the southern range maturing earlier (ASMFC 2007-TN2771).

In the mid-Atlantic, adults migrate upriver from April to May to spawn. Females in the Delaware River produce 0.8 to 2.4 million highly adhesive eggs, which fall to the bottom of the water column and adhere to cobble or other hard bottom substrate (ASSRT 2007-TN2082; Gilbert 1989-TN2149). Eggs hatch in 94 to 140 hours at temperatures of 20°C (68°F) and 18°C (64.4°F), respectively (ASSRT 2007-TN2082). Larvae consume their yolk sac in 8 to 12 days, during which time larvae migrate downstream into brackish water, where they live for a few months (ASSRT 2007-TN2082). When juveniles reach a size of 30 to 36 in. (76 to 92 cm), they migrate to nearshore coastal waters, where they feed on benthic invertebrates, including crustaceans, worms, and mollusks (NMFS 2012-TN2797).

3.7.2 Distribution and Habitat

Historically, the Atlantic Sturgeon has inhabited riverine, estuarine, and coastal ocean waters from the St. Lawrence River, Canada, to St. Johns River, Florida (ASMFC 2013-TN2770). However, within the U.S., the species is only known to remain in the Hudson River, Delaware River, and a few South Carolina river systems (ASMFC 2013-TN2770). At one time, the Delaware River Estuary supported the largest population of Atlantic Sturgeon along the Atlantic coast (Secor and Waldman 1999-TN2207). Tagging studies in 2005 and 2006 indicated that Atlantic Sturgeon follow migration patterns similar to Shortnose Sturgeon with spawning potentially occurring in mid-to-late June in the upper tidal Delaware reaches between Philadelphia, Pennsylvania, and Trenton, New Jersey (Simpson and Fox 2007-TN2194).

Atlantic Sturgeon larvae hatch in freshwater, and larvae migrate from freshwater to brackish estuarine environments, where they remain for a few months to a few years (NMFS 2012-TN2797). Juveniles and non-spawning adults inhabit estuaries and coastal marine waters dominated by gravel and sand substrates (NMFS 2012-TN2797).

3.7.3 Population Trends and ESA Status

Atlantic Sturgeon have been commercially fished from as early as 1628, though a substantial Atlantic Sturgeon fishery did not appear until the late 1800s (Shepherd 2006-TN2785). In 1998, the Atlantic States Marine Fisheries Commission, which manages the commercial harvest of the species, instituted a moratorium on Atlantic Sturgeon harvest in U.S. waters (NMFS 2012-TN2797). Based on data from 2001 to 2006, the ASMFC (ASMFC 2007-TN2771) estimated that between 2,752 and 7,904 individuals per year are caught as bycatch in sink gillnets, and 2,167 to 7,210 individuals per year are caught as bycatch in trawls. In a 2007 Status Review of the species, the Atlantic Sturgeon Status Review Team (ASSRT 2007-TN2082) noted that little is known about the size and spawning of the Delaware River population, but that the current population has been greatly reduced within all life stages.

On October 6, 2010, the NMFS published Proposed Listing Determinations for five Atlantic Sturgeon DPSs and listed the Atlantic Sturgeon as endangered (75 FR 61872-TN2758; 75 FR 61904-TN2764). The PSEG Site in the Delaware River Estuary is part of the proposed New York Bight DPS, which includes the Long Island Sound, the New York Bight, and the Delaware Bay from Chatham, Massachusetts, to the Delaware–Maryland border. On February 6, 2012, the Atlantic Sturgeon New York Bight DPS was listed as endangered (77 FR 5880-TN2081). Atlantic Sturgeon are known to occur in waters near the PSEG Site.

4.0 PROPOSED ACTION EFFECTS ANALYSIS

A new nuclear power plant at the PSEG Site may affect Federally listed species in the Delaware River Estuary in the following ways:

1. Dredging and in-water installation activities associated with improvements to the existing HCGS barge slip, a new barge storage area and unloading facility, the intake and discharge structures, and causeway structures
2. Impingement of listed individuals as juveniles or adults at the facilities' water intake point (impingement occurs when aquatic organisms are pinned against intake screens or other parts of the cooling water system intake structure)
3. Entrainment of eggs or larvae of listed species at the facilities' water intake point (entrainment occurs when aquatic organisms—usually eggs, larvae, and other small organisms—are drawn into the cooling water system)
4. Discharge of cooling water effluent at the facilities' discharge point (thermal, chemical, and physical effects may occur to aquatic organisms present in the vicinity of the point of discharge in the Delaware River Estuary)
5. Maintenance dredging of the HCGS barge slip, barge storage, and unloading facility
6. Barge traffic during building and operation may cause localized sedimentation and scouring

4.1 Dredging and In-Water Building

For each of the sea turtle and sturgeon species, dredging and in-water building activities and barge traffic are not likely to affect Federally listed species that may be in the vicinity of the intake, discharge, and barge facility areas at the PSEG Site or HCGS barge slip area because the turtles and sturgeon would avoid any noise or disturbances. Causeway installation activities also are not likely to affect any sea turtle or sturgeon species because of their lack of preference for marsh creek habitat.

4.2 Impingement

HCGS has not reported any impingement of listed turtle and sturgeon species in its intake since it began operating in 1986 (PSEG 2009-TN2209), and thus, has no historical impingement records. Because a new nuclear power plant at the PSEG Site would operate using intake and discharge technologies similar to HCGS (closed-cycle cooling) and would be compliant with NJPDES permitting requirements, it is reasonable to assume that a new plant also would not be expected to impinge listed turtle or sturgeon species. The review team concludes that turtle or sturgeon strandings on the PSEG Site intake trash bars are unlikely and would be limited to moribund or compromised individuals.

4.3 Entrainment

Entrainment of sea turtle eggs or hatchlings is not possible because sea turtles lay their eggs on beaches along the southeastern coast of the United States and, after emerging, hatchlings quickly swim to deep ocean water where they remain until breeding age (NMFS 2013-TN2792). When juveniles are old enough to migrate to nearshore coastal areas, they are large enough that they would not be susceptible to entrainment.

The life history of the Shortnose and Atlantic Sturgeon species suggests that entrainment of sturgeon eggs or larvae is unlikely. As mentioned in Sections 3.6 and 3.7, respectively, within the Delaware River Estuary, Shortnose Sturgeon spawn upriver of Trenton (RM 131 [RKM 211], whereas Atlantic Sturgeon spawn between Philadelphia and Trenton (between RM 109 and RM 131 [RKM 176 and RKM 211]) in the upper freshwater–tidal reaches of the Delaware River Estuary. The PSEG site is located downriver at RM 52 (RKM 84) in brackish water. Eggs adhere to river substrate, and juvenile stages tend to remain in freshwater or fresher areas of the Delaware River Estuary for 3 to 5 years before moving downriver to more saline reaches of the Delaware River Estuary or ocean. The NRC (NRC 2011-TN3131) noted that PSEG has not collected the eggs or larvae of sturgeon in annual entrainment monitoring samples from 1978 to 2008 at either HCGS or SGS. Thus, sturgeon eggs or larvae are unlikely to be present in the water column at the PSEG Site intake, and entrainment of sturgeon eggs or larvae is unlikely.

4.4 Discharge Impacts

The potential impacts of increased water temperatures at the PSEG discharge on sea turtles and sturgeon species is expected to be minimal. Both SGS and HCGS have NJPDES permits that place thermal limits on the maximum discharge temperature and maximum change in ambient estuary temperature caused by facility discharge (NRC 2011-TN3131). The high exit velocity of discharge water produces rapid dilution, which limits high temperatures to relatively small areas of the initial mixing zone for HCGS, and is assumed to be similar for a new plant at the PSEG Site. Sea turtles and sturgeon species may largely avoid these areas because of high velocity and turbulence. As described in Section 2.3, the thermal discharge is not expected to alter foraging behavior because the buoyant thermal plume would rise toward the surface of the estuary and is limited in size. Reproduction and nursery areas for sea turtles and sturgeon species do not occur in the area of the discharge. Chemical and physical impacts also are not expected to adversely affect water quality or habitat quality in the Delaware River Estuary due to compliance with chemical discharge permitting required by the NJPDES permit, engineered placement of discharge structures, and protection of bottom habitat from scouring. Therefore, the review team does not expect the discharge from a new plant at the PSEG Site to adversely affect sea turtles or sturgeon species.

4.5 Maintenance Dredging

Dredging may be required to maintain use of the HCGS barge slip and the cooling water intake channel as well as barge storage and the unloading facility during operation. As with in-water installation activities, sea turtle and sturgeon species are not likely to be affected by maintenance dredging because sea turtles and sturgeon would avoid any noise or disturbances in the area.

4.6 Barge Traffic

Disruption of habitat in the Delaware River Estuary from sedimentation and scouring due to propeller wash is expected to be localized and temporary (PSEG 2014-TN3452). Sea turtles and sturgeon species likely would avoid habitats in the area of incoming and outgoing barge traffic and could find unaffected habitat nearby for foraging activities.

5.0 CUMULATIVE EFFECTS ANALYSIS

Many historical events have affected the Delaware Estuary and River Basin and its resources (Berger et al. 1994-TN2127). As Europeans began settling the estuary region early in the 17th century, agriculture expanded, and the clearing of forest led to erosion. Dredging, diking, and filling gradually altered extensive areas of shoreline and tidal marsh. By the late 1800s, industrialization had altered much of the watershed of the upper estuary, and fisheries were declining because of overfishing as well as pollution from ships, sewers, and industry. By the 1940s, anadromous fish were blocked from migrating upstream to spawn because of a barrier of low oxygen levels in the Philadelphia area. This barrier, combined with small dams on tributaries, nearly destroyed the herring and shad fisheries. A large increase in industrial pollution in the early-to-mid 1900s resulted in the Delaware River near Philadelphia becoming one of the most polluted river reaches in the world. Major improvements in water quality began in the 1960s and continued through the 1980s as a result of State, multi-State, and Federal actions, including the Clean Water Act and the activities of the DRBC (PDE 2012-TN2191). The Delaware Estuary and River Basin is the subject of numerous restoration activities and projects under the purview of the Partnership for the Delaware Estuary, the DRBC, and numerous research and academic institutions. In its 2012 annual report, the Partnership for the Delaware Estuary suggested that the overall environmental conditions of the region were fair (PDE 2012-TN2191). Since 2008, some conditions were found to be declining in areas such as sediment removal impairing estuarine habitats and a decline in young-of-year Atlantic Sturgeon, and some areas were seeing improvements such as a reduction of total organic carbon and an increase in Striped Bass populations (PDE 2012-TN2191).

Other actions in the vicinity that have present and reasonably foreseeable future impacts on the Delaware River Estuary include the continued operation of SGS and HCGS, the completion of dredging operations for the Delaware River Main Channel Deepening Project by the USACE, and potential construction of a new transmission corridor and transmission line by PJM Interconnection, LLC, for grid stability. Planning and development for the new transmission corridor would avoid or span channelized waterways, perennial streams, and intermittent streams (PSEG 2014-TN3452). Development for new transmission-line crossings would require BMPs to protect water quality and minimize effects to aquatic habitats that may be at risk from clearing activities, runoff, and bank erosion. An estimated 77,088 linear ft of stream habitat (S&L 2010-TN2671) is within the 5-mi-wide macro-corridor for the hypothetical transmission line discussed in Sections 7.1 and 7.3.2. The hypothetical transmission line would cross the Delaware River and would require installation of footings. Placement of footings would result in permanent benthic habitat loss, but this loss would be minimal when compared to available adjacent habitat. Installation activities would be managed through use of BMPs required for Federal and State permitting to minimize siltation and protect adjacent aquatic habitats. PSEG would consult with Federal and State agencies, as required, when an exact route is identified and installation effects to protected species can be directly assessed (PSEG 2014-TN3452).

Water quality in the region may be affected by continued withdrawal and discharge of water to support power generation. Large commercial and recreational fisheries harvest fish and invertebrates that make up the ecological community within the Delaware River Estuary. The effects of natural environmental stressors such as climate change and extreme weather events also would affect aquatic communities in the region.

Each of the current and reasonably foreseeable future activities may influence the structure and function of estuarine food webs and result in observable changes to the aquatic resources in the Delaware River Estuary. In most cases, it is not possible to determine quantitatively the impact of individual stressors or groups of stressors on aquatic resources because they affect the region simultaneously, and their effects are cumulative.

5.1 Continued Operation of the SGS Once-Through Cooling System

Based on the assessment presented in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants—Supplement 45: Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2 Final Report (NRC 2011-TN3131), NRC staff concluded that “entrainment, impingement, and thermal discharge impacts on aquatic resources from the operation of SGS Units 1 and 2 collectively have not had a noticeable adverse effect on the balanced indigenous community of the Delaware Estuary.” However, operation of SGS Units 1 and 2 continues to impinge and entrain aquatic species and would contribute, in part, to the cumulative loss of these species in the Delaware River Estuary. Several improvements to the cooling water intake structures have been made to reduce impingement mortality at SGS. Some of these improvements included installation of modified traveling screens, installation of improved screen mesh, and modifications to spray wash nozzle configurations (PSEG 2009-TN2513). Decades of monitoring and survey data for finfish and aquatic invertebrates have been used to assess species density and richness in the vicinity of SGS as directed under NJPDES permits starting in 1994 and in subsequent renewals (PSEG 2014-TN3452). Impingement, entrainment, and fish assemblage sampling by trawling and seining are conducted each year, in accordance with NJPDES permit requirements for biological monitoring. The reporting emphasis is on targeted representative important species that include Blueback Herring, Alewife (Alosa pseudoharengus), American Shad, Atlantic Menhaden, Bay Anchovy, Atlantic Silverside, White Perch, Striped Bass, Bluefish (Pomatomus saltatrix), Weakfish, Spot (Leiostomus xanthurus), and Atlantic Croaker (PSEG 2014-TN3452). All of these representative important species also are considered either recreationally or commercially important or are ecologically important as forage fish for sustainability of the ecosystem within the Delaware River Estuary. They are discussed in more detail in Section 2.4.2.3 of the EIS. Although individual species abundances change year to year, the overall trends in community abundances and diversity show no significant changes (PSEG 2014-TN3452).

5.2 Continued Operation of the HCGS Closed-Cycle Cooling System

HCGS uses closed-cycle cooling and therefore requires substantially less water volume for cooling operations (maximum of 66,000 gpm from the Delaware River Estuary). Accordingly, effects on the aquatic community through impingement, entrainment, and discharge also are expected to be reduced when compared with the once-through cooling system at SGS (NRC 2011-TN3131). Impingement studies at HCGS were performed only in 1986 and 1987 at the commencement of operation for the single unit and showed a reduced overall impingement rate when compared to SGS (see EIS Section 5.3.2). Because HCGS was operating concurrently with SGS, the NJPDES permit-directed biological monitoring of the aquatic community through trawling and seining studies also reflected the combined effect of both HCGS and SGS operations. Therefore, the conclusions regarding the effect of continued operation of SGS also apply to HCGS in that the overall species diversity and community abundances near the PSEG Site are expected to continue to show no noticeable effects from operations (NRC 2011-TN3131).

5.3 SGS and HCGS Effects on Protected Species

Relicensing of SGS and HCGS is under ongoing consultation pursuant to Section 7 of the ESA for species under NMFS jurisdiction (NRC 2010-TN2811). NMFS issued a Biological Opinion for the two facilities on May 14, 1993 (PSEG 1999-TN2787), which was amended by letter dated January 21, 1999 (NMFS 1999-TN2711).

Consultation pursuant to Section 7 of the ESA regarding the nearby SGS and HCGS has been ongoing between the NRC and NMFS since 1979. In 1980, NMFS issued a Biological Opinion that concluded that the continued operation of these facilities was not likely to jeopardize the Shortnose Sturgeon and set a take limit of up to 11 Shortnose Sturgeon per year. Sea turtles were not included in the 1980 Biological Opinion.
The NRC reinitiated consultation on August 19, 1988, because SGS had impinged a number of sea turtles. NMFS issued a revised Biological Opinion on January 2, 1991, to include sea turtles. In this Biological Opinion, NMFS concluded that continued operation of SGS and HCGS would affect sea turtles but would not jeopardize the continued existence of any populations of threatened or endangered species. The 1991 Biological Opinion also reduced the number of allowable Shortnose Sturgeon takes based on actual levels of impingement at SGS and HCGS up to that point.

NMFS modified the 1991 Biological Opinion on August 4, 1992, to increase the total allowable take limit for loggerheads and Shortnose Sturgeon. However, between June and October 1992, SGS and HCGS exceeded their take limit for Kemp's ridley mortalities and met their take limit for Shortnose Sturgeon mortalities. NMFS issued another Biological Opinion on May 14, 1993 (PSEG 1999-TN2787), which did not change the take limits of listed species but specified that SGS and HCGS should develop a research program using mark/recapture to determine whether SGS has features that attract sea turtles. Also in 1993, PSEG implemented a policy of removing the ice barriers from the trash racks on the intake structure between May 1 and October 24, which resulted in substantially lower turtle impingement rates at SGS.

The NRC reinitiated Section 7 Consultation in 1998 to remove the study requirement from the SGS and HCGS Incidental Take Statement. The NRC cited the change in PSEG procedure regarding removal of ice barriers during the spring and summer. In response, NMFS issued a Biological Opinion on January 21, 1999, that removed the study requirement and decreased the number of annual allowable takes of Shortnose Sturgeon from 10 individuals to 5 individuals based on the review of Shortnose Sturgeon capture rates at SGS and HCGS. The Biological Opinion also formalized ice barrier removal from May 1 through October 24 by making it a requirement in the "Terms and Conditions" section of the Biological Opinion. To implement the 1999 Biological Opinion, PSEG developed associated guidance documents, *Biological Opinion Compliance* and *Species Management* (PSEG 1999-TN2787).

Table 3 provides a summary of the incidental take limits for each Biological Opinion that NMFS issued, including the current 1999 Biological Opinion take limits. The leatherback sea turtle, hawksbill sea turtle, and the Atlantic Sturgeon have not been included in previous assessments of SGS and HCGS impacts or in previous Biological Opinions.

The current Biological Opinion (NMFS 1999-TN2711) Incidental Take Statement was amended on January 21, 1999, and revised the number of incidental takes of listed species as detailed in Table 3.

Table 3. SGS and HCGS Incidental Take Statement Limits

	Annual Take Limit Set by NMFS Biological Opinions[(a)]				
Species	**1980**	**1991**	**1992**	**1993**	**1999**
Loggerhead sea turtle	–	10 (5)	30 (5)	30 (5)	30 (5)
Green sea turtle	–	5 (2)	5 (2)	5 (2)	5 (2)
Kemp's ridley sea turtle	–	5 (1)	5 (1)	5 (1)	5 (1)
Shortnose Sturgeon	11	2 (2)	10 (2)	10 (10)	5 (5)

(a) The first number given is the total number of allowable takes. The second number, in parentheses, is the number of takes out of the total that may be lethal takes.

Sources: PSEG 1999-TN2787; NMFS 1999-TN2711.

The Biological Opinion also contains the following "Reasonable and Prudent Measures," which apply to SGS:

- Removable ice barriers located on the trash racks must be removed by May 1 of each year and replaced after October 24 of each year.

- Trash racks associated with SGS's circulating water system must be cleaned three times per week from May 1 through November 15 and must be cleaned daily from June 1 through October 15.
- Trash racks must be inspected every two hours from June 1 through October 15.
- If a lethal incidental take that is directly attributable to the plant occurs between June 1 and October 15, monitoring of the trash racks must be increased to hourly for the remainder of the year.

A previous Biological Opinion (PSEG 1999-TN2787) concluded that HCGS would not affect listed species because no species had been documented at the site between when the plant began operating in 1986 and the 1993 Biological Opinion, which did not require monitoring at HCGS beyond normal cleaning operations. The 1999 Biological Opinion did not modify any requirement specific to HCGS.

The "Terms and Conditions" portion of the Biological Opinion requires PSEG to report all incidental takes to NMFS within 30 days of the take and to include appropriate documentation in the report. Additionally, the "Terms and Conditions" detail a number of requirements for sea turtle resuscitation, live sea turtle inspection, dead sea turtle necropsy reports, and Shortnose Sturgeon tagging and inspection. An updated Biological Opinion is expected to be issued by NMFS, and it will include requirements for the Atlantic Sturgeon, which has been recently listed as endangered.

Between 1992 and 2001, 16 loggerhead turtles were stranded at SGS (NRC 2010-TN2811), while 3 Atlantic green turtles have been captured at SGS since it began operations, with all captures occurring between 1980 and 1992 (PSEG 2014-TN3452). In 1992, two live and two dead Kemp's ridley sea turtles were found at the SGS cooling water intake; the cause of mortality was not reported (PSEG 1992-TN3173). In 1993, a live Kemp's ridley sea turtle was found at the SGS cooling water intake (PSEG 1999-TN2787). Implementation of mitigation measures in 1993 reduced the likelihood of additional turtle strandings; however, two Kemp's ridley turtles were stranded at SGS in 2013 (PSEG 2013-TN2690; PSEG 2013-TN3137). Incidental takes of sea turtle and sturgeon species at SGS between 2000 and 2013 are summarized in Table 4.

Since 2000, three live and nine dead Shortnose Sturgeon have been collected on SGS intake structures (PSEG 2000-TN3150; PSEG 2003-TN3149; PSEG 2004-TN3144; PSEG 2007-TN3148; PSEG 2008-TN3147; PSEG 2011-TN3146; PSEG 2011-TN3365; PSEG 2013-TN2707; PSEG 2013-TN2691; PSEG 2013-TN2692; PSEG 2013-TN2695; PSEG 2013-TN2704). Atlantic Sturgeon were not reported at the SGS intake screens until after this species was considered for listing as a Federally endangered species. Ongoing consultation with NMFS to revise the Biological Opinion will result in the inclusion of Atlantic Sturgeon. During 2012 and 2013, 14 live and 7 dead Atlantic Sturgeon were reported at the SGS intake system (PSEG 2012-TN3143; PSEG 2012-TN3142; PSEG 2013-TN2693; PSEG 2013-TN2694; PSEG 2013-TN2696; PSEG 2013-TN2697; PSEG 2013-TN2698; PSEG 2013-TN2699; PSEG 2013-TN2700; PSEG 2013-TN2701; PSEG 2013-TN2702; PSEG 2013-TN2703; PSEG 2013-TN2705; PSEG 2013-TN3138; PSEG 2013-TN3139; PSEG 2013-TN3140; PSEG 2013-TN3141; PSEG 2013-TN3198).

Table 4. Incidental Takes of Sea Turtle Species and Sturgeon Species Between 2000 and 2013[(a)]

Species	Year	Number of Takes	Condition[(b)]
Sea turtle			
Loggerhead	2000	2	1 live, 1 dead
	2001	1	dead
Kemp's ridley	2013	2	1 live, 1 dead
Sturgeon			
Shortnose	2000	1	dead
	2003	1	dead
	2004	1	dead
	2007	1	dead
	2008	1	dead
	2011	2	2 dead
	2012	1	live
	2013	4	2 live, 2 dead
Atlantic[(c)]	2012	2	1 live, 1 dead
	2013	19	13 live, 6 dead

(a) References provided in text.
(b) Found live or dead in intake area; counted as dead if found live but died shortly afterward.
(c) Atlantic Sturgeon reported at SGS only in 2012 and 2013.

5.4 Commercial and Recreational Harvest of Fish and Shellfish

The Delaware River Estuary supports a diverse commercial and recreational fishery for finfish and invertebrates. Losses to the ecosystem from fishery harvest are managed at the Federal and State levels through catch limits, regulations on fishing gear, and seasonal closures. Unintended harvest or mortality is another source of loss through bycatch while targeting a different species. These activities have the potential to contribute to cumulative effects on aquatic species in the Delaware River Estuary. However, the direct contribution is difficult to assess because many of these fish populations have life histories that involve a large migratory territory offshore and along the Atlantic coast of the United States, and therefore, effects to populations are difficult to directly attribute to Delaware River Estuary habitat effects.

5.5 Habitat Loss and Restoration

Current and future land use development for industry, agriculture, or other habitat alterations in the Delaware River Estuary watershed may affect water quality. These types of activities may also result in shoreline habitat loss.

Dredging activities from past efforts to maintain navigation in the Delaware River Estuary may have affected estuarine habitats, and future dredging activities are planned that may continue to affect the aquatic ecosystem. Starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). To deepen the channel, material would be dredged by hydraulic and hopper dredges and placed in USACE confined disposal facilities (CDFs) or used for beneficial reuse purposes (e.g., wetland and beach restoration; habitat creation) in lower Delaware Bay. The USACE estimates that 1,012,428 yd^3 of material were dredged from Reach D of the Delaware River Estuary near Artificial Island and placed in the Federally-owned Artificial Island CDF (USACE 2013-TN2851). When completed, the entire deepening project would remove and dispose of an estimated 16 million yd^3 of sediments from the Delaware River in Philadelphia down to the mouth of the Delaware Bay. The subsequent maintenance dredging would remove an estimated 4,317,000 yd^3 of sediment from the 45-ft-deep channel each year (USACE 2011-TN2262). Maintenance dredging would be carried out as needed, generally over a 2-month period between August and December. As with building in-river components of a new nuclear power plant at the PSEG Site, fish and benthic invertebrates in the Delaware River Estuary would be displaced during the USACE dredging activities but are expected to recolonize the affected areas. The USACE would implement appropriate measures required by Federal and State agencies and organizations to protect aquatic resources, including endangered species (sturgeon and sea turtles), sharks, horseshoe crabs (*Limulus polyphemus*), blue crabs, freshwater mussels, and American Eels (USACE 2011-TN2262). For example, mechanical dredge activities between March 15 and June 30 would be avoided within selected reaches of the project area to prevent sedimentation and turbidity effects on reproduction of Atlantic Sturgeon, Striped Bass, American Shad, and river herring (USACE 2013-TN2851).

While aquatic habitats continue to be affected by natural and anthropogenic activities in the Delaware River Estuary, efforts to restore salt marsh and estuary habitat have met with some success and are expected to continue in the future. For example, ongoing restoration activities within the Mad Horse Creek WMA, located 4 mi east of the PSEG Site, would restore nearly 200 ac of the Mad Horse Creek WMA to address injuries to shoreline and bird resources resulting from the 2004 *Athos I* oil spill (NOAA 2008-TN2721). NJDEP and the National Oceanic and Atmospheric Administration proposed a tidal wetland restoration project that would allow development of smooth cordgrass (*Spartina alterniflora*) habitat to improve habitat quality in the area. Restoration would be accomplished through fill material removal to lower the marsh elevation and allow tidal inundation (PSEG 2014-TN3452). As described in EIS Section 4.3.1, unavoidable impacts to wetlands during development of a new nuclear power plant at the PSEG Site and the proposed causeway would be mitigated by habitat restoration and enhancement, using experience and proven techniques developed by the PSEG EEP. Sensitive species that utilize such marsh habitats would be affected positively by the proposed Mad Horse Creek WMA restoration effort and by the proposed mitigation for a new nuclear power plant at the PSEG Site and causeway (i.e., restoration of low quality marsh habitats) (PSEG 2014-TN3452).

5.6 Climate Change

The potential impacts of climate change on aquatic organisms and habitat in the geographic area of interest are not precisely known. In addition to rising sea levels, climate change could lead to regional increases in the frequency and intensity of extreme precipitation events, increases in annual precipitation, and increases in average temperature (GCRP 2014-TN3472). Such changes in climate could alter aquatic community composition on or near the PSEG Site through changes in species diversity, abundance, and distribution. In 2012, Hurricane Sandy created increased storm surge during this event within the Delaware River Estuary and had moderate effects on water quality and coastal habitats within the southernmost portion of the

Delaware River Estuary through erosion, sedimentation, and resuspension of contaminants within sediments (ALS 2012-TN2720). Elevated water temperatures, droughts, and severe weather phenomena could adversely affect or severely reduce aquatic habitat; however, specific predictions on aquatic habitat changes in this region due to climate change are inconclusive at this time. The level of impact resulting from these events would depend on the intensity of the perturbation and the resiliency of the aquatic communities. The DRBC stated in the State of the Delaware River Basin report for 2013 that increases in temperature and salinity are expected with future sea-level rise and climate change (DRBC 2013-TN2609). These potential changes are likely to result in movement of populations of more marine and euryhaline species farther up the Delaware River Estuary. For example, in a recent report, hard bottom areas north and south of the Chesapeake and Delaware Canal (upriver of the PSEG Site) were identified as having potential as reef sites for the establishment of new oyster beds and were discussed as a future conservation target due to changing climate conditions resulting in increases in salinity farther upriver (PDE 2011-TN2190).

5.7 Summary of Cumulative Effects

Aquatic resources of the Delaware River Estuary are cumulatively affected to varying degrees by multiple activities and processes that have occurred in the past, are occurring currently, and are likely to occur in the future. The food web and the abundance of important aquatic forage species and other species have been substantially affected by these stressors historically, as described in EIS Section 2.4.2. The effects of some of these stressors associated with human activities are addressed by management actions (e.g., cooling system operation, regulation of fishing pressure, water quality improvements, and habitat restoration).

Other stressors, such as climate change and increased human population and associated development in the Delaware River Basin, cannot be directly managed, and their effects are more difficult to quantify and predict. It is likely, however, that future anthropogenic and natural environmental stressors would cumulatively affect the aquatic community of the Delaware River Estuary sufficiently that they would noticeably alter important attributes, such as species ranges, populations, diversity, habitats, and ecosystem processes, just as they have in the past. These stressors have modified important attributes of aquatic resources and would continue to exert an influence in the future, potentially destabilizing some of the attributes of the aquatic ecosystem. Based on these observations, the review team concludes that cumulative effects have been noticeable and destabilizing for some aquatic resources, primarily based on past stressors affecting aquatic resources in the Delaware Estuary and River Basin.

Cumulative effects on aquatic ecology resources are estimated based on the information provided by PSEG, NMFS, and the review team's independent review. The significant history of the degradation of the Delaware River Estuary has had a noticeable and sometimes destabilizing effect on many aquatic species and communities. Commencement of operations at SGS Units 1 and 2 resulted in significant numbers of aquatic species being entrained and impinged, which led to required restoration of the area through the PSEG EEP as a form of mitigation. In addition, present and reasonably foreseeable future activities such as the continued operation of SGS and HCGS and the completion of dredging operations for the Delaware River Main Channel Deepening Project would continue to have effects on the aquatic resources in the Delaware River Estuary. However, the review team concludes that the incremental contribution of the NRC-authorized activities related to construction and operation of a new nuclear power plant at the PSEG Site would be negligible.

6.0 CONCLUSION AND DETERMINATION OF EFFECTS

Building activities associated with cooling water intake and discharge structures, HCGS barge slip improvements, barge storage area and unloading facility, and causeway would require dredging and in-water work that may cause siltation and disturbance of benthic habitats on the immediate areas of building and in nearby coastal waters. However, Federal and State permitting requires BMPs associated with use of cofferdams, siltation barriers, and avoidance of in-water activities in marsh creeks during spawning cycles to control and minimize the potential for adverse impacts to protected species. Dredging and installation of intake and discharge structures would occur in a portion of the Delaware River Estuary that is used by sea turtles and anadromous fish. While installation activities are expected to be temporary and localized, the presence of any of the species described in this document within the installation area may occur, although these species should be able to migrate around the installation area and forage in adjacent, unaffected habitat.

Because PSEG proposes to use a cooling water intake configuration similar to the closed-cycle cooling at HCGS, and operation of HCGS has been determined to have no adverse effects on any listed sea turtle or sturgeon species in the future (NRC 2010-TN2811), the review team has determined that building and operation activities for a new nuclear power plant at the PSEG Site may affect, but are not likely to adversely affect the loggerhead sea turtle, green sea turtle, Kemp's ridley sea turtle, Shortnose Sturgeon, and Atlantic Sturgeon.

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Biological Assessment

Supplement

National Marine Fisheries Service

PSEG Site

Early Site Permit Application

Department of the Army Permit Application

U.S. Nuclear Regulatory Commission Early Site Permit Application

Docket Number 52-043

Salem County, New Jersey

August 2015

U.S. Nuclear Regulatory Commission

Rockville, Maryland

U.S. Army Corps of Engineers

Philadelphia District

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ABBREVIATIONS/ACRONYMS

ac	acre(s)
BMPs	best management practices
CFR	*Code of Federal Regulations*
cm	centimeter(s)
COL	combined construction permit and operating license
CP	construction permit
DPS	distinct population segment(s)
DRBC	Delaware River Basin Commission
EEP	Estuary Enhancement Program
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973, as amended
ESP	early site permit
ft	foot (feet)
gpm	gallon(s) per minute
HCGS	Hope Creek Generating Station
km	kilometer(s)
m	meter(s)
mi	mile(s)
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
ppt	parts per thousand
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
RKM	River Kilometer
RM	River Mile
SGS	Salem Generating Station, Units 1 and 2
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area
yd^3	cubic yard(s)

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 (SGS) Units 1 and 2 on the eastern shore of the Delaware River Estuary in Lower Alloways Creek Township, Salem County, New Jersey. As part of its review of the ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 51 (10 CFR Part 51-TN250)—the NRC regulations that implement the National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq. –TN661). The EIS includes 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) is participating in the preparation of the EIS as a cooperating agency and as a member of the review team, which consists of the NRC staff, its contractor staff, and the USACE staff. The discussion that follows describes the ESP application and

Department of the Army permit application reviews, the proposed actions by the NRC and USACE, and the activities over which the USACE has jurisdiction.

An ESP is an NRC approval of a site for one or more nuclear power facilities that resolves safety and environmental issues related to site suitability. Issuance of an ESP is a process that is separate from the issuance of a construction permit (CP) and operating license (OL) or a combined construction permit and operating license (COL) for such a facility, which would be needed to construct and operate a nuclear power plant on a site approved by an ESP. 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)(1) (TN249) without applying for and receiving further authorization. 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 (TN250). An applicant for a CP or COL for a new nuclear plant to be located at a site for which an ESP has been issued may reference the ESP, and matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent the identification of new and significant information. For a COL application that references an ESP, the NRC staff, pursuant to 10 CFR 51.75(c)(1) (TN250), would prepare a supplement to the ESP EIS in accordance with 10 CFR 51.92(e) (TN250) 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).

The proposed actions related to the PSEG ESP application are (1) NRC issuance of an ESP for the PSEG Site (10 CFR Part 52-TN251) and (2) USACE permit action on a Department of the Army permit application pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act; 33 USC 1251 et seq. -TN662) and Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403 et seq. -TN660). The U.S. Environmental Protection Agency (EPA) has the authority to review and veto USACE decisions on Section 404 permits.

As mentioned previously, the USACE is participating as a cooperating agency with the NRC in preparing the EIS and participates collaboratively on the review team. Upon issuance of the draft EIS (NRC and USACE 2014-TN4279), PSEG submitted a Section 10/404 permit application to the USACE on August 8, 2014 (PSEG 2014-TN4235); the Department of the Army permit application number is CENAP–OP–R–2009–0157–45. The NRC and USACE prepared this biological assessment (BA) to support their joint consultation with the National Marine Fisheries Service (NMFS) in accordance with section 7(c) of the ESA (16 USC 1531 et seq. -TN1010). The USACE permit decision will be made following issuance of the final EIS and would authorize preparation of a haul road bulkhead along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, and installation of the cooling water system intake and discharge structures. Therefore, only these activities, which are identified in the Department of Army permit application, are described in this assessment.

In a final rule dated October 9, 2007 (72 FR 57416-TN260), the NRC limited the definition of "construction" to the activities that fall within its regulatory authority, as provided in 10 CFR 50.10(a)(1) (TN249) and 10 CFR 51.4 (TN250). Many of the site-preparation activities associated with building a nuclear power plant are not part of the NRC action to license the plant. These activities, which are not regulated by the NRC and therefore not within the purview of the NRC action, are grouped under the term "preconstruction." Preconstruction activities include clearing and grading, excavating, erecting support buildings and transmission lines, and other associated activities. These preconstruction activities may take place before the application for an ESP, CP/OL, or COL is submitted, during its review, or after it has been granted. Although preconstruction activities are outside the NRC's regulatory authority, many of them are within the regulatory authority of local, State, or other Federal agencies, including the USACE.

While an NRC ESP does not authorize site-preparation activities denoted as "preconstruction" under NRC regulations, USACE permits would authorize some of those site-preparation activities. Because this is a joint supplemental BA for both the NRC and USACE, the distinction between construction and preconstruction is not carried forward in this BA; both are jointly discussed using the term "site-preparation activities" when discussing effects to species that would take place under the proposed actions.

By letter dated October 26, 2010 (NRC 2010-TN2203), the NRC initiated informal ESA section 7 consultation with NMFS 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. NMFS provided the requested information for species under their jurisdiction by letter dated December 9, 2010 (NMFS 2010-TN2171). An update for endangered, threatened, candidate, and proposed species was requested on July 31, 2013 (NRC 2013-TN2805). NMFS provided updated information by letter dated October 25, 2013 (NMFS 2013-TN2804). NMFS received the draft EIS (NRC and USACE 2014-TN4279) and BA (NRC and USACE 2014-TN4313) and provided comments on November 12, 2014 (NMFS 2014-TN4203), and additional clarification on comments January 26, 2015 (NRC 2015-TN4209). A revised species list is presented in Table 1. This supplemental document addresses the comments received and clarified related to the following:

- clarification of activities considered for consultation regarding the PSEG ESP and the Department of the Army permit (provided earlier in this section)
- additional information regarding dredging activities (i.e., type of equipment used, duration, and in-water work restrictions)
- additional information regarding pile-driving activities (i.e., type and number of piles, duration of installation activities, noise effects to ESA species, and mitigation measures)
- additional information regarding barging activities (i.e., number and type of vessels and assessment of impacts to ESA species from PSEG barge traffic)
- clarification of cumulative impacts assessed for ESA consultation
- revision of species-specific information to include current status of the SGS/HCGS Biological Opinion.

Table 1. Endangered (E) or Threatened (T) Species under the Jurisdiction of NMFS in the Vicinity of the PSEG Site that May Be Affected by the Proposed Action

Species Name	Common Name	ESA Status
Reptiles		
Caretta caretta	Loggerhead sea turtle[(a)]	T
Chelonia mydas	Atlantic green sea turtle[(b)]	E
Lepidochelys kempii	Kemp's ridley sea turtle	E
Fish		
Acipenser brevirostrum	Shortnose Sturgeon	E
Acipenser oxyrinchus oxyrinchus	Atlantic Sturgeon[(c)]	

(a) Northwest Atlantic distinct population segment (DPS)
(b) Proposed DPS for North Atlantic (T) (80 FR 15271-TN4272)
(c) Gulf of Maine DPS (T), New York Bight DPS (E), Chesapeake Bay DPS (E), Carolina DPS (E), and South Atlantic DPS (E)

Source: NMFS 2014-TN4238

Accordingly, this supplemental BA focuses on evaluating the potential effects from site-preparation activities for a new nuclear plant at the PSEG Site, adjacent to SGS and HCGS, on the Federally listed species under NMFS's jurisdiction that occur in the Delaware River Estuary. However, because an ESP does not authorize the site-preparation activities as defined under 10 CFR 50.10(a)(2) (TN249) that would take place under the proposed action, the effects discussed in this BA from those site-preparation activities are regulated by the USACE and not by the NRC.

2.0 DESCRIPTION OF PROPOSED ACTION

PSEG is seeking an ESP from the NRC for a site approval for a potential new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS. PSEG is also seeking a Department of the Army permit from the USACE for certain site-preparation activities described below. Site-preparation activities authorized by USACE and the New Jersey Department of Environmental Protection (NJDEP) (but not an NRC ESP) that could directly affect onsite and offsite aquatic ecosystems include preparation of a haul road bulkhead along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, installation of the cooling water system intake and discharge structures, dredging, installation of piles, and transport of building materials by barge to the PSEG Site. As these actions require a Department of the Army permit and are permissible, but not authorized, under an NRC ESP, they are assessed in detail below.

2.1 Site Location and Description

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 2015-TN4280). Figure 1 shows the location of the PSEG Site and the areas within a 6-mi (10-km) radius and 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 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 PSEG Site would encompass 819 ac. Figure 3 provides aerial plan view of the proposed site layout for a new nuclear power plant at the PSEG Site.

The region within 15 mi (24 km) of the site is used primarily for agriculture. This region also includes numerous parks, wildlife refuges, and preserves (e.g., Mad Horse Creek Wildlife Management Area [WMA] to the east; Cedar Swamp State WMA to the south in Delaware; Appoquinimink, Silver Run, and Augustine State WMAs to the west in Delaware; and Supawna Meadows National Wildlife Refuge to the north) (PSEG 2015-TN4280).

2.1.1 Delaware River Estuary

The Delaware River and Delaware Bay are a part of the larger Delaware Estuary and River Basin that extends from headwaters in New York State to the coastal plains near Cape Henlopen in Delaware (PDE 2012-TN2191). The Delaware Bay extends from the confluence of the Delaware River with the Atlantic Ocean from Delaware River Mile (RM) 0 to RM 54 (River Kilometer [RKM] 0 to RKM 87). The Delaware River Estuary includes the Delaware Bay and extends up the tidal Delaware River, which is characterized by brackish water between Delaware RM 54 and RM 80 (RKM 87 and RKM 129) and becomes freshwater at Delaware RM 80 (RKM 129) (BBL and Integral 2007-TN2126). The PSEG Site near the mouth of Alloway Creek is at Delaware RM 52 (RKM 84) (DRBC 2011-TN2412) and is considered to be in the lower estuary watershed unit of the Delaware River Estuary (PDE 2012-TN2191).

The boundary of salinity intrusion in the Delaware River Estuary, also known as the salt line, fluctuates with flow changes. The salt line moves in response to the tides and variations in Delaware River Estuary freshwater discharge. During most of the year, the salt line is located between the Commodore Barry Bridge at Delaware RM 82 (RKM 132) and Reedy Island at Delaware RM 54 (RKM 87) (DRBC 2008-TN2277). Salinity measurements taken over a number of years between RM 51 and RM 49 (RKM 82 and RKM 79) report a minimum salinity of 0.1 parts per thousand (ppt) and a maximum of 17.9 ppt (PSEG 2015-TN4280).

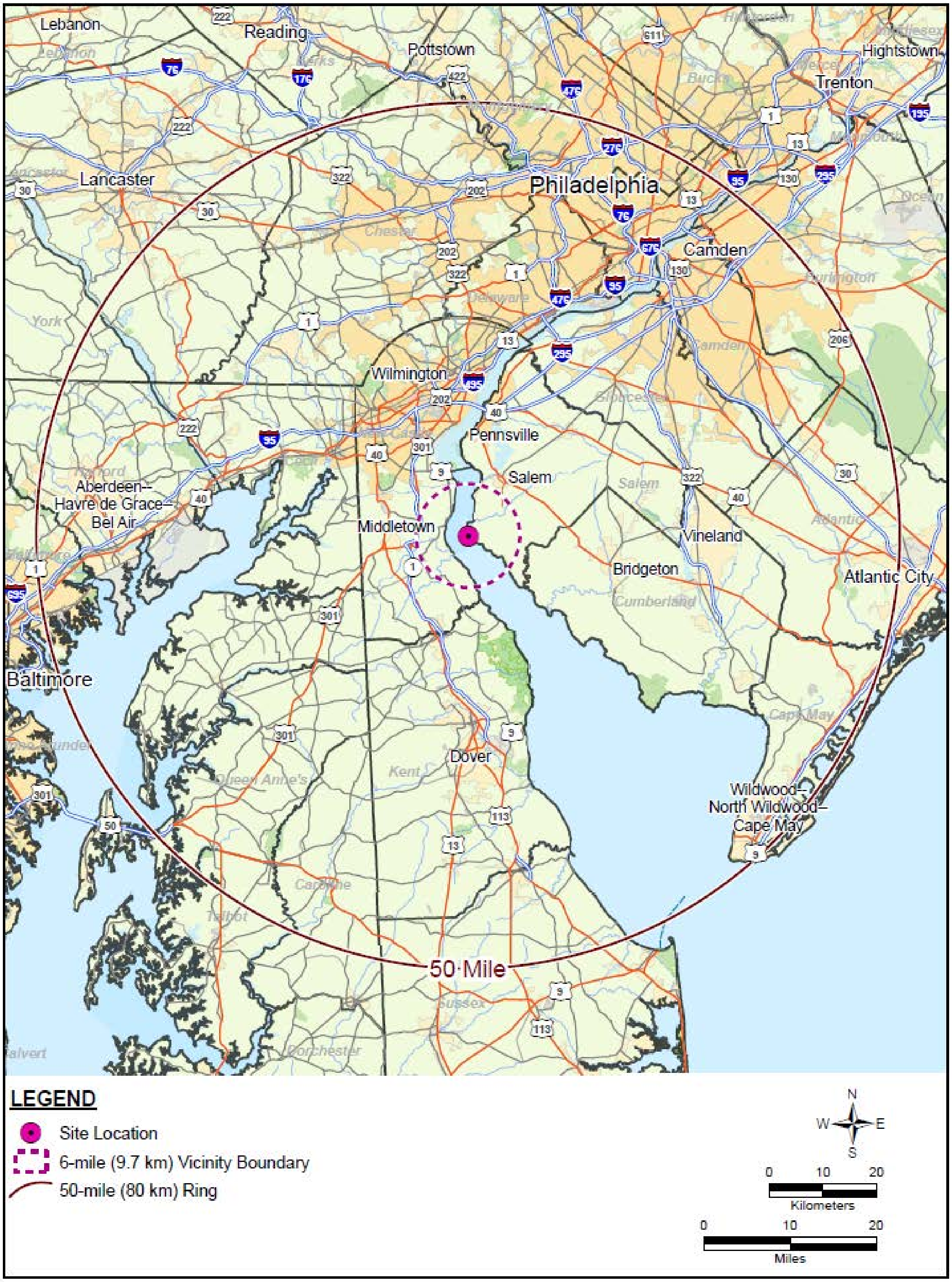

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2015-TN4280).

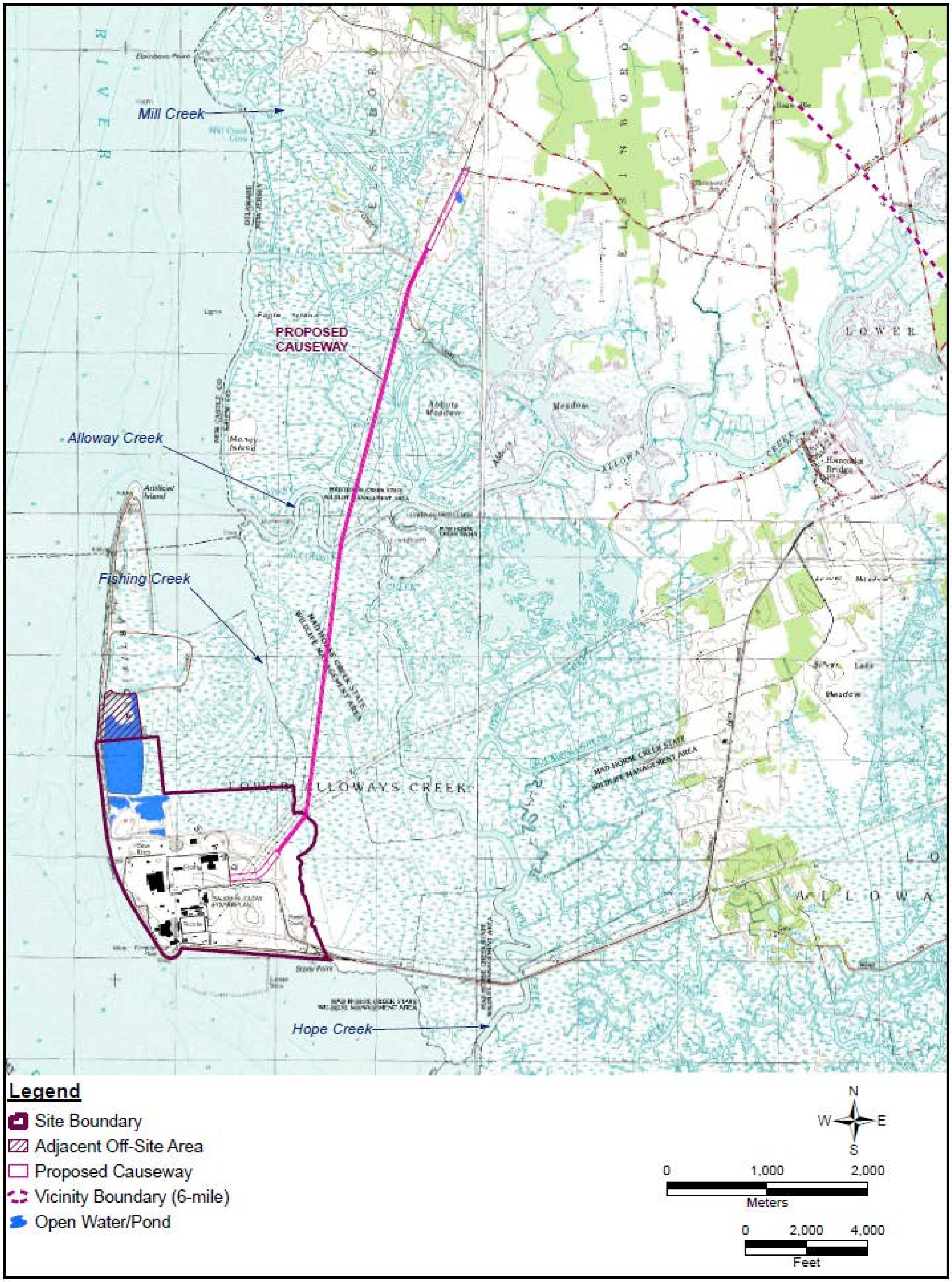

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2015-TN4280).

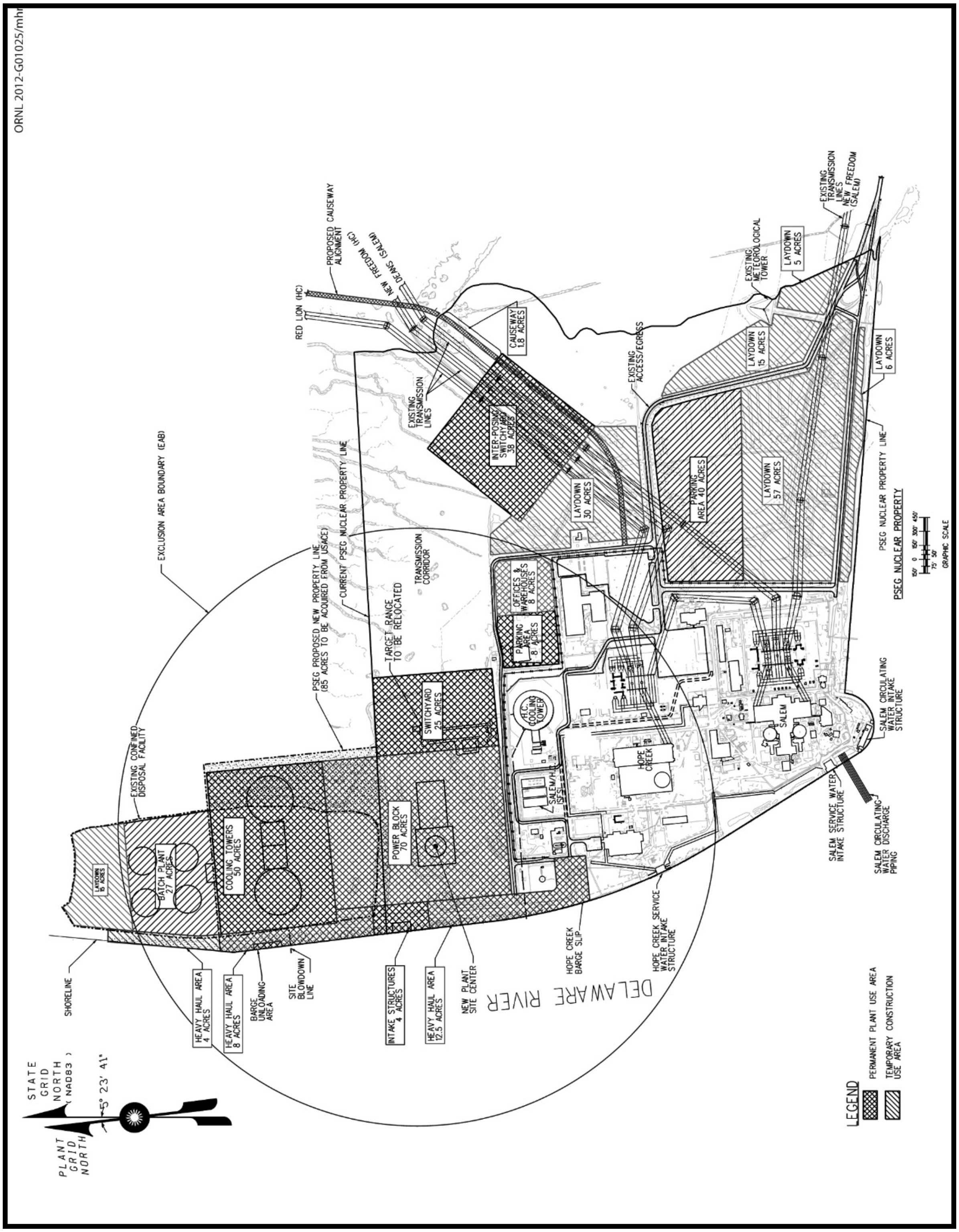

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489).

At the PSEG Site on Artificial Island, the estuary is tidal with a net flow to the south. The USACE maintains a dredged navigation channel near the center of the estuary about 6,600 ft (2,000 m) west of the shoreline of the PSEG Site. The navigation channel is about 40 ft (12 m) deep and 1,300 ft (400 m) wide; however, starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). On the New Jersey side of the channel, water depths in the open estuary at mean low water are fairly uniform at about 20 ft (6 m). Predominant tides in the area are semi-diurnal, with a period of approximately 12 hours and a mean tidal range of 5.3 ft (1.6 m) at RM 52 (RKM 84) (PSEG 2015-TN4280).

Submerged aquatic vegetation has not historically been observed in the Delaware River Estuary primarily because of the high levels of turbidity (Miller et al. 2012-TN2686) and no submerged aquatic vegetation was observed in the sampling areas near the PSEG Site (PSEG 2015-TN4280). The Delaware River Estuary is a complex ecosystem with many species playing different roles throughout their lifecycles. Major assemblages of organisms within the estuarine community include plankton, benthic invertebrates, and fish. Detailed descriptions of these assemblages can be found in Section 2.4.2.1 of the EIS.

2.2 Dredging Activities

Before initiating any site-preparation or development activities, PSEG would be required to obtain, from the USACE, the appropriate authorizations regulating alterations to waters of the United States, including ponds and creeks. Site-preparation activities that could directly affect onsite and offsite aquatic ecosystems include installing the haul road bulkhead, building the barge storage area and unloading facility, installing the cooling water system intake and discharge structures, and building the proposed causeway (Figure **2** and Figure 3). Aquatic habitats potentially affected include habitats associated with the Delaware River Estuary and the interconnected system of tidal wetlands and marsh creeks primarily north of the PSEG Site. Potential direct impacts on aquatic resources as a result of site-preparation activities would involve physical alteration of habitat (e.g., infilling, dredging) including temporary or permanent removal of associated benthic organisms, sedimentation, changes in hydrological regimes, and changes in water quality. Potential indirect impacts would include increased runoff from impervious surfaces and subsequent erosion, as well as sedimentation (PSEG 2015-TN4280). Benthic habitats in the areas for proposed dredging consist of fine-grained sediments composed of clay, silt, and sand. Shoreline depths drop quickly to 10 to 12 ft (3.0 to 3.7 m) and then gradually increase in depth to between 15 to 25 ft (4.6 to 7.6 m) nearshore (PSEG 2015-TN4280). The depth of the areas identified for dredging is a minimum of 10 ft (3.0 m) relative to mean low water with the exception of the western boundary of Artificial Island, which is shallower than 10 ft (3.0 m) and consists of artificially placed rock. Mitigation is not warranted as there is no shallow water habitat conversion to deep water habitat (PSEG 2015-TN4234), and compensatory mitigation is generally not required where a habitat change does not occur. The nearshore benthic macroinvertebrate community and fish diversity is described in Section 2.4.2.1 of the EIS.

Shoreline-installation and site-preparation activities would require a stormwater pollution prevention plan, developed as part of the New Jersey Pollutant Discharge Elimination System

(NJPDES) stormwater permit, which would describe best management practices (BMPs) to control sedimentation and erosion and provide stormwater management. Shoreline structures would be hardened to protect from shoreline erosion using placement of concrete or riprap (PSEG 2015-TN4280). Approximately 1 ac of open water would be filled (average width of fill would be 10 ft) due to placement of the bulkhead cap and sheeting along the bulkhead shoreline (PSEG 2014-TN4235).

The new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 61 ac (PSEG 2015-TN4280). An additional 0.05 ac of river bottom habitat would be removed for installation of seven 20-ft-diameter barge mooring caissons. Installation of a new intake structure would require dredging of about 225,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 31 ac (PSEG 2015-TN4280). Dredging, grading, and backfilling activities would be required for installation of a new discharge structure; approximately 0.2 ac of tidal waters would be affected (PSEG 2014-TN4235). As dredging will be done by one hydraulic suction dredge, dredged material disposal would be by direct pipeline to Artificial Island (PSEG 2015-TN4234). No maintenance dredging is planned under the Department of the Army permit application. In total, approximately 92 ac of open water habitat would be permanently affected by dredging, which would occur over a 2-month period (USACE 2015-TN4277).

The installation of the barge storage and unloading facilities as well as the intake and discharge structures would result in temporary disturbances to the aquatic habitat in those portions of the Delaware River Estuary. An increase in suspended sediments could occur during dredging activities; however, PSEG determined that due to the natural high turbidity of the Delaware Estuary at the project location, any increase in sedimentation would not be noticeable (PSEG 2015-TN4234). PSEG would comply with NJDEP and USACE permitting regulations regarding timing and duration of dredging to avoid sensitive aquatic life stage development or spawning (e.g., the current USACE work window to avoid dredge activities occurs between March 1 and June 30). The review team reviewed a recent report on sediment analysis for the Delaware River Basin that describes sediment samples near the PSEG Site as probably/potentially suitable for aquatic habitat restoration projects (DERSMPW 2013-TN4204). Therefore, dredging in this area near the PSEG Site is unlikely to introduce adverse exposure from sediment contaminants to nearby aquatic biota. PSEG proposes to use a hydraulic suction dredge to further minimize increases in turbidity and sedimentation, to limit the duration of dredging, and to avoid the need to handle dredged material twice (PSEG 2015-TN4234). PSEG also would use appropriate BMPs to minimize sedimentation effects as required for Federal and State permitting. Motile invertebrates, fish, and sea turtles might swim into this portion of the Delaware River Estuary, but they would be able to swim away or likely would avoid the area due to dredging activity and noise from pile driving that may occur simultaneously.

Mobile macroinvertebrates in this area might be able to occupy adjacent habitat in the Delaware River Estuary as the species composition and abundance of the macroinvertebrate community in the Delaware River Estuary near the site are similar to those of benthic communities in adjacent benthic areas of the estuary. Although permanent alteration of at least 92 ac of river bottom habitat would occur, the impacts to aquatic communities in the vicinity are expected to be minimal as benthic organisms would begin to re-colonize the area following the completion of dredging activities (Wilber and Clarke 2007-TN4271).

2.3 Pile Installation

PSEG estimated acoustic effects from representative pile-driving studies to determine pile-installation effects on aquatic biota. In-water activities included daytime installation of 24-in.-wide steel sheeting in the Delaware Estuary for the intake structure (650 sheet piles), the haul road bulkhead (2,400 sheet piles), and the barge unloading facility 20-ft-diameter caissons (1,200 sheet piles) with a vibratory hammer. Causeway installation would also occur during the daytime, and analysis was conducted for approximately 1,000 30-in.-square concrete piles using an impact hammer with additional cushioning to reduce pile head damage (PSEG 2015-TN4234) (Table 2). PSEG used the NMFS Pile Driving Calculations spreadsheet model (Caltrans 2013-TN4236) to calculate isopleths for the peak sound pressure level (SPL_{peak}), cumulative sound exposure level (SEL_{cum}), and behavioral root mean square sound pressure level (SPL_{rms}) using specific information on piles such as installation method, number of piles, and type of pile. For SPL_{peak} and SPL_{rms} noise isopleth estimates, the NMFS model can apply a default transmission loss of 15 m as a conservative assumption under a practical spreading loss model that considers the noise attenuation (transmission loss) when site-specific attenuation is not known (PSEG 2015-TN4234). The modeled isopleths for SEL_{cum} account for the number of pile-driving strikes per day, and the number of piles per day is provided in Table 2.

Table 2. Pile Material and Installation Information (PSEG 2015-TN4234).

	Structure			
Pile Information	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Type of pile	Sheeting	Sheeting	Sheeting	Concrete
Length/number of piles	1,200 linear ft	4,500 linear ft	2,200 linear ft	1,000
Piles installed/day	120 linear ft	240 linear ft	120 linear ft	20
Duration of pile driving (days)	10	20	20	50

The criteria for fish are as follows: 206 dB re: 1μPa SPL_{peak}, 187 dB re: 1μPa^2·s SEL_{cum} for fish > 2 cm, 183 dB re: 1μPa^2·s SEL_{cum} for fish < 2 cm, and 150 dB re: 1μPa SPL_{rms}. The determination for potential onset of physical injury is determined by exceedance of both the peak pressure (SPL_{peak}) and cumulative sound exposure level (SEL_{cum}). A determination for potential behavioral effects is made using exceedance of the root mean square sound pressure level (SPL_{rms}) (Caltrans 2013-TN4236). Distances from the pile-driving activity that exceed these criteria are presented in Table 3.

Table 3. Estimated Acoustic Area of Effect for Fish from Pile-Driving Activities (PSEG 2015-TN4234).

	Exceedance Distance in m (ft)			
Acoustic Criteria	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Peak pressure (206 dB)	0	0	0	1 (3)
Cumulative sound exposure level (187 dB/183 dB)	40/74 (131/243)	40/74 (131/243)	40/74 (131/243)	216/398 (709/1,306)
Adverse behavioral effects (150 dB)	74 (243)	74 (243)	74 (243)	1,166 (3,825)

Criteria that may be used for sea turtles are as follows: onset of injury from impulsive sound (pile driving) for cetaceans is 180 dB re: 1μPa SPL_{rms} and disruption of natural behavior from impulsive sound is 160 dB re: 1μPa SPL_{rms} (NMFS 2015-TN4273). While these criteria may be used conservatively for sea turtles, a recent study used a 190 dB re: 1μPa SPL_{rms} threshold for onset of injury in sea turtles (NAVSEA 2013-TN4237).

Based on the NMFS model, the 206 dB SPL_{peak} is only exceeded immediately adjacent to pile-driving activity and does not extend 1 m out except for causeway installation. The exceedance distance of 187/183 dB SEL_{cum} for fish, which is similar to 190/180 dB SPL_{rms} for sea turtles, for the proposed causeway is 216/398 m (709/1,306 ft); however, this distance extends over mostly vegetated marsh plain and shallow marsh creeks, not open water (Figure 4).

The behavioral effects criterion of 150 dB SPL_{rms} for fish is exceeded for the causeway pile installation up to 1,166 m (3,825 ft) from the source, which is mostly vegetated marsh plain and shallow marsh creeks (PSEG 2015-TN4234). For vibratory shoreline steel sheet pile installation at Artificial Island, caisson installation, and intake installation, the behavioral effects criterion exceedance for fish extends from the source out to 74 m (243 ft) into the Delaware River (Figure 4), which could also be a conservative estimate for sea turtles (criterion of 160 dB SPL_{rms}).

As a comparison, PSEG also assessed vessel-related sounds for large container transport ships moving at 22.7 knots and smaller tugboats. Both vessel types have a small behavioral exceedance zone for fish—349 m (1,118 ft) and 10.9 m (36 ft), respectively (PSEG 2015-TN4234)—and are shown on Figure 4.

2.4 Barge Traffic

Vessel use during dredging or installation of the in-water structures and transportation of building materials and large system components to the PSEG Site may affect the aquatic resources of the Delaware River Estuary, particularly the benthos or benthic dwelling organisms (PSEG 2015-TN4280). The main impacts of using vessels would include turbulence from propellers (prop wash), collisions with aquatic species, and accidental spills of materials overboard. PSEG estimated the annual number of vessel trips for the installation activities correlated to the activities described for the Department of Army permit to be between 247 and 357. This is an incremental increase to the reported annual average of 4,485 commercial vessel trips in the Delaware River and Estuary between 2007 and 2014 (PSEG 2015-TN4234). PSEG estimated that general construction materials shipped by barge over a 3- to 7-year period, would originate at the Ports of Camden, Philadelphia, and Salem, and use shipping routes in the Delaware Bay and River (USACE 2015-TN4281).

The NRC review team determined that vessel traffic during site-preparation activities would result in minimal disturbance to benthic habitats associated with the PSEG Site as it would occur in deeper waters associated with the installation of piles or dredging activities and should not affect the general resources in the region along this coast of the Delaware River Estuary.

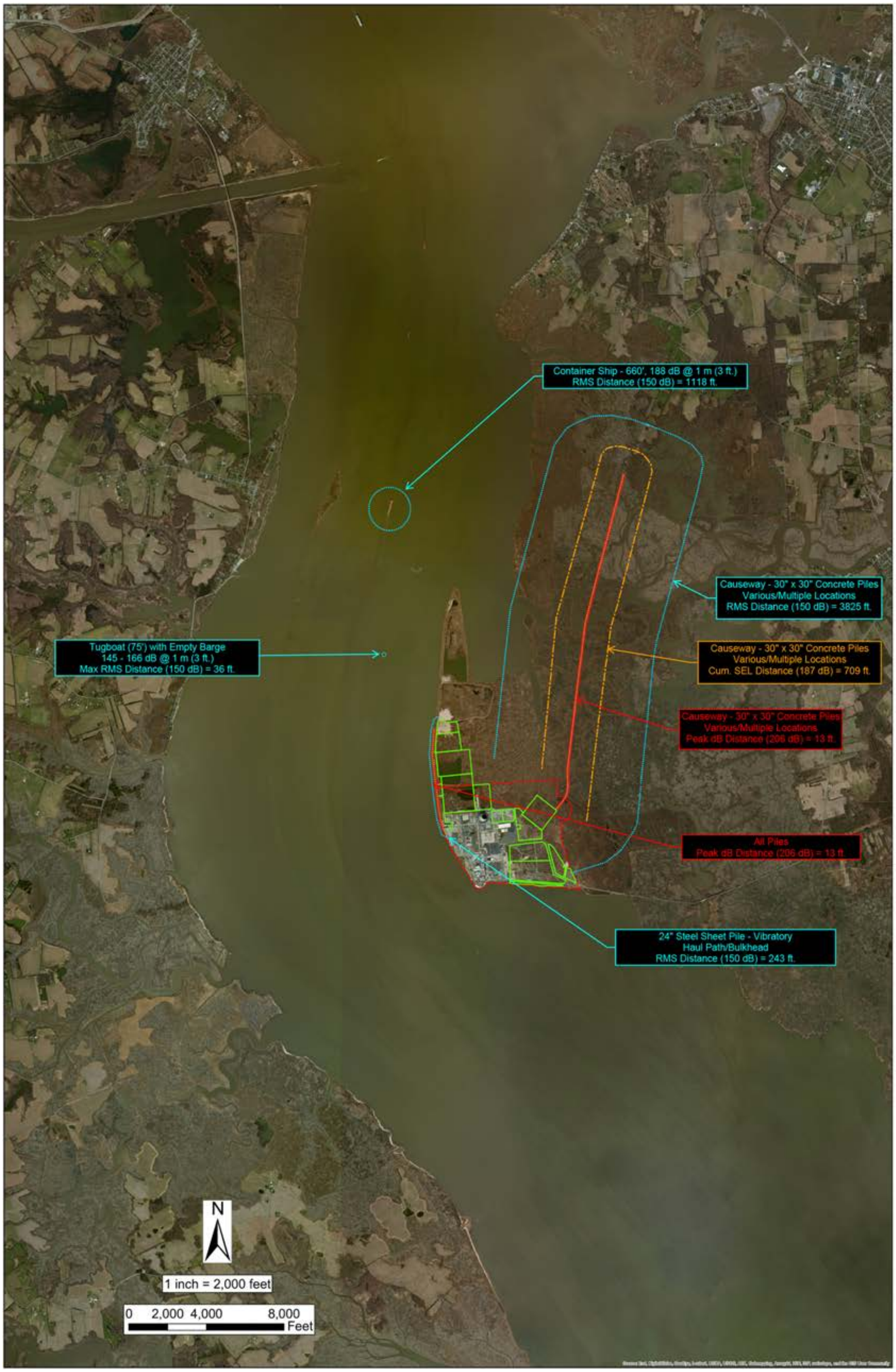

Figure 4. Acoustic Criteria Isopleths for In-Water and Nearshore Pile-Driving Activities (PSEG 2015-TN4275).

3.0 FEDERALLY LISTED SPECIES CONSIDERED

NMFS (2010-TN2171) identified aquatic species under its jurisdiction that are Federally listed as threatened or endangered and one species (i.e., Atlantic Sturgeon [*Acipenser oxyrinchus oxyrinchus*]) that was listed as a candidate species that may occur in the Delaware River Estuary in the vicinity of a new nuclear power plant at the PSEG Site. By 2013, the Atlantic Sturgeon was updated to endangered, and an updated list of Federally protected species near the PSEG Site was provided by NMFS (2013-TN2804). These species are listed in Table 1.

3.1 Sea Turtle Species Known to Occur Near the PSEG Site

Loggerhead sea turtles (*Caretta caretta*) are historically the most commonly observed sea turtle species in the vicinity of PSEG, and Kemp's ridley sea turtles (*Lepidochelys kempii*) are known to occur in Delaware Bay waters near the PSEG Site (Eggers 1989-TN2778). Three Atlantic green sea turtles (*Chelonia mydas*) were reported at the SGS intake between 1980 and 1992 (PSEG 2015-TN4280). More recently, two Kemp's ridley turtles were reported at the SGS intake in 2013 (PSEG 2013-TN2690; PSEG 2013-TN3137), and another two Kemp's ridley turtles at the SGS intake in 2014 (PSEG 2015-TN4262). Therefore, these three sea turtle species are considered below with regard to site-preparation effects from dredging, pile installation, and barge traffic.

3.2 Sturgeon Species Known to Occur Near the PSEG Site

The Shortnose Sturgeon (*Acipenser brevirostrum*) and the Atlantic Sturgeon are anadromous, primitive bony fish that occur in Delaware River Estuary (NMFS 2013-TN2791; NMFS 2012-TN2797). The Shortnose Sturgeon is believed to spawn earlier in the year than Atlantic Sturgeon species. Shortnose adults begin to migrate upstream to freshwater in the winter, spend most of the winter in deep waters of rivers and estuaries, and spawn between January and mid-May (Dadswell et al. 1984-TN2780). Atlantic Sturgeon adults migrate upriver later in the spring to spawn (ASSRT 2007-TN2082; Gilbert 1989-TN2149). Juveniles of both species feed on benthic insects and crustaceans, and as adults, feed on mollusks and large crustaceans (Shepherd 2006-TN2785; NMFS 2012-TN2797).

4.0 PROPOSED ACTION EFFECTS ANALYSIS

Site-preparation activities for a new nuclear power plant at the PSEG Site that would be authorized under the USACE permitting action may affect Federally listed species in the Delaware River Estuary in the following ways:

1. dredging activities associated with a new barge storage area and unloading facility and the intake structure
2. noise generated from installation of piles for building of a barge facility, causeway, shoreline haul road bulkhead, and intake structure
3. barge traffic during building activities may cause localized sedimentation and scouring, or may collide with protected species.

4.1 Dredging

PSEG proposes to use one hydraulic dredge over a 2-month period (USACE 2015-TN4277), which would serve to reduce dredging duration and handling of dredged material to limit the extent of impacts on aquatic resources (PSEG 2015-TN4234). Although use of an environmental hopper dredge may be less likely to be directly injurious to fish species, this method requires a longer work window, increases turbidity, and requires additional handling of material for disposal. Because hydraulic dredging could potentially entrain or impinge smaller sturgeon, PSEG would adhere to the seasonal in-water timing restrictions imposed by the USACE (currently March 1 through June 30) and NJDEP for dredging and other in-water work to avoid sensitive spawning or recruitment windows to minimize these effects (PSEG 2015-TN4234). PSEG did not detect any sturgeon species from fish sampling in the areas associated with the barge unloading facility and intake (i.e., between RKM 80 and 100) between 2003 and 2010 (PSEG 2015-TN4280); however, sturgeon may still migrate through this area.

Some dredging will likely coincide with pile-driving activities previously described, and thus discourage sea turtle and fish species from foraging in the immediate area (NMFS 2014-TN4239). The review team reviewed a recent report on sediment analysis for the Delaware River Basin that describes sediment samples near the PSEG Site as probably/potentially suitable for aquatic habitat restoration projects (DERSMPW 2013-TN4204). Therefore, dredging in this area near the PSEG Site is unlikely to introduce adverse exposure from sediment contaminants to nearby aquatic biota. An increase in suspended sediments could occur during dredging activities; however, PSEG determined that due to the natural high turbidity of the Delaware Estuary at the project location, any increase in sedimentation would not be noticeable (PSEG 2015-TN4234). Disruption of habitat for foraging in these areas of the Delaware River is expected to be minor and temporary, due to use of hydraulic dredge technology and compliance with USACE and NJDEP work window requirements. Sea turtles, juvenile and adult sturgeon, and their prey that may be present should be able to use adjacent unaffected habitats during dredge activities. Therefore, adverse effects to sea turtles, sturgeon, and their prey from dredging operations would be minor.

4.2 Pile Installation

Sturgeon and sea turtles may be affected by noise from installation of piles. In addition, sturgeon and some sea turtles rely on fish prey species that may also be affected by pile-installation noise. PSEG provided an analysis using criteria accepted by NMFS for estimating exceedance distances to determine cumulative sound exposure effect, and behavioral adverse effects to fish from pile-driving activities. Figure 4 shows the areas for noise effects which will occur over a period of approximately 50 days for causeway piling installation, 10 days for intake structure sheet piles, and 20 days each for shoreline and caisson sheet pile installation (See Table 2) (PSEG 2015-TN4234). While sea turtle effects were not specifically assessed, the exceedance distances provide a conservative analysis for sea turtle for injury effect and adverse behavioral effect. Given the short duration of activity and the abundance of nearby, adjacent unaffected habitat, it is likely that sturgeon, sea turtles, and their mobile prey will avoid the zones of cumulative sound and adverse behavioral effects (NMFS 2014-TN4239). Therefore, effects to sturgeon, sea turtles, and their prey from pile-driving activities would be minor.

4.3 Barge Traffic

Disruption of habitat in the Delaware River Estuary from sedimentation and scouring due to propeller wash is expected to be localized and temporary (PSEG 2015-TN4280). Sea turtles and sturgeon species likely would avoid habitats in the area of incoming and outgoing barge traffic and could find unaffected habitat nearby for foraging activities. Vessels for site preparation include bulk material delivery scow barges with a draft of 11 ft maximum and a speed of 1 to 7 knots (after leaving the Federal Navigation Channel); work vessels (e.g., barge, tugboat, and crane barges) with drafts ranging from 6 to 10.5 ft; and dredges with a maximum draft of 10 ft (PSEG 2015-TN4234). Bulk material scow barges (200 ft long by 35 ft wide) and some work craft vessels (up to 300 ft long by 50 ft wide) would be used following completion of the barge unloading facility. Dredge depths would allow for at least 2 feet of clearance at mean low water for the deepest draft vessels at the barge unloading facility and transit area (PSEG 2015-TN4234). Barges used for dredging (up to 270 ft long by 65 ft wide) in the areas for the intake and barge unloading facility would use a slow approach speed of 1 to 2 knots within 500 ft of the dredge area and would not significantly increase the overall traffic volume in the Delaware River; therefore these barges would not significantly increase the probability of sea turtle or sturgeon collisions. A recent Biological Opinion written for the Tappan Zee Bridge Replacement Project in the Hudson River concluded that vessels with a draft of less than 15 ft (e.g., construction barges and scows) reduce the likelihood of sturgeon strikes and are expected to have low vessel-related mortality (NMFS 2014-TN4239).

5.0 CUMULATIVE EFFECTS ANALYSIS

Cumulative effects, as defined in 50 CFR 402.02 (TN4312), 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. Other actions in the vicinity that have reasonably foreseeable future impacts on the Delaware River Estuary include the continued operation of SGS and HCGS, continued recreational and commercial fishing, continued water use and discharge by other power-producing plants and wastewater facilities, and potential construction of a new transmission corridor and transmission line by PJM Interconnection, LLC, for grid stability. Planning and development for the new transmission corridor would avoid or span channelized waterways, perennial streams, and intermittent streams (PSEG 2015-TN4280). Development for new transmission line crossings would require BMPs to protect water quality and minimize effects to aquatic habitats that may be at risk from clearing activities, runoff, and bank erosion. An estimated 77,088 linear ft of stream habitat (S&L 2010-TN2671) is within the 5-mi-wide macro-corridor for the hypothetical transmission line discussed in Sections 7.1 and 7.3.2 of the EIS. The hypothetical transmission line would cross the Delaware River and would require installation of footings. Placement of footings would result in permanent benthic habitat loss, but this loss would be minimal when compared to available adjacent habitat. Installation activities would be managed through use of BMPs required for Federal and State permitting to minimize siltation and protect adjacent aquatic habitats. PSEG would consult with Federal and State agencies, as required, when an exact route is identified and installation effects to protected species can be directly assessed (PSEG 2015-TN4280).

Water quality in the region may be affected by continued withdrawal and discharge of water to support power generation. Large commercial and recreational fisheries harvest fish and invertebrates that make up the ecological community within the Delaware River Estuary. In addition, the effects of natural environmental stressors (e.g., climate change and extreme weather events) would affect aquatic communities in the region.

Boat hull collisions and entrainment through propellers from vessel traffic in the Delaware River and Estuary are a significant source of anthropogenic sturgeon mortality. Brown and Murphy (2010-TN4274) examined the prevalence of these vessel strike mortalities between 2005 and 2008 and determined that 14 of the total 28 Atlantic Sturgeon mortalities in the Delaware Estuary had injuries consistent with vessel strike. Brown and Murphy (2010-TN4274) further concluded that any increase in mortality to Atlantic Sturgeon females may have significant effects on future population recovery of all DPS groups and recruitment due to the slow maturation rate of the species.

Each of the reasonably foreseeable future activities may influence the structure and function of estuarine food webs and result in observable changes to the aquatic resources in the Delaware River Estuary. In most cases, it is not possible to determine quantitatively the impact of individual stressors or groups of stressors on aquatic resources because they affect the region simultaneously, and their effects are cumulative.

5.1 Continued Operation of the SGS Once-Through Cooling System

Based on the assessment presented in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants—Supplement 45 Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2—Final Report* (NRC 2011-TN3131), NRC staff concluded that "entrainment, impingement, and thermal discharge impacts on aquatic resources from the operation of SGS Units 1 and 2 collectively have not had a noticeable adverse effect on the balanced indigenous community of the Delaware Estuary." However, operation of SGS Units 1 and 2 continues to impinge and entrain aquatic species and would contribute, in part, to the cumulative loss of these species in the Delaware River Estuary. Several improvements to the cooling water intake structures have been made to reduce impingement mortality at SGS. Some of these improvements included installation of modified traveling screens, installation of improved screen mesh, and modifications to spray wash nozzle configurations (PSEG 2009-TN2513). Decades of monitoring and survey data for finfish and aquatic invertebrates have been used to assess species density and richness in the vicinity of SGS as directed under NJPDES permits starting in 1994 and in subsequent renewals (PSEG 2015-TN4280). Impingement, entrainment, and fish assemblage sampling by trawling and seining are conducted each year, in accordance with NJPDES permit requirements for biological monitoring. The reporting emphasis is on targeted representative important species that include Blueback Herring (*Alosa aestivalis*), Alewife (*A. pseudoharengus*), American Shad (*A. sapidissima*), Atlantic Menhaden (*Brevoortia tyrannus*), Bay Anchovy (*Anchoa mitchilli*), Atlantic Silverside (*Menidia menidia*), White Perch (*Morone americana*), Striped Bass (*M. saxatilis*), Bluefish (*Pomatomus saltatrix*), Weakfish (*Cynoscion regalis*), Spot (*Leiostomus xanthurus*), and Atlantic Croaker (*Micropogonias undulatus*) (PSEG 2015-TN4280). All of these representative important species are considered either recreationally or commercially important or are ecologically important as forage fish for sustainability of the ecosystem within the

Delaware River Estuary. They are discussed in more detail in Section 2.4.2.3 of the EIS. Although individual species abundances change year to year, the overall trends in community abundances and diversity show no significant changes (PSEG 2015-TN4280).

5.2 Continued Operation of the HCGS Closed-Cycle Cooling System

HCGS uses closed-cycle cooling and therefore requires substantially less water volume for cooling operations (i.e., a maximum of 66,000 gpm from the Delaware River Estuary). Accordingly, effects on the aquatic community through impingement, entrainment, and discharge also are expected to be reduced when compared with the once-through cooling system at SGS (NRC 2011-TN3131). Impingement studies at HCGS were performed only in 1986 and 1987 at the commencement of operation for the single unit and showed a reduced overall impingement rate when compared to SGS (see EIS Section 5.3.2). Because HCGS was operating concurrently with SGS, the NJPDES permit-directed biological monitoring of the aquatic community through trawling and seining studies also reflected the combined effect of both HCGS and SGS operations. Therefore, the conclusions regarding the effect of continued operation of SGS also apply to HCGS in that the overall species diversity and community abundances near the PSEG Site are expected to continue to show no noticeable effects from operations (NRC 2011-TN3131).

5.3 SGS and HCGS Effects on Protected Species

Coordination pursuant to section 7 of the ESA regarding the nearby SGS and HCGS has been ongoing between the NRC and NMFS since 1979. In 1980, NMFS issued a Biological Opinion that concluded that the continued operation of these facilities was not likely to jeopardize the Shortnose Sturgeon and set a take limit of up to 11 Shortnose Sturgeon per year at SGS. Sea turtles were not included in the 1980 Biological Opinion.

The NRC reinitiated consultation on August 19, 1988, because SGS had impinged a number of sea turtles. NMFS issued a revised Biological Opinion on January 2, 1991, to include sea turtles. In this Biological Opinion, NMFS concluded that continued operation of SGS and HCGS would affect sea turtles but would not jeopardize the continued existence of any populations of threatened or endangered species. The 1991 Biological Opinion also reduced the number of allowable Shortnose Sturgeon takes based on actual levels of impingement at SGS and HCGS up to that point.

NMFS modified the 1991 Biological Opinion on August 4, 1992, to increase the total allowable take limit for loggerheads and Shortnose Sturgeon. However, between June and October 1992, SGS and HCGS exceeded their take limit for Kemp's ridley mortalities and met their take limit for Shortnose Sturgeon mortalities. NMFS issued another Biological Opinion on May 14, 1993 (PSEG 1999-TN2787), which did not change the take limits of listed species but specified that SGS and HCGS should develop a research program using mark/recapture to determine whether SGS has features that attract sea turtles. Also in 1993, PSEG implemented a policy of removing the ice barriers from the trash racks on the intake structure between May 1 and October 24, which resulted in substantially lower turtle impingement rates at SGS.

The NRC reinitiated section 7 consultation in 1998 to remove the study requirement from the SGS and HCGS Incidental Take Statement. The NRC cited the change in PSEG procedure regarding removal of ice barriers during the spring and summer. In response, NMFS issued a revised Biological Opinion on January 21, 1999, that removed the study requirement and decreased the number of annual allowable takes of Shortnose Sturgeon from 10 individuals to 5 individuals based on the review of Shortnose Sturgeon capture rates at SGS and HCGS. The Biological Opinion also formalized ice barrier removal from May 1 through October 24 by making it a requirement in the "Terms and Conditions" section of the Biological Opinion. To implement the 1999 Biological Opinion, PSEG developed associated guidance documents, *Biological Opinion Compliance* and *Species Management* (PSEG 1999-TN2787).

NMFS issued a new Biological Opinion in 2014 for the continued operation of SGS and HCGS under the terms of the facilities' renewed licenses (NMFS 2014-TN4238). The 2014 Biological Opinion allows for the incidental take of all five DPSs of Atlantic Sturgeon at SGS Units 1 and 2 trash bars and intake screens and revises incidental take limits for sea turtles and Shortnose Sturgeon (Table 4).

Table 4. SGS Incidental Take Statement Exemption (NMFS 2014-TN4238)

Species	Incidental Take Combined for SGS Units 1 and 2[(a)]
Loggerhead sea turtle[(b)]	9 (2 dead)
Green sea turtle[(b)]	1 at either SGS Unit 1 or 2 (alive or dead)
Kemp's ridley sea turtle[(b)]	4 (3 dead)
Shortnose Sturgeon[(b)]	26 (22 dead, 11 due to impingement)
Atlantic Sturgeon[(c)]	
(at trash bars)	200 (61 dead, 18 due to impingement)
(at traveling screens)	300 (26 injury or mortality)

(a) For the life of the renewed license for both SGS Unit 1 and 2
(b) At trash bars only
(c) All ages and DPSs combined, see NMFS 2014-TN4238 for specific information

The "Terms and Conditions" section of the Biological Opinion requires PSEG to report all incidental takes to NMFS within 30 days of the take and to include appropriate documentation in the report. In addition, the "Terms and Conditions" section details a number of requirements for sea turtle resuscitation, live sea turtle inspection, dead sea turtle necropsy reports, and sturgeon tagging and inspection.

Between 1992 and 2001, 16 loggerhead turtles were stranded at SGS (NRC 2010-TN2811). No loggerhead turtles have been impinged since 2001 (NMFS 2014-TN4238). Only two Atlantic green turtles have been captured at SGS since it began operations—one in 1991 (alive) and one in 1992 (dead) (NMFS 2014-TN4238). In 1992, two live and two dead Kemp's ridley sea turtles were found at the SGS cooling water intake; the cause of mortality was not reported (PSEG 1992-TN3173). In 1993, a live Kemp's ridley sea turtle was found at the SGS cooling water intake (PSEG 1999-TN2787). Implementation of mitigation measures in 1993 reduced the likelihood of additional turtle strandings; however, two Kemp's ridley turtles were stranded at SGS in 2013 (PSEG 2013-TN2690; PSEG 2013-TN3137) and two more in 2014 (PSEG 2015-TN4262). Table 5 summarizes incidental takes of sea turtle and sturgeon species at SGS between 2000 and 2015.

Table 5. SGS Incidental Takes of Sea Turtle Species and Sturgeon Species Between 2000 and 2015[(a)]

Species	Year	Number of Takes	Condition[(b)]
Sea turtle			
Loggerhead	2000	2	1 live, 1 dead
	2001	1	dead
Kemp's ridley	2013	2	1 live, 1 dead
	2014	2	2 dead
Sturgeon			
Shortnose	2000	1	dead
	2003	1	dead
	2004	1	dead
	2007	1	dead
	2008	1	dead
	2011	2	2 dead
	2012	1	live
	2013	4	2 live, 2 dead
	2014	6	4 live, 2 dead
Atlantic[(c)]	2012	2	1 live, 1 dead
	2013	18	12 live, 6 dead
	2014	18	10 live, 8 dead
	2015[(d)]	1	live

(a) References provided in text.
(b) Found alive or dead in intake area; counted as dead if found live but died shortly afterward.
(c) Atlantic Sturgeon reported at SGS between 2012 and 2014.
(d) Total impingement reported for January 1 through May 31, 2015.

Since 2000, 7 live and 11 dead Shortnose Sturgeon have been collected on SGS intake structures (PSEG 2000-TN3150; PSEG 2003-TN3149; PSEG 2004-TN3144; PSEG 2007-TN3148; PSEG 2008-TN3147; PSEG 2011-TN3146; PSEG 2011-TN3365; PSEG 2013-TN2707; PSEG 2013-TN2691; PSEG 2013-TN2692; PSEG 2013-TN2695; PSEG 2013-TN2704; PSEG 2014-TN4246; PSEG 2014-TN4253; PSEG 2014-TN4254; PSEG 2014-TN4255; PSEG 2014-TN4256; PSEG 2014-TN4257; PSEG 2014-TN4260).

Atlantic Sturgeon were not reported at the SGS intake screens until after this species was considered for listing as a Federally endangered species, and are reported here since 2012. NMFS revised the Biological Opinion in 2014 to include Atlantic Sturgeon (NMFS 2014-TN4238), with the New York Bight DPS being the majority of the take over the license period for SGS Units 1 and 2, although there may be incidental take of the other four DPSs. Between 2012 and May 31, 2015, 24 live and 15 dead Atlantic Sturgeon were reported at the SGS intake system (PSEG 2012-TN3143; PSEG 2012-TN3142; PSEG 2013-TN2693; PSEG 2013-TN2694; PSEG 2013-TN2696; PSEG 2013-TN2697; PSEG 2013-TN2698; PSEG 2013-TN2699; PSEG 2013-TN2700; PSEG 2013-TN2701; PSEG 2013-TN2702; PSEG 2013-TN2703; PSEG 2013-TN2705; PSEG 2013-TN3138; PSEG 2013-TN3139; PSEG 2013-TN3140; PSEG 2013-TN3141; PSEG 2013-TN3198; PSEG 2014-TN4240; PSEG 2014-TN4241; PSEG 2014-TN4242; PSEG 2014-TN4243; PSEG 2014-TN4244; PSEG 2014-TN4245; PSEG 2014-TN4247; PSEG 2014-TN4248; PSEG 2014-TN4249; PSEG 2014-TN4250; PSEG 2014-TN4251; PSEG 2015-TN4258; PSEG 2015-TN4261).

5.4 Commercial and Recreational Harvest of Fish and Shellfish

The Delaware River Estuary supports a diverse commercial and recreational fishery for finfish and invertebrates. Losses to the ecosystem from fishery harvest are managed at the Federal and State levels through catch limits, regulations on fishing gear, and seasonal closures. Unintended harvest or mortality is another source of loss through bycatch while targeting a different species. These activities have the potential to contribute to cumulative effects on aquatic species in the Delaware River Estuary. However, the direct contribution is difficult to assess because many of these fish populations have life histories that involve a large migratory territory offshore and along the Atlantic coast of the United States, and therefore, effects to populations are difficult to directly attribute to Delaware River Estuary habitat effects.

5.5 Habitat Loss and Restoration

Future land-use development for industry, agriculture, or other habitat alterations in the Delaware River Estuary watershed may affect water quality. These types of activities may also result in shoreline habitat loss. While aquatic habitats continue to be affected by natural and anthropogenic activities in the Delaware River Estuary, efforts to restore salt marsh and estuary habitat have met with some success and are expected to continue in the future. For example, ongoing restoration activities within the Mad Horse Creek WMA, located 4 mi east of the PSEG Site, would restore nearly 200 ac of the Mad Horse Creek WMA to address injuries to shoreline and bird resources resulting from the 2004 *Athos I* oil spill (NOAA 2008-TN2721). NJDEP and the National Oceanic and Atmospheric Administration proposed a tidal wetland restoration project that would allow development of smooth cordgrass (*Spartina alterniflora*) habitat to improve habitat quality in the area. Restoration would be accomplished through fill material removal to lower the marsh elevation and allow tidal inundation (PSEG 2015-TN4280). As described in EIS Section 4.3.1, unavoidable impacts to wetlands during site-preparation activities at the PSEG Site and the proposed causeway would be mitigated by habitat restoration and enhancement, using experience and proven techniques developed by the PSEG Estuary Enhancement Program (EEP). Sensitive species that utilize such marsh habitats would be affected positively by the proposed Mad Horse Creek WMA restoration effort and by the proposed mitigation for a new nuclear power plant at the PSEG Site and causeway (i.e., restoration of low quality marsh habitats) (PSEG 2015-TN4280).

5.6 Climate Change

The potential impacts of climate change on aquatic organisms and habitat in the geographic area of interest are not precisely known. In addition to rising sea levels, climate change could lead to regional increases in the frequency and intensity of extreme precipitation events, increases in annual precipitation, and increases in average temperature (GCRP 2014-TN3472). Such changes in climate could alter aquatic community composition on or near the PSEG Site through changes in species diversity, abundance, and distribution. In 2012, Hurricane Sandy created increased storm surge during this event within the Delaware River Estuary and had moderate effects on water quality and coastal habitats within the southernmost portion of the Delaware River Estuary through erosion, sedimentation, and resuspension of contaminants within sediments (ALS 2012-TN2720). Elevated water temperatures, droughts, and severe weather phenomena could adversely affect or severely reduce aquatic habitat; however, specific predictions on aquatic habitat changes in this region due to climate change are inconclusive at this time. The level of impact resulting from these events would depend on the intensity of the perturbation and the resiliency of the aquatic communities. The Delaware River Basin Commission (DRBC) stated in the State of the Delaware River Basin report for 2013 that increases in temperature and salinity are expected with future sea-level rise and climate change (DRBC 2013-TN2609). These potential changes are likely to result in movement of populations of more marine and euryhaline species farther up the Delaware River Estuary. For example, in a recent report, hard bottom areas north and south of the Chesapeake and Delaware Canal (upriver of the PSEG Site) were identified as having potential as reef sites for the establishment of new oyster beds and were discussed as a future conservation target due to changing climate conditions resulting in increases in salinity farther upriver (PDE 2011-TN2190).

5.7 Summary of Cumulative Effects

Aquatic resources of the Delaware River Estuary will be cumulatively affected to varying degrees by multiple activities and processes that are likely to occur in the future. The food web and the abundance of important aquatic forage species and other species may be affected by these stressors associated with human activities, but can be addressed by management actions (e.g., cooling system operation, regulation of fishing pressure, water quality improvements, and habitat restoration).

Other stressors, such as climate change and increased human population and associated development in the Delaware River Basin, cannot be directly managed, and their effects are more difficult to quantify and predict. It is likely, however, that future anthropogenic and natural environmental stressors would cumulatively affect the aquatic community of the Delaware River Estuary sufficiently that they would noticeably alter important attributes, such as species ranges, populations, diversity, habitats, and ecosystem processes, just as they have in the past. These stressors have modified important attributes of aquatic resources and would continue to exert an influence in the future, potentially destabilizing some of the attributes of the aquatic ecosystem. Based on these observations, the review team concludes that cumulative effects may be noticeable for some aquatic resources, primarily based on future use and climate change affecting aquatic resources in the Delaware Estuary and River Basin.

Cumulative effects on aquatic ecology resources are estimated based on the information provided by PSEG, NMFS, and the review team's independent review. Future operation of SGS and HCGS will continue to have effects on the aquatic resources in the Delaware River Estuary; however, the PSEG EEP as a form of mitigation may reduce the overall impacts to the aquatic ecosystems in the area. The review team concludes that the incremental contribution of the site-preparation activities for the PSEG Site would be negligible.

6.0 CONCLUSION AND DETERMINATION OF EFFECTS

Site-preparation activities associated with dredging, pile installation, and barge traffic may temporarily affect ESA protected species and their prey species in the immediate vicinity of those activities. These activities would be permissible under Department of the Army and NJDEP authorizations, but would not be authorized under an NRC ESP. Installation of cooling water intake structures, barge storage area and unloading facility, shoreline haul road bulkhead, and a 5-mi causeway may cause increased siltation and disturbance of benthic habitats, and produce intermittent noise from installation activities that could affect protected species and their prey. In addition, there will be an increase in barge vessel use and traffic in the area of these site-preparation activities. However, Federal and State permitting requires BMPs associated with minimization practices (e.g., restricted activity windows and dredge technologies) that minimize the potential for adverse impacts to protected species.

Dredging and installation of barge unloading facility, shoreline bulkhead for a haul road, and intake structures would be permissible under a Department of the Army and NJDEP authorization, but not authorized under an NRC ESP, and would occur in a portion of the Delaware River Estuary that is used by sea turtles and anadromous fish. Installation activities are expected to be temporary and localized, and any increase in siltation would be negligible given the high turbidity in these areas. The presence of any of the species described in this document within the installation area may occur, although these species should be able to migrate around the dredge areas and forage in adjacent, unaffected habitat.

Noise effects from pile-driving activities may induce behavioral modifications that deter sea turtles and sturgeon from migrating or foraging in the areas affected by pile-driving activities (NMFS 2014-TN4239). However, the duration of pile installation will be brief and PSEG would comply with USACE and NJDEP requirements to avoid work during seasons deemed critical for protected species (PSEG 2015-TN4234).

Any increase in barge traffic and use for site-preparation activities is not expected to be noticeable given the annual barge traffic reported for the Delaware Estuary. In addition, vessels approaching the in-water work areas or PSEG barge unloading facility would have slower approach speeds of 1 to 2 knots within 500 ft of these areas (PSEG 2015-TN4234).

The review team has determined that site-preparation activities for a new nuclear power plant at the PSEG Site as described herein and included in Department of the Army permit application number CENAP–OP–R–2009–0157–45 may affect, but are not likely to adversely affect, Atlantic Sturgeon from the New York Bight, Gulf of Maine, Chesapeake Bay, South Atlantic, and Carolina DPSs; Shortnose Sturgeon; the Northwest Atlantic DPS of loggerhead sea turtles; green sea turtle; and Kemp’s ridley sea turtle.

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F.3.2 National Marine Fisheries Service Essential Fish Habitat Assessment

Two versions of the NMFS EFHA are on display in this section. The first version (dated June 2014) is the EFHA originally sent by the NRC to the NMFS for review. This is the same version of the EFHA that was on display in Section F.3.2 of the draft EIS. Following the issuance of the draft EIS, comments were received from NMFS (see Section E.2.10 of Appendix E) on the June 2014 version of the EFHA.

The second version of the NMFS EFHA (dated August 2015) on display in this section is a supplement to the original EFHA. This supplemental EFHA incorporates the review team's responses to the comments received from the NMFS on the June 2014 version.

Essential Fish Habitat Assessment

PSEG Site

Early Site Permit Application

June 2014

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U.S. Nuclear Regulatory Commission

Rockville, Maryland

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ABBREVIATIONS/ACRONYMS

°C	degrees Celsius
°F	degrees Fahrenheit
ac	acre(s)
ASMFC	Atlantic States Marine Fisheries Commission
BMPs	best management practices
CDF	confined disposal facility
CFR	*Code of Federal Regulations*
COL	combined construction permit and operating license
CP	construction permit
DRBC	Delaware River Basin Commission
EEP	Estuary Enhancement Program
EFH	essential fish habitat
EIS	environmental impact statement
ER	Environmental Report
ESP	early site permit
fps	feet per second
ft	foot (feet)
gpm	gallon(s) per minute
ha	hectare(s)
HCGS	Hope Creek Generating Station
HDA	heat dissipation area
in.	inch(es)
km	kilometer(s)
lb	pound(s)
m	meter(s)
m^3	cubic meter(s)
MAFMC	Mid-Atlantic Fishery Management Council
Mgd	million gallons per day
mi	mile(s)
MSA	Magnuson-Stevens Fishery and Conservation Management Act
MSL	mean sea level
MT	metric ton(nes)
NAVD	North American Vertical Datum (sea level reference point used in surveying)
NEFMC	New England Fishery Management Council
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration

NRC	U.S. Nuclear Regulatory Commission
OL	operating license
PDE	Partnership for the Delaware Estuary
ppt	parts per thousand
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
RKM	River Kilometer
RM	River Mile
SGS	Salem Generating Station, Units 1 and 2
SWPPP	stormwater pollution prevention plan
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area
yd^3	cubic yard(s)

Essential Fish Habitat Assessment for the PSEG Site Early Site Permit Application

1.0 INTRODUCTION

In compliance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (16 USC 1801-TN1061), the U.S. Nuclear Regulatory Commission (NRC) review team prepared this essential fish habitat (EFH) assessment for the proposed Federal action: NRC issuance of an early site permit (ESP) for a site (the PSEG Power, LLC, and PSEG Nuclear, LLC [PSEG] Site) located adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station Units 1 and 2 (SGS) in Lower Alloways Creek Township, Salem County, New Jersey, on the eastern shore of the Delaware River Estuary.

Pursuant to the MSA, the review team requested via letter dated October 26, 2010, that the National Marine Fisheries Service (NMFS) provide information on EFH in the vicinity of the PSEG Site (NRC 2010-TN2203). In their response to the NRC dated December 9, 2010, NMFS indicated that the estuarine portions of the Delaware River and its tributaries contain designated EFH for a number of species and directed the NRC to prepare an EFH assessment as part of the EFH consultation process (NMFS 2010-TN2171). Another request was sent to NMFS dated July 31, 2013, to confirm designated EFH for the species provided in the December 9, 2010, NMFS letter, or to provide an updated EFH species list (NRC 2013-TN2805). A slightly revised list of species with designated EFH was received from NMFS (PNNL 2013-TN2687; NMFS 2013-TN2804).

Accordingly, this EFH assessment describes the proposed action, identifies relevant commercially, Federally managed species within the vicinity of the proposed action site, assesses whether the proposed action may adversely affect any designated EFH, and describes potential measures to avoid, minimize, or offset potential adverse impacts to EFH as a result of the proposed action. This assessment also considers the recent EFH assessment prepared for relicensing of SGS and HCGS (NRC 2011-TN2611).

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed NRC Federal action is the issuance, under the provisions of Title 10 of the *Code of Federal Regulations* (CFR) Part 52 (10 CFR 52-TN251), of an ESP for the PSEG Site for nuclear power facilities with characteristics that fall within the plant parameter envelope. An ESP is NRC approval of a site or sites 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 construction permit and operating 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 and can conduct certain site preparation and preliminary construction activities enumerated in 10 CFR 50.10 (e)(1) (10 CFR 50-TN249). An ESP does not, however, authorize construction and 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). An applicant for a CP or COL for a new nuclear power plant to be located at a site for which an ESP has been issued may reference the ESP, and matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent the identification of new and significant information.

PSEG is seeking an ESP for the PSEG Site located adjacent to the existing HCGS and SGS. As part of its review of the ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of CFR Part 51, the NRC regulations that implement the National Environmental Policy Act of 1969, as amended. 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) is participating as a cooperating agency with the NRC in preparing the EIS and participates collaboratively on the review team. Upon issuance of the draft EIS, PSEG plans to submit a Federal and a State application to the USACE and the New Jersey Department of Environmental Protection (NJDEP) for the Alteration of Any Floodplains, Waterways, or Tidal or Nontidal Wetlands in New Jersey. The USACE application number, the NJDEP Tidal Application number, and the NJDEP Nontidal Application number all will be included in the final EIS. The final EIS will be issued after considering public comments on the draft EIS. The USACE permit action on a Department of the Army individual permit application pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act; 33 USC 1251-TN662) and Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403-TN660) will be made following issuance of the final EIS.

2.1 Site Location and Description

The PSEG Site lies on Artificial Island, directly north of the existing SGS and HCGS located on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey, at which point the river is approximately 2.5 mi (4 km) wide. Artificial Island is a human-made island approximately 1,500 ac (600 ha) in size that consists of tidal marsh and grassland. The USACE created the island in the 20th century by the deposition of hydraulically dredged material atop a natural sand bar that projected into the river. The average elevation of the island is about 9 ft (3 m) above mean sea level (MSL) with a maximum elevation of approximately 18 ft (5.5 m) above MSL (PSEG 2014-TN3452). The site is located approximately 17 mi (27 km) south of the Delaware Memorial Bridge; 35 mi (56 km) southwest of Philadelphia, Pennsylvania; and 8 mi (13 km) southwest of the City of Salem, 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 50-mi (80-km) radius of the facility.

PSEG owns approximately 740 ac (300 ha) at the southern end of the Artificial Island, of which SGS occupies approximately 220 ac (89 ha) and HCGS occupies about 153 ac (62 ha). PSEG is developing an agreement in principle with the USACE to acquire an additional 85 ac of the USACE's Confined Disposal Facility (CDF) land immediately north of HCGS. Figures 2 and 3 provide a context for the site in relation to nearby water bodies and a plan view of the proposed site layout for PSEG, respectively. The region within 15 mi (24 km) of the site is primarily used

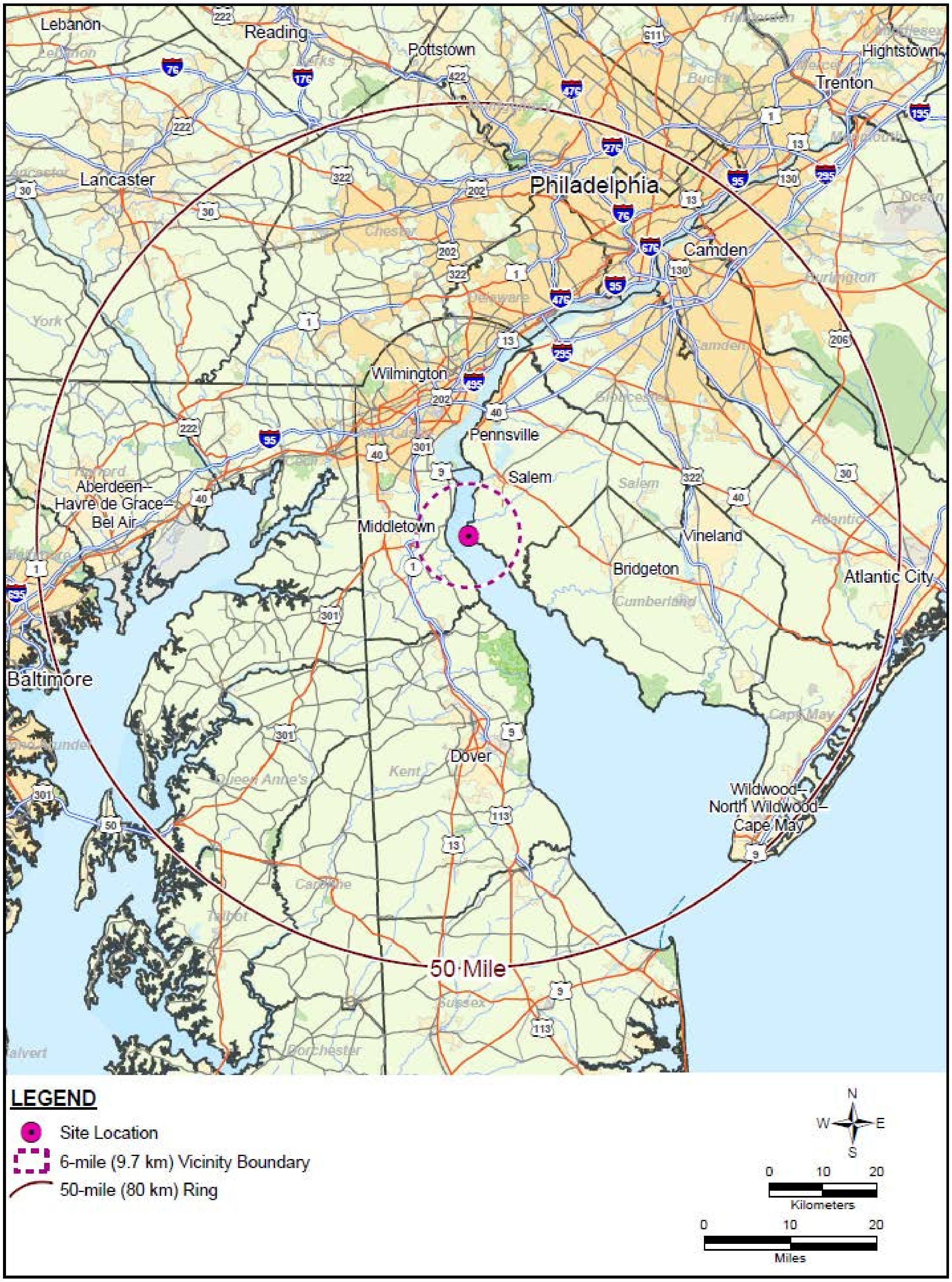

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2014-TN3452)

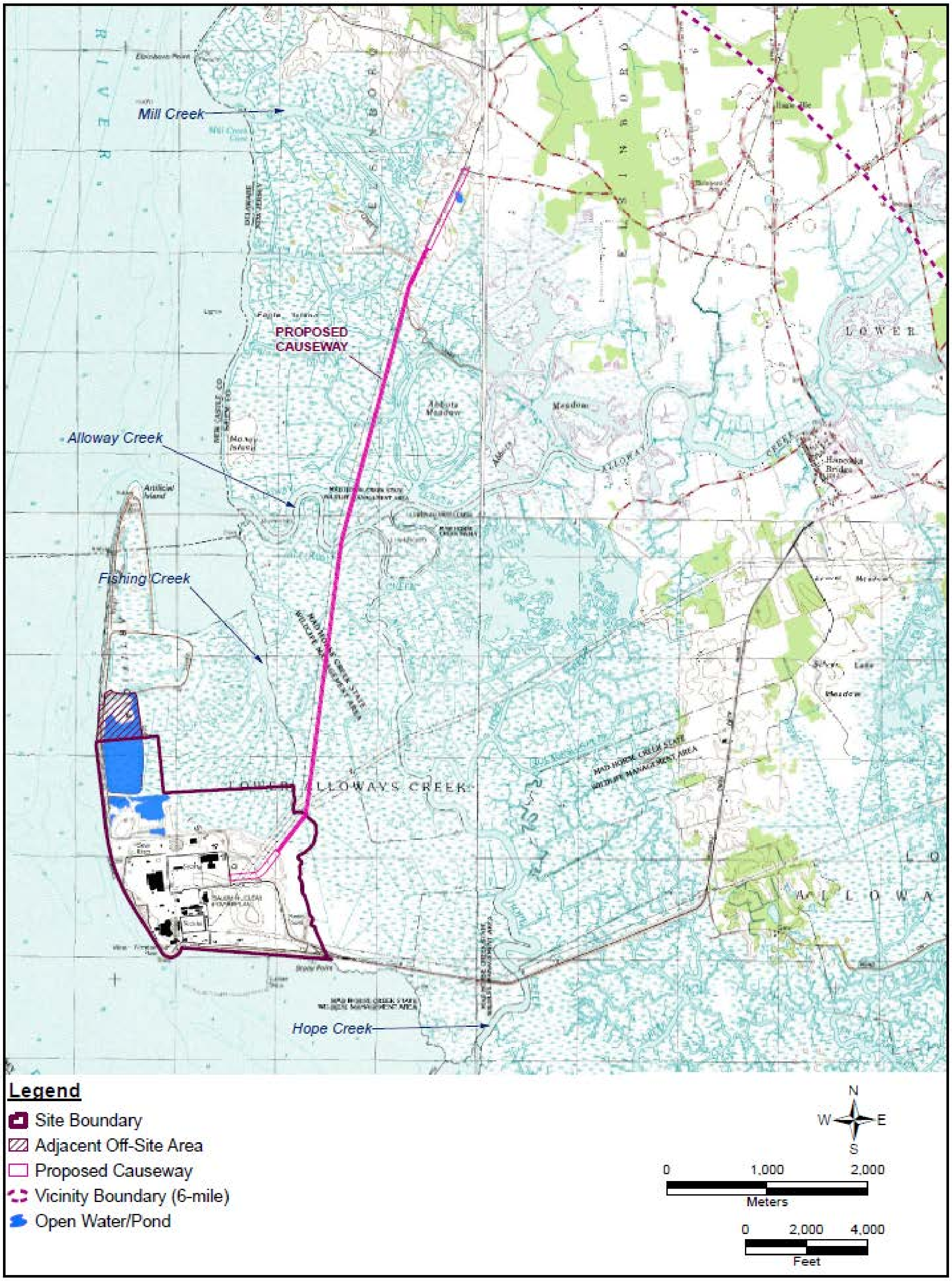

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2014-TN3452).

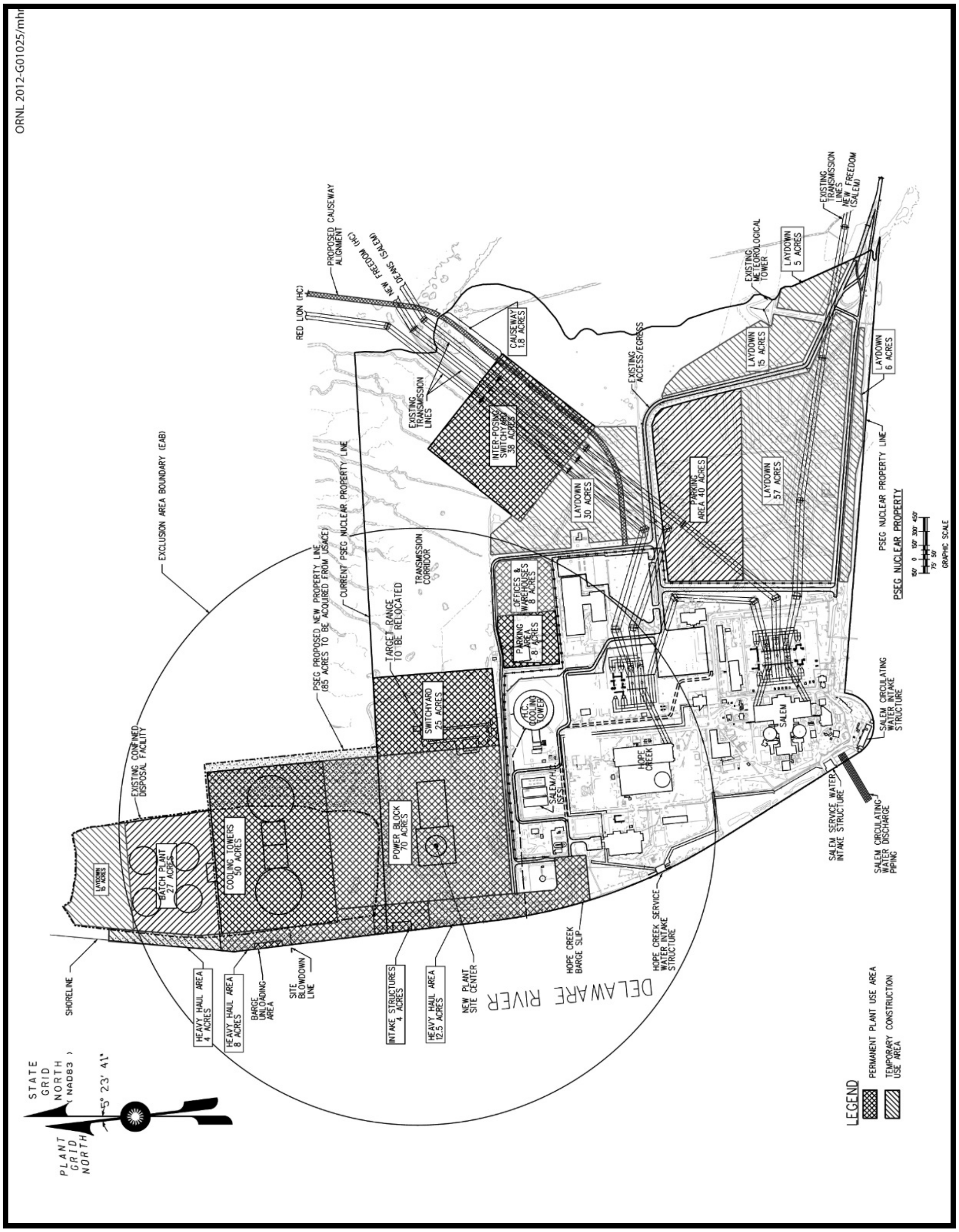

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489)

for agriculture. The area also includes numerous parks, wildlife refuges, and preserves such as Mad Horse Creek Wildlife Management Area (WMA) to the east; Cedar Swamp State WMA to the south in Delaware; Appoquinimink, Silver Run, and Augustine State WMAs to the west in Delaware; and Supawna Meadows National Wildlife Refuge to the north (PSEG 2014-TN3452).

2.1.1 Delaware River Estuary

The Delaware River and Delaware Bay are a part of the larger Delaware Estuary and River Basin that extends from headwaters in New York to the coastal plains near Cape Henlopen in Delaware (PDE 2012-TN2191). The Delaware Bay extends from the confluence of the Delaware River with the Atlantic Ocean from Delaware River Mile (RM) 0 to RM 54 (River Kilometer [RKM] 0 to RKM 86.9). The Delaware River Estuary includes the Delaware Bay and extends up the tidal Delaware River, which is characterized by brackish water between Delaware RM 54 and RM 80 (RKM 86.9 and RKM 128.8) and becomes freshwater at Delaware RM 80 (BBL and Integral 2007-TN2126). The PSEG Site near the mouth of Alloway Creek is at Delaware RM 52 (DRBC 2011-TN2412) and is considered to be in the lower estuary watershed unit of the Delaware River Estuary (PDE 2012-TN2191).

Characterization of the region dates back to pre-Revolutionary War times when shipping and trading at developing ports from the mouth of the Delaware River Estuary to inland Delaware, Pennsylvania, and New Jersey increased use of the watershed (Berger et al. 1994-TN2127). Increasing urbanization and industrialization of the region from 1840 to present day have significantly contributed to the degradation of the watershed with habitat alteration, water diversion, and increased pollution of the Delaware Estuary and River Basin ecosystems because no environmental policies were established until the 1960s and later (Berger et al. 1994-TN2127). According to the most recent status report on the Delaware Estuary and River Basin, the region continues to see some decline in environmental health indicators, such as removal of estuary sediments and increases in nitrogen and contaminant levels. However, environmental conditions such as technology implementation to increase fish passage and restoration of targeted aquatic habitats have improved the aquatic ecology for the watershed (PDE 2012-TN2191). The Delaware River Basin Commission (DRBC) stated in the State of the Delaware River Basin report for 2013 that increases in temperature and salinity are expected with future sea-level rise and climate change (DRBC 2013-TN2609). These potential changes are likely to result in movement of populations of more marine and euryhaline species further up the Delaware River Estuary.

The boundary of salinity intrusion in the Delaware River Estuary, also known as the salt line, fluctuates with flow changes. The salt line moves in response to the tides and variations in Delaware River Estuary freshwater discharge. During most of the year, the salt line is located between the Commodore Barry Bridge at Delaware RM 82 and Reedy Island at Delaware RM 54 (DRBC 2008-TN2277). During the drought of record in the 1960s, the salt line moved to its most upstream historically observed location at Delaware RM 102 (DRBC 2008-TN2277). Salinity is an important determinant of biotic distribution in estuaries, and salinity near the PSEG Site varies with river flow. Between 2003 and 2010, surface-water salinity measurements near the PSEG Site ranged from 1.8 to 13.3 parts per thousand (ppt) and surface-water temperatures ranged from 0.4 to 28.6°C (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567;

PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Salinity measurements taken over a greater number of years between RM 51 and RM 49 report a minimum salinity of 0.1 ppt and a maximum of 17.9 ppt (PSEG 2014-TN3452). For the purposes of EFH habitat assessment, the salinity range will conservatively be estimated between 0 and 18 ppt.

At the PSEG Site on Artificial Island, the estuary is tidal with a net flow to the south. The USACE maintains a dredged navigation channel near the center of the estuary about 6,600 ft (2,000 m) west of the shoreline of the PSEG Site. The navigation channel is about 40 ft (12 m) deep and 1,300 ft (400 m) wide; however, starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). On the New Jersey side of the channel, water depths in the open estuary at mean low water are fairly uniform at about 20 ft (6 m). Predominant tides in the area are semi-diurnal, with a period of approximately 12 hours and a mean tidal range of 5.3 ft (1.6 m) at RM 52 (PSEG 2014-TN3452).

The biological communities of the Delaware River Estuary in the area of the PSEG Site are typical of those that exist all along the main reaches of the Delaware Bay system. To mitigate egg and larval fish loss through the cooling system for SGS, PSEG proposed and established an estuary enhancement program (EEP) to restore salt marshes and provide monitoring and other structural enhancements to mitigate losses of aquatic species through impingement and entrainment at SGS (Balletto and Teal 2011-TN2612). The PSEG EEP was established in 1995 as part of New Jersey Pollutant Discharge Elimination System (NJPDES) requirements for SGS and includes an ongoing biological monitoring program in addition to habitat restoration to track the success of the mitigation actions. Because of the biological monitoring surveys that have been conducted in this area of the Delaware River Estuary since the mid-1980s in support of environmental requirements for the construction and operation of SGS and HCGS, an extensive long-term data set exists on the fishery and benthic macroinvertebrate communities of this area.

There is little to no submerged aquatic vegetation observed in the sampling areas near the PSEG Site (PSEG 2014-TN3452). Phytoplankton and zooplankton studies between 1973 and 1976 identified over 100 genera of phytoplankton in the area of the site, with three diatom taxa dominating the phytoplankton community: *Skeletonema costatum*, *Melosira* spp., and *Chaetoceros* spp. (IAI 1980-TN2608). The primary production contributed by the phytoplankton community is highest during the warmer months and lowest during the winter. Because estuarine systems are typically characterized by a shallow euphotic zone and high turbidity, contribution of organic carbon to the base of the food web by phytoplankton production is relatively small compared to that supplied by organic detritus and other primary producers such as benthic algae, periphyton, and submergent and emergent macrophytes (IAI 1980-TN2608). Surveys of zooplankton communities in the Delaware River Estuary near the site have identified over 100 taxa of microzooplankton (IAI 1980-TN2608). Dominant taxa consisted of rotifers and copepods (largely nauplii). Macroinvertebrate plankton samples were composed of 46 taxa (32 arthropods), with the dominant groups being amphipods *Gammarus* spp., the mysid shrimp *Neomysis americana*, larvae of the crabs *Rhithropanopeus harrisii* and *Uca minax*, and the isopod *Chiridotea almyra*. Seasonal variations in total density of zooplankton were not as consistent as that observed for the phytoplankton community and were generally related to short-lived differential abundances of a few dominant taxa (IAI 1980-TN2608).

The Delaware River Estuary is a complex ecosystem with many species playing different roles throughout their life cycles. Major assemblages of organisms within the estuarine community include plankton, benthic invertebrates, and fish. Detailed descriptions of these assemblages can be found in Section 2.4.2.3 of the EIS for a new nuclear power plant at the PSEG Site.

2.2 Dredging and In-Water Installation Activities

Before initiating any site preparation or development activities, PSEG would be required to obtain the appropriate authorizations regulating alterations to waters of the United States, including ponds and creeks. Building activities that could directly affect EFH include improvements to and use of the HCGS barge slip during site development activities, building the barge storage area and unloading facility, installing the cooling water system intake and discharge structures, and building the proposed causeway (Figures 2 and 3). Aquatic habitats potentially affected include habitats associated with the Delaware River Estuary and the interconnected system of tidal wetlands and marsh creeks primarily north of the PSEG Site. Potential direct impacts on aquatic resources as a result of building activities would involve physical alteration of habitat (e.g., infilling, cofferdam placement, dredging, pile driving) including temporary or permanent removal of associated benthic organisms, sedimentation, changes in hydrological regimes, and changes in water quality. Potential indirect impacts include increased runoff from impervious surfaces and subsequent erosion, as well as sedimentation and isolation of marsh creek segments due to infilling (PSEG 2014-TN3452).

Shoreline installation and site preparation activities would require a stormwater pollution prevention plan (SWPPP), developed as part of the NJPDES stormwater permit, which would describe best management practices (BMPs) to control sedimentation and erosion and provide stormwater management. Shoreline structures would be hardened to protect from shoreline erosion using placement of concrete or riprap (PSEG 2014-TN3452).

Improvements to the HCGS barge slip would include deepening the existing barge slip by another 2 ft to accommodate equipment-carrying barges (Cook 2009-TN2713). An estimated 1,350 yd^3 of dredged material would be removed within the existing HCGS barge slip to allow for additional clearance of barges carrying equipment that can be delivered to the PSEG Site. If the final plant designs indicate modules larger than 54 ft in width are required, the existing 60 ft wide HCGS barge slip may be widened an additional 20 ft along the south side of the barge slip and dredged an additional 2 ft below current barge slip depth. A double row of sheet piling would need to be placed before removal of excess earth by dredging. An estimated 5,800 yd^3 of material would be removed, and the existing riprap at the front end of the slip would be removed and then replaced at the widened river end of the slip (Cook 2009-TN2713).

The new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 61 ac (PSEG 2014-TN3452). An additional 0.05 ac of river bottom habitat would be removed for installation of seven 20 ft diameter barge mooring caissons. Installation of a new intake structure would require dredging of about 150,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 31 ac (PSEG 2014-TN3452). Dredging would also be required for installation of a new discharge structure; however, specific details on the amount of material to be dredged for discharge structure placement likely would depend on final design and placement criteria. Dredged material disposal would be either on the site or in another approved upland disposal facility (PSEG 2014-TN3452).

The installation of the barge storage and unloading facilities as well as the intake and discharge structures would result in temporary disturbances to the aquatic habitat in those portions of the Delaware River Estuary. An increase in suspended sediments could occur during dredging activities; however, PSEG would comply with NJDEP and USACE permitting regulations regarding type of dredge used as well as timing and duration of dredging to avoid sensitive aquatic life stage development or spawning. PSEG also would use appropriate BMPs to minimize sedimentation effects as required for Federal and State permitting. Motile invertebrates, fish, and sea turtles might swim into this portion of the Delaware River Estuary, but they would be able to swim away or likely would avoid the area because of vibratory noise from pile-driving activities. Mobile macroinvertebrates in this area might be able to occupy adjacent habitat in the Delaware River Estuary as the species composition and abundance of the macroinvertebrate community in the Delaware River Estuary near the site are similar to those of benthic communities in adjacent benthic areas of the estuary. Although permanent alteration of at least 92 ac of river bottom habitat would occur, the impacts to aquatic communities in the vicinity are expected to be minimal.

Offsite, an estimated 2,123 linear ft of marsh creek channels would be crossed by the proposed causeway (PSEG 2014-TN3452). Installation of the elevated causeway would require permanent pier placement for support structures. However, PSEG plans to avoid placement in stream channels (PSEG 2014-TN3452). Runoff from disturbed areas would be temporary and controlled through the use of BMPs required for water quality in compliance with Federal and New Jersey permitting, and runoff is not expected to adversely affect Delaware River Estuary surface waters (PSEG 2014-TN3452).

Vessel use during dredging or installation of the in-water structures and transportation of large system components to the PSEG Site may affect the aquatic resources of the Delaware River Estuary, particularly the benthos. The main impacts of using vessels would include turbulence from propellers (prop wash) and accidental spills of materials overboard. Vessels would be used during the installation of the cooling water discharge pipeline and during offloading of materials from barges (PSEG 2014-TN3452). Vessel operation during building or operation activities may cause short-term, localized impacts on aquatic species in the Delaware River Estuary. These impacts should not affect the general resources in the area of the PSEG Site or the region along this coast of the Delaware River Estuary.

2.3 Cooling Water System Description and Operation

Potential effects to managed species, their prey, and their habitats include the impingement of managed species or their prey as juveniles or adults at the facilities' water intake points, entrainment of eggs or larvae of managed species or their prey at the facilities' water intake points, and thermal effects from the discharge of heated water at the facilities' discharge points.

Several factors, such as the type of cooling system, the design and location of the intake structure, and the amount of water withdrawn from the source water body greatly influence the degree to which impingement and entrainment affect aquatic biota. Impingement and entrainment impacts are regulated by the U.S. Environmental Protection Agency or its designees (in this case, NJDEP) under Section 316(b) of the Clean Water Act (33 USC 1251-TN662). Section 316(b) “requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. A new nuclear power plant at the PSEG Site would employ closed-cycle cooling. Depending on the quality of the makeup water, closed-cycle, recirculating cooling water systems can reduce water use by 96 to 98 percent of the amount that the facility would use if it employed a once-through cooling system (66 FR 65256-TN243). This significant reduction in the water withdrawal rate results in a corresponding reduction in impingement and entrainment losses.

The Delaware River Estuary would provide condenser cooling water and service water using closed-cycle cooling technology composed of pumps, a water basin, and wet cooling towers (PSEG 2014-TN3452). The intake structure would be approximately 110 ft by 200 ft to meet bounding requirements of normal and safety-related cooling systems by drawing water directly from the Delaware River Estuary. The intake structure would be located along the east shoreline of the Delaware River Estuary, west of the plant site. This location is 2,800 ft north of the existing HCGS service water intake structure, as shown in Figure 3 (PSEG 2014-TN3452). The forebay for the intake would extend into the river, and the area in front of the intake structure would be dredged to an elevation of -19 ft, 10 inches (in.) North American Vertical Datum (NAVD). It is assumed that the river bottom would be dredged from the shoreline to the -19 ft, 10 in. NAVD river bottom contour on both sides of the intake to provide sufficient depth for the intake water withdrawal. The intake structure design would include a bar rack at the inlet to prevent debris from entering intake bays and would be cleaned mechanically by a trash rake (PSEG 2014-TN3452).

The intake structure bay and intake screens would be sized so that the average intake through-screen flow velocity would be less than 0.5 feet per second (fps), as required by Clean Water Act Section 316(b) Phase I requirements specified in 40 CFR 125.84 (40 CFR 125-TN254). In accordance with these rules, this design value would be subject to conditions of maximum flow (i.e., all pumps in the bay operating at full capacity) to enhance the performance of the debris-filtering system and minimize organism mortality due to impingement and entrainment (PSEG 2014-TN3452). The fish protection system (traveling screens and fish return) would be designed and operated to comply with the NJPDES permit that would be issued for a new plant’s cooling system (PSEG 2014-TN3452). Makeup water for the closed-cycle cooling system would be drawn from the Delaware River Estuary at an average rate of 78,196 gallons per minute (gpm; 112.6 million gallons per day [Mgd]), with consumptive use at a rate of 26,420 gpm (38 Mgd) (PSEG 2014-TN3452). In contrast, the adjacent SGS has a once-through cooling system, which takes in considerably more water (3,024 Mgd). Additionally, a new plant’s slower intake velocity (<0.5 fps) compared to SGS’s intake velocity (roughly 0.9 fps) increases the likelihood that smaller and/or slower fish would be able to escape from the intake area before being impinged.

2.3.1 Impingement

Because of its location on the Delaware River Estuary, a new nuclear power plant at the PSEG Site would impinge a variety of freshwater and marine fish and shellfish. Data from the impingement studies for SGS (once-through cooling) indicate that 50 to 67 finfish species are impinged each year, compared to just under 50 species of finfish impinged at HCGS (closed-cycle cooling) between 1986 and 1987. However, the number of sampling events differed dramatically between the two plants, with only 46 to 48 sampling events at HCGS over the same years (1986–87) as the more than 530 sampling events per year at SGS (VJSA 1988-TN2564; ECS 1989-TN2572). The species composition in the screen samples also varied between SGS and HCGS during the 1986 to 1987 sampling and varied at SGS between the sampling dates in the 1980s and sampling dates since 2003. Table 1 compares important, most abundant and total finfish species, as well as blue crab (*Callinectes sapidus*), impinged at SGS and HCGS between 1986 and 1987 as well as at SGS between 2003 and 2010.

The comparison of the SGS 1986–87 impingement data with SGS 2003–10 impingement data shows shifts in specific species abundance. Calculating mean density impinged per volume of water corrects for the difference in number of sampling events as more frequent samples were collected between 2003 and 2010. Interestingly, the total abundance of blue crab, Bay Anchovy (*Anchoa mitchilli*), Summer Flounder (*Paralichthys dentatus*), Oyster Toadfish (*Opsanus tau*), and Hogchoker (*Trinectes maculatus)* diminished by a factor of 2 or more since the 1986–87 sampling events. However, increases in Atlantic Silverside (*Menidia menidia*), White Perch (*Morone americana*), Striped Bass (*Morone saxatilis*), Atlantic Croaker (*Micropogonias undulatus*), American Shad (*Alosa sapidissima*), Channel Catfish (*Ictalurus punctatus*), Northern Kingfish (*Menticirrhus saxatilis*), and Gizzard Shad (*Dorosoma cepedianum*) are evident since the 1986–87 sampling. Of note, impingement data for SGS from 2008 to 2010 (PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571) also were examined and compared with SGS impingement data from 2003 to 2007 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569) to assess any recent deviation from the previous 2003 to 2007 trend (data not shown in table). Gizzard Shad, Northern Kingfish, Black Drum (*Pogonias cromis*), and Atlantic Menhaden (*Brevoortia tyrannus*) all increased by a factor of 2 in the more recent sampling. However, Blueback Herring (*Alosa aestivalis*), Atlantic Croaker, Butterfish (*Peprilus triacanthus*), Channel Catfish, Scup (*Stenotomus chrysops*), and Spotted Hake (*Urophycis regia*) were all reduced by a factor of 2 in the more recent sampling. These deviations in annual averages may represent changes to environmental conditions at the larger regional scale, such as climate, seasonal weather extremes, and fishing pressure, and do not appear to reflect any longer term trends in abundance.

Impingement mortality was not reported during the HCGS impingement sampling in 1986 or 1987 (VJSA 1988-TN2564; ECS 1989-TN2572). However, sampling at SGS (1986–87) and (2003–10) reported between 97 percent and 100 percent live, undamaged blue crab, and live condition for greater than 50 percent of the finfish impinged with the exception of White Perch and Atlantic Croaker juveniles between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572; PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Table 1. Impingement Rate for Important, Most Abundant, and Total Finfish Species and Blue Crab Impinged at SGS and HCGS

		Impingement Rate (number of individuals/10^6 m^3)		
Common Name	**Scientific Name**	**SGS (1986–87)[a]**	**HCGS (1986–87)[a]**	**SGS (2003–10)[b]**
American Eel	*Anguilla rostrata*	7.6	13.4	4.1
Blueback Herring	*Alosa aestivalis*	49.1	5.0[d]	37.2
Alewife	*Alosa pseudoharengus*	7.6	1.1[d]	8.14
Bay Anchovy	*Anchoa mitchilli*	601.9	521.5	115.4[d]
Atlantic Menhaden	*Brevoortia tyrannus*	31.0	3.7[d]	28.9
Atlantic Silverside	*Menidia menidia*	18.6	15.1	46.7[c]
White Perch	*Morone americana*	359.3	27.9[e]	1,066.4[c]
Striped Bass	*Morone saxatilis*	5.3	0.7[d]	78.8[e]
Weakfish	*Cynoscion regalis*	585.4	143.0[c]	486.4
Spot	*Leiostomus xanthurus*	13.8	2.1[d]	16.6
Atlantic Croaker	*Micropogonias undulatus*	109.8	965.4[d]	636.7[d]
Summer Flounder	*Paralichthys dentatus*	13.0	4.7[c]	4.1[c]
Oyster Toadfish	*Opsanus tau*	16.2	38.3[c]	1.8[d]
Northern Pipefish	*Syngnathus fuscus*	2.1	40.6[e]	4.1
Naked Goby	*Gobiosoma bosc*	2.3	303.2[e]	3.3
Hogchoker	*Trinectes maculatus*	636.4	112.2[d]	152.3[c]
Spotted Hake	*Urophycis regia*	58.6	7.0[d]	83.5
Gizzard Shad	*Dorosoma cepedianum*	14.3	1.7[d]	63.0[c]
American Shad	*Alosa sapidissima*	5.5	0.2	12.3[c]
Black Drum	*Pogonias cromis*	2.8	0.8	3.0
Black Sea Bass	*Centropristis striata*	3.0	2.0	0.4
Butterfish	*Peprilus triacanthus*	0.7	ND	0.6
Channel Catfish	*Ictalurus punctatus*	0.9	1.0	8.2[d]
Conger Eel	*Conger oceanicus*	0.1	0.4	0.1
Northern Kingfish	*Menticirrhus saxatilis*	0.2	ND	12.2[e]
Northern Searobin	*Prionotus carolinus*	3.8	1.8	6.0
Scup	*Stenotomus chrysops*	ND	ND	1.4
Silver Hake	*Merluccius bilinearis*	0.4	0.1	0.1
Windowpane Flounder	*Scophthalmus aquosus*	4.7	2.4	5.2
Winter Flounder	*Pseudopleuronectes americanus*	0.3	0.4	1.1
Total finfish density rate[f]		2,643.6	2,095.4	3,152.5
Blue Crab	*Callinectes sapidus*	1,542.5	2,450.1	690.4[c]
Total finfish and blue crab density rate[f]		4,186.1	4,545.5	3,842.9

Note: ND = not detected.
(a) Sources: VJSA 1988-TN2564; ECS 1989-TN2572.
(b) Sources: PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571.
(c) Differs from 1986–87 SGS impingement rate by more than a factor of 2.
(d) Differs from 1986–87 SGS impingement rate by more than a factor of 5.
(e) Differs from 1986–87 SGS impingement rate by more than a factor of 10.
(f) Includes all finfish impinged, not just those listed in table.

Historical impingement rates for the aquatic community from SGS (2003 to 2010) and HCGS (1986 to 1987) were used to estimate potential impingement losses associated with the operation of a new nuclear power plant at the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; VJSA 1988-TN2564; ECS 1989-TN2572). HCGS is more similar to a new plant at the PSEG Site with a closed-cycle cooling system design, versus the once-through cooling system of SGS. SGS withdraws larger volumes of water from the Delaware River Estuary with a faster through-screen velocity (roughly 0.9 fps), and therefore, SGS would be expected to impinge more fish than the closed-cycle cooling systems of HCGS and a new nuclear power plant at the PSEG Site.

PSEG examined the most recent HCGS impingement data from 1986 and 1987 with same year impingement data for SGS and derived a correction factor by dividing the HCGS data by the SGS data to allow comparison between the two plants and normalize the differences in intake volume and velocity (VJSA 1988-TN2564; ECS 1989-TN2572). Examination of 1986 to 1987 density impingement rates for finfish show a total impingement density average of 2,095.4 organisms per million cubic meters (m^3) total water volume for HCGS and 2,643.6 organisms per million m^3 total water volume for SGS. When combining both finfish and blue crab impingement rates, the total impingement density average is 4,545.5 organisms per million m^3 total water volume for HCGS and 4,189.1 organisms per million m^3 total water volume for SGS. The more recent impingement rates for SGS between 2003 and 2010 report a finfish impingement rate of 3,152.5 organisms per million m^3 total water volume and a combined blue crab and finfish impingement rate of 3,842.9 organisms per million m^3 total water volume. Therefore, a correction factor may not be needed to assess total organism impingement, and PSEG used a conservative approach for assessing potential impingement rates for a new nuclear power plant at the PSEG Site in its environmental report (ER). However, for comparative purposes, PSEG presented in its ER both the conservative assumption and the correction factor for estimating potential impingement rates (PSEG 2014-TN3452).

Sampled total finfish density was moderately lower at HCGS relative to SGS using data sets either from 1986 to 1987 or from 2003 to 2010, possibly because of the lower approach velocities to the HCGS screens. The only commercially important invertebrate vulnerable to substantial impingement by the intake structure of a new nuclear power plant at the PSEG Site is the blue crab. Blue crab densities for impingement samples at SGS were 690.4 per million m^3 total water volume between 2003 and 2010 and 1,542.5 per million m^3 total water volume in 1986 to 1987. At HCGS, blue crabs were impinged at a mean rate of 2,450.1 per million m^3 total water volume in 1986 to 1987 (see Table 1). It is possible that the rate of impingement at a new nuclear power plant at the PSEG Site for blue crab may be less than in 1986 to 1987 because there was a significant drop in impingement abundance of blue crab at SGS between the sampling dates in the 1980s and the average of 8 years of more recent sampling.

The applicant estimated impingement rates of finfish at a new nuclear power plant at the PSEG Site by multiplying the more recent SGS impingement densities by a correction factor representing the ratio of the total finfish impingement density at HCGS (1986 to 1987) to that of SGS for the same period. Recent examination of these data sets and impingement rates derives the correction factor to be 0.79 (2,095.4/2,643.6). It is reasonable to use the historical HCGS impingement rate correction factor for the estimate of impingement rate at a new plant at the PSEG Site because the intake design velocity for a new plant (less than 0.5 fps) is more comparable to HCGS than to SGS (roughly 0.9 fps). Thus, the estimated total impingement rate of finfish due to operation of a new plant is 2,490.5 per million m^3 total water volume compared to the more recent impingement rate of 3,152.5 per million m^3 total water volume for SGS. White Perch, Atlantic Croaker, and Weakfish (*Cynoscion regalis*) are expected to comprise the majority of the impingement total. The proposed maximum rate of water withdrawal for a new nuclear power plant at the PSEG Site is equivalent to 3.7 percent of the intake flow at SGS (PSEG 2014-TN3452). Assuming a constant withdrawal of 78,196 gpm for a new plant, and using the 79 percent correction factor for finfish impingement, a new plant would result in impingement of an estimated 386,526 fish annually. Using the conservative assumption with no correction factor and a maximum rate of water withdrawal for a new plant of 3.7 percent of the intake flow of SGS, approximately 489,148 fish would be impinged annually at a new plant at the PSEG Site (PSEG 2014-TN3452).

The intake structure for a new plant at the PSEG Site would contain traveling water screens to collect debris and fish. Impinged organic debris and aquatic organisms would be washed from the traveling screens and returned to the Delaware River Estuary. Mixed organic and manmade debris (e.g., wood, plastic) collected from the trash racks would be disposed of offsite. Details about the screen design, screen wash, and fish return system for a new plant are not available, but PSEG has stated in its ER that the screen design would be compliant with EPA 316(b) Phase I requirements specified in 40 CFR 125.84 (40 CFR 125-TN254), similar to screens at HCGS, and would include low-pressure screen washes to safely remove impinged organisms and water-filled fish buckets to improve the survival of screen-washed fish and shellfish until they are transported back to the Delaware River Estuary by the fish return system (PSEG 2014-TN3452).

In terms of numbers, the estimated impingement of most fish species is a small percentage of the commercial and recreational harvests of these species in Delaware and New Jersey as described in EIS Section 2.4.2. Estimated impingement of blue crab, Weakfish, White Perch, and Atlantic Croaker at a new plant at the PSEG Site potentially would have the highest impingement rates. However, it is expected that a large portion of these impinged organisms would survive because of the comparable impingement mortality recorded for SGS with a higher through-screen velocity than would be used for a new plant. Based on the planned low through-screen intake velocity and the use of closed-cycle cooling, the review team concludes that impacts from impingement of aquatic organisms at a new nuclear power plant at the PSEG Site would be minor.

2.3.2 Entrainment

Small, passively drifting, or weakly swimming aquatic organisms that are drawn into the intake and pass through the openings in the traveling screens would be killed by passage through the closed-cycle cooling system. Some entrained organisms are present year-round, such as phytoplankton and many types of zooplankton. These diverse plant and animal species (often referred to as holoplankton) are abundant throughout the Delaware River Estuary and have short generation times, so they can rapidly replace the losses due to entrainment, heat shock, and other stresses. Other entrained organisms, such as the larval stages of fish, crabs, and other bottom-dwelling crustaceans, are present only seasonally near the proposed intake of a new nuclear power plant at the PSEG Site. However, many of these seasonally planktonic organisms (collectively referred to as meroplankton) have longer life spans and generation times, so losses from cooling system effects are not as readily replaced.

The history of entrainment sampling at SGS and analyses of entrainment losses are described in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants–Supplement 45: Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2, Final Report (NRC 2011-TN3131). Most recently, entrainment of fish eggs, larvae, juveniles, and adults in the SGS cooling water system was studied between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Over the 8-year period, between 25 and 38 species were identified each year among the entrained fish (eggs, larvae, small juveniles, and adults). Of these, 92 percent of the entrainment samples were composed of two species: Bay Anchovy (75.3 percent) and Naked Goby (Gobiosoma bosc) (16.7 percent). Additional species that comprised over 98 percent of all entrained species included Atlantic Croaker (3.5 percent), Striped Bass (1.4 percent), Weakfish (0.8 percent), Atlantic Menhaden (0.4 percent), and Atlantic Silverside (0.4 percent). Bay Anchovy was the most abundantly entrained species for the egg (99.7 percent) and adult (57 percent) life stages; Naked Goby was the most abundantly entrained larval species (49 percent); and Atlantic Croaker was the most abundantly entrained juvenile species (56 percent) (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Seasonal vulnerability to entrainment is species-specific. For example, eggs, larvae, and juveniles of Bay Anchovy were most numerous in entrainment samples in summer months (June and July), whereas Atlantic Croaker juveniles were most abundant in the fall (October and November) (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). In general, the densities of entrained individuals for most fish species were greatest in the spring and/or summer, corresponding to the spawning periods for these species. Total densities of all fish life stages in the entrainment samples ranged from 54.0/100 m^3 (2003) to 264.2/100 m^3 (2007) and averaged 125.0/100 m^3 (PSEG 2014-TN3452).

PSEG applied estimated annual entrainment rates from SGS directly to calculate entrainment rates for a new nuclear power plant at the PSEG Site. The entrainment rates at SGS were applied to a new plant without a correction factor because entrained organisms are planktonic. Entrainment rates are a function of water withdrawal rates and are not influenced by through-screen velocities. Entrainment rates of holoplankton and meroplankton would be much smaller for a new plant than for SGS because of the smaller volume of water withdrawn by the closed-cycle system at a new plant. Based on the small volume of water withdrawn for the closed-cycle cooling water system at a new plant at the PSEG Site, the annual entrainment of organisms during operation of the intake system is expected to be minor and average less than 125 organisms per 100 m^3. Bay Anchovy, the likely dominantly entrained species for a new plant at the PSEG Site, is a highly abundant species in the area, with females spawning every 4 to 5 days over the spawning season (Zastrow et al. 1991-TN2670).

2.3.3 Cooling Water Discharge Impacts

Blowdown from the cooling towers, service water system, and other aqueous waste streams at a new nuclear power plant at the PSEG Site would be combined and discharged to the Delaware River Estuary at an average flow rate of 50,516 gpm (113 cfs) and a velocity of 9.2 fps, as described in EIS Section 5.2.3.1. The submerged 48-in. diameter discharge pipe would be located 8,000 ft north of the SGS discharge pipe and 4,000 ft north of the HCGS discharge pipe. The outlet of the discharge pipe would be 100 ft from the shoreline, 12 ft below mean lower low water and 3 ft above the river bottom (PSEG 2014-TN3452). Relative to the Delaware River Estuary, the discharged water would have an elevated temperature and increased concentration of both natural chemical constituents and chemical contaminants. Because of the tidal nature of the Delaware River Estuary in this area, the direction of the thermal discharge plume would vary with the tidal cycle.

2.3.3.1 Thermal Impacts

Potential thermal impacts on aquatic organisms could include heat stress, cold shock, and the creation of favorable conditions for invasive species.

As described in EIS Section 5.2.3.1, the portion of the Delaware River Estuary where discharge would occur is located in Zone 5 between Delaware RM 78.8 and RM 48.2. The DRBC temperature-related standards for Zone 5 require that the discharge-induced water temperature increases above the ambient water temperature in the river outside the permitted heat dissipation area (HDA) may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371) (Figure 4). Recent trawling of the Delaware River Estuary zone in the vicinity of SGS and HCGS between 2003 and 2010 has not identified significant shifts in species abundances near the SGS and HCGS discharge areas compared to adjacent zones (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). The volume of the thermal discharge from a new nuclear power plant at the PSEG Site (50,516 gpm) is only 2.4 percent of that from SGS (about 2,100,000 gpm circulated through the once-through cooling system) (PSEG 2014-TN3452). As discussed in Section 5.2.3.1, the thermal plume of the discharge from a new plant would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge; would be completely contained within the existing SGS HDA; and would not be expected to impede fish migration.

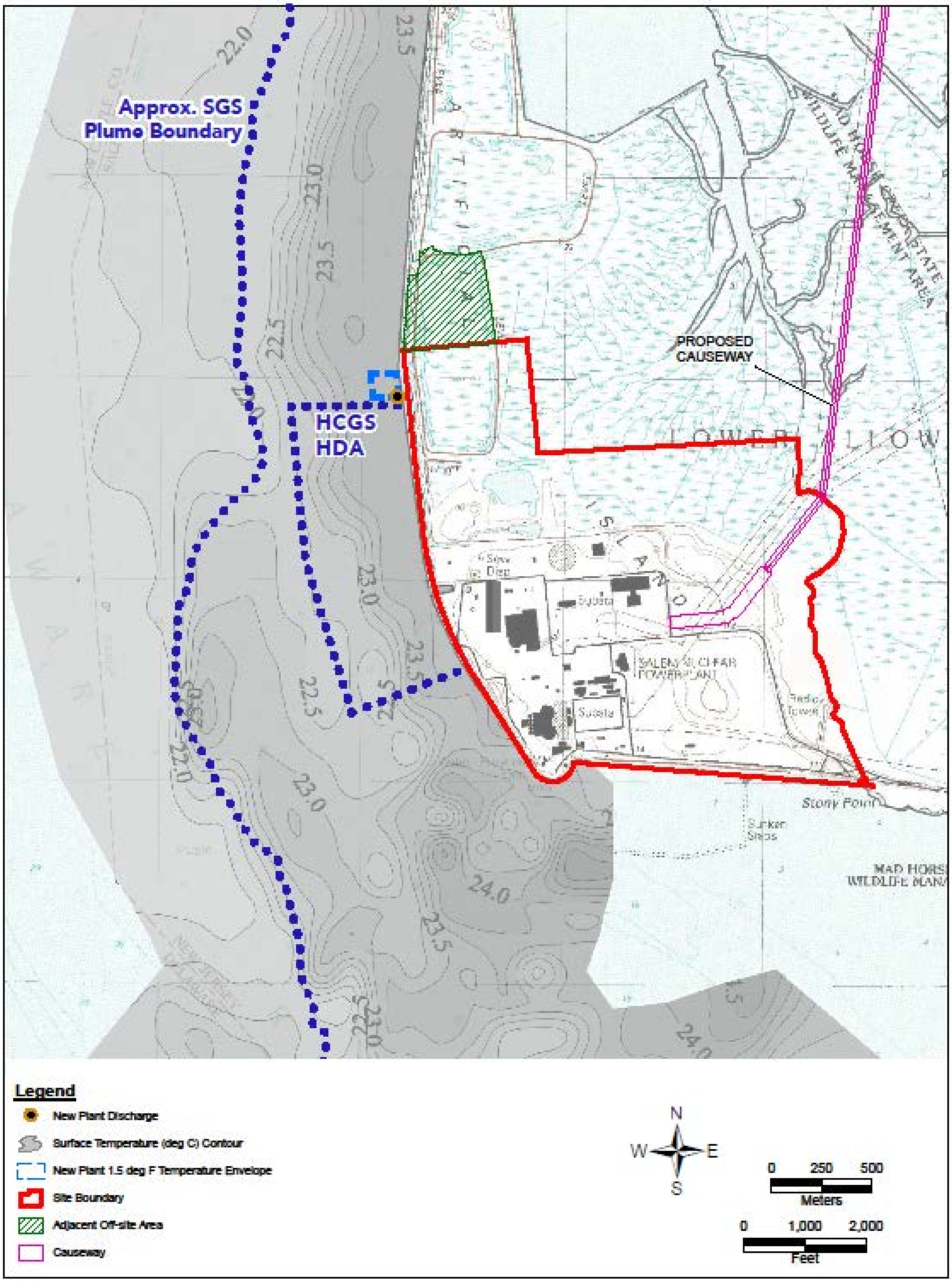

Figure 4. Predicted PSEG Thermal Plume in Relation to HCGS HDA and SGS Plume Boundary Under Flood Tide Conditions (Source: Modified from PSEG 2014-TN3452).

During flood tide conditions, when the median water temperature exceeds 79.4°F (26.3°C), the review team estimated that a portion of the thermal plume would exceed 86°F (30°C) because of the cumulative effects from SGS, HCGS, and a new plant (3.6°F, 1.5°F, 1.5°F, respectively). However, the combination of high-velocity discharge, turbulence in the discharge outlet area, and rapid mixing of the discharge effluent would limit the size of the thermal plume.

A factor related to thermal discharges that may affect aquatic biota is cold shock. Cold shock occurs when aquatic organisms that have been acclimated to warm water are exposed to a sudden temperature decrease. This sometimes occurs when single-unit power plants shut down suddenly in winter or when an unseasonable cold weather event occurs. Cold shock is less likely to occur at a multiple-unit plant because the temperature decrease from shutting down one unit is moderated by the heated discharge from the units that continue to operate. Based on the foregoing, any thermal impacts on the fish populations due to cold shock would be expected to be minor.

2.3.3.2 Chemical Impacts

As described in EIS Section 3.2.1.2, the cycles of concentration increase the concentration of total dissolved solids and minerals in the blowdown. In addition, the blowdown would contain chemical additives such as biocides and pH-adjusting chemicals to ensure proper functioning of the cooling towers. Predicted concentrations of dissolved chemical constituents in the discharges from the cooling water and other systems are expected to be compliant and controlled by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452).

2.3.3.3 Physical Impacts

Because of the increased temperature and chemical content of the discharged water compared to ambient conditions, the plume is expected to be negatively buoyant (PSEG 2014-TN3452). Due to the high discharge velocity of 9.21 fps, there would be rapid mixing with tidal currents upstream and downstream, with some potential for scouring occurring at the point of discharge. To minimize the scouring potential, PSEG would place riprap or other engineered features near the end of the discharge pipe and reduce the possible interactions of the discharge plume with bottom habitats and bottom-dwelling aquatic organisms (PSEG 2014-TN3452).

2.3.3.4 Barge Traffic

Use of the HCGS barge slip and the PSEG barge storage and unloading facility area are expected to be infrequent during operation. However, propeller wash may cause localized scouring and sedimentation within the barge slip. Because this area would be previously disturbed during site preparation and used during transport of building materials, it is unlikely that the temporary habitat disruption would have adverse effects on the aquatic communities in the area (PSEG 2014-TN3452). Adjacent, undisturbed habitat is available, and mobile aquatic organisms likely would avoid the barge slip area.

2.3.3.5 Maintenance Dredging

Dredging may be required to maintain use of the HCGS barge slip and intake channel as well as the barge storage and unloading facility during operation. Seasonal restrictions on activities to minimize effects to sensitive aquatic life stage development or spawning may be required for Federal and State permitting. Any effects to water quality, such as siltation, during these infrequent periods would be temporary and would be managed through the use of BMPs as required by Federal and State permits, and dredged material disposal would be in approved upland disposal areas (PSEG 2014-TN3452). Mobile organisms in the area would avoid activities involved in dredging and could use adjacent, undisturbed habitat during the temporary disruption.

2.3.3.6 Stormwater Management

As described in EIS section 5.2.3.1, PSEG would develop an SWPPP to minimize stormwater drainage effects to nearby surface waters. The SWPPP would be required to meet NJPDES stormwater discharge requirements.

3.0 EFH SPECIES NEAR THE SITE

3.1 EFH Species Identified for Preliminary Analysis

The 1996 amendments to the MSA (16 USC 1801-TN1061) identified the importance of habitat protection to healthy fisheries. The amendments, known as the Sustainable Fisheries Act of 1996, strengthened the authority of governing agencies to protect and conserve the habitat of marine, estuarine, and anadromous animals. EFH is defined as the waters and substrate necessary for spawning, breeding, feeding, or growth to maturity for managed fishery species. Identifying EFH is an essential component in the development of fishery management plans to evaluate the effects of habitat loss or degradation on fishery stocks and to take actions to mitigate such damage. NMFS considers the estuarine portion of the Delaware River and tidal waters near the PSEG Site to be EFH for 15 species (PNNL 2013-TN2687; NMFS 2013-TN2804), which are listed in Table 2.

The review team compared salinity, water temperatures, and depth in the vicinity of the PSEG Site with EFH requirements for each of the species and life stages that appear in Table 2 to further refine the EFH species with the potential to be adversely affected by the proposed action. The EFH requirements of several of the fish species and life stages are conditions that have been reported in the vicinity of the PSEG Site (see Table 3). For those species whose EFH requirements do not match the local conditions, the review team did not consider these species or life stages further in this EFH assessment. With the exception of the Atlantic Butterfish, the exclusion of certain species and life stages from consideration was based on salinity requirements being too high for the habitat near the PSEG Site. Atlantic Butterfish was excluded based on depth requirements not being met for habitat near the PSEG Site. The remaining species and life stages whose EFH requirements match local conditions appear in Table 4. Accordingly, the remaining species are described in detail in Section 3.2.

Table 2. Species with Designated EFH in the Delaware Bay

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Atlantic Butterfish	*Peprilus triacanthus*	-	-	X	--
Atlantic Sea Herring	*Clupea harengus*	-	-	X	X
Black Sea Bass	*Centropristis striata*	-	-	X	-
Bluefish	*Pomatomus saltatrix*	-	-	X	X
Clearnose Skate	*Raja eglanteria*	-	-	X	X
Cobia	*Rachycentron canadum*	X	X	X	X
King Mackerel	*Scomberomorus cavalla*	X	X	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Red Hake	*Urophycis chuss*	-	-	-	X
Scup	*Stenotomus chrysops*	-	-	X	-
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

Notes: X = designated EFH present for species and life stage; - = no designated EFH present for species and life stage.

Sources: NOAA 2006-TN2820; NOAA 2010-TN2821.

Table 3. Habitat Requirements of Identified EFH Species

Species, Life Stage	EFH Requirement			Site Matches EFH Requirements?
	Salinity (ppt)	**Temperature (°C)**	**Depth (m)**	
PSEG Site	***0–18***	***0.4–28.6***	***4.4–7.6***	
Atlantic Butterfish				
juveniles	3–37	3–28	10–365	No
Atlantic Sea Herring				
juveniles	26–32	<10	15–135	No
adults	>28	<10	20–130	No
Black Sea Bass				
juveniles	>18	>6	1-38	Yes
Bluefish				
juveniles	23–36	19–24	unspecified	No
adults	>25 ppt	14–16	unspecified	No
Clearnose Skate[(a)]				
juveniles and adults	12–30	6–20	5–23	Yes
Cobia				
all life stages	>25	>20	unspecified	No
King Mackerel				
all life stages	>30	>20	unspecified	No

Table 3. (continued)

Species, Life Stage	EFH Requirement			Site Matches EFH Requirements?
	Salinity (ppt)	Temperature (°C)	Depth (m)	
Little Skate[b]				
juveniles and adults	15–32	3–22	4–21	Yes
Red Hake				
adults	33–34	<12	10–130	No
Scup				
juveniles	>15	>7	0–38	Yes
adults	>15	>7	2–185	Yes
Spanish Mackerel				
all life stages	>30	>20	unspecified	No
Summer Flounder				
juveniles	10–30	>11	0.5–5	Yes
adults	unspecified	unspecified	0–25	Yes
Windowpane Flounder				
eggs and larvae	unspecified	<20	<70	Yes
juveniles and adults	5.5–36	<25–26.8	1–100	Yes
Winter Flounder				
eggs	10–30	<10	<5	Yes
larvae	4–30	<15	<6	Yes
juveniles	10–30	<25	1–50	Yes
adults	15–33	<25	1–100	Yes
Winter Skate[c]				
juveniles and adults	15–35	3–17	7–18	Yes

(a) Packer et al. 2003-TN2822.
(b) Packer et al. 2003-TN2823.
(c) Packer et al. 2003-TN2824.

Source: NOAA 2006-TN2820.

Table 4. Species Retained for In-Depth EFH Analysis

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Black Sea Bass	*Centropristis striata*	-	-	X	-
Clearnose Skate	*Raja eglanteria*	-	-	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Scup	*Stenotomus chrysops*	-	-	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

Notes: X = retained for in-depth analysis in Section 3.2; - = not subjected to in-depth analysis in Section 3.2.

3.2 EFH Species Identified for In-Depth Analysis

3.2.1 Black Sea Bass (*Centropristis striata*)

3.2.1.1 Species Description

The Black Sea Bass is a member of the Serranidae family and has an unusual life history. Black Sea Bass start out as females with full reproductive capability and then switch to become fertile males sometime around 6 years of age. Adults are found along the continental shelf in habitats characterized by relief structures such as reefs or sunken structures. Juveniles or young-of-year fish prefer more estuarine habitats but are also associated with relief habitat (Drohan et al. 2007-TN2825). Adults overwinter in deep offshore waters and move inshore in the spring. Off coastal New Jersey, spawning occurs between May and June. Females release 191,000 to 369,500 eggs in waters between 20 and 50 m depth in nearshore continental waters (Drohan et al. 2007-TN2825). Both juveniles and adults feed on benthic invertebrates such as crustaceans and squid (MDMF 2006-TN2159).

3.2.1.2 Status of the Fishery

The Mid-Atlantic Fishery Management Council (MAFMC) and Atlantic States Marine Fisheries Commission (ASMFC) jointly manage the Black Sea Bass under Amendment 13 of the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (ASMFC 2013-TN2826).

Black Sea Bass are highly valued by both commercial and recreational fishermen throughout the Mid-Atlantic as a food fish. Commercial harvests of Black Sea Bass in New Jersey and Delaware totaled 293,609 lb and 3,524 lb, respectively, in 2011 (NOAA 2013-TN2174). Recreational harvests in 2011 totaled 1,568,503 individuals in New Jersey and 326,358 in Delaware (NOAA 2013-TN2175). The September 26, 2013, status of the stock report indicated that Black Sea Bass are currently not considered overfished (MAMFC 2013-TN2827).

Trawling, seining, and weir surveys between 2003 and 2010 indicate Black Sea Bass are more commonly abundant in Delaware River waters to the south of the PSEG Site. A single fish was collected in Delaware River waters near the PSEG Site, and none were collected in the marsh creeks near the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.2 Clearnose Skate (*Raja eglanteria*)

3.2.2.1 Species Description

The Clearnose Skate occurs along the eastern Atlantic coast and in the coastal Gulf of Mexico in waters between 9 and 30°C. Clearnose Skates prefer habitat characterized by soft or gravelly substrate between 1 and 30 m depth, although some species have been reported at depths exceeding 100 m (Packer et al. 2003-TN2822). This species moves to inshore waters during the spring and early summer to reproduce and moves to offshore waters during fall and early winter. An oviparous species, females produce egg cases that are deposited in pairs and incubate for an average of 82 days for species occurring north of Cape Hatteras, North Carolina

(Packer et al. 2003-TN2822). Females may lay up to 35 pairs of eggs in one breeding season. Clearnose Skates prey on polychaete worms, small crustaceans, squid, and small fishes such as Weakfish, Butterfish, and Scup.

3.2.2.2 Status of Fishery

The Clearnose Skate is managed as part of the Northeast Skate Complex, although currently this species is not considered to be overfished (Sosebee 2006-TN2828). Skates have been reported in New England fishery landings since the late 1800s and primarily have been fished commercially as bait, although harvest also occurs incidentally as bycatch in other species fished by trawl and gillnets (NOAA 2013-TN2829).

A total of 104 Clearnose Skate were captured during trawling surveys by PSEG between 2003 and 2010 in Delaware River Estuary waters south of the PSEG Site, with no observations from field surveys occurring in the waters near the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.3 Little Skate (*Leucoraja erinacea*)

3.2.3.1 Species Description

The Little Skate is most commonly found in onshore and offshore waters associated with the Mid-Atlantic Bight and Georges Bank in the northeast. Little Skate prefer sandy or gravelly habitat where they can bury themselves during the day (Packer et al. 2003-TN2823). Little Skate juveniles and adults move into nearshore water in the winter and have been reported in Delaware Bay waters between October and May when water temperatures were less than 15°C, with the highest abundances occurring in the lower Delaware Bay near the mouth (Packer et al. 2003-TN2823). Like the Clearnose Skate, Little Skate deposit egg cases during winter months. Little Skate juveniles and adults feed on small crustaceans, amphipods, and polychaete worms (Packer et al. 2003-TN2823).

3.2.3.2 Status of Fishery

The Little Skate is managed as part of the Northeast Skate Complex, where it is fished commercially along with other skate species for bait and for harvest of skate wings (Packer et al. 2003-TN2823). The Little Skate is not currently considered to be overfished (NEFMC 2012-TN2830). Skates have been reported in New England fishery landings since the late 1800s and primarily have been fished commercially as bait, although harvest also occurs incidentally as bycatch in other species fished by trawl and gillnets (NOAA 2013-TN2829).

A total of 27 Little Skate were captured during trawling surveys by PSEG between 2003 and 2010 in Delaware River Estuary waters south of the PSEG Site, with no observations from field surveys occurring in the waters near the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.4 Scup (Stenotomus chrysops)

3.2.4.1 Species Description

The Scup, also known as the Porgy, range along the continental shelf of North America and are most common between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina (MDMF 2006-TN2161). Scup form schools in offshore waters to overwinter and move to inshore habitats characterized by smooth bottom substrate in the spring and summer. Adult Scup spawn annually in inshore waters between May and August in southern New England waters (ASMFC 2013-TN2831). Juvenile and adult scup prefer a variety of intertidal and subtidal habitats characterized by rocky ledges, reefs, sand, shell, and mud bottoms and are commonly found in large estuaries during summer and fall months (ASMFC 2013-TN2831). Adults feed on small crustaceans, mollusks, annelid worms, jellyfish, and sand dollars (MDMF 2006-TN2161).

3.2.4.2 Status of Fishery

The MAFMC and ASMFC jointly manage the Scup under Amendment 13 of the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (ASMFC 2013-TN2826). Scup are fished commercially and recreationally. The commercial harvest totaled 3,726,460 lb in New Jersey and 8 lb in Delaware in 2011 (NOAA 2013-TN2174). Recreational harvests in 2011 totaled 89,882 individuals in New Jersey and 1,258 in Delaware (NOAA 2013-TN2175). The September 26, 2013, status of the stock report indicated that Scup are currently not considered overfished (MAMFC 2013-TN2827).

Trawling, seining, and weir surveys between 2003 and 2010 indicate Scup are not found in Delaware River waters near the PSEG Site but are more abundant to the south of the PSEG Site in Delaware Bay (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.5 Summer Flounder (*Paralichthys dentatus*)

3.2.5.1 Species Description

The Summer Flounder ranges along the Atlantic coast from Maine to northern Florida. The Summer Flounder prefers sandy substrate for burrowing but may also use mud or silt substrates found in estuary habitats (Grimes et al. 1989-TN2150). Spawning behaviors are not clearly understood but are assumed to occur sometime between late fall and early spring in bottom habitats along continental shelf waters (Grimes et al. 1989-TN2150). Summer Flounder eggs are found in pelagic waters between 14 and 17°C, and larvae peak in abundance around November in waters between 9 and 18°C (ASMFC 2013-TN2832). Larvae drift into estuarine habitats where juvenile development takes place. Juveniles and adults prefer estuarine marsh creeks with mud or sandy substrate for burying (ASMFC 2013-TN2832). Adults feed on smaller fish, squids, crustaceans, mollusks, marine worms, and sand dollars (Grimes et al. 1989-TN2150).

3.2.5.2 Status of Fishery

The MAFMC and ASMFC jointly manage the Summer Flounder under Amendment 13 of the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (ASMFC 2013-TN2826). Summer Flounder are considered an excellent food fish and an important species in both recreational and commercial harvests. Commercial harvests in New Jersey and Delaware totaled 2,830,403 lb and 836 lb, respectively, in 2011 (NOAA 2013-TN2174). Recreational harvests in 2011 totaled 9,101,622 individuals in New Jersey and 808,442 in Delaware (NOAA 2013-TN2175). The September 26, 2013, status of the stock report indicated that Summer Flounder are currently not considered overfished (MAMFC 2013-TN2827).

Trawling, seining, and weir surveys between 2003 and 2010 indicate Summer Flounder are found in Delaware River waters near the PSEG Site and have been detected in offsite small and large marsh creeks near the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.6 Windowpane Flounder (*Scophthalmus aquosus*)

3.2.6.1 Species Description

The Windowpane Flounder is found in estuaries, nearshore waters, and waters along the continental shelf of the northwestern Atlantic from the Gulf of St. Lawrence in Canada to northern Florida (Hendrickson 2006-TN2153). Adults prefer muddy or fine-grain sandy substrates in waters and tolerate a wide range of temperatures and salinities—from 23°F to 80.2°F (0°C to 26.8°C) and 5.5 ppt to 36 ppt (Chang et al. 1999-TN2133). Spawning starts in February or March and peaks in May over inner continental shelf waters (Chang et al. 1999-TN2133). Females release pelagic, buoyant eggs that hatch in approximately 8 days. In spring-spawned fish, larvae settle in estuaries and over the continental shelf and then inhabit the polyhaline portions of the estuary throughout the summer. In fall-spawned fish, larvae settle mostly on the shelf. Juveniles migrate from estuaries to coastal waters during autumn, and they overwinter offshore in deeper waters. Adults remain offshore throughout the year and are highly abundant off southern New Jersey (Chang et al. 1999-TN2133).

Juvenile and adult Windowpane have similar food sources, including small crustaceans and fish larvae of hakes and Tomcod (*Microgadus tomcod*), and in turn are preyed upon by a number of species including Spiny Dogfish (*Squalus acanthias*), Thorny Skate (*Amblyraja radiata*), Goosefish (*Lophius americanus*), Atlantic Cod (*Gadus morhua*), Black Sea Bass, Weakfish, and Summer Flounder (Chang et al. 1999-TN2133).

3.2.6.2 Status of the Fishery

The Windowpane Flounder is managed by the New England Fishery Management Council (NEFMC) as two stocks, the Gulf of Maine/Georges Bank stock and the Southern New England/Mid-Atlantic stock, under its Multispecies Groundfish Fishery Management Plan (Hendrickson 2006-TN2153). Windowpane Flounder have never been widely or directly targeted as a commercial species but have been harvested in mixed-species fisheries since the 1900s. Landings ranged from 1.1 to 2.0 million lbs (500 to 900 metric tonnes [MT]) per year

between 1975 and 1981, increased to a record high of 4.6 million lbs (2,100 MT) in 1985, and have since steadily declined (Hendrickson 2006-TN2153). Although the Windowpane Flounder is not currently a major target of the commercial fishing industry, a total of 11,902 lb were harvested commercially in New Jersey in 2009 (NOAA 2013-TN2174).
Trawling, seining, and weir surveys between 2003 and 2010 indicate adult and juvenile Windowpane Flounder are not commonly found in Delaware River waters near the PSEG Site but were frequently collected in surveys south of the PSEG Site in Delaware Bay (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.7 Winter Flounder (*Pleuronectes americanus*)

3.2.7.1 Species Description

The Winter Flounder ranges along the Atlantic coast from Labrador, Canada, to Georgia. Winter Flounder prefer a variety of bottom substrates in inshore bays and estuaries during the winter and migrate to deeper water in the summer (Hendrickson et al. 2006-TN2154). Adult Winter Flounder migrate inshore to bays and estuaries in the fall and early winter to spawn and may remain inshore year-round in areas where temperatures are 59°F (15°C) or lower and where enough food is available (Grimes et al. 1989-TN2150). Eggs adhere to each other to form large clumps on the bottom and are most often found at salinities between 10 and 30 ppt (Buckley 1989-TN2833). Larvae initially are planktonic but become increasingly benthic as they develop (Pereira et al. 1999-TN2834). Juveniles and adults are completely benthic, with juveniles remaining in estuaries for the first year (Grimes et al. 1989-TN2150). Water temperature appears to dictate adult movements; south of Cape Cod, Winter Flounder spend the colder months in inshore and estuarine waters and move farther offshore in the warmer months (Buckley 1989-TN2833). Adult Winter Flounder tolerate salinities from 5 to 35 ppt and prefer waters temperatures from 32°F to 77°F (0°C to 25°C).

Juveniles remain in their natal shallow waters during their first summer and feed on diatoms, small crustaceans, and mollusks. Adults prey on small crustaceans, annelid worms, small mollusks, and fish (Hendrickson et al. 2006-TN2154). Adults and juveniles are an important food source for other predatory fish such as the Striped Bass, Bluefish (*Pomatomus saltatrix*), Goosefish, Spiny Dogfish, other flounders, and birds inhabiting estuarine marshes (Buckley 1989-TN2833).

3.2.7.2 Status of the Fishery

Winter Flounder, managed by the ASMFC in state waters and by the NEFMC in Federal waters under the Northeast Multispecies Fishery Management Plan, is one of the most important species for commercial and recreational fisheries on the Atlantic coast (Buckley 1989-TN2833). Winter Flounder are generally commercially harvested using otter trawl, but the species is also a popular recreational fish. Winter Flounder in the vicinity of the PSEG Site are part of the Southern New England/Mid-Atlantic Bight Stock. This stock peaked in the mid-1960s with 26 million lbs (12,000 MT) in landings in 1966, declined through the 1970s, peaked again through the 1980s with 24 million lbs (11,000 MT) in landings in 1981, and has since continued to decline (Hendrickson et al. 2006-TN2154). The Winter Flounder is the most important recreationally caught flounder in inshore waters of the Mid-Atlantic (Grimes et al. 1989-TN2150). The commercial harvest in New Jersey totaled 6,051 lb in 2011 (NOAA 2013-TN2174). The recreational harvest totaled 83,086 individuals in New Jersey in 2007 (NOAA 2013-TN2175).

Trawling, seining, and weir surveys between 2003 and 2010 indicate juvenile and adult Winter Flounder are not found in Delaware River waters near the PSEG Site but were observed in Delaware Bay waters south of the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

3.2.8 Winter Skate (Leucoraja ocellata)

3.2.8.1 Species Description

The Winter Skate occurs along the eastern Atlantic coast between southern New England waters and coastal North Carolina waters with water temperatures between -1.2 and 19°C. Winter skates prefer habitat characterized by sandy substrate between 1 and 300 m depth (Packer et al. 2003-TN2824). This species moves to inshore waters during the spring and early summer to reproduce and moves to offshore waters during fall and early winter. In the Delaware Bay, adult and juvenile Winter Skate have been observed to prefer higher salinities in the fall and winter and tolerate lower salinities in the spring (Packer et al. 2003-TN2824). Females produce egg cases that are deposited in pairs on sandy substrates, and fully formed juveniles hatch from these egg cases (Packer et al. 2003-TN2824). Winter skates prey on polychaete worms and amphipods and are prey to sharks, other skate species, and gray seals (Packer et al. 2003-TN2824).

3.2.8.2 Status of Fishery

The Winter Skate is managed as part of the Northeast Skate Complex, where it is fished commercially along with other skate species for bait and for harvest of skate wings for human consumption (Packer et al. 2003-TN2824). The Winter Skate is not currently considered to be overfished (NEFMC 2012-TN2830). Skates have been reported in New England fishery landings since the late 1800s and primarily have been fished commercially as bait, although harvest also occurs incidentally as bycatch in other species fished by trawl and gillnets (NOAA 2013-TN2829).

A total of 28 Winter Skate were captured during trawling surveys by PSEG between 2003 and 2010 in Delaware River Estuary waters south of the PSEG Site, with no observations from field surveys occurring in the waters near the PSEG Site (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571; PSEG 2013-TN2586).

4.0 POTENTIAL ADVERSE EFFECTS TO EFH

The provisions of the MSA define an "adverse effect" to EFH as the following (50 CFR 600-TN1342):

> *Adverse effect* means any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The review team has identified the following potential PSEG building and operation activities that may cause adverse effects to EFH:

- Dredging and in-water installation activities
- Impingement
- Entrainment
- Discharge effects (thermal, chemical, and physical)
- Maintenance dredging and barge traffic
- Loss of forage species through activities listed above

In the following sections, each of these issues is addressed for each of the species identified for in-depth analysis in Table 4. Cumulative effects are discussed separately in Section 5.0 below.

4.1 Black Sea Bass

As discussed in Section 3.2.1, the NMFS has designated EFH for juvenile Black Sea Bass within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the juvenile life stage.

In the spring, juvenile Black Sea Bass may forage in more estuarine habitats including the following areas of proposed dredging and in-water installation activities: HCGS barge slip, barge storage and unloading facility, caisson installation area, and intake and discharge structures. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Juvenile Black Sea Bass that may be present should be able to use adjacent unaffected habitats.

As described in Section 2.3, a conservative estimate of impingement losses for the closed-cycle cooling operation of PSEG would be approximately 481,479 annually. The majority of these species are expected to be White Perch, Atlantic Croaker, and Weakfish. Entrainment losses are expected to be minor and average less than 125/100 m^3 intake water volume, with the majority of these losses being Bay Anchovy (eggs) and Naked Goby (larvae). Impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572), and at SGS between 2003 and 2010 recorded minimal occurrences of Black Sea

Bass (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410, DRBC 2011-TN2371). Juvenile Black Sea Bass are generally found in bottom habitats at depths between 1 and 38 m (3 and 125 ft) and could avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the localized point of discharge and the heated discharge plume. Aquatic species, including juvenile Black Sea Bass, largely may avoid the immediate vicinity of the discharge outlet because of high velocity and turbulence. Chemical discharge effects are expected to be minimal and comply with the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452). Disruption of habitat for foraging due to maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are expected to be localized and temporary. Juvenile Black Sea Bass that may be present should be able to use adjacent unaffected habitats.

Black Sea Bass juveniles primarily forage on benthic invertebrates, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS, and therefore operation of a new plant at the PSEG Site would not be expected to reduce the abundance of the benthic invertebrate prey species for Black Sea Bass. Thus, building and operation activities in the vicinity of the PSEG Site would likely have minimal adverse effect on juvenile Black Sea Bass EFH.

4.2 Clearnose Skate

As discussed in Section 3.2.2, NMFS has designated EFH for juvenile and adult Clearnose Skate within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the juvenile and adult life stages.

Juvenile and adult Clearnose Skate may forage within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility dredging and installation. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Juvenile and adult Clearnose Skate that may be present should be able to use adjacent unaffected habitats.

As described in Section 2.3, a conservative estimate of impingement losses for the closed-cycle cooling operation of PSEG would be approximately 481,479 annually. The majority of these species are expected to be White Perch, Atlantic Croaker, and Weakfish. Entrainment losses are expected to be minor and average less than 125/100 m^3, with the majority of these losses being Bay Anchovy (eggs) and Naked Goby (larvae). Impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572), and at SGS between 2003 and 2010 recorded no occurrences of juvenile or adult Clearnose Skate (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410, DRBC 2011-TN2371). Juvenile and adult Clearnose Skate are generally found in bottom habitats at depths of 5 to 23 m (16 to 75 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including juvenile and adult Clearnose Skate, may largely avoid the immediate vicinity of the discharge outlet because of high velocity and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and not affect Clearnose Skate EFH for juveniles or adults.

Disruption of habitat for prey species or for foraging because of maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary.

Clearnose Skate juveniles and adults primarily forage on polychaete worms, small crustaceans, squid, and small fishes such as Weakfish, Butterfish, and Scup. While Butterfish and Scup are not abundant near the PSEG Site, Weakfish are abundant and may be impinged at a rate similar to HCGS, which is roughly 143 individuals per one million m^3 of intake water (see Section 5.3.2.1 of the EIS). However, Weakfish was one of the most abundant species caught in the Delaware River near the PSEG Site between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571) and would not be expected to decrease significantly with closed-cycle cooling water operation at the PSEG Site. In addition, population abundances of these forage species have not been shown to be adversely affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of the prey species for Clearnose Skate in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site likely would have minimal adverse effects on juvenile and adult Clearnose Skate EFH.

4.3 Little Skate

As discussed in Section 3.2.3, NMFS has designated EFH for juvenile and adult Little Skate within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support juvenile and adult life stages.

Juvenile and adult Little Skate may forage within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility installation and dredging. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs to control sedimentation (PSEG 2014-TN3452). Juvenile and adult Little Skate that may be present should be able to use adjacent unaffected habitats.

As described in Section 2.3, a conservative estimate of impingement losses for the closed-cycle cooling operation of PSEG would be approximately 481,479 annually. The majority of these species are expected to be White Perch, Atlantic Croaker, and Weakfish. Entrainment losses are expected to be minor and average less than 125/100 m^3, with the majority of these losses being Bay Anchovy (eggs) and Naked Goby (larvae). Impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572), and at SGS between 2003 and 2010 recorded no occurrences of juvenile or adult Little Skate (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371). Juvenile and adult Little Skate are generally found in bottom habitats at depths of 4 to 21 m (13 to 69 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the mixing zone under slack tides represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including juvenile and adult Little Skate, may largely avoid these areas because of high velocities and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and not affect Little Skate EFH for juveniles or adults.

Disruption of habitat for foraging because of maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary.

Little Skate juveniles and adults primarily forage on small crustaceans, amphipods, and polychaete worms, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of the prey species for juvenile and adult Little Skate in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site would likely have no adverse effect on juvenile and adult Little Skate EFH.

4.4 Scup

As discussed in Section 3.2.4, NMFS has designated EFH for juvenile and adult Scup within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the juvenile and adult life stages.

Scup may forage within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility dredging and installation. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs to control sedimentation (PSEG 2014-TN3452). Juvenile and adult Scup that may be present should be able to use adjacent unaffected habitats.

Scup were not observed in impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572) and were detected at low abundance in impingement sampling at SGS between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371). Juvenile and adult Scup are generally found over a range of bottom habitats at depths between 0 and 185 m (0 to 607 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including juvenile and adult Scup, may largely avoid these areas because of high velocities and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and are not expected to affect Scup EFH for juveniles or adults.

Disruption of habitat for foraging because of maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary.

Scup juveniles and adults primarily forage on small crustaceans and mollusks, annelid worms, and jellyfish, which are not expected to be affected in the long term from dredging and in-water installation activities described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of these prey species for juvenile and adult Scup in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site would likely have minimal adverse effects on juvenile and adult Scup EFH.

4.5 Summer Flounder

As discussed in Section 3.2.5, NMFS has designated EFH for juvenile and adult Summer Flounder within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the juvenile and adult life stages. Juvenile and adult Summer Flounder may forage within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility dredging and installation. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs to control sedimentation (PSEG 2014-TN3452). Juvenile and adult Summer Flounder that may be present should be able to use adjacent unaffected habitats. A total of eight Summer Flounder were collected during bottom trawl surveys near the PSEG Site between 2003 and 2010, with over 300 collected during that same time in the Delaware River Estuary to the south of the site in higher salinity waters (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Summer Flounder were detected in impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572) and at SGS between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Between 2003 and 2010, an average of 11.4 larvae and 58.6 juveniles were entrained per year at SGS (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371). Juvenile and adult Summer Flounder are generally found over a range of bottom habitats at depths between 0 and 25 m (0 and 82 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including juvenile and adult Summer Flounder, may largely avoid these areas because of high velocities and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and not affect Summer Flounder EFH for juveniles or adults.

Disruption of habitat for foraging because of maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary. Juvenile and adult Summer Flounder that may be present should be able to use adjacent unaffected habitats.

Summer Flounder juveniles and adults primarily forage on small crustaceans, mollusks, and squid, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of these prey species for juvenile and adult Summer Flounder in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site would likely have minimal adverse effects on juvenile and adult Summer Flounder EFH.

4.6 Windowpane Flounder

As discussed in Section 3.2.6, NMFS has designated EFH for Windowpane eggs, larvae, juveniles, and adults within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the occurrence of these life stages.

Windowpane Flounder eggs are present in surface waters over the Atlantic continental shelf beginning in February, with peak abundances occurring in the middle Atlantic between March and October (Chang et al. 1999-TN2133). Following offshore spawning, eggs and larvae may drift into estuarine waters by tidal and wave action. No Windowpane eggs and very few larvae were observed during sampling events between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Larvae drift along the continental shelf waters or in estuaries and settle to the bottom, and it is possible that a few may settle within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility dredging and installation. Disruption of larval habitat from in-water installation activities or maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation and minimize habitat disruption during spawning and post-spawning development seasons in the spring and early summer (PSEG 2014-TN3452).

Juvenile and adult Windowpane Flounder may forage within the areas of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage area and unloading facility dredging and installation. Disruption of habitat for foraging in these areas of the Delaware River Estuary near the PSEG Site during installation and maintenance dredging is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary. Juvenile and adult Windowpane Flounder that may be present should be able to use adjacent unaffected habitats.

Two Windowpane Flounder were collected during bottom trawl surveys near the PSEG Site between 2003 and 2010, with over 600 collected during that same time in the Delaware River Estuary to the south of the site in higher salinity waters (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Windowpane Flounder were detected at low abundance in impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572), and at SGS between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). No Windowpane eggs were collected from entrainment samples between 2003 and 2010, and an average of 0.9 larvae and 0.25 juveniles were entrained per year at SGS (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371). Windowpane larvae and juvenile and adult Windowpane Flounder are generally found over a range of bottom habitats at depths between 1 and 100 m (3 and 328 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 2.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including larval, juvenile, and adult Windowpane Flounder, may largely avoid these areas because of high velocity and turbulence. Chemical discharge effects are expected to be minimal and comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and are not expected to affect Windowpane Flounder EFH for eggs, larvae, juveniles, or adults.

Windowpane Flounder eggs are not known to occur near the PSEG Site and, therefore, there would be no adverse effect to Windowpane egg EFH from building and operating a new plant at the PSEG Site. Windowpane Flounder larvae may occur near the PSEG Site in relatively low abundance and would not be affected in the long term from dredging, in-water installation activities, and maintenance dredging as described in Section 2. Therefore, building and operation activities in the vicinity of the PSEG Site would likely have minimal adverse effects on larval Windowpane Flounder EFH.

Windowpane Flounder juveniles and adults primarily forage on small crustaceans and larval hakes and cods, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of these prey species for juvenile and adult Windowpane Flounder in the vicinity of the PSEG Site. Therefore, building and operation activities at the PSEG Site would likely have minimal adverse effect on juvenile and adult Windowpane Flounder EFH.

4.7 Winter Flounder

As discussed in Section 3.2.7, NMFS has designated EFH for Winter Flounder eggs, larvae, juveniles, and adults within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the occurrence of these life stages.

Winter Flounder eggs are present in clumps that sink to the bottom and can be found in water depth of less than 5 m (16 ft) between February and June (Buckley 1989-TN2833). No Winter Flounder eggs were observed during sampling events between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Larvae are initially planktonic but become benthic as they mature, and a small number of Winter Flounder larvae may settle in areas within the area of the cooling water intake and discharge dredging and installation, caisson installation area, and barge slip and new barge facility dredging. Disruption of larval habitat from in-water installation activities or maintenance dredging in the Delaware River Estuary at the PSEG Site is expected to be localized, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation and minimize habitat disruption during spawning and post-spawning development seasons in the spring and early summer (PSEG 2014-TN3452).

Juvenile and adult Winter Flounder may forage within area of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage and unloading facility improvements and dredging. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs required by Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary. Juvenile and adult Winter Flounder that may be present should be able to use adjacent unaffected habitats. No Winter Flounder were collected during bottom trawl surveys near the PSEG Site between 2003 and 2010, while over 50 were collected during that same time in the Delaware River Estuary to the south of the site in higher salinity waters (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Winter Flounder were detected at low abundance in impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572) and at SGS between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). No Winter Flounder eggs were collected from entrainment samples between 2003 and 2010, and an average of 1.5 larvae and 1.0 juveniles were entrained per year at SGS (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR 410-TN3235; DRBC 2011-TN2371). Larval, juvenile, and adult Winter Flounder are generally found over a range of bottom habitats at depths between 1 and 100 m (3 and 328 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including larval, juvenile, and adult Winter Flounder, largely may avoid these areas because of high velocities and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and not affect Winter Flounder EFH for eggs, larvae, juveniles, or adults.

Winter Flounder eggs are not known to occur near the PSEG Site and therefore, there would be no adverse effect to Winter Flounder egg EFH from building and operating activities at the PSEG Site. Winter Flounder larvae and juveniles feed on diatoms and phytoplankton, while older juveniles and adults primarily forage on small crustaceans, annelid worms, and small mollusks, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of these prey species for juvenile and adult Windowpane Flounder in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site would likely have minimal adverse effect on larval, juvenile, and adult Windowpane Flounder EFH.

4.8 Winter Skate

As discussed in Section 3.2.8, NMFS has designated EFH for juvenile and adult Winter Skate within the vicinity of the PSEG Site because of the depth, temperature, and salinity characteristics present to support the juvenile and adult life stages.

Although no Winter Skate were collected near the PSEG Site during trawling and seining surveys between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-

TN2570; PSEG 2011-TN2571), Winter Skate may still forage within the area of the cooling water intake and discharge dredging and installation, caisson installation area, HCGS barge slip improvements and dredging, and barge storage area and unloading facility improvements and dredging. Disruption of habitat for foraging in these areas of the Delaware River Estuary is expected to be minor, temporary, and largely mitigable with the use of BMPs required for Federal and State permits to control sedimentation (PSEG 2014-TN3452). Barge traffic effects are also expected to be localized and temporary. Juvenile and adult Winter Skate that may be present should be able to use adjacent unaffected habitats.

Winter Skate were not observed in impingement sampling at SGS and HCGS between 1986 and 1987 (VJSA 1988-TN2564; ECS 1989-TN2572) or in impingement sampling at SGS between 2003 and 2010 (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571).

Thermal plume analysis for a new plant at the PSEG Site estimates that ambient water temperature in the estuary outside the NJPDES-permitted HDA may not increase by more than 4°F (2.2°C) from September through May and by 1.5°F (0.8°C) from June through August, with a year-round maximum water temperature of 86°F (30°C) (18 CFR Part 410; DRBC 2011-TN2371). Juvenile and adult Winter Skate are generally found over a range of bottom habitats at depths between 7 and 18 m (23 and 59 ft) and would avoid the buoyant thermal plume at the discharge point. As described in Section 2.3, the size of the thermal plume for a new plant would be relatively small and would have a maximum extent of about 700 ft into the river from the discharge location, about 300 ft upstream from the discharge, and about 500 ft downstream from the discharge. Because the horizontal extent of the thermal plume represents only 5.3 percent of the river width at Delaware RM 52, mobile organisms would be able to avoid the heated discharge plume. Aquatic species, including juvenile and adult Winter Skate, may largely avoid these areas because of high velocity and turbulence. Chemical discharge effects are expected to be minimal, comply by the terms of the NJPDES permit that would be issued for a new plant at the PSEG Site (PSEG 2014-TN3452), and not affect Winter Skate EFH for juveniles or adults.

Winter Skate juveniles and adults primarily forage on polychaete worm and amphipods, which are not expected to be affected in the long term from dredging and in-water installation activities as described in Section 2.2. In addition, these forage species have not been shown to be affected by operations at the adjacent HCGS and SGS and would therefore not be expected to reduce the abundance of these prey species for juvenile and adult Winter Skate in the vicinity of the PSEG Site. Therefore, building and operation activities in the vicinity of the PSEG Site likely would have no adverse effect on juvenile and adult Winter Skate EFH.

5.0 CUMULATIVE EFFECTS TO EFH

A wide variety of historical events have affected the Delaware Estuary and River Basin and its resources (Berger et al. 1994-TN2127). As Europeans began settling the estuary region early in the 17th century, agriculture expanded, and the clearing of forest led to erosion. Dredging, diking, and filling gradually altered extensive areas of shoreline and tidal marsh. By the late 1800s, industrialization had altered much of the watershed of the upper estuary, and fisheries were declining because of overfishing as well as pollution from ships, sewers, and industry. By the 1940s, anadromous fish were blocked from migrating upstream to spawn because of a barrier of low oxygen levels in the Philadelphia area. This barrier, combined with small dams on tributaries, nearly destroyed the herring and shad fisheries. A large increase in industrial pollution in the early-to-mid 1900s resulted in the Delaware River near Philadelphia becoming one of the most polluted river reaches in the world. Major improvements in water quality began in the 1960s and continued through the 1980s as a result of State, multi-State, and Federal actions, including the Clean Water Act and the activities of DRBC (PDE 2012-TN2191). The Delaware Estuary and River Basin is the subject of numerous restoration activities and projects under the purview of the Partnership for the Delaware Estuary (PDE), DRBC, and numerous research and academic institutions. In its 2012 annual report, PDE suggested that the overall environmental conditions of the region were fair (PDE 2012-TN2191). Since 2008, some conditions were found to be declining in areas such as sediment removal impairing estuarine habitats and a decline in young-of-year Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*), and some areas were seeing improvements such as a reduction of total organic carbon and an increase in Striped Bass populations (PDE 2012-TN2191).

Other actions in the vicinity that have present and reasonably foreseeable future impacts on the Delaware River Estuary include the continued operation of SGS and HCGS, the completion of dredging operations for the Delaware River Main Channel Deepening Project by the USACE, and potential construction of a new transmission corridor and transmission line by PJM Interconnection, LLC, for grid stability. Planning and development for the new transmission corridor would avoid or span channelized waterways, perennial streams, and intermittent streams (PSEG 2014-TN3452). New transmission line crossing development would require BMPs to protect water quality and minimize effects to aquatic habitats that may be at risk from clearing activities, runoff, and bank erosion. An estimated 77,088 linear ft of stream habitat (S&L 2010-TN2671) is within the 5-mi-wide macro-corridor for the hypothetical transmission line discussed in EIS Sections 7.1 and 7.3.2. The hypothetical transmission line would cross the Delaware River and would require installation of footings. Placement of footings would result in permanent benthic habitat loss, but this loss would be minimal when compared with available adjacent habitat. Installation activities would be managed through use of BMPs required for Federal and State permitting to minimize siltation and protect adjacent aquatic habitats. PSEG would consult with Federal and State agencies, as required, when an exact route is identified and installation effects to protected species can be assessed directly (PSEG 2014-TN3452). Water quality in the region may be affected by continued withdrawal and discharge of water to support power generation. There are large commercial and recreational fisheries that harvest fish and invertebrates that make up the ecological community within the Delaware River Estuary. The effects of natural environmental stressors such as climate change and extreme weather events also would affect aquatic communities in the region.

Each of the current and reasonably foreseeable future activities may influence the structure and function of estuarine food webs and result in observable changes to the aquatic resources in the Delaware River Estuary. In most cases, it is not possible to determine quantitatively the impact of individual stressors or groups of stressors on aquatic resources because they affect the region simultaneously, and their effects are cumulative.

5.1 Continued Operation of the SGS Once-Through Cooling System

Based on the assessment presented in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants–Supplement 45 Regarding Hope Creek Generating Station and Salem Nuclear Generating Station, Units 1 and 2 Final Report (NRC 2011-TN3131), NRC staff concluded that “entrainment, impingement, and thermal discharge impacts on aquatic resources from the operation of SGS Units 1 and 2 collectively have not had a noticeable adverse effect on the balanced indigenous community of the Delaware Estuary.” However, operation of SGS Units 1 and 2 continues to impinge and entrain aquatic species and would contribute, in part, to the cumulative loss of these species in the Delaware River Estuary. Several improvements to the cooling water intake structures have been made to reduce impingement mortality at SGS. Some of these improvements included installation of modified traveling screens, installation of improved screen mesh, and modifications to spray wash nozzle configurations (PSEG 2009-TN2513). Decades of monitoring and survey data for finfish and aquatic invertebrates have been used to assess species density and richness in the vicinity of SGS as directed under NJPDES permits starting in 1994 and subsequent renewals (PSEG 2014-TN3452). Impingement, entrainment, and fish assemblage sampling by trawling and seining are conducted each year, in accordance with NJDPES permit requirements for biological monitoring. The reporting emphasis is on targeted representative important species that include Blueback Herring, Alewife (Alosa pseudoharengus), American Shad, Atlantic Menhaden, Bay Anchovy, Atlantic Silverside, White Perch, Striped Bass, Bluefish, Weakfish, Spot (Leiostomus xanthurus), and Atlantic Croaker (PSEG 2014-TN3452). All of these representative important species also are considered either recreationally or commercially important or are ecologically important as forage fish for sustainability of the ecosystem within the Delaware River Estuary. They discussed in more detail in EIS Section 2.4.2.3. Although individual species abundances change year to year, the overall trends in community abundances and diversity show no significant changes (PSEG 2014-TN3452).

5.2 Continued Operation of the HCGS Closed-Cycle Cooling System

HCGS uses closed-cycle cooling and therefore requires substantially less water volume for cooling operations. Accordingly, effects on the aquatic community through impingement, entrainment, and discharge also are expected to be reduced when compared with the once-through cooling system at SGS (NRC 2011-TN3131). Impingement studies at HCGS were performed only in 1986 and 1987 at the commencement of operation for the single unit and showed a reduced overall impingement rate when compared to SGS (see EIS Section 5.3.2). EFH species impinged at HCGS between 1986 and 1987 included Black Sea Bass, Summer Flounder, Windowpane Flounder, and Winter Flounder. Because HCGS was operating concurrently with SGS, the NJPDES permit-directed biological monitoring of the aquatic community through trawling and seining studies also reflected the combined effect of both HCGS and SGS operations. Therefore, the conclusions regarding effect of continued operation of SGS apply also to HCGS in that the overall species diversity and community abundances near the PSEG Site are expected to continue to show no noticeable effects from operations (NRC 2011-TN3131).

5.3 Commercial and Recreational Harvest of Fish and Shellfish

The Delaware River Estuary supports a diverse commercial and recreational fishery for finfish and invertebrates. Losses to the ecosystem from fishery harvest are managed at the Federal and State levels through catch limits, regulations on fishing gear, and seasonal closures. Unintended harvest or mortality is another source of loss through bycatch while targeting a different species. While these activities have the potential to contribute to cumulative effects on aquatic species in the Delaware River Estuary, the direct contribution is difficult to assess because many of these fish populations have life histories that involve a large migratory territory offshore and along the Atlantic coast of the United States, and therefore, effects to populations are difficult to attribute directly to Delaware River Estuary habitat effects.

5.4 Habitat Loss and Restoration

Current and future land use development for industry, agriculture, or other habitat alterations in the Delaware River Estuary watershed may affect water quality. These types of activities also may result in shoreline habitat loss.

Dredging activities from past efforts to maintain navigation in the Delaware River Estuary may have affected estuarine habitats, and planned dredging activities may continue to affect the aquatic ecosystem. Starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). To deepen the channel, material would be dredged by hydraulic and hopper dredges and placed in USACE CDFs or used for beneficial reuse purposes (e.g., wetland and beach restoration or habitat creation) in lower Delaware Bay. The USACE estimates that 1,012,428 yd^3 of material were dredged from Reach D of the Delaware River Estuary near Artificial Island and placed in the Federally-owned Artificial Island CDF (USACE 2013-TN2851). When completed, the entire deepening project would remove and dispose of an estimated 16 million yd^3 of sediments from the Delaware River in Philadelphia down to the mouth of the Delaware Bay. The subsequent maintenance dredging would remove an estimated 4,317,000 yd^3 of sediment from the 45-ft-deep channel each year (USACE 2011-TN2262). Maintenance dredging would be carried out as needed, generally over a 2-month period between August and December. As with building in-river components of a new nuclear power plant at the PSEG Site, fish and benthic invertebrates in the Delaware River Estuary would be displaced during the USACE dredging activities but are expected to recolonize the affected areas. The USACE would implement appropriate measures required by Federal and State agencies and organizations to protect aquatic resources, including endangered species (sturgeon and sea turtles), sharks, horseshoe crabs (*Limulus polyphemus*), blue crabs, freshwater mussels, and American Eels (USACE 2011-TN2262). For example, mechanical dredge activities between March 15 and June 30 would be avoided within selected reaches of the project area to prevent sedimentation and turbidity effects on reproduction of Atlantic Sturgeon, Striped Bass, American Shad, and river herring (USACE 2013-TN2851).

While aquatic habitats continue to be affected by natural and anthropogenic activities in the Delaware River Estuary, efforts to restore salt marsh and estuary habitat have met with some success and are expected to continue. For example, ongoing restoration activities within the Mad Horse Creek WMA, which is located 4 mi east of the PSEG Site, would restore nearly 200 ac of the Mad Horse Creek WMA to address injuries to shoreline and bird resources resulting from the 2004 *Athos I* oil spill (NOAA 2008-TN2721). NJDEP and the National Oceanic and Atmospheric Administration (NOAA) proposed a tidal wetland restoration project that would allow development of smooth cordgrass (*Spartina alterniflora*) habitat to improve habitat quality in the area. Restoration would be accomplished through fill material removal to lower the marsh elevation and allow tidal inundation (PSEG 2014-TN3452). As described in EIS Section 4.3.1, unavoidable impacts to wetlands during development of a new nuclear power plant at the PSEG Site and the proposed causeway would be mitigated by habitat restoration and enhancement, using experience and proven techniques developed by the PSEG EEP. Sensitive species that utilize such marsh habitats would be positively affected by the proposed Mad Horse Creek WMA restoration effort and by the proposed mitigation for a new nuclear power plant at the PSEG Site and causeway (i.e., restoration of low quality marsh habitats) (PSEG 2014-TN3452).

5.5 Climate Change

The potential impacts of climate change on aquatic organisms and habitat in the geographic area of interest are not precisely known. In addition to rising sea levels, climate change could lead to regional increases in the frequency and intensity of extreme precipitation events, increases in annual precipitation, and increases in average temperature (GCRP 2014-TN3472). Such changes in climate could alter aquatic community composition on or near the PSEG Site through changes in species diversity, abundance, and distribution. In 2012, Hurricane Sandy created increased storm surge during this event within the Delaware River Estuary and had moderate effects on water quality and coastal habitats within the southernmost portion of the Delaware River Estuary through erosion, sedimentation, and resuspension of contaminants within sediments (ALS 2012-TN2720). Elevated water temperatures, droughts, and severe weather phenomena could adversely affect or severely reduce aquatic habitat; however, specific predictions on aquatic habitat changes in this region due to climate change are inconclusive at this time. The level of impact resulting from these events would depend on the intensity of the perturbation and the resiliency of the aquatic communities. The DRBC stated in the State of the Delaware River Basin report for 2013 that increases in temperature and salinity are expected with future sea-level rise and climate change (DRBC 2013-TN2609). These potential changes are likely to result in movement of populations of more marine and euryhaline species farther up the Delaware River Estuary. For example, in a recent report, hard bottom areas north and south of the Chesapeake and Delaware Canal (upriver of the PSEG Site) were identified as having potential as reef sites for the establishment of new oyster beds and were discussed as a future conservation target due to changing climate conditions resulting in increases in salinity farther upriver (PDE 2011-TN2190).

5.6 Summary of Cumulative Impacts

Aquatic resources of the Delaware River Estuary are cumulatively affected to varying degrees by multiple activities and processes that have occurred in the past, are occurring currently, and are likely to occur in the future. The food web and the abundance of important aquatic forage species and other species have been substantially affected by these stressors historically as is described in Section 2.4.2. The impacts of some of these stressors associated with human activities are addressed by management actions (e.g., cooling system operation, regulation of fishing pressure, water quality improvements, and habitat restoration).

Other stressors, such as climate change as well as increased human population and associated development in the Delaware River Basin, cannot be managed directly, and their effects are more difficult to quantify and predict. It is likely, however, that future anthropogenic and natural environmental stressors would cumulatively affect the aquatic community of the Delaware River Estuary so as to noticeably alter important attributes, such as species ranges, populations, diversity, habitats, and ecosystem processes, just as they have in the past. These stressors have modified important attributes of aquatic resources and would continue to exert an influence in the future, potentially destabilizing some of the attributes of the aquatic ecosystem. Based on these observations, the review team concludes that cumulative impacts have been noticeable and destabilizing for some aquatic resources, primarily based on past stressors affecting aquatic resources in the Delaware Estuary and River Basin.

Cumulative impacts on aquatic ecology resources are estimated based on the information provided by PSEG, NMFS, and the review team's independent review. The significant history of the degradation of the Delaware River Estuary has had a noticeable and sometimes destabilizing effect on many aquatic species and communities. Commencement of operations at SGS Units 1 and 2 resulted in significant numbers of aquatic species being entrained and impinged, which led to required restoration of the area through the PSEG EEP as a form of mitigation. In addition, present and reasonably foreseeable future activities such as the continued operation of SGS and HCGS and the completion of dredging operations for the Delaware River Main Channel Deepening Project would continue to have effects on the aquatic resources in the Delaware River Estuary. However, the review team concludes that the incremental contribution of the NRC-authorized activities related to construction and operation of a new nuclear power plant at the PSEG Site would be negligible.

6.0 CONCLUSIONS

Conclusions regarding PSEG adverse effects on EFH are addressed in the following sections by species and provided in Table 5. All conclusions are made for the PSEG Site development, operation, and cumulative effects within the region.

6.1 Black Sea Bass

The review team concludes that a new nuclear power plant at the PSEG Site would have minimal adverse effect on Black Sea Bass juvenile EFH. The review team concludes that installation activities and dredging may cause localized disruption to foraging activity in those areas of the Delaware River Estuary. Juvenile Black Sea Bass would be able to forage in adjacent, unaffected habitat during the temporary period of in-water work. In addition, a new plant at the PSEG Site may impinge a small number of juvenile Black Sea Bass each year based on the impingement rates for HCGS, which uses a closed-cycle cooling design similar to that proposed for a new plant at the PSEG Site. However, these impingement losses are minor, and the review team expects that operation of a new plant at the PSEG Site would not affect longer term species abundance in the Delaware River Estuary.

6.2 Clearnose Skate

The review team concludes that a new nuclear power plant at the PSEG Site would have minimal adverse effect on Clearnose Skate juvenile and adult EFH. The review team concludes that installation and dredging activities are not likely to affect juvenile or adult Clearnose Skate as this species has not been collected or reported in the vicinity of the PSEG Site. In addition, intake and discharge operations also are not likely to affect juvenile or adult Clearnose Skate as this species has not been observed in impingement sampling at HCGS and SGS. However, Clearnose Skate juveniles and adults prey on Weakfish, which is expected to be impinged at a new plant at the PSEG Site based on Weakfish impingement rates for the similar closed-cycle cooling system at HCGS. These prey impingement losses are expected to be minor and would not affect longer term Clearnose Skate population abundance in the Delaware River Estuary.

6.3 Little Skate

The review team concludes that a new nuclear power plant at the PSEG Site would have no adverse effect on Little Skate juvenile and adult EFH. The review team concludes that installation and dredging activities for a new plant at the PSEG Site are not likely to affect juvenile or adult Little Skate as this species has not been collected or reported in the vicinity of the PSEG Site. In addition, intake and discharge operations are also not likely to affect juvenile or adult Little Skate as this species has not been observed in impingement sampling at the nearby HCGS and SGS.

6.4 Scup

The review team concludes that a new nuclear power plant at the PSEG Site would have minimal adverse effect on Scup juvenile and adult EFH. The review team concludes that installation activities and dredging may cause localized disruption to foraging activity in those areas of the Delaware River Estuary. Juvenile and adult Scup would be able to forage in adjacent, unaffected habitat during the temporary period of in-water work. In addition, a new plant at the PSEG Site may impinge a small number of juvenile and adult Scup each year based on the impingement rates for HCGS, which uses a closed-cycle cooling design similar to that proposed for a new plant at the PSEG Site. However, these impingement losses are minor, and the review team expects that operation of a new plant at the PSEG Site would not affect longer term species abundance in the Delaware River Estuary.

6.5 Summer Flounder

The review team concludes that a new nuclear power plant at the PSEG Site would have minimal adverse effect on Summer Flounder juvenile and adult EFH. The review team concludes that installation activities and dredging may cause localized disruption to foraging activity in those areas of the Delaware River Estuary. Juvenile and adult Summer Flounder would be able to forage in adjacent, unaffected habitat during the temporary period of in-water work. Although a small number of Summer Flounder juveniles were entrained at SGS, a new plant at the PSEG Site would use closed-cycle cooling with reduced intake volume and velocity, as opposed to the once-through cooling used at SGS. In addition, a new plant at the PSEG Site may impinge a small number of juvenile and adult Summer Flounder each year based on the impingement rates for HCGS, which uses a closed-cycle cooling design similar to that proposed for a new plant at the PSEG Site. However, these impingement losses are minor, and the review team expects that operation of a new plant at the PSEG Site would not affect longer term species abundance in the Delaware River Estuary.

6.6 Windowpane Flounder

The review team concludes that a new nuclear power plant at the PSEG Site would have no adverse effect on Windowpane Flounder EFH for eggs. The review team concludes that a new plant at the PSEG Site would not entrain Windowpane eggs because they have not been collected or reported in the vicinity of the PSEG Site or from impingement and entrainment sampling at the nearby SGS.

The review team concludes that a new plant at the PSEG Site would have a minimal adverse effect on larval, juvenile, and adult Windowpane Flounder EFH. The review team concludes that installation activities and dredging may cause localized disruption to benthic habitat and juvenile and adult foraging activity in those areas of the Delaware River Estuary. Juvenile and adult Windowpane Flounder would be able to forage in adjacent, unaffected habitat during the temporary period of in-water work.

Although a small number of Windowpane Flounder larvae and juveniles were entrained at SGS, a new plant at the PSEG Site would use closed-cycle cooling with reduced intake volume and velocity, as opposed to the once-through cooling used at SGS. In addition, a new plant at the PSEG Site may impinge a small number of juvenile and adult Windowpane each year based on the impingement rates for HCGS, which uses a closed-cycle cooling design similar to that proposed for a new plant at the PSEG Site. However, these impingement losses are minor, and the review team expects that operation of a new plant at the PSEG Site would not affect longer term species abundance in the Delaware River Estuary.

6.7 Winter Flounder

The review team concludes that a new nuclear power plant at the PSEG Site would have no adverse effect on Winter Flounder EFH for eggs. The review team concludes that a new plant at the PSEG Site would not entrain Winter Flounder eggs because they have not been collected or reported in the vicinity of the PSEG Site or from impingement and entrainment sampling at the nearby SGS.

The review team concludes that a new plant at the PSEG Site would have a minimal adverse effect on larval, juvenile, and adult Winter Flounder EFH. The review team concludes that installation activities and dredging may cause localized disruption to benthic habitat and juvenile and adult foraging activity in those areas of the Delaware River Estuary. Juvenile and adult Winter Flounder would be able to forage in adjacent, unaffected habitat during the temporary period of in-water work.

Although a small number of Winter Flounder larvae and juveniles were entrained at SGS, a new plant at the PSEG Site would use closed-cycle cooling with reduced intake volume and velocity, as opposed to the once-through cooling used at SGS. In addition, a new plant at the PSEG Site may impinge a small number of juvenile and adult Winter Flounder each year based on the impingement rates for HCGS, which uses a closed-cycle cooling design similar to that proposed for a new plant at the PSEG Site. However, these impingement losses are minor, and the review team expects that operation of a new plant at the PSEG Site would not affect longer term species abundance in the Delaware River Estuary.

6.8 Winter Skate

The review team concludes that a new nuclear power plant at the PSEG Site would have no adverse effect on Winter Skate juvenile and adult EFH. The review team concludes that installation and dredging activities for a new plant at the PSEG Site are not likely to affect juvenile or adult Winter Skate as this species has not been collected or reported in the vicinity of the PSEG Site. In addition, intake and discharge operations are also not likely to affect juvenile or adult Winter Skate as this species has not been observed in impingement and entrainment sampling at the nearby HCGS and SGS.

Table 5. Impacts on EFH from Building Activities and Operation of a New Nuclear Power Plant at the PSEG Site

Common Name	Life Stage	EFH Description[a] Salinity (ppt)	Temperature (°C)	Depth (m)	Expected Impact
Black Sea Bass	Juveniles	>18	>6	1–38	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Intake operations may impinge a small number of fish
Clearnose Skate	Juveniles and Adults	12–30	6–20	5–23	Minimal adverse effect. Intake operations may impinge a small percentage of prey species
Little Skate	Juveniles and Adults	15–32	3–22	4–21	No adverse effect
Scup	Juveniles	>15	>7	0–38	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Intake operations may impinge a small number of fish
	Adults	>15	>7	2–185	
Summer Flounder	Juveniles	10–30	>11	0.5–5	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Intake operations may impinge a small number of fish
	Adults	unspecified	unspecified	0–25	
Windowpane Flounder	Eggs	unspecified	<20	<70	No adverse effect
	Larvae	unspecified	<20	<70	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat
	Juveniles and Adults	5.5–36	<25–26.8	1–100	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Intake operations may impinge a small number of fish
Winter Flounder	Eggs	10–30	<10	<5	No adverse effect
	Larvae	4–30	<15	<6	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat
	Juveniles	10–30	<25	1–50	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Intake operations may impinge a small number of fish
	Adults	15–33	<25	1–100	
Winter Skate	Juveniles and Adults	15–35	3–17	7–18	No adverse effect

(a) NOAA 2006-TN2820; Packer et al. 2003-TN2822; Packer et al. 2003-TN2823; Packer et al. 2003-TN2824.

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Essential Fish Habitat Assessment Supplement

National Marine Fisheries Service

PSEG Site

Early Site Permit Application

Department of the Army Permit Application

U.S. Nuclear Regulatory Commission Early Site Permit Application
Docket Number 52-043

Salem County, New Jersey

August 2015

U.S. Nuclear Regulatory Commission

Rockville, Maryland

U.S. Army Corps of Engineers

Philadelphia District

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ABBREVIATIONS/ACRONYMS

°C	degrees Celsius
ac	acre(s)
BMPs	best management practices
CDF	confined disposal facility
CFR	*Code of Federal Regulations*
COL	combined construction permit and operating license
CP	construction permit
DRBC	Delaware River Basin Commission
EEP	Estuary Enhancement Program
EFH	essential fish habitat
EIS	environmental impact statement
ESP	early site permit
ft	foot (feet)
HCGS	Hope Creek Generating Station
km	kilometer(s)
m	meter(s)
mi	mile(s)
MSA	Magnuson-Stevens Fishery and Conservation Management Act
MSL	mean sea level
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
PDE	Partnership for the Delaware Estuary
ppt	parts per thousand
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
RKM	River Kilometer
RM	River Mile
SGS	Salem Generating Station, Units 1 and 2
SWPPP	stormwater pollution prevention plan
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area
yd^3	cubic yard(s)

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 (SGS), Units 1 and 2, on the eastern shore of the Delaware River Estuary in Lower Alloways Creek Township, Salem County, New Jersey. As part of its review of the ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 51 (10 CFR Part 51-TN250), the NRC regulations that implement the National Environmental Policy Act of 1969, as amended (42 USC 4321 et seq. –TN661). The EIS includes 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) is participating in the preparation of this EIS as a cooperating agency and as a member of the review team, which consists of the NRC staff, its contractor staff, and the USACE staff. The discussion that follows describes the ESP application and Department of the Army permit application reviews, the proposed actions by the NRC and USACE, and the activities over which the USACE has jurisdiction.

An ESP is an NRC approval of a site for one or more nuclear power facilities that resolves safety and environmental issues related to site suitability. Issuance of an ESP is a process that is separate from the issuance of a construction permit (CP) and operating license (OL) or a combined construction permit and operating license (COL) for such a facility, which would be needed to construct and operate a nuclear power plant on a site approved by an ESP. 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)(1) (TN249) without applying for and receiving further authorization. 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 (TN250). An applicant for a CP or COL for a new nuclear plant to be located at a site for which an ESP has been issued may reference the ESP, and matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent the identification of new and significant information. For a COL application that references an ESP, the NRC staff, pursuant to 10 CFR 51.75(c)(1) (TN250), would prepare a supplement to the ESP EIS in accordance with 10 CFR 51.92(e) (TN250) and would engage in new consultation in accordance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA, 16 USC 1801 et seq. -TN1061), as amended by the Sustainable Fisheries Act of 1996 (16 USC 1801 et seq. -TN1060).

The proposed actions related to the PSEG ESP application are (1) NRC issuance of an ESP for the PSEG Site (10 CFR Part 52-TN251) and (2) USACE permit action on a Department of the Army permit application pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act; 33 USC 1251 et seq. -TN662) and Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403 et seq. -TN660). The U.S. Environmental Protection Agency (EPA) has the authority to review and veto USACE decisions on Section 404 permits.

As mentioned previously, the USACE is participating as a cooperating agency with the NRC in preparing the EIS and participates collaboratively on the review team. Upon issuance of the draft EIS (NRC and USACE 2014-TN4279), PSEG submitted a Section 10/404 permit application to the USACE on August 8, 2014 (PSEG 2014-TN4235); the Department of the Army permit application number is CENAP–OP–R–2009–0157–45. The NRC and USACE prepared this essential fish habitat (EFH) assessment to support their joint consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 305(b)(2) of the MSA, as amended (16 USC 1801 et seq. -TN1061). The USACE permit decision will be made following issuance of the final EIS and would authorize preparation of a haul road along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, and installation of the cooling water system intake and discharge structures. Therefore, only these activities, which are identified in the Department of Army permit application, are described in this assessment.

In a final rule dated October 9, 2007 (72 FR 57416-TN260), the NRC limited the definition of “construction” to the activities that fall within its regulatory authority, as provided in 10 CFR 50.10(a)(1) (TN249) and 10 CFR 51.4 (TN250). Many of the site-preparation activities associated with building a nuclear power plant are not part of the NRC action to license the plant. These activities, which are not regulated by the NRC and therefore not within the purview of the NRC action, are grouped under the term “preconstruction.” Preconstruction activities include clearing and grading, excavating, erecting support buildings and transmission lines, and other associated activities. These preconstruction activities may take place before the application for an ESP, CP/OL, or COL is submitted, during its review, or after it has been granted. Although preconstruction activities are outside the NRC’s regulatory authority, many of them are within the regulatory authority of local, State, or other Federal agencies, including the USACE.

While an NRC ESP does not authorize site-preparation activities denoted as “preconstruction” under NRC regulations, USACE permits would authorize some of those site-preparation activities. Because this is a joint supplemental EFH for both the NRC and USACE, the distinction between construction and preconstruction is not carried forward in this EFH; both are jointly discussed using the term “site-preparation activities” when discussing effects to species that would take place under the proposed actions.

Pursuant to the MSA, the review team requested via letter dated October 26, 2010, that the NMFS provide information on EFH in the vicinity of the PSEG Site (NRC 2010-TN2203). In their response to the NRC dated December 9, 2010, NMFS indicated that the estuarine portions of the Delaware River and its tributaries contain designated EFH for a number of species and directed the NRC to prepare an EFH assessment as part of the EFH consultation process (NMFS 2010-TN2171). Another request was sent to NMFS dated July 31, 2013, to confirm designated EFH for the species provided in the December 9, 2010, NMFS letter, or to provide an updated EFH species list (NRC 2013-TN2805). A slightly revised list of species with designated EFH was received from NMFS (PNNL 2013-TN2687; NMFS 2013-TN2804). NMFS received the draft EIS (NRC and USACE 2014-TN4279) and EFH assessment and provided comments on November 12, 2014 (NMFS 2014-TN4203), and additional clarification on comments December 15, 2014 (NRC 2014-TN4208).

Accordingly, this EFH assessment supplement addresses only the comments received on the EFH assessment related to the following:

- discussion on Bluefish EFH and reasons for exclusion from the EFH assessment

- clarification of wetland impacts and resulting effects on EFH and prey species for managed species from installation activities
- discussion of mitigation for wetlands impacts.

2.0 DESCRIPTION OF THE PROPOSED ACTION

PSEG is seeking an ESP from the NRC for a site approval for a potential new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS. PSEG is also seeking a Department of the Army permit from the USACE for certain site-preparation activities described below. Site-preparation activities authorized by USACE and the New Jersey Department of Environmental Protection (NJDEP) (but not an NRC ESP) that could directly affect onsite and offsite aquatic ecosystems include preparation of a haul road bulkhead along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, installation of the cooling water system intake and discharge structures, dredging, installation of piles, and transport of building materials by barge to the PSEG Site. As these actions require a Department of the Army permit and are permissible, but not authorized, under an NRC ESP, they are assessed in detail below.

2.1 Site Location and Description

The PSEG Site lies on Artificial Island, directly north of the existing SGS and HCGS located on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey, at which point the river is approximately 2.5 mi (4 km) wide. Artificial Island is a human-made island approximately 1,500 ac (600 ha) in size that consists of tidal marsh and grassland. The USACE created the island in the 20th century by the deposition of hydraulically dredged material atop a natural sand bar that projected into the river. The average elevation of the island is about 9 feet (ft, 2.7 meters [m]) above mean sea level (MSL) with a maximum elevation of approximately 18 ft (5.5 m) above MSL (PSEG 2015-TN4280). The site is located approximately 17 mi (27 km) south of the Delaware Memorial Bridge; 35 mi (56 km) southwest of Philadelphia, Pennsylvania; and 8 mi (13 km) southwest of the City of Salem, New Jersey (PSEG 2015-TN4280). Figure 1 shows the location of the PSEG Site and the areas within a 6-mi (10-km) radius and 50-mi (80-km) radius of the facility.

PSEG owns 734 ac (297 ha) at the southern end of the Artificial Island, of which SGS occupies 220 ac (89 ha) and HCGS occupies 53 ac (62 ha). PSEG is developing an agreement in principle with the USACE to acquire an additional 85 ac (34 ha) of the USACE's Confined Disposal Facility (CDF) land immediately north of HCGS. Figure 2 and Figure 3 provide a context for the site in relation to nearby water bodies and a plan view of the proposed site layout for PSEG, respectively.

The region within 15 mi (24 km) of the site is primarily used for agriculture. The area also includes numerous parks, wildlife refuges, and preserves (e.g., Mad Horse Creek Wildlife Management Area [WMA] to the east; Cedar Swamp State WMA to the south in Delaware; Appoquinimink, Silver Run, and Augustine State WMAs to the west in Delaware; and Supawna Meadows National Wildlife Refuge to the north) (PSEG 2015-TN4280).

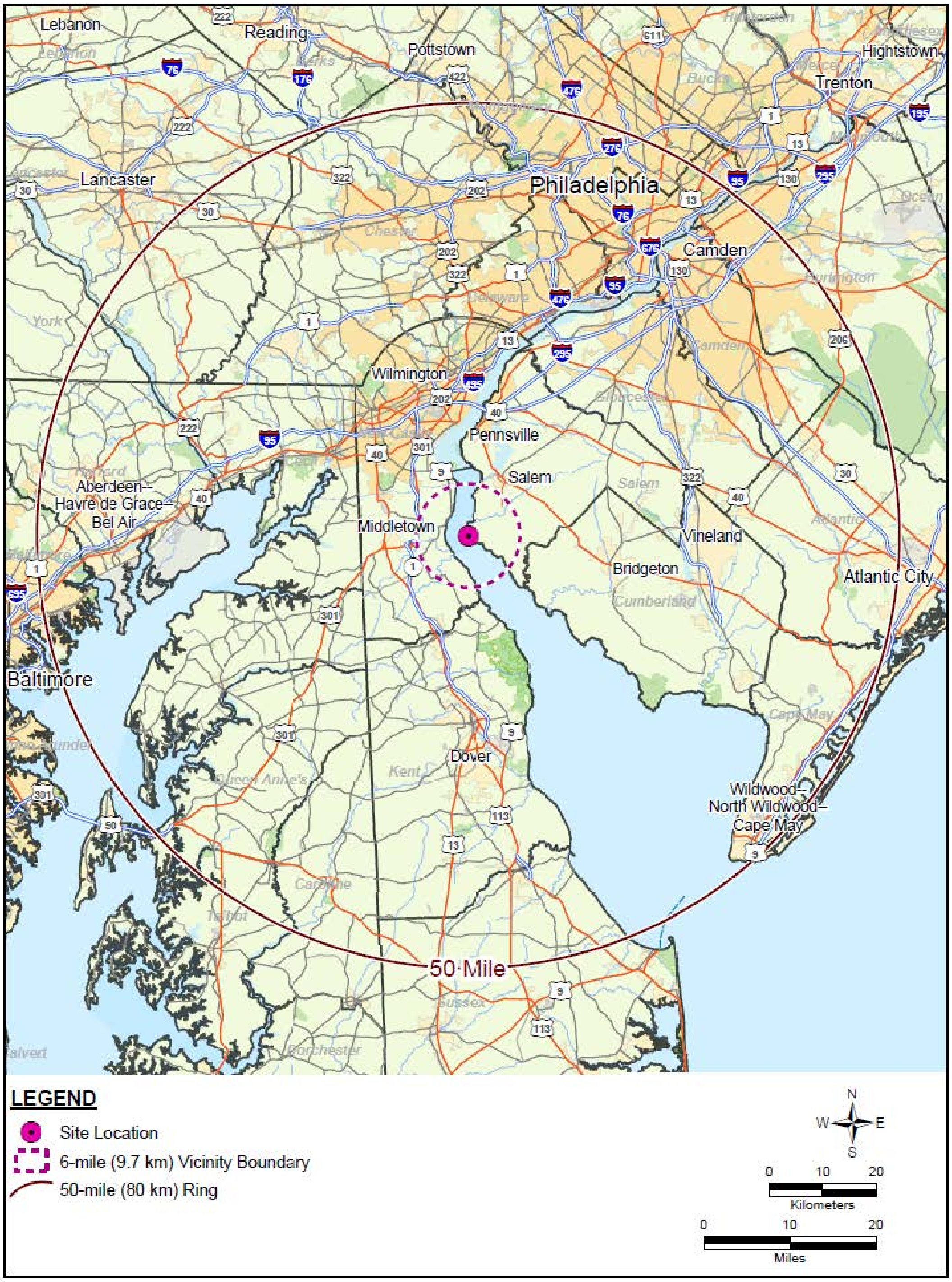

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2015-TN4280).

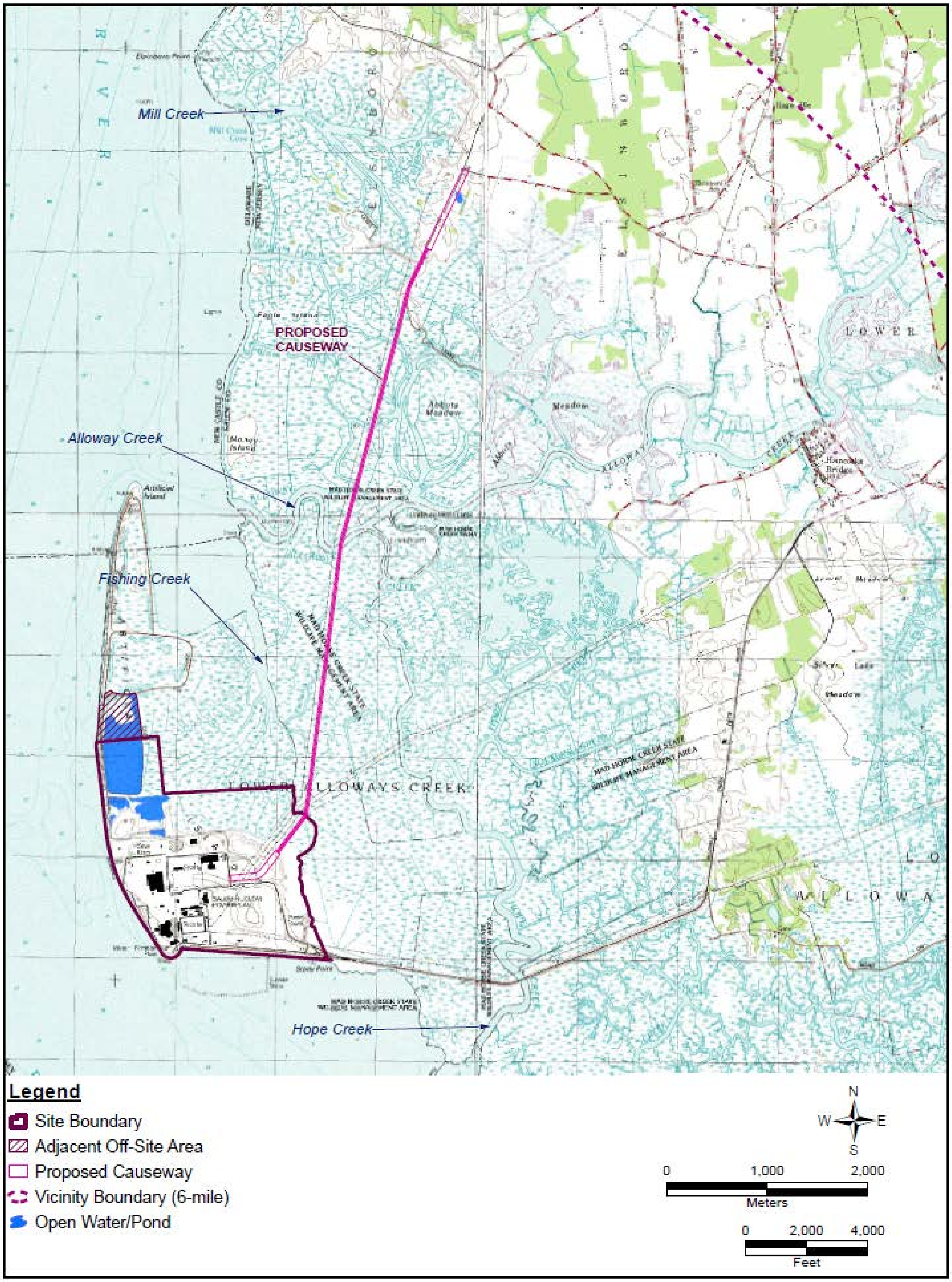

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2015-TN4280).

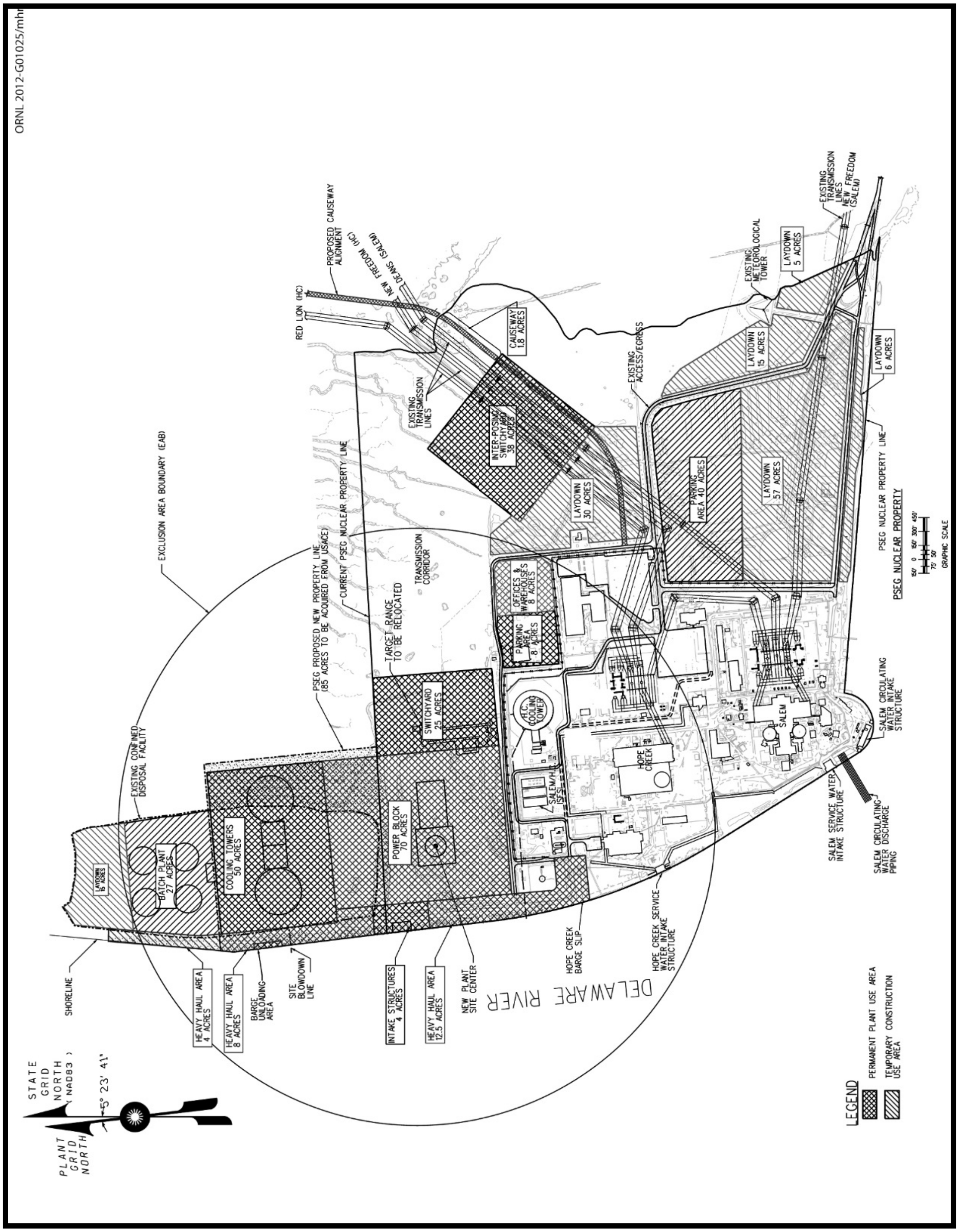

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489).

2.1.1 Delaware River Estuary

The Delaware River and Delaware Bay are a part of the larger Delaware Estuary and River Basin that extends from headwaters in New York State to the coastal plains near Cape Henlopen in Delaware (PDE 2012-TN2191). The Delaware Bay extends from the confluence of the Delaware River with the Atlantic Ocean from Delaware River Mile (RM) 0 to RM 54 (River Kilometer [RKM] 0 to RKM 87). The Delaware River Estuary includes the Delaware Bay and extends up the tidal Delaware River, which is characterized by brackish water between Delaware RM 54 and RM 80 (RKM 87 and RKM 129) and becomes freshwater at Delaware RM 80 (RKM 129) (BBL and Integral 2007-TN2126). The PSEG Site near the mouth of Alloway Creek is at Delaware RM 52 (RKM 84) (DRBC 2011-TN2412) and is considered to be in the lower estuary watershed unit of the Delaware River Estuary (PDE 2012-TN2191).

The boundary of salinity intrusion in the Delaware River Estuary, also known as the salt line, fluctuates with flow changes. The salt line moves in response to the tides and variations in Delaware River Estuary freshwater discharge. During most of the year, the salt line is located between the Commodore Barry Bridge at Delaware RM 82 (RKM 132) and Reedy Island at Delaware RM 54 (RKM 87) (DRBC 2008-TN2277). During the drought of record in the 1960s, the salt line moved to its most upstream historically observed location at Delaware RM 102 (RKM 164) (DRBC 2008-TN2277). Salinity is an important determinant of biotic distribution in estuaries, and salinity near the PSEG Site varies with river flow. Between 2003 and 2010, surface-water salinity measurements near the PSEG Site ranged from 1.8 to 13.3 parts per thousand (ppt) and surface-water temperatures ranged from 0.4 to 28.6°C (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Salinity measurements taken over a greater number of years between RM 51 and RM 49 (RKM 82 and RKM 79) report a minimum salinity of 0.1 ppt and a maximum of 17.9 ppt (PSEG 2015-TN4280). For the purposes of EFH habitat assessment, the salinity range will conservatively be estimated between 0 and 18 ppt.

At the PSEG Site on Artificial Island, the estuary is tidal with a net flow to the south. The USACE maintains a dredged navigation channel near the center of the estuary about 6,600 ft (2,000 m) west of the shoreline of the PSEG Site. The navigation channel is about 40 ft (12 m) deep and 1,300 ft (400 m) wide; however, starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). On the New Jersey side of the channel, water depths in the open estuary at mean low water are fairly uniform at about 20 ft (6 m). Predominant tides in the area are semi-diurnal, with a period of approximately 12 hours and a mean tidal range of 5.3 ft (1.6 m) at RM 52 (RKM 84) (PSEG 2015-TN4280).

2.1.2 Wetlands

Most of the PSEG Site is surrounded by tidal marsh dominated by near monocultures of the invasive common reed (*Phragmites australis*). This is also the case for most of the tidal marsh surrounding Hope Creek, Alloway Creek, and associated smaller marsh creeks. Most of the coastal wetlands occur within the northern portion of the PSEG Site and connect to the contiguous Alloway Creek and Hope Creek coastal wetland systems (marshes) (PSEG 2015-

TN4280). The eastern portion of the PSEG Site contains primarily freshwater wetlands dominated by monocultures of common reed. They are predominantly tidal wetland systems that are contiguous with coastal wetlands mapped by the New Jersey Wetlands Act of 1970 (NJSA 13:9A et seq. –TN3361). Functionally, these wetlands are similar to the coastal wetlands and are tidally influenced systems. Some areas on Artificial Island, such as the CDF and the PSEG Site desilt basins, have been diked and are no longer tidally influenced (PSEG 2015-TN4280). These diked areas and onsite linear drainage features for stormwater conveyance are not considered EFH (PSEG 2015-TN4234).

The proposed causeway would cross NJDEP's Mad Horse Creek WMA, NJDEP's Abbotts Meadow WMA, and lands that are part of PSEG's Alloway Creek Watershed Wetland Restoration (ACW) Site, which is part of PSEG's Estuary Enhancement Program (EEP) (PSEG 2012-TN2282).

2.2 Wetlands Alterations

A total of 131 ac of wetlands would be lost as a result of site-preparation activities on the PSEG Site and vicinity (onsite and offsite). This represents less than 1 percent of the 25,534 ac of wetlands available in the vicinity. Most of these wetlands are dominated by near monocultures of the common reed, a nonnative aggressive invasive plant species that significantly impacts wetland diversity and habitat structure with resultant significant impacts to wildlife habitat quality (PSEG 2015-TN4280).

As described in Table 1, building a new nuclear power plant would permanently disturb 108 ac of wetlands onsite, including 71.75 ac within the USACE and PSEG confined disposal facilities areas. A total of 31.8 ac of wetlands would be temporarily disturbed (PSEG 2015-TN4280).

Offsite impacts to wetlands from building activities in the offsite adjacent areas and the proposed causeway would total 72.8 ac, of which 49.8 ac would be temporary impacts. A permanent loss of 23 ac would occur in the wetlands associated with the proposed causeway, (Table 2).

Permanent impacts to wetland plant communities along the causeway would be limited to placement of piers and direct shading. Shading could potentially 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 an easement (PSEG 2015-TN4280). Original estimates for the causeway impacts were calculated for a 50-ft-wide easement. However, PSEG further refined the engineering plan for the causeway and reduced the proposed width to 39 ft and approximately 10 ft above the marsh plain, which should further reduce any shading effects (PSEG 2014-TN4235). Reductions in primary productivity due to causeway development should be minimal overall, considering the large area of adjacent coastal wetlands within the project vicinity. An estimated 2,123 linear ft of marsh creek channels would be crossed by the proposed causeway (PSEG 2015-TN4280). PSEG plans to avoid placement of support pilings in stream channels (PSEG 2015-TN4280). Runoff from disturbed areas would be temporary and controlled through the use of BMPs required for water quality in compliance with Federal and New Jersey permitting, and runoff is not expected to adversely affect Delaware River Estuary surface waters (PSEG 2015-TN4280).

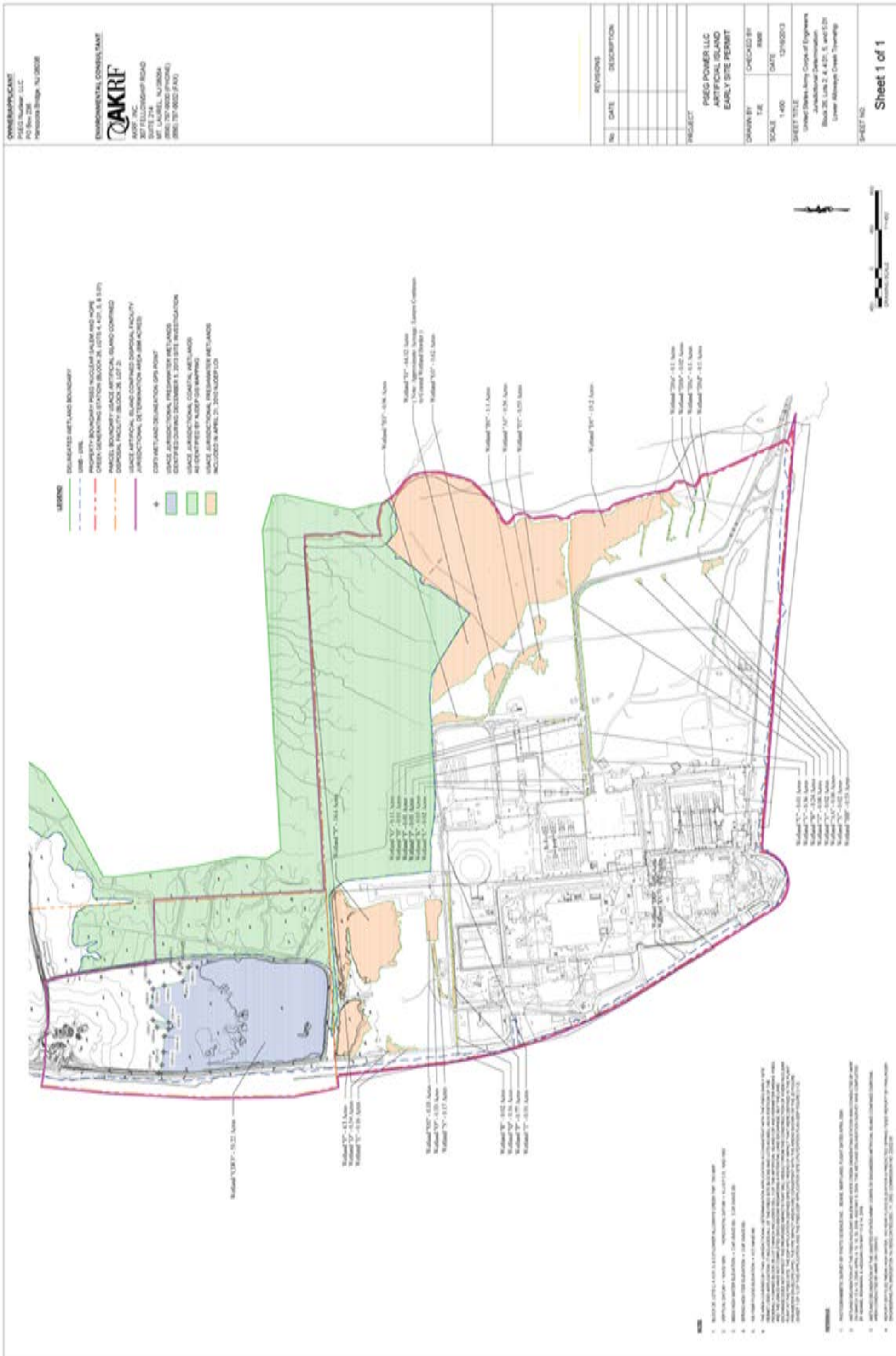

Figure 4. USACE Jurisdictional Determination Block 26, Lots 2, 4, 4.01, 5, and 5.01, Lower Alloways Creek Township (Source: USACE 2013-TN3283).

Table 1. Onsite Wetland Disturbance by Proposed PSEG Site-Preparation Activities (Modified from PSEG 2015-TN4280).

Wetland Types	PSEG Site Area Total (ac)	Permanently Disturbed (ac)	Temporarily Disturbed (ac)
Saline Marsh	0.2	0.1	
Phragmites-Dominated Coastal Wetlands	155.6	58.3	5.1
Deciduous Scrub/Shrub Wetlands	4.6	4.6	
Herbaceous Wetlands	5.8	0.9	2.5
Phragmites-Dominated Interior Wetlands	118.7	44.1	24.2
Total	284.9	108	31.8

Table 2. Offsite Wetland Disturbance by Causeway Installation and Temporary Offsite Activities (Modified from PSEG 2015-TN4280).

Wetland Types	Permanently Disturbed (ac)	Temporarily Disturbed (ac)
Saline Marsh	--	0.8
Freshwater Tidal Marsh	6.1	6.6
Phragmites-Dominated Coastal Wetlands	11.2	13.2
Deciduous Scrub/Shrub Wetlands	0.1	--
Herbaceous Wetlands	1.2	--
Phragmites-Dominated Interior Wetlands	4.4	29.2
Total	23	49.8

The biological communities of the Delaware River Estuary in the area of the PSEG Site are typical of those that exist all along the main reaches of the Delaware Bay system. To mitigate egg and larval fish loss through the cooling system for SGS, PSEG proposed and established an EEP to restore salt marshes and provide monitoring and other structural enhancements to mitigate losses of aquatic species through impingement and entrainment at SGS (Balletto and Teal 2011-TN2612). The PSEG EEP was established in 1995 as part of New Jersey Pollutant Discharge Elimination System (NJPDES) requirements for SGS and includes an ongoing biological monitoring program in addition to habitat restoration to track the success of the mitigation actions. Because of the biological monitoring surveys that have been conducted in this area of the Delaware River Estuary since the mid-1980s in support of environmental requirements for the construction and operation of SGS and HCGS, an extensive long-term data set exists on the fishery and benthic macroinvertebrate communities of this area, which includes prey species for managed fishery species discussed further in Section 3.2.

2.3 Dredging Activities

Before initiating any site-preparation or development activities, PSEG would be required to obtain, from the USACE, the appropriate authorizations regulating alterations to waters of the United States, including ponds and creeks. Site-preparation activities that could directly affect onsite and offsite aquatic ecosystems include installing the haul road bulkhead, building the barge storage area and unloading facility, installing the cooling water system intake and discharge structures, and building the proposed causeway (Figure 2 and Figure 3). Aquatic habitats potentially affected include habitats associated with the Delaware River Estuary and the interconnected system of tidal wetlands and marsh creeks primarily north of the PSEG Site. Potential direct impacts on aquatic resources as a result of site-preparation activities would involve physical alteration of habitat (e.g., infilling, dredging) including temporary or permanent removal of associated benthic organisms, sedimentation, changes in hydrological regimes, and changes in water quality. Potential indirect impacts would include increased runoff from impervious surfaces and subsequent erosion, as well as sedimentation (PSEG 2015-TN4280). Benthic habitats in the areas for proposed dredging consist of fine-grained sediments composed of clay, silt, and sand. Shoreline depths drop quickly to 10 to 12 ft (3.0 to 3.7 m) and then gradually increase in depth to between 15 to 25 ft (4.6 to 7.6 m) nearshore (PSEG 2015-TN4280). The depth of the areas identified for dredging is a minimum of 10 ft (3.0 m) relative to mean low water with the exception of the western boundary of Artificial Island, which is shallower than 10 ft (3.0 m) and consists of artificially placed rock. Mitigation is not warranted as there is no shallow water habitat conversion to deep water habitat (PSEG 2015-TN4234), and compensatory mitigation is generally not required where a habitat change does not occur. The nearshore benthic macroinvertebrate community and fish diversity is described in Section 2.4.2.1 of the EIS.

Shoreline installation and site-preparation activities would require a stormwater pollution prevention plan, developed as part of the NJPDES stormwater permit, which would describe best management practices (BMPs) to control sedimentation and erosion and provide stormwater management. Shoreline structures would be hardened to protect from shoreline erosion using placement of concrete or riprap (PSEG 2015-TN4280). Approximately 1 ac of open water would be filled (average width of fill would be 10 ft) due to placement of the bulkhead cap and sheeting along the bulkhead shoreline (PSEG 2014-TN4235).

The new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 61 ac (PSEG 2015-TN4280). An additional 0.05 ac of river bottom habitat would be removed for installation of seven 20-ft-diameter barge mooring caissons. Installation of a new intake structure would require dredging of about 225,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 31 ac (PSEG 2015-TN4280).

Dredging, grading, and backfilling activities would be required for installation of a new discharge structure; approximately 0.2 ac of tidal waters would be affected (PSEG 2014-TN4235). As dredging will be done by one hydraulic suction dredge, dredged material disposal would be by direct pipeline to Artificial Island (PSEG 2015-TN4234). No maintenance dredging is planned under the Department of Army permit application. In total, approximately 92 ac of open water habitat would be permanently affected by dredging, which will occur over a 2-month period (USACE 2015-TN4277).

The installation of the barge storage and unloading facilities as well as the intake and discharge structures would result in temporary disturbances to the aquatic habitat in those portions of the Delaware River Estuary. An increase in suspended sediments could occur during dredging activities; however, PSEG determined that due to the natural high turbidity of the Delaware Estuary at the project location, any increase in sedimentation would not be noticeable (PSEG

2015-TN4234). PSEG would comply with NJDEP and USACE permitting regulations regarding timing and duration of dredging to avoid sensitive aquatic life stage development or spawning (e.g., the current USACE work window to avoid dredge activities occurs between March 1 and June 30). The review team reviewed a recent report on sediment analysis for the Delaware River Basin that describes sediment samples near the PSEG Site as potentially suitable for aquatic habitat restoration projects (DERSMPW 2013-TN4204). Therefore, dredging in this area near the PSEG Site is unlikely to introduce adverse exposure from sediment contaminants to nearby aquatic biota. PSEG proposes to use a hydraulic suction dredge to further minimize increases in turbidity and sedimentation, to limit the duration of dredging, and to avoid the need to handle dredged material twice (PSEG 2015-TN4234). PSEG also would use appropriate BMPs to minimize sedimentation effects as required for Federal and State permitting. Motile invertebrates, fish, and sea turtles might swim into this portion of the Delaware River Estuary, but they would be able to swim away or likely would avoid the area due to dredging activity and noise from pile driving that may occur simultaneously.

Mobile macroinvertebrates in this area might be able to occupy adjacent habitat in the Delaware River Estuary as the species composition and abundance of the macroinvertebrate community in the Delaware River Estuary near the site are similar to those of benthic communities in adjacent benthic areas of the estuary. Although permanent alteration of at least 92 ac of river bottom habitat would occur, the impacts to aquatic communities in the vicinity are expected to be minimal as benthic organisms would begin to re-colonize the area following the completion of dredging activities (Wilber and Clarke 2007-TN4271).

2.4 Barge Traffic

Vessel use during dredging or installation of the in-water structures and transportation of building materials and large system components to the PSEG Site may affect the aquatic resources of the Delaware River Estuary, particularly the benthos or benthic dwelling organisms (PSEG 2015-TN4280). The main impacts of using vessels would include turbulence from propellers (prop wash), collisions with aquatic species, and accidental spills of materials overboard. PSEG estimated the annual number of vessel trips for the installation activities correlated to the activities described for the Department of Army permit to be between 247 and 357. This is an incremental increase to the reported annual average of 4,485 commercial vessel trips in the Delaware River and Estuary between 2007 and 2014 (PSEG 2015-TN4234). PSEG estimated that general construction materials shipped by barge over a 3- to 7-year period, would originate at the Ports of Camden, Philadelphia, and Salem, and use shipping routes in the Delaware Bay and River (USACE 2015-TN4281).

The NRC review team determined that vessel traffic during site-preparation activities would result in minimal disturbance to benthic habitats associated with the PSEG Site as it would occur in deeper waters associated with the installation of piles or dredging activities and should not affect the general resources in the region along this coast of the Delaware River Estuary.

2.5 Pile Installation Activities

PSEG estimated acoustical effects from representative pile-driving studies to determine pile installation effects on aquatic biota. In-water activities included day-time installation of 24-in.-

wide steel sheeting in the Delaware Estuary for the intake structure (650 sheet piles), the haul road bulkhead (2,400 sheet piles) and the barge unloading facility 20-ft-diameter caissons (1,200 sheet piles) with a vibratory hammer (Table 3). Causeway installation would also occur during the daytime, and analysis was conducted for approximately 1000 30-in.-square concrete piles using an impact hammer with additional cushioning to reduce pile head damage (PSEG 2015-TN4234). PSEG used the NMFS Pile Driving Calculations spreadsheet model (Caltrans 2013-TN4236) to calculate isopleths for the peak sound pressure level (SPL_{peak}), cumulative sound exposure level (SEL_{cum}), and behavioral root mean square sound pressure level (SPL_{rms}) using specific information on piles such as installation method, number of piles, and type of pile. For SPL_{peak} and SPL_{rms} noise isopleth estimates, the NMFS model can apply a default transmission loss of 15 m as a conservative assumption under a practical spreading loss model that considers the noise attenuation (transmission loss) when site-specific attenuation is not known (PSEG 2015-TN4234). The modeled isopleths for SEL_{cum} account for the number of pile-driving strikes per day, and the number of piles per day is provided in Table 3.

Table 3. Pile Material and Installation Information (PSEG 2015-TN4234).

	Structure			
Pile Information	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Type of pile	Sheeting	Sheeting	Sheeting	Concrete
Length/number of piles	1,200 linear ft	4,500 linear ft	2,200 linear ft	1,000
Piles installed/day	120 linear ft	240 linear ft	120 linear ft	20
Duration of pile driving (days)	10	20	20	50

The criteria for fish are as follows: 206 dB re: 1μPa SPL_{peak}, 187 dB re: 1μPa^2·s SEL_{cum} for fish > 2 cm, 183 dB re: 1μPa^2·s SEL_{cum} for fish < 2 cm, and 150 dB re: 1μPa SPL_{rms}. The determination for potential onset of physical injury is determined by exceedance of both the peak pressure (SPL_{peak}) and cumulative sound exposure level (SEL_{cum}). A determination for potential behavioral effects is made using exceedance of the root mean square pressure level (SPL_{rms}) (Caltrans 2013-TN4236). Distances from the pile-driving activity that exceed these criteria are presented in Table 4.

Table 4. Estimated Acoustic Area of Effect for Fish from Pile-Driving Activities (PSEG 2015-TN4234)

	Exceedance Distance in m (ft)			
Acoustic Criteria	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Peak pressure (206 dB)	0	0	0	1 (3)
Cumulative sound exposure level (187 dB/183 dB)	40/74 (131/243)	40/74 (131/243)	40/74 (131/243)	216/398 (709/1,306)
Adverse behavioral effects (150 dB)	74 (243)	74 (243)	74 (243)	1,166 (3,825)

Based on the NMFS model, the 206 dB SPL_{peak} is only exceeded immediately adjacent to pile-driving activity and does not extend 1 m out except for causeway installation. The 187/183 dB SEL_{cum} exceedance distance for the proposed causeway is 216/398 m (709/1,306 ft); however, this distance extends over mostly vegetated marsh plain and shallow marsh creeks, not open water (Figure 5).

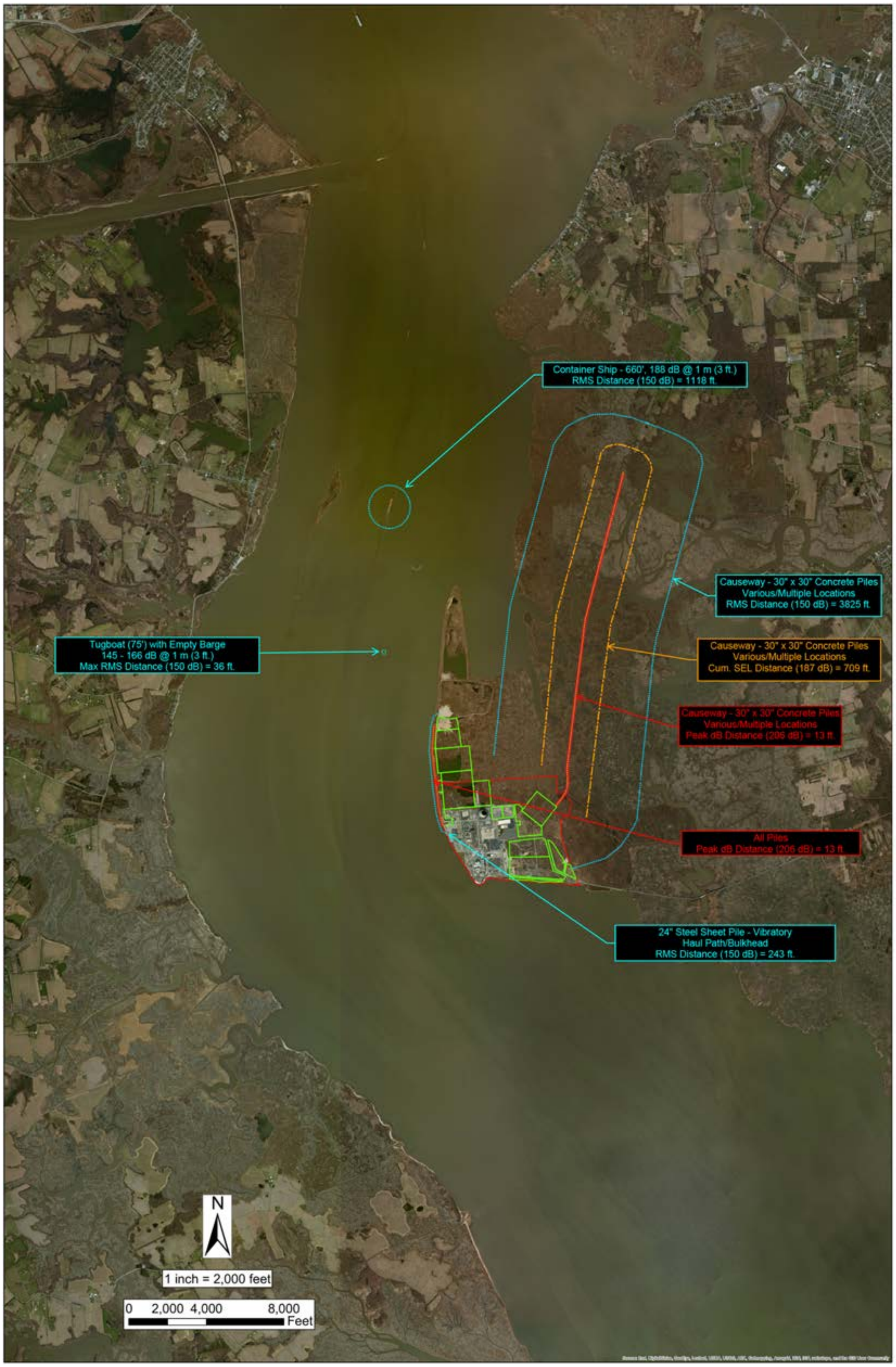

Figure 5. Acoustic Criteria Isopleths for In-Water and Nearshore Pile-Driving Activities (PSEG 2015-TN4275).

The behavioral effects criteria of 150 dB SPL_{rms} is exceeded for the causeway pile installation up to 1,166 m (3,825 ft) from the source, which is mostly vegetated marsh plain and shallow marsh creeks (PSEG 2015-TN4234). For vibratory shoreline steel sheet pile installation at Artificial Island, caisson installation, and intake installation, the behavioral effects criteria exceedance extends out to 74 m (243 ft) from the source into the Delaware River (Figure 5).

3.0 CONSIDERATION OF EFH NEAR THE SITE

3.1 EFH Species Identified for Preliminary Analysis

The 1996 amendments to the MSA (16 USC 1801 et seq. -TN1061) identified the importance of habitat protection to healthy fisheries. The amendments, known as the Sustainable Fisheries Act of 1996 (16 USC 1801 et seq. –TN1060), strengthened the authority of governing agencies to protect and conserve the habitat of marine, estuarine, and anadromous animals. EFH is defined as the waters and substrate necessary for spawning, breeding, feeding, or growth to maturity for managed fishery species. Identifying EFH is an essential component in the development of fishery management plans to evaluate the effects of habitat loss or degradation on fishery stocks and to take actions to mitigate such damage. NMFS considers the estuarine portion of the Delaware River and tidal waters near the PSEG Site to be EFH for 15 species (PNNL 2013-TN2687; NMFS 2013-TN2804), which are listed in Table 5.

Table 5. Species with Designated EFH in the Delaware Bay

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Atlantic Butterfish	*Peprilus triacanthus*	-	-	X	
Atlantic Sea Herring	*Clupea harengus*	-	-	X	X
Black Sea Bass	*Centropristis striata*	-	-	X	
Bluefish	*Pomatomus saltatrix*	-	-	X	X
Clearnose Skate	*Leucoraja eglantaria*	-	-	X	X
Cobia	*Rachycentron canadum*	X	X	X	X
King Mackerel	*Scomberomorus cavalla*	X	X	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Red Hake	*Urophycis chuss*	-	-	-	X
Scup	*Stenotomus chrysops*	-	-	X	
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

Sources: NOAA 2006-TN2820; NOAA 2010-TN2821
X = designated EFH present for species and life stage
- = no designated EFH present for species and life stage

The review team compared salinity, water temperatures, and depth in the vicinity of the PSEG Site with EFH requirements for each of the species and life stages that appear in Table 5 to further refine the EFH species with the potential to be adversely affected by the proposed action. The EFH requirements of several of the fish species and life stages are conditions that have been reported in the vicinity of the PSEG Site (Table 6).

Table 6. Habitat Requirements of Identified EFH Species

Species, Life Stage	EFH Requirement Salinity (ppt)	Temperature (°C)	Depth (m)	Site Matches EFH Requirements?
PSEG Site	**0 – 18**	**0.4 – 28.6**	**4.4 – 7.6**	
Atlantic Butterfish				
juveniles	3-37	3-28	10-365	No
Atlantic Sea Herring				
juveniles	26-32	<10	15-135	No
adults	>28	<10	20-130	No
Black Sea Bass				
juveniles	>18	>6	1-38	Yes
Bluefish				
juveniles	23-36	19-24	unspecified	No
adults	>25ppt	14-16	unspecified	No
Clearnose Skate[(a)]				
juveniles and adults	12-30	6-20	5-23	Yes
Cobia				
all life stages	>25	>20	unspecified	No
King Mackerel				
all life stages	>30	>20	unspecified	No
Little Skate[(b)]				
juveniles and adults	15-32	3-22	4-21	Yes
Red Hake				
Adults	33-34	<12	10-130	No
Scup				
juveniles	>15	>7	0-38	Yes
adults	>15	>7	2-185	Yes
Spanish Mackerel				
all life stages	>30	>20	unspecified	No
Summer Flounder				
juveniles	10-30	>11	0.5-5	Yes
adults	unspecified	unspecified	0-25	Yes
Windowpane Flounder				
eggs and larvae	unspecified	<20	<70	Yes
juveniles and adults	5.5-36	<25-26.8	1-100	Yes
Winter Flounder				
eggs	10-30	<10	<5	Yes
larvae	4-30	<15	<6	Yes
juveniles	10-30	<25	1-50	Yes
adults	15-33	<25	1-100	Yes
Winter Skate[(c)]				
juveniles and adults	15-35	3-17	7-18	Yes

Source: NOAA 2006-TN2820, except where noted
(a) Packer et al. 2003-TN2822
(b) Packer et al. 2003-TN2823
(c) Packer et al. 2003-TN2824

3.2 EFH Species Identified for Specific Analysis

For those species whose EFH requirements do not match the local conditions as described in Table 6, the review team did not consider these species or life stages further in this EFH assessment. The Atlantic Butterfish was excluded based on depth requirements not being met for habitat near the PSEG Site. Atlantic Sea Herring juveniles and adults were excluded based on salinity and depth requirements not being met for habitat near the PSEG Site. Bluefish juveniles and adults, Cobia, King Mackerel, Red Hake, and Spanish Mackerel were all excluded as their salinity requirements exceed the available salinity range near the PSEG Site. The remaining species and life stages with EFH requirements matching local conditions appear in Table 7.

Table 7. Species Retained for In-Depth EFH Analysis

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Black Sea Bass	*Centropristis striata*	-	-	X	-
Clearnose Skate	*Raja eglanteria*	-	-	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Scup	*Stenotomus chrysops*	-	-	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

X = retained for in-depth analysis
- = not retained for in-depth analysis

3.3 Prey for EFH Species

As described in the draft EIS (NRC and USACE 2014-TN4279), a diversity of aquatic species exist in the nearshore waters and coastal wetlands near the PSEG Site, with many of these species representative of prey species for other aquatic organisms. Juvenile and adult Black Sea Bass (*Centropristis striata*) and adult Scup (*Stenotomus chrysops*) prey on benthic invertebrates such as crustaceans and squid (MDMF 2006-TN2159; MDMF 2006-TN2161), whereas Clearnose (*Raja eglanteria*), Little (*Leucoraja erinacea*), and Winter (*L. ocellata*) skates prey on polychaete worms, small crustaceans, squid, and amphipods (Packer et al. 2003-TN2822; Packer et al. 2003-TN2823; Packer et al. 2003-TN2824).

Adult Summer Flounder (*Paralichtys dentatus*) feed on smaller fish, squids, crustaceans, mollusks, marine worms, and sand dollars (Grimes et al. 1989-TN2150), and adult Winter Flounder (*Pseudopleuronectes americanus*) prefer similar prey items such as small crustaceans, annelid worms, small mollusks, and fish (Hendrickson 2006-TN2154). Juvenile and adult Windowpane Flounder (*Scophthalmus aquosus*) have similar food sources, including small crustaceans and fish larvae of hakes and Tomcod (*Microgadus tomcod*) (Chang et al. 1999-TN2133).

4.0 POTENTIAL ADVERSE EFFECTS TO EFH

The provisions of the MSA define an "adverse effect" to EFH as the following (50 CFR Part 600-TN1342):

> *Adverse effect* means any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The review team has identified the following potential PSEG site-preparation activities that may cause adverse effects to EFH:

- wetlands Impacts
- dredging activities
- pile installation activities.

In the following section, each of these issues is addressed for the EFH species and their prey identified for in-depth analysis in Table 7.

4.1 Wetlands Effects

The NMFS has designated EFH for the species identified in Table 7 within the vicinity of the PSEG Site due to the depth, temperature, and salinity characteristics present to support specific life stages. Managed species with EFH that may be affected by impacts to wetlands include Black Sea Bass juveniles, Scup juveniles and adults, Summer Flounder juveniles and adults, Windowpane juveniles and adults, and Winter Flounder juveniles, and adults. In addition, these managed species all rely on prey species that use wetland habitats in the vicinity of the PSEG Site. Wetland habitats are not considered EFH for skates such as the Little Skate or Winter Skate which have not been collected or reported in the vicinity of the PSEG Site. However, these skate species prey on small crustaceans, and the Clearnose Skate, which may occur near the PSEG Site, preys on small fishes that are abundant in wetland habitats.

Site-preparation activities within the diked CDFs would encompass 71.75 ac (66%) of the total affected wetland habitats identified as being permanently affected on the PSEG Site. These wetland habitats, not connected to the coastal, tidally influenced surrounding wetland habitats, are dominated by the invasive common reed (i.e., *Phragmites)*, and have been routinely disturbed by authorized dredged material disposal activities. The remaining 36.25 ac of permanent wetland habitat loss are a mix of different wetland types, with the majority also being *Phragmites*-dominated wetland as described in Section 2.2.

Permanent loss of 23 ac of wetlands along the elevated causeway would be limited to areas of pier placement. PSEG proposes to build the elevated causeway from the northeast corner of the PSEG property along or adjacent to the existing Hope Creek-Red Lion transmission corridor to minimize land impacts. Shading could potentially result in some alteration of plant community makeup under the causeway and a reduction in primary productivity. PSEG proposes to use construction work mats within a 50-ft-wide easement, although final installation plans would likely identify a smaller installation area footprint (PSEG 2015-TN4280). Loss of wetland habitat and reductions in primary productivity due to causeway development should be minimal overall, considering the large area of adjacent coastal wetlands within the project vicinity.

Although the affected wetlands are a minimal portion of the overall abundance of wetland land-cover types within the vicinity (25,534 ac), the potential impacts to wetland habitats are expected to be noticeable and will warrant some form of compensatory mitigation. The quality of the impacted resource reflects a dominance of the invasive common reed, and a large amount of onsite wetland acreage is within the diked CDFs, which are not connected to nearshore EFH. The wetlands are regulated under the authority and jurisdiction of the USACE and the NJDEP.

The USACE approach is that mitigation may only be used after all appropriate and practical steps to avoid and minimize adverse impacts to aquatic resources, including nontidal wetlands and streams, have been taken. Further, the USACE requires all remaining unavoidable impacts to be compensated to the extent appropriate and practicable. The USACE could monitor or require monitoring for compliance with the USACE-issued permits. The Department of the Army permit could include special conditions that could require PSEG to ensure that the created and enhanced wetlands meet the Federal wetland criteria outlined in the report entitled *Corps of Engineers Wetlands Delineation Manual* (USACE 1987-TN2066). If the USACE did not find the wetlands and stream mitigation satisfactory, it could determine whether adverse impacts to the waterway and wetlands were more than minimal and any project modifications could be warranted. In addition, the USACE would require PSEG to assume all liability for accomplishing the corrective work in accordance with 73 FR 19594, "Compensatory Mitigation for Losses of Aquatic Resources" (73 FR 19594-TN1789; 33 CFR Part 320-TN424; 33 CFR Part 325-TN425).

PSEG has taken measures to avoid or minimize impacts to jurisdictional wetlands to the maximum extent possible. Mitigation measures to minimize adverse impacts to waters of the United States include the following: minimizing encroachment into coastal wetlands; minimizing encroachment into NJDEP-regulated freshwater wetlands; use of already existing sediment-disposal basins for plant development (i.e., the PSEG permitted disposal facility and the USACE CDF); refinement of the PSEG Site Utilization Plan (Figure 3) to avoid various wetland areas throughout the PSEG Site; and a causeway built on elevated piers or bridges, instead of on fill, to minimize direct impacts to tidal wetlands and to avoid impacts to tidal creeks (PSEG 2015-TN4280). PSEG plans to develop additional wetland impact minimization measures after a reactor technology has been selected and final site layout design is developed (PSEG 2014-TN4235).

Following the implementation of reasonable measures to avoid or minimize impacts to wetlands, compensation for unavoidable adverse impacts could be undertaken with the execution of an approved wetland restoration and/or rehabilitation program. In selecting a site for wetland mitigation, the following factors are typically considered: existing land use (historic and current), property ownership or potential for acquisition, hydrologic potential, proximity to other wetland sites, site topography, connectivity to adjacent natural habitats, site accessibility, and the presence of or potential to develop hydric soils (PSEG 2015-TN4280). Opportunities for wetland mitigation exist at various locations throughout the PSEG Site and vicinity. Factors that may influence site selection for wetland creation include topography, soil types, watershed size, and the presence of adjacent streams as a source of additional water (PSEG 2015-TN4280). Once a candidate mitigation site has been selected, wetland mitigation could be achieved through a series of rehabilitation and/or restoration methods. These methods could be site-specific and might include the control of common reed, restoration of the hydrologic state (i.e., levee removal, channel design, and reestablishing a connection of upland areas to tidal influences), and wetland enhancement that included the restoration of desirable and native vegetation (PSEG 2015-TN4280).

Wetland mitigation plan details would primarily be guided by conditions established under Clean Water Act (33 USC 1251 et seq. –TN662) Section 404 permits issued by the USACE or the NJDEP Land Use Regulation Program and Section 401 water-quality certifications issued by NJDEP. Therefore, specific wetland mitigation efforts could be determined as part of such authorizations (PSEG 2015-TN4280). Several candidate mitigation areas that have the potential to meet some or all of PSEG wetland mitigation needs were identified during the ESP application process. These candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason’s Point, and additional areas of the PSEG ACW Site (PSEG 2015-TN4280).

Wetland mitigation concepts for each area include the enhancement and/or development of coastal and freshwater wetland systems. A network of marsh creeks is integral to the restoration of coastal marsh and would address the loss of creeks within the existing marsh. While the loss of wetlands for site preparation and causeway installation may be noticeable, the review team determined that the habitat loss would not destabilize wetland resources in the vicinity or the ecological function of nearby, unaffected habitat to support prey species important to sustain populations of managed species. Therefore, effects to EFH for managed species and their prey from wetland habitat loss would be minor.

4.2 Dredging Effects

Managed species with EFH that may be affected by dredging impacts include all species and life stages listed in Table 7. In addition, juvenile and adult managed species rely on prey species found in the vicinity of the dredge areas. PSEG proposes to use one hydraulic dredge over a 2-month period, which would serve to reduce turbidity and sedimentation associated with dredging and would limit the extent of impacts on aquatic resources by minimizing the duration of in-water activity (PSEG 2015-TN4234). Although use of an environmental hopper dredge may be less likely to be directly injurious to fish species, this method requires a longer work window, increases turbidity, and requires additional handling of material for disposal.

Since hydraulic dredging could potentially entrain or impinge juvenile fish, fish larvae, and eggs, PSEG would adhere to the seasonal in-water timing restrictions imposed by the USACE (currently March 1 through June 30) and NJDEP for dredging and other in-water work to avoid sensitive spawning or recruitment windows to minimize these effects (PSEG 2015-TN4234). Some dredging would likely coincide with pile-driving activities previously described, and thus discourage fish species from foraging in the immediate area. Disruption of habitat for foraging in these areas of the Delaware River or wetland areas associated with the causeway is expected to be minor, temporary, and largely mitigable with the use of BMPs, hydraulic dredge technology, and compliance with USACE and NJDEP work window requirements. Juvenile and adult managed species and their prey species that may be present should be able to use adjacent unaffected habitats during dredge activities. Therefore, effects to EFH for managed species and their prey from dredging operations would be minor.

4.3 Pile Installation Effects

Managed species with EFH that may be affected by noise from installation of piles include all juvenile and adult species listed in Table 7. In addition, juvenile and adult managed species rely on fish prey species that may also be affected by pile installation noise. PSEG provided an analysis using criteria accepted by NMFS for estimating exceedance distances to determine cumulative sound exposure effect and behavioral adverse effects from pile-driving activities. Figure 5 shows the areas for noise effects which will occur over a period of approximately 50 days for causeway piling installation, 10 days for intake structure sheet piles, and 20 days each for shoreline and caisson sheet pile installation (PSEG 2015-TN4234). Given the short duration of activity, and the abundance of nearby, adjacent unaffected habitat, it is likely that managed species and their mobile prey would avoid the zone of adverse behavioral affect. Therefore, effects to EFH for managed species and their prey from pile-driving activities would be minor.

5.0 CONCLUSIONS

Conclusions regarding PSEG adverse effects on EFH are addressed in Table 8. All conclusions are made for the PSEG site-preparation activities as defined in the Department of Army permit application (PSEG 2014-4235).

Table 8. Impacts on EFH from Site-Preparation Activities for a New Nuclear Power Plant at the PSEG Site

Common Name	Life Stage	EFH Description[(a)] Salinity (ppt)	EFH Description[(a)] Temperature (°C)	EFH Description[(a)] Depth (m)	Expected Impact
Black Sea Bass	Juveniles	>18	>6	1–38	Minimal adverse effect. Pile installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Clearnose Skate	Juveniles and Adults	12–30	6–20	5–23	Minimal adverse effect. Prey species would be affected by pile-driving and dredging activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Little Skate	Juveniles and Adults	15–32	3–22	4–21	No adverse effect as this species has not been collected or reported in the vicinity of the PSEG Site.
Scup	Juveniles Adults	>15 >15	>7 >7	0–38 2–185	Minimal adverse effect. Pile installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Summer Flounder	Juveniles Adults	10–30 unspecified	>11 unspecified	0.5–5 0–25	Minimal adverse effect. Pile installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Windowpane Flounder	Eggs	unspecified	<20	<70	No adverse effect.
	Larvae	unspecified	<20	<70	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat.
	Juveniles and Adults	5.5–36	<25–26.8	1–100	Minimal adverse effect. Pile installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Winter Flounder	Eggs	10–30	<10	<5	No adverse effect.
	Larvae	4–30	<15	<6	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat.
	Juveniles Adults	10–30 15–33	<25 <25	1–50 1–100	Minimal adverse effect. Pile installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Winter Skate	Juveniles and Adults	15–35	3–17	7–18	No adverse effect as this species has not been collected or reported in the vicinity of the PSEG Site.

(a) NOAA 2006-TN2820; Packer et al. 2003-TN2822; Packer et al. 2003-TN2823; Packer et al. 2003-TN2824.

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F.3.3 U.S. Fish and Wildlife Service Biological Assessment

Two versions of the FWS BA are on display in this section. The first version (dated June 2014) is the BA originally sent by the NRC to the FWS for review. This is the same version of the BA that was on display in Section F.3.3 of the draft EIS.

Subsequent to the issuance of the draft EIS and 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 were not discussed in the June 2014 version of the BA. These species are northern long-eared bat (*Myotis septentrionalis*) and rufa red knot (*Calidris canutus rufa*).

The second version of the FWS BA (dated August 2015) on display in this section is a supplement to the original BA. This supplemental 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 the rufa red knot.

BIOLOGICAL ASSESSMENT

U.S. FISH AND WILDLIFE SERVICE

PSEG SITE
EARLY SITE PERMIT APPLICATION

U.S. NUCLEAR REGULATORY COMMISSION EARLY SITE PERMIT APPLICATION
DOCKET NUMBER 052-043

SALEM COUNTY, NEW JERSEY

JUNE 2014

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

BIOLOGICAL ASSESSMENT OF THE POTENTIAL EFFECTS ON FEDERALLY LISTED/PROPOSED LISTED ENDANGERED OR THREATENED SPECIES FROM THE PROPOSED EARLY SITE 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 or sites 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 construction permit and operating 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 and can conduct certain site preparation activities enumerated in 10 CFR 50.10(a)(2) (10 CFR 50-TN249). An ESP does not, however, authorize construction and 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).

By letter dated October 26, 2010 (NRC 2010-TN2202), the NRC initiated Endangered Species Act of 1973 (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 e-mail 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). NRC had not yet received a response as of the date of the preparation of this BA.

Based on NRC review of electronic sources from the states of Delaware, and New Jersey, one Federally listed turtle species was identified that has the potential to be present in the site vicinity. Additionally, the northern long-eared bat has been proposed for listing as an endangered species. The sensitive joint vetch, swamp pink, and small whorled pogonia species have been documented in the vicinity of the PSEG Site. However, the occurrence of these species and suitable habitat to support them has not been documented or is not known to occur on the PSEG Site or along areas that would be disturbed by building support facilities or a proposed causeway. Accordingly, this BA focuses on evaluating the potential effects from building and operating a new nuclear power plant at the PSEG Site, adjacent to SGS and HCGS, on the Federally listed turtle species and Federally proposed endangered bat species.

2.0 DESCRIPTION OF PROPOSED ACTION

PSEG is seeking an ESP for a new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS. 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).

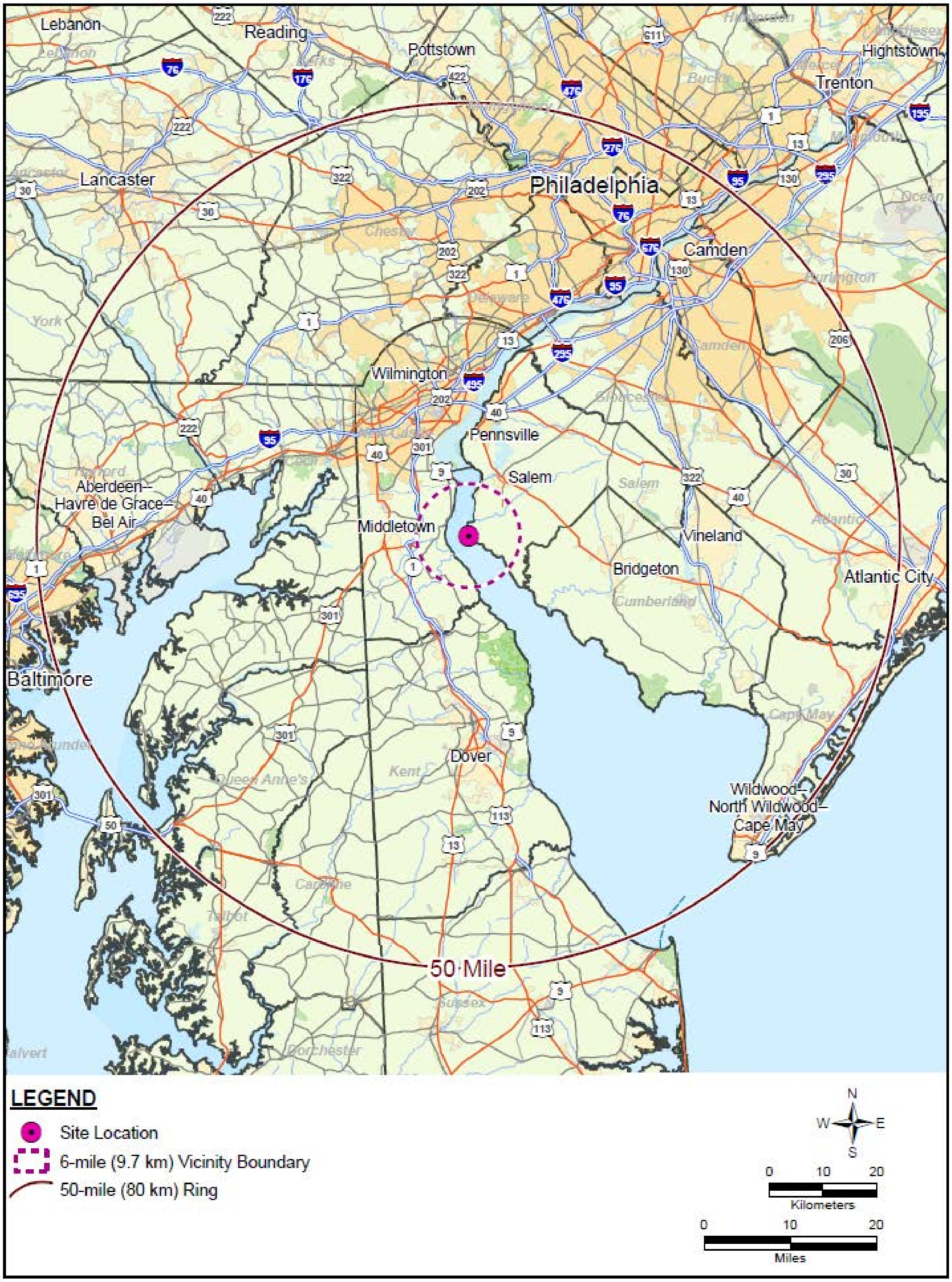

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2014-TN3452)

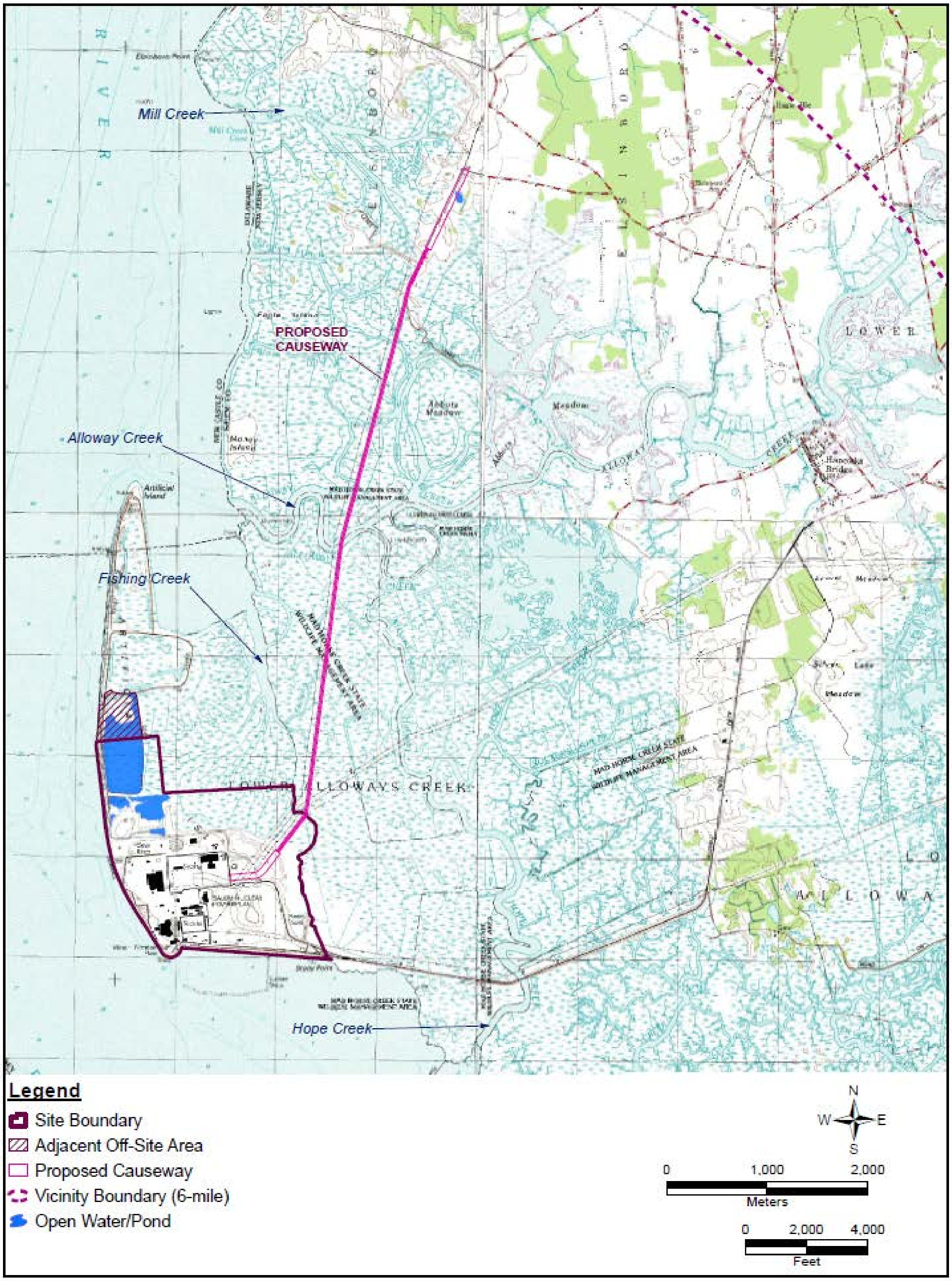

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2014-TN3452).

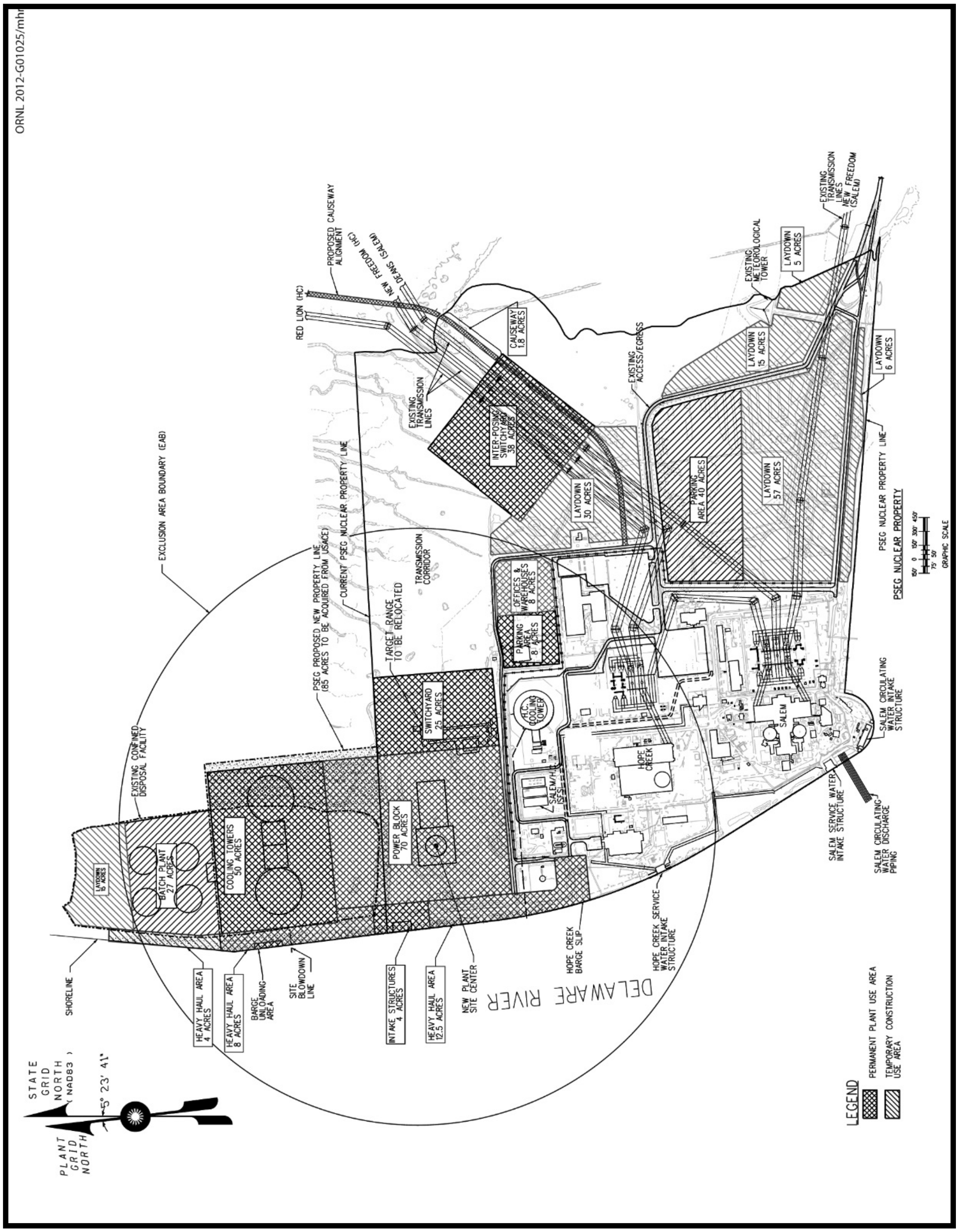

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489)

Appendix F

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 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

NJ LULC Categories	Existing PSEG	85-Acre Parcel	PSEG

	Property		to be Acquired		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 percent 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	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 green space	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.

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 (<25% 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 13 percent, of the site (PSEG 2014-TN3452).

Old field (<25% 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 construction and preconstruction 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, construction and preconstruction 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 construction and preconstruction 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 construction and preconstruction 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 Total Onsite Area (ac)	PSEG Site Permanent Use (ac)	PSEG Site Temporary Use (ac)	Adjacent Offsite Areas[(a)] 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 percent 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. Construction and preconstruction 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. Construction and preconstruction 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 (<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 construction and preconstruction 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 construction and preconstruction activities would permanently remove less than 1 percent of that available habitat. The effects on forestland from construction and preconstruction 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 construction and preconstruction 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).

Construction and preconstruction 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. The proposed 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 construction and preconstruction 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 construction and preconstruction 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 construction and preconstruction 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 construction and preconstruction 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). Construction and preconstruction 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

		Noise Levels (dBA)	
Monitoring Location	**Location Specific Attributes**	**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).

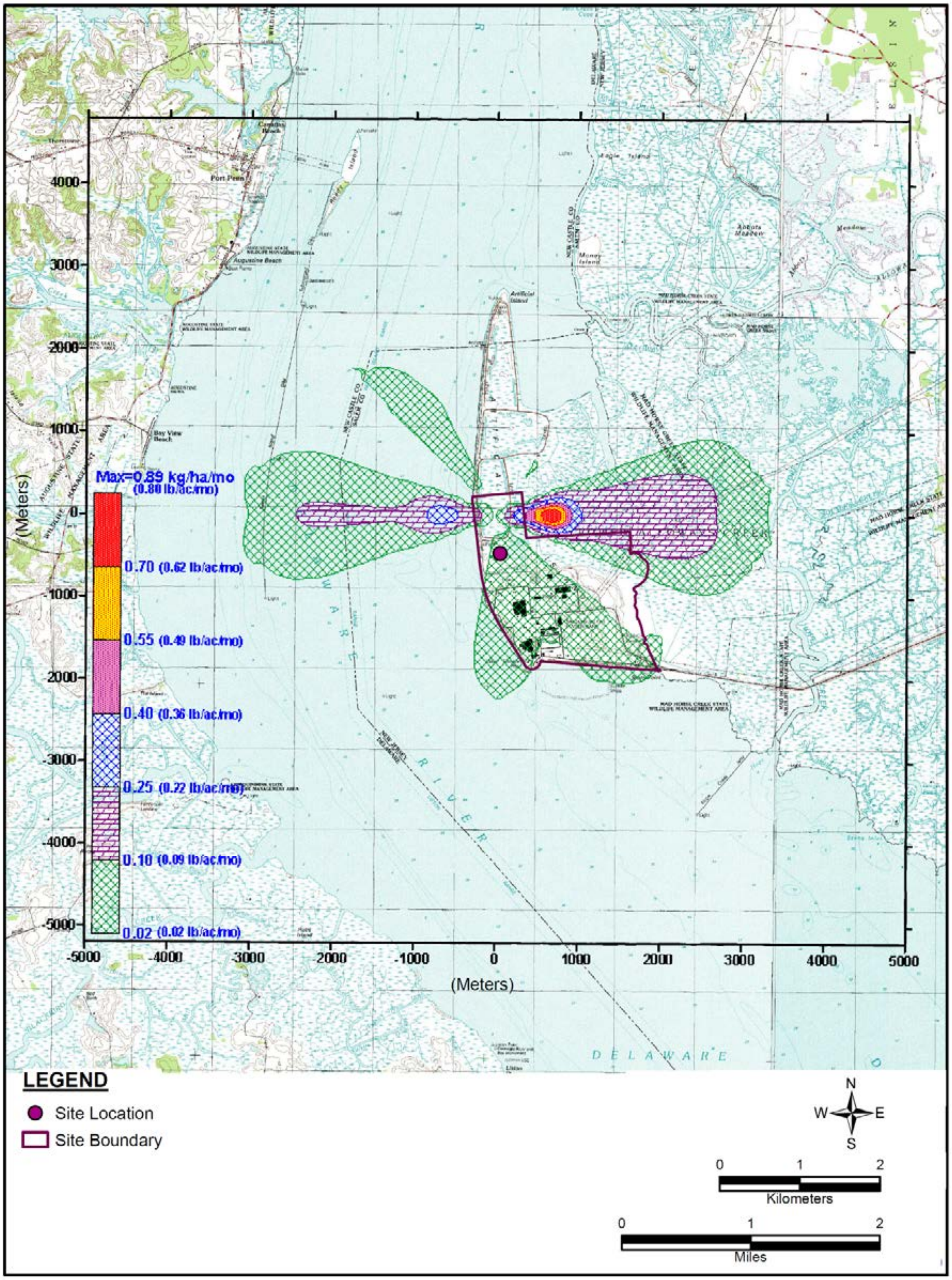

Figure 4. LMDCT Salt Deposition Rates (Source: Modified from PSEG 2014-TN3452)

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 rights-of-way 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 rights-of-way 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 turtle species and one Federally proposed endangered mammal species were identified with the potential to be present in the site vicinity. These species are the bog turtle (*Gyptemys muhlenbergii*) and northern long-eared bat (*Myotis septentrionalis*). Accordingly, this BA focuses on evaluating the potential effects from building and operating a new nuclear plant at the PSEG Site on the bog turtle and northern long-eared bat.

3.1 Bog Turtle

3.1.1 Species Description

The Federally threatened bog turtle measures up to 4 in. long and is dark brown with distinct orange patches on either side of its head. Its carapace scutes are brown or black and may have a yellow or reddish center, and its plastron is brownish-black. The bog turtle's limbs are brown and may have variable amounts of dark yellow, orange, or red blotching. Male bog turtles have a concave plastron, long thick tail, and long foreclaws. The females have a flat to semi-convex plastron (CWFNJ 2014-TN3288).

3.1.2 Distribution and Habitat

Bog turtles occur in disjointed populations in the eastern United States from New York to northern Georgia. Populations of bog turtles in New Jersey occur in isolated colonies in northern, central, and southern counties including Salem County, New Jersey. The largest populations can be found in the Wallkill River and Paulinskill River watersheds (CWFNJ 2014-TN3288).

Bog turtles inhabit fens, bogs, and wet meadows characterized by mucky, organic soil that remains saturated by groundwater. Plant communities in bog turtle habitat vary in species composition but are almost always dominated by low-growing grasses, sedges, rushes, ferns, scattered cattails, and forbs. Shrub and tree cover is typically low, and physical features of the habitat include spring-derived rivulets; shallow, mucky pools; and abundant sedge or moss-covered hummocks. Bog turtles spend much of their time hiding in cool, soft muck that provides cover and aids in thermoregulation during warm summer months. After emerging from subterranean hibernacula in the spring, they spend much of that season into early summer basking on hummocks and other areas. Mating occurs primarily in May and June. Females lay their eggs in drier areas of the marsh such as sedge and moss hummocks or rotted tree stumps. The diet of the bog turtle is mainly invertebrates, particularly slugs. They also may feed on carrion, small berries, sedge seeds, young cattail shoots, and duckweed. Once abundant throughout New Jersey, the bog turtle is now restricted to the remaining rural portions of the state, including Sussex, Warren, Hunterdon, and Salem counties. They require large contiguous areas of land for dispersal. Intense land-uses affect bog turtle habitat through direct alteration of wetlands and secondary effects such as stormwater inputs, water table drawdown, and nutrient enrichment (NJDEP 2014-TN3287).

3.1.3 Population Trends and ESA Status

The FWS listed the northern population of the bog turtle on the Federal List of Endangered and Threatened Wildlife under the ESA on November 4, 1997. The bog turtle experienced a 50 percent reduction in range and population from 1976 to 1996. In New Jersey, there were 68 recorded locations where the bog turtle was found in 1978. In 1989, 44 of the recorded New Jersey sites surveyed indicated that the bog turtle was no longer present. In 2000, there were 350 extant sites comprising the entire northern population, which was an increase from the 191 known extant sites reported in 1996. Of those 350 extant sites, 165 known extant sites were located in New Jersey (FWS 2001-TN3315).

The primary threats to bog turtle populations in New Jersey have been habitat loss because of natural succession, habitat fragmentation, and illegal collection. Vegetation succession has a negative effect on bog turtles by eliminating open areas, resulting in the reduction of suitable nesting sites and basking habitat. Important microclimates may also be eliminated and a monoculture created with the infiltration of invasive plant species such as *Phragmites australis*, reed canary grass (*Phalaris arundinacea*), or purple loosestrife (*Lycopodium sabinifolium*). Bog turtle colonies are isolated with habitat fragmentation, which has the potential to result in decreased genetic diversity and to affect the colonization of new sites. Bog turtles also are killed when trying to cross roadways that split wetlands (CWFNJ 2014-TN3288).

The bog turtle was recorded historically for Artificial Island and the vicinity during a study conducted between 1972 and 1978. There were no records for this species in the latest surveys conducted by PSEG in 2009 to 2010. Methods used for surveying reptiles and amphibians on the PSEG Site during 2009 to 2010 included general site reconnaissance and observation, evening anuran (frog) call surveys in the spring, and transect surveys along eight transects also used for bird and mammal surveys. Representative portions of the proposed causeway and areas adjacent to the existing access road were also surveyed qualitatively (PSEG 2014-TN3452).

3.2 Northern Long-eared Bat

3.2.1 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) (78 FR 61046-TN3207).

3.2.2 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 (78 FR 61046-TN3207).

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 (78 FR 61046-TN3207).

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 (78 FR 61046-TN3207).

3.2.3 Population Trends and ESA Status

The northern long-eared bat was proposed for listing under the ESA on December 2, 2013. The 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 (78 FR 61046-TN3207).

4.0 PROPOSED ACTION EFFECTS ANALYSIS

This section provides descriptions of potential construction, preconstruction, and operations impacts on the Federally threatened bog turtle and Federally proposed endangered northern long-eared bat. Construction, preconstruction, 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 listed bog turtle and Federally proposed endangered northern long-eared bat 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

Construction and preconstruction activities proposed for the PSEG Site will impact habitats (water and wetlands) that could provide potential habitat for the bog turtle. Although the project will affect approximately 94 percent of the water habitat on the site, over 93 percent of that total consists of artificial lakes that would not be expected to provide adequate habitat for the bog turtle. Furthermore, the majority of the wetland habitat to be disturbed or lost consists of monocultures of the nonnative invasive common reed (*Phragmites australis*). Such monocultures do not provide the important microhabitats required to sustain bog turtles.

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.

4.2 Cooling System Impacts on Vegetation

Potential effects on the bog turtle from the operation of a new nuclear power plant mainly would be associated with water vapor and drift from the cooling tower systems. 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 bog turtle or northern long-eared bat habitat from PSEG Site cooling system operations.

4.3 Wildlife Collisions with Plant Structures

There has been documentation of bat mortality as a result of collisions with human-made structures. However, these collisions do not significantly affect bat populations. Additionally, the PSEG Site does not contain habitat suitable for northern long-eared bat hibernacula, maternity roosts, or foraging. Therefore, bat 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. There could be a decline of bog turtle populations if roadkill rates exceed the rates of reproduction. However, the proposed causeway would be built on piers to limit impacts to wildlife corridors, and the bog turtle population is not expected to be affected by increased traffic on the PSEG Site or vicinity.

4.5 Transmission Lines

The operation and maintenance of onsite transmission lines are not expect to affect the bog turtle or northern-long eared bat. 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 mortality as a result of collisions with the lines. However, habitat for the northern long-eared bat 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. Therefore, transmission lines on the PSEG Site would not be expected to affect bog turtles or northern long-eared bats.

5.0 CUMULATIVE EFFECTS ANALYSIS

In addition to impacts from construction, preconstruction, and operation, 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. 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 impacts 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.

Currently, the USACE is in the process of deepening the existing Delaware River Federal Navigation Channel from 40 to 45 ft from Philadelphia, Pennsylvania, and Camden, New Jersey, to the mouth of the Delaware River (USACE 2013-TN2665). The cumulative impact contribution to terrestrial and wetland resources associated with the acquisition by PSEG of the 85 ac CDF on Artificial Island will be dependent on potential need for the USACE to develop a new CDF and could add to the overall cumulative impacts for the geographic region of interest. PSEG is in the process of obtaining a separate land exchange agreement with the USACE, Philadelphia District, for the Artificial Island CDF. Any land exchange agreement between the USACE and PSEG would undergo a separate NEPA review and would require PSEG to provide an alternative CDF for USACE-dredged material disposal operations currently available at the Artificial Island CDF. The current CDF on Artificial Island contains low quality terrestrial and wetland habitat, and the addition of a new CDF has the potential of affecting habitat of higher quality. The USACE's Delaware River Main Channel Deepening Project would require a site to dispose of dredge material. The USACE proposes to dispose of dredge material at Fort Mifflin CDF. The USACE determined that the planned impacts are consistent with previous actions and would not result in significant impacts to the affected environment (USACE 2013-TN2665). Similarly, current operations of SGS and HCGS would require a new location for disposing of dredge material, and a disposal site would be needed for dredge material from the barge access area at the PSEG Site. The effects on terrestrial and wetland habitat are expected to be less than, but consistent with, those of the Delaware River Main Channel Deepening Project. Consequently, the review team determined that the cumulative impact on terrestrial and wetland ecology habitats from dredging activities as a result of building and operating a new nuclear power plant at the PSEG Site, in conjunction with past, present, and reasonably foreseeable future dredging activities, is minimal.

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 Impacts

The potential cumulative impacts 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 impacts would be noticeable.

Although the PSEG Site does not contain suitable habitat for the Federally threatened (State-listed) bog turtle and the Federally proposed endangered northern long-eared bat, potential offsite transmission lines along with other actions taken in the geographical area of interest could result in potential impacts to this species.

The extent of potential cumulative impacts on the bog turtle and northern long-eared bat 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 impacts.

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 protect wetlands and streams from future ROW development and urbanization. However, the impacts to terrestrial and wetland resources from these activities and a proposed new nuclear power plant at the PSEG Site would be noticeable.

Potential cumulative impacts 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 bog turtle and northern long-eared bat habitat. Overall, when combined with other past, present, and reasonably foreseeable future actions, the cumulative impacts 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 impacts on terrestrial and wetland resources within this region would be expected to be minimal.

6.0 CONCLUSIONS AND DETERMINATION OF EFFECTS

Construction and preconstruction activities proposed for the PSEG Site will affect habitats (water and wetlands) that could provide potential habitat for the bog turtle. Although the project will impact approximately 94 percent of the water habitat on the site, over 93 percent of that total consists of artificial lakes that would not be expected to provide adequate habitat for the bog turtle. Furthermore, the majority of the wetland habitat to be disturbed or lost consists of monocultures of the nonnative invasive common reed. Such monocultures do not provide the important microhabitats required to sustain bog turtles. 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. 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 bog turtle from the operation of the new nuclear power plant would be associated mainly with water vapor and drift from the cooling tower systems. The main concern would be salt drift and deposition that could potentially affect vegetation in the surrounding area. However, calculated salt deposition rates fall within rates that are not generally damaging to plants. Furthermore, most plants within the salt drift zone for the PSEG Site have medium to high salinity tolerance. Increased traffic associated with the operations of the new nuclear power plant has the potential to increase wildlife road kills due to collisions with vehicles, and this is known to be a mortality factor for bog turtles.

Potential impacts to the northern long-eared bat 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 mortality as a result of collisions is not known to affect overall bat populations. Additionally, northern-long-eared bats are not known to occur on the PSEG Site and suitable habitat does not exist on the site.

The PSEG Site does not appear to provide suitable habitat requirements to sustain the bog turtle or the northern long-eared bat. Therefore, habitat disturbed or lost because of the construction of a new nuclear power plant on the PSEG Site should not affect these species. Furthermore, there are no recent records for the bog turtle on the PSEG Site, FWS previously indicated that this species is not known to occur on or in the vicinity of the HCGS and SGS sites, and recent feedback from the FWS stated that the activities proposed for the site would not likely affect Federally listed species. Therefore, the review team has determined that building and operation activities associated with a new nuclear power plant on the PSEG Site would have no adverse effects on the Federally threatened bog turtle or Federally proposed endangered northern long-eared bat.

7.0 REFERENCES

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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

July 2015

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/Proposed 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 (10 CFR Part 51-TN250), the NRC regulations that implement the National Environmental Policy Act of 1969, as amended (NEPA) (42 USC 4321 et seq. -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 construction permit and operating 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) (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 (TN250). For a COL or CP application that references an ESP, the NRC staff, pursuant to 10 CFR 51.75(c)(1) (TN250), would prepare a supplement to the ESP EIS in accordance with 10 CFR 51.92(e) (TN250) 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 et seq. -TN1010).

By letter dated October 26, 2010 (NRC 2010-TN2202), the NRC initiated ESA (16 USC 1531 et seq. -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 e-mail 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 (NRC and USACE 2014-TN4279) and BA (NRC and USACE 2014-TN4313) to USFWS on August 28, 2014 (NRC 2014-TN4268). The U.S. Department of Interior submitted a response to the EIS and BA on November 5, 2014, indicating that no additional measures were required (DOI 2014-TN4269).

The August 2014 BA (NRC and USACE 2014-TN4313) 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 (NRC and USACE 2014-TN4313).

Since publication of the BA (NRC and USACE 2014-TN4313) and the draft EIS (NRC and USACE 2014-TN4279), 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-TN4267). 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 (16 USC 1531 et seq. –TN1010). 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 SGS and HCGS.

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280).

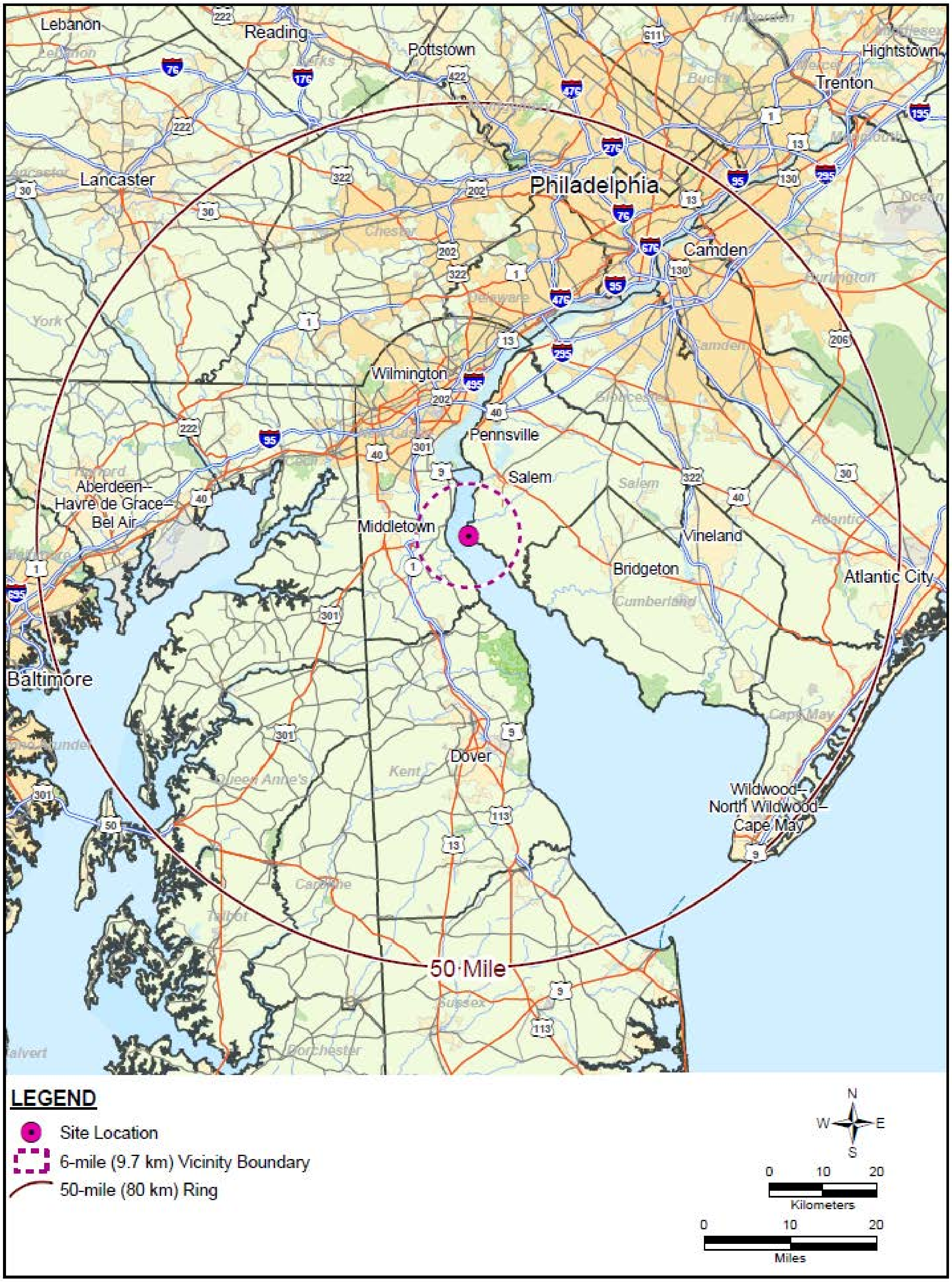

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2015-TN4280)

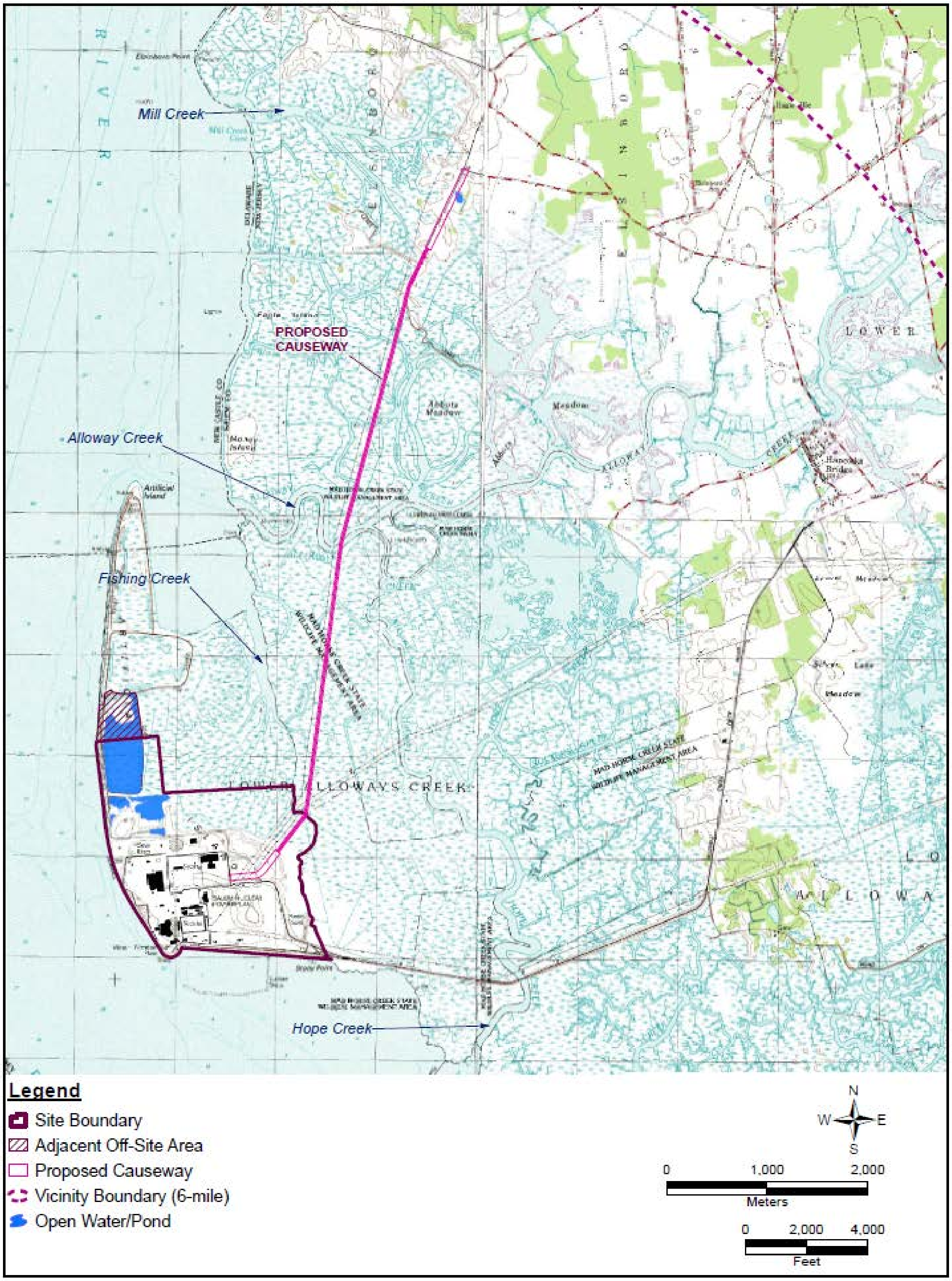

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2015-TN4280).

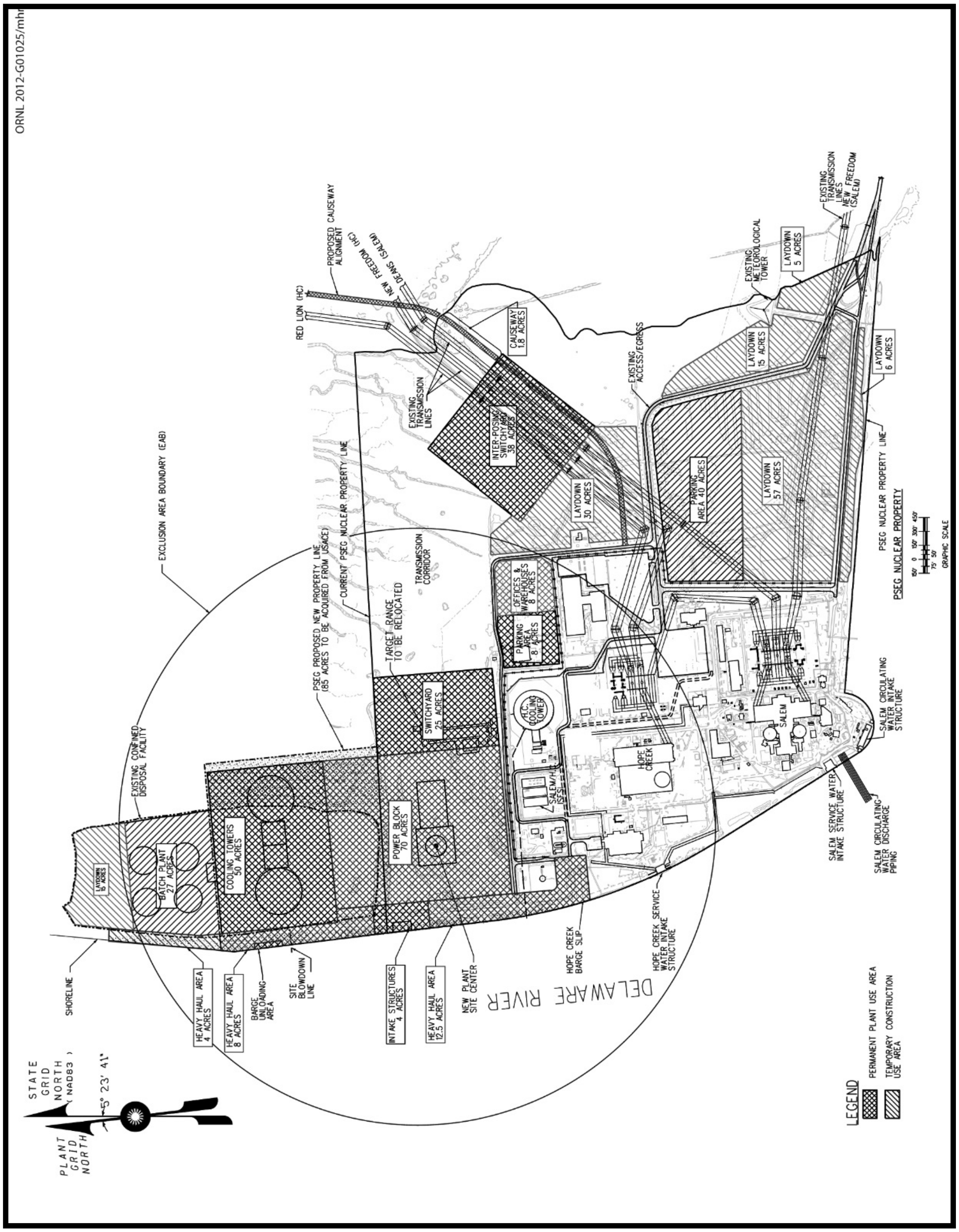

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489)

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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). *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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280). *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 (<25% 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 2015-TN4280).

Old field (<25% 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).

Ten walking surveys conducted by PSEG in 2009 on brushland/scrubland areas indicated that the most common vegetation species included 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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280).

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 2015-TN4280).

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

	PSEG Site			Adjacent Offsite Areas[a]
New Jersey Land Use Category	**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 2015-TN4280.

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 2015-TN4280).

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 2015-TN4280).

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 (<25 percent brush covered) (2.6 ac) under the NJ LULC system (PSEG 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 ft 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 2015-TN4283). The estimated dBA noise emission for this type of cooling tower is 60 dBA at 1,000 ft. 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 2015-TN4280).

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 2015-TN4280). 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]	Noise Levels (dBA) 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 2015-TN4280.

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 2015-TN4280). 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 ft 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 2015-TN4280). 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 2015-TN4280). 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). PSEG's ER (PSEG 2015-TN4280), 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 PSEG (PSEG 2015-TN4280) 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 2015-TN4280).

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; PSEG 2015-TN4280). 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 2015-TN4280).

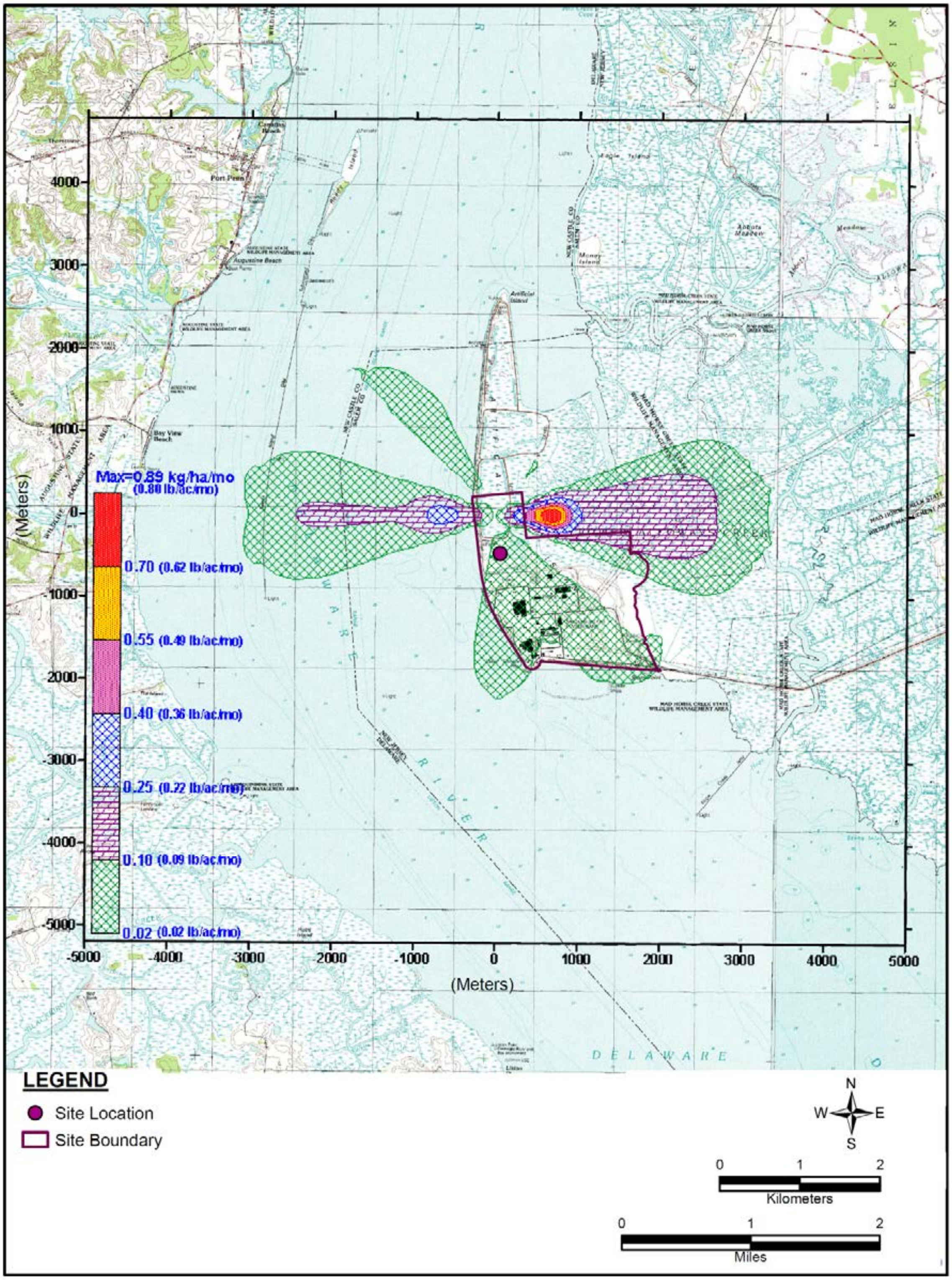

Figure 4. LMDCT Salt Deposition Rates (Source: Modified from PSEG 2015-TN4280)

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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 2015-TN4280). 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 rights-of-way 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 2015-TN4280).

PSE&G transmission lines and rights-of-way 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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280).

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 2015-TN4280). Additionally, PSEG's wildlife management practices would be required to comply with the Migratory Bird Treaty Act (16 USC 703 et seq. –TN3331) 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 2015-TN4280). 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 2015-TN4280), 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 2014-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 (NRC 2014-TN4313).

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 (16 USC 1531 et seq. – TN1010) 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. Adults 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 red knots roosted along the shoreline or in sandy washovers above the high tide line, but 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.

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 red knots due to the abundance of horseshoe crab eggs available.

3.2.3 Population Trends and ESA Status

The red knot was added to the Federal list of candidate species in 2006. On December 11, 2014 the final rule was published (79 FR 73705-TN4267) to list the rufa subspecies as threatened under the ESA (16 USC 1531 et seq. –TN1010). The effective date of listing was January 12, 2015. A decline in the 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 (TN4312), 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 2015-TN4280).

The USACE created Artificial Island in the early 1900s with the authorization of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403 et seq. –TN660). 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 2015-TN4280). 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 2015-TN4280). 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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APPENDIX G

SUPPORTING INFORMATION AND DATA: POPULATION PROJECTIONS AND RADIOLOGICAL DOSE ASSESSMENT

APPENDIX G

SUPPORTING INFORMATION AND DATA: POPULATION PROJECTIONS AND RADIOLOGICAL DOSE ASSESSMENT

G.1 Population Projections

Table G-1 provides resident population distribution and projections through the year 2081 for the area within 50 mi of the PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) Site. Table G-2 provides transient population distribution and projections through the year 2081 for the area within 10 mi of the PSEG Site. PSEG obtained population estimates from various sources, including the U.S. Census Bureau (USCB) (PSEG 2015-TN4283). PSEG used the estimates to develop population projections for the year 2010, the expected first year of operation for the new plant (i.e., 2021), and 10-year increments over the potential operating life of the new plant (through 2081) (PSEG 2015-TN4283).

Based on the aforementioned USCB 2000 census block data, Table G-1 provides population estimates within the concentric bands from 0 to 1 mi, 1 to 2 mi, 2 to 3 mi, 3 to 4 mi, 4 to 5 mi, 5 to 10 mi, 10 to 20 mi, 20 to 30 mi, 30 to 40 mi, and 40 to 50 mi for each of the 16 directional sectors, with each directional sector consisting of 22.5 degrees. For each segment formed by a distance band and directional sector, the percentage of each census block's land area that fell, either completely or partially, within that segment is calculated using geographic information system (GIS) software ArcMap9.2 (PSEG 2015-TN4283). The equivalent proportion of each census block's population is then assigned to each segment. If portions of two or more census blocks fall within the same segment, the proportional population estimates for each census block are summed to obtain the population estimate for that segment (PSEG 2015-TN4283).

The GIS baseline, which includes the population estimates distributed by segment, is used to develop projections of future populations (Table G-1). The 2010 populations are projected by using USCB growth rates for the 2000 through 2008 period (PSEG 2015-TN4283). From 2010 onward, population growth rates are derived from county population projections developed by the states of Delaware, Maryland, New Jersey, and Pennsylvania (PSEG 2015-TN4283). New Jersey has published population projections out to 2025, while Delaware, Maryland, and Pennsylvania have published population projections out to 2030 (PSEG 2015-TN4283). The county population growth rates derived from these projections are used to extrapolate the baseline 2010 projections out to 2021 and 2031 for appropriate counties within each of the four states. No official published data were found that could be applied beyond the 2031 projections (PSEG 2015-TN4283). Population projections beyond 2031 are based on the county-specific annual growth rate calculated for each county between 2021 and 2031. The county-specific growth rates for this 10-year period are used to obtain the population projections for each successive 10-year period (i.e., 2041, 2051, 2061, 2071, and 2081) (PSEG 2015-TN4283).

Table G-1. Population/Distance in Miles

Year	Sectors	0–1	1–2	2–3	3–4	4–5	5–10	Total 0–10	10–20	20–30	30–40	40–50	Total 10–50	Total 0–50
2010	N	0	0	0	0	105	224	–	146,379	127,017	180,586	171,958	625,940	626,269
2021	N	0	0	0	0	112	240	352	155,730	134,747	210,005	194,320	694,802	695,154
2031	N	0	0	0	0	120	257	377	162,469	140,863	237,903	214,653	755,888	756,265
2041	N	0	0	0	0	129	275	404	169,510	147,356	269,731	237,612	824,209	824,613
2051	N	0	0	0	0	138	195	433	176,867	154,261	306,050	263,562	900,740	901,173
2061	N	0	0	0	0	148	316	464	184.555	161,618	347,503	292,921	986,597	987,061
2071	N	0	0	0	0	158	338	496	192,589	169,469	394.822	326,165	1,083,045	1,083,541
2081	N	0	0	0	0	170	362	532.2	00.986	177,866	448,847	363,839	1,191,538	1,192,070
2010	NNE	0	0	3	5	31	5,398	5,437	17,013	135,920	883,240	1,003,853	2,040,026	2,045,463
2021	NNE	0	0	3	6	33	5,775	5,817	18,210	141,555	886,469	1,006,508	2,052,742	2,058,559
2031	NNE	0	0	4	6	36	6,186	6,232	19,519	147,943	896,061	1,012,808	2,076,331	2,082,563
2041	NNE	0	0	4	7	38	6,627	6,676	20,924	154,763	906,131	1,019,671	2,101,489	2,108,165
2051	NNE	0	0	4	7	41	7,100	7,152	22,430	162,055	916,696	1,027,119	2,128,300	2,135,452
2061	NNE	0	0	5	8	44	7,606	7,663	24,045	169,864	927,771	1,035,179	2,156,859	2,164,522
2071	NNE	0	0	5	8	47	8,148	8,208	25,777	178,240	939,374	1,043,880	2,187,271	2,195,479
2081	NNE	0	0	5	9	50	8,729	8,793	27,634	187,239	951,522	1,053,252	2,219,647	2,228,440
2010	NE	0	0	1	5	42	3,200	3,248	9,052	79,314	443,708	498,939	1,031,013	1,034,261
2021	NE	0	0	1	6	44	3,423	3,474	9,707	88,435	473,816	525,180	1,097,138	1,100,612
2031	NE	0	0	2	6	48	3,667	3,723	10,425	98,741	503,842	550,506	1,163,514	1,167,237
2041	NE	0	0	2	7	51	3,928	3,988	11,198	110,249	536,375	577,796	1,235,618	1,239,606
2051	NE	0	0	2	7	55	4,209	4,273	12,029	123,099	571,658	607,203	1,313,989	1,318,262
2061	NE	0	0	2	8	59	4,509	4,578	12,924	137,449	609,960	638,891	1,399,224	1,403,802
2071	NE	0	0	2	8	63	4,830	4,903	13,887	153,473	651,580	673,037	1,491,977	1,496,880
2081	NE	0	0	2	9	67	5,174	5,252	14,923	171,366	696,849	709,835	1,592,973	1,598,225
2010	ENE	0	0	12	31	193	1,160	1,396	4,681	39,356	94,959	45,462	184,458	185,854
2021	ENE	0	0	12	33	206	1,240	1,491	5,006	43,441	103,127	49,543	201,117	202,608
2031	ENE	0	0	13	36	221	1,329	1,599	5,353	48,004	111,616	53,473	218,446	220,045
2041	ENE	0	0	14	38	237	1,424	1,713	5,724	53,066	120,923	57,732	237,445	239,158

Table G-1. (continued)

Year	Sectors	0–1	1–2	2–3	3–4	4–5	5–10	Total 0–10	10–20	20–30	30–40	40–50	Total 10–50	Total 0–50
2051	ENE	0	0	15	41	254	1,525	1,835	6,120	58,682	131,133	62,349	258,284	260,119
2061	ENE	0	0	16	44	272	1,634	1,966	6,545	64,915	142,343	67,355	281,158	283,124
2071	ENE	0	0	17	47	291	1,750	2,105	6,999	71,834	154,660	72,783	306,276	308,381
2081	ENE	0	0	19	50	312	1,875	2,256	7,485	79,517	168,204	78,672	333,878	336,134
2010	E	0	0	9	29	26	1,020	1,084	26,614	74,640	23,952	45,739	170,945	172,029
2021	E	0	0	9	31	28	1,091	1,159	28,407	79,806	26,125	50,365	184,703	185,862
2031	E	0	0	10	33	30	1,166	1,239	29,724	83,782	28,230	55,176	196,912	198,151
2041	E	0	0	11	36	32	1,247	1,326	31,103	87,973	30,520	60,446	210,042	211,368
2051	E	0	0	11	38	34	1,333	1,416	32,546	92,392	33,010	66,219	224,167	225,583
2061	E	0	0	12	41	36	1,426	1,515	34,056	97,054	35,721	72,543	239,374	240,889
2071	E	0	0	13	44	39	1,525	1,621	35,637	101,974	38,671	79,472	255,754	257,375
2081	E	0	0	14	47	42	1,631	1,734	37,292	107,168	41,884	87,062	273,406	275,140
2010	ESE	0	0	0	0	3	380	383	20,279	24,928	10,673	21,323	77,203	77,586
2021	ESE	0	0	0	0	3	405	408	21,644	26,606	11,362	22,000	81,612	82,020
2031	ESE	0	0	0	0	3	425	428	22,636	27,825	11,887	22,947	85,295	85,723
2041	ESE	0	0	0	0	3	446	449	23,674	29,100	12,437	23,939	89,150	89,599
2051	ESE	0	0	0	0	3	467	470	24,759	30,434	13,012	24,978	93,183	93,653
2061	ESE	0	0	0	0	4	490	494	25,893	31,829	13,615	26,067	97,404	97,898
2071	ESE	0	0	0	0	4	514	518	27,080	33,288	14,247	27,210	101,825	102,343
2081	ESE	0	0	0	0	4	539	543	28,321	34,813	14,908	28,408	106,450	106,993
2010	SE	0	0	0	0	0	6	6	97	641	40	36,596	37,374	37,380
2021	SE	0	0	0	0	0	6	6	104	684	43	37,592	38,423	38,429
2031	SE	0	0	0	0	0	7	7	108	715	45	39,073	39,941	39,948
2041	SE	0	0	0	0	0	7	7	113	748	47	40,611	41,519	41,526
2051	SE	0	0	0	0	0	7	7	118	782	49	42,211	43,160	43,167
2061	SE	0	0	0	0	0	8	8	124	818	51	43,873	44,866	44,874
2071	SE	0	0	0	0	0	8	8	130	856	53	45,601	46,640	46,648
2081	SE	0	0	0	0	0	9	9	135	895	56	47,396	48,482	48,491
2010	SSE	0	0	0	0	0	6	6	152	1539	1304	6981	9976	9982
2021	SSE	0	0	0	0	0	6	6	170	1726	1510	8528	11,934	11,940

Table G-1. (continued)

Year	Sectors	0–1	1–2	2–3	3–4	4–5	5–10	Total 0–10	10–20	20–30	30–40	40–50	Total 10–50	Total 0–50
2031	SSE	0	0	0	0	0	7	7	182	1847	1659	9750	13,438	13,445
2041	SSE	0	0	0	0	0	7	7	195	1976	1824	11,148	15,143	15,150
2051	SSE	0	0	0	0	0	8	8	209	2115	2007	12,745	17,076	17,084
2061	SSE	0	0	0	0	0	8	8	224	2264	2211	14,572	19,271	19,279
2071	SSE	0	0	0	0	0	9	9	239	2422	2439	16,660	21,760	21,769
2081	SSE	0	0	0	0	0	10	10	256	2592	2693	19,048	24,589	24,599
2010	S	0	0	0	0	4	128	132	13,777	80,752	33,679	21,093	149,301	149,433
2021	S	0	0	0	0	4	139	143	15,453	90,578	38,350	25,476	169,857	170,000
2031	S	0	0	0	0	4	147	151	16,537	96,933	41,554	28,890	183,914	184,065
2041	S	0	0	0	0	4	154	158	17,697	103,733	45,056	32,777	199,263	199,421
2051	S	0	0	0	0	4	163	167	18,938	111,011	48,887	37,202	216,038	216,205
2061	S	0	0	0	0	5	171	176	20,266	118,800	53,084	42,243	234,393	234,569
2071	S	0	0	0	0	5	180	185	21,688	127,135	57,684	47,985	254,492	254,677
2081	S	0	0	0	0	5	190	195	23,209	136,055	62,733	54,529	276,526	276,721
2010	SSW	0	0	0	4	7	612	623	20,410	14,540	11,162	16,338	62,450	63,073
2021	SSW	0	0	0	4	7	651	662	22,708	16,471	13,139	19,344	71,662	72,324
2031	SSW	0	0	0	5	7	677	689	24,202	17,802	14,720	21,791	78,515	79,204
2041	SSW	0	0	0	5	8	705	718	25,798	19,249	16,501	24,564	86,112	86,830
2051	SSW	0	0	0	5	8	734	747	27,501	20,825	18,511	27,709	94,546	95,293
2061	SSW	0	0	0	5	8	764	777	29,319	22,542	20,779	31,274	103,914	104,691
2071	SSW	0	0	0	5	9	795	809	31,260	24,413	23,340	35,319	114,332	115,141
2081	SSW	0	0	0	6	9	828	843	33,333	26,456	26,232	39,908	125,929	126,772
2010	SW	0	0	1	6	8	1,772	1787	4,269	6,256	6,815	11,477	28,817	30,604
2021	SW	0	0	1	7	8	1,885	1,901	4,645	7,170	7,856	13,174	32,845	34,746
2031	SW	0	0	1	7	9	1,962	1,979	4,890	7,878	8,687	14,513	35,968	37,947
2041	SW	0	0	1	7	9	2,042	2,059	5,149	8,661	9,607	15,995	39,412	41,471
2051	SW	0	0	1	8	9	2,126	2,144	5,423	9,525	10,627	17,634	43,209	45,353
2061	SW	0	0	2	8	10	2,213	2,233	5,712	10,481	11,757	19,447	47,397	49,630
2071	SW	0	0	2	8	10	2,303	2,323	6,018	11,536	13,010	21,455	52,019	54,342
2081	SW	0	0	2	9	11	2,398	2,420	6,341	12,703	14,398	23,676	57,118	59,538

Table G-1. (continued)

Year	Sectors	0–1	1–2	2–3	3–4	4–5	5–10	Total 0–10	10–20	20–30	30–40	40–50	Total 10–50	Total 0–50
2010	WSW	0	0	2	16	154	4,262	4,434	3,687	3,722	11,737	28,284	47,430	51,864
2021	WSW	0	0	2	17	163	4,532	4,714	4,303	4,170	13,003	29,950	51,426	56,140
2031	WSW	0	0	2	18	170	4,718	4,908	4,782	4,454	13,760	30,266	53,262	58,170
2041	WSW	0	0	2	19	177	4,911	5,109	5,335	4,764	14,564	30,592	55,255	60,364
2051	WSW	0	0	2	19	184	5,112	5,317	5,975	5,104	15,422	30,928	57,429	62,746
2061	WSW	0	0	2	20	192	5,321	5,535	6,718	5,479	16,335	31,275	59,807	65,342
2071	WSW	0	0	2	21	200	5,539	5,762	7,582	5,893	17,309	31,632	62,416	68,178
2081	WSW	0	0	2	22	208	5,766	5,998	8,588	6,352	18,349	32,002	65,291	71,289
2010	W	0	0	2	134	322	14,199	14,657	6,170	6,108	56,270	198,557	267,105	281,762
2021	W	0	0	2	143	343	15,099	15,587	7,274	7,366	62,969	218,504	296,113	311,700
2031	W	0	0	2	148	357	15,718	16,225	8,181	8,219	64,348	222,304	303,052	319,277
2041	W	0	0	2	154	371	16,361	16,888	9,237	9,218	65,758	226,183	310,396	327,284
2051	W	0	0	2	161	386	17,031	17,580	10,471	10,391	67,198	230,141	318,201	335,781
2061	W	0	0	2	167	402	17,729	18,300	11,913	11,770	68,669	234,180	326,532	344,832
2071	W	0	0	2	174	419	18,455	19,050	13,602	13,391	70,173	238,303	335,469	354,519
2081	W	0	0	3	181	436	19,211	19,831	15,582	15,301	71,710	242,510	345,103	364,934
2010	WNW	0	0	52	162	276	3,906	4,396	26,208	30,162	34,621	26,919	117,910	122,306
2021	WNW	0	0	55	173	293	4,154	4,675	32,151	38,578	41,817	29,726	142,272	146,947
2031	WNW	0	0	57	180	305	4,324	4,866	37,126	45,710	47,031	30,866	160,733	165,599
2041	WNW	0	0	60	187	318	4,501	5,066	42,982	54,163	53,142	32,063	182,350	187,416
2051	WNW	0	0	62	195	331	4,685	5,273	49,881	64,181	60,313	33,321	207,696	212,969
2061	WNW	0	0	64	203	344	4,877	5,488	58,012	76,052	68,738	34,644	237,446	242,934
2071	WNW	0	0	67	211	358	5,077	5,713	67,604	90,120	78,647	36,035	272,406	278,119
2081	WNW	0	0	70	220	373	5,284	5,947	78,925	106,793	90,311	37,500	313,529	319,476
2010	NW	0	0	0	121	167	2,625	2,913	104,022	31,899	31,100	46,300	213,321	216,234
2021	NW	0	0	0	129	178	2,791	3,098	113,104	38,686	35,933	49,289	237,012	240,110
2031	NW	0	0	0	134	185	2,906	3,225	119,859	44,703	40,473	51,956	256,991	260,216
2041	NW	0	0	0	140	193	3,025	3,358	127,285	51,704	45,634	54,781	279,404	282,762
2051	NW	0	0	0	145	201	3,148	3,494	135,481	59,853	51,501	57,775	304,610	308,104
2061	NW	0	0	0	151	209	3,277	3,637	144,565	69,343	58,177	60,949	333,034	336,671

Table G-1. (continued)

Year	Sectors	0–1	1–2	2–3	3–4	4–5	5–10	Total 0–10	10–20	20–30	30–40	40–50	Total 10–50	Total 0–50
2071	NW	0	0	0	157	218	3,412	3,787	154,675	80,401	65,775	64,317	365,168	368,955
2081	NW	0	0	0	164	227	3,551	3,942	165,975	93,291	74,425	67,892	401,583	405,525
2010	NNW	0	0	0	87	27	1,798	1,912	132,354	81,031	83,847	57,711	354,943	356,855
2021	NNW	0	0	0	93	29	1,912	2,034	140,746	91,010	98,845	66,726	397,327	399,361
2031	NNW	0	0	0	97	30	1,990	2,117	146,509	99,795	113,009	75,203	434,516	436,633
2041	NNW	0	0	0	101	31	2071	2,203	152,509	109,665	129,202	84,838	476,214	478,417
2051	NNW	0	0	0	105	33	2,156	2,294	158,754	120,769	147,715	95,795	523,033	525,327
2061	NNW	0	0	0	109	34	2,244	2,387	165,255	133,274	168,881	108,260	575,670	578,057
2071	NNW	0	0	0	114	35	2,336	2,485	172,022	147,374	193,080	122,446	634,922	637,407
2081	NNW	0	0	0	118	37	2,432	2,587	179,067	163,291	220,746	138,597	701701	704,288

Source: PSEG 2015-TN4280.

Table G-2. Transient Population Distribution and Projections within 10 Mi of the PSEG Site, 2010 to 2081

	Distance in Miles						
Year	**0–1**	**1–2**	**2–3**	**3–4**	**4–5**	**5–10**	**Total 0–10**
2010	0	0	0	166	98	12,285	12,549
2021	0	0	0	176	105	13,097	13,378
2031	0	0	0	183	109	13,765	14,057
2041	0	0	0	191	116	14,470	14,777
2051	0	0	0	199	122	15,212	15,533
2061	0	0	0	206	129	15,997	16,332
2071	0	0	0	215	136	16,824	17,175
2081	0	0	0	224	143	17,696	18,063

Source: PSEG 2015-TN4280.

In addition to the permanent residents within 10 mi of the PSEG Site, there are people that enter this area on a regular basis for employment, education (e.g., schools and daycare facilities), recreation (e.g., parks, wildlife areas, resorts, beaches, and associated lodging and restaurants), and medical care (e.g., hospitals and assisted living centers) (PSEG 2015-TN4283). The transient population data in Table G-2 are based primarily on 2009 surveys conducted by KLD Engineering (PSEG 2015-TN4283). These data assume that transient populations increase at the same rate as resident populations (PSEG 2015-TN4283).

G.2 Supporting Documentation on Radiological Dose Assessment

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed and performed an independent dose assessment of the radiological impacts from normal operation of new and existing nuclear units at the PSEG Site. The results of the assessment are presented in this appendix and are compared to the results from PSEG's assessment found in Section 5.9, Radiological Impacts of Normal Operations. The appendix is divided into four sections: (1) dose estimates to the public from liquid effluents, (2) dose estimates to the public from gaseous effluents, (3) cumulative dose estimates, and (4) dose estimates to the biota from gaseous and liquid effluents.

G.2.1 Dose Estimates to the Public from Liquid Effluents

The NRC staff used the dose assessment approach specified in Regulatory Guide 1.109 (NRC 1977-TN90) and the LADTAP II computer code (Strenge et al. 1986-TN82) to estimate doses to the maximally exposed individual (MEI) and population from the liquid effluent pathway of a new nuclear plant at the PSEG Site. The NRC staff used the projected radioactive effluent release values for Salem Generating Station (SGS) Units 1 and 2 and Hope Creek Generating Station (HCGS) Unit 1 to estimate doses to the MEI and population from liquid effluent releases from a new nuclear power plant. The NRC staff used the projected radioactive effluents release values from the Site Safety Analysis Report (SSAR) (PSEG 2015-TN4283).

G.2.1.1 Scope

Doses from to the MEI were calculated and compared to regulatory criteria for the following:

- Total Body—Dose was the total for all pathways (i.e., ingestion of aquatic organisms as food and recreational activity on and near the Delaware River) with the highest value for either the adult, teen, child, or infant compared to the 3 mrem/yr per reactor design objective in Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix I (10 CFR Part 50-TN249).
- Organ—Dose was the total for each organ for all pathways (i.e., ingestion of aquatic organisms as food and recreational activity on and near the Delaware River) with the highest value for the adult, teen, child, or infant compared to the 10 mrem/yr per reactor design objective specified in 10 CFR Part 50, Appendix I (TN249).

The NRC staff reviewed the assumed exposure pathways and the input parameters and values used by PSEG (PSEG 2015-TN4280; PSEG 2015-TN4283) for appropriateness, including references made to the AP1000 (Westinghouse 2011-TN261). Default values from Regulatory Guide 1.109 (NRC 1977-TN90) were used when input parameters were not available. The NRC staff concluded that the assumed exposure pathways were appropriate; drinking water withdrawal from the Delaware River does not occur downstream of the site. In addition, the input parameters and values used by PSEG were generally appropriate.

G.2.1.2 Resources Used

To calculate doses to the public from liquid effluents, the NRC staff used a personal computer version of the LADTAP II code titled NRCDOSE, Version 2.3.15 (CNS 2006-TN102), obtained through the Oak Ridge Radiation Safety Information Computational Center (RSICC) with updates to the user interface obtained directly from Chesapeake Nuclear Services.

G.2.1.3 Input Parameters

Table G-3 provides a listing of the major parameters used in calculating dose to the public from liquid effluent releases during normal operation.

G.2.1.4 Comparison of Results

The results documented in the PSEG environmental report (ER) (PSEG 2015-TN4280) and SSAR (PSEG 2015-TN4283) for doses from liquid effluent releases are compared in Table G-4 with the results calculated by the NRC staff. The doses calculated by the NRC staff are in agreement with doses calculated by PSEG. For calculating the population dose from liquid effluents, PSEG used the population distribution for 2036. However, Section 5.4.1 of the NRC's Environmental Standard Review Plan (ESRP) (NRC 2000-TN614) requires use of "projected population for 5 years from the time of the licensing action under consideration." Because the population is increasing, the use of the year 2036 is conservative as long as operations at the site begin before then, so the NRC staff also used the year 2036 for comparisons.

Table G-3. Parameters Used in Calculating Dose to the Public from Liquid Effluent Releases

Nuclide	Annual Release (Ci)		Nuclide	Annual Release (Ci)	
	Single Unit[a]	Dual Unit[b]		Single Unit[a]	Dual Unit[b]
H-3	1.66×10^{3}	3.32×10^{3}	Na-24	6.10×10^{-3}	1.22×10^{-2}
P-32	5.68×10^{-4}	1.14×10^{-3}	Cr-51	1.70×10^{-2}	3.40×10^{-2}
Mn-54	2.04×10^{-3}	4.08×10^{-3}	Fe-55	9.46×10^{-3}	1.89×10^{-2}
Mn-56	2.04×10^{-3}	4.08×10^{-3}	Co-58	9.80×10^{-3}	1.96×10^{-2}
Fe-59	2.30×10^{-3}	4.60×10^{-3}	Co-60	1.54×10^{-2}	3.08×10^{-2}
Ni-63	1.70×10^{-3}	3.40×10^{-3}	Cu-64	1.26×10^{-2}	2.52×10^{-2}
Zn-65	4.41×10^{-4}	8.82×10^{-4}	Br-84	2.00×10^{-5}	4.00×10^{-5}
Rb-88	2.80×10^{-2}	5.60×10^{-2}	Sr-89	3.14×10^{-4}	6.28×10^{-4}
Sr-90	2.68×10^{-5}	5.36×10^{-5}	Sr-91	1.25×10^{-3}	2.50×10^{-3}
Y-91	2.35×10^{-4}	4.70×10^{-4}	Y-91m	5.00×10^{-5}	1.00×10^{-4}
Sr-92	4.43×10^{-4}	8.86×10^{-4}	Y-92	1.69×10^{-3}	3.38×10^{-3}
Y-93	1.36×10^{-3}	2.72×10^{-3}	Nb-95	2.00×10^{-3}	4.00×10^{-3}
Zr-95	1.30×10^{-3}	2.60×10^{-3}	Mo-99	2.61×10^{-3}	5.22×10^{-3}
Tc-99m	5.68×10^{-3}	1.14×10^{-2}	Ru-103	4.93×10^{-3}	9.86×10^{-3}
Ru-106	7.35×10^{-2}	1.47×10^{-1}	Ag-110m	1.80×10^{-3}	3.60×10^{-3}
Sb-124	4.30×10^{-4}	8.60×10^{-4}	Te-129	3.10×10^{-4}	6.20×10^{-4}
Te-129m	1.20×10^{-4}	2.40×10^{-4}	I-131	3.40×10^{-2}	6.80×10^{-2}
Te-131	7.60×10^{-5}	1.52×10^{-4}	Te-131m	3.10×10^{-4}	6.20×10^{-4}
I-132	1.93×10^{-3}	3.86×10^{-3}	Te-132	4.80×10^{-4}	9.60×10^{-4}
I-133	3.73×10^{-2}	7.46×10^{-2}	Cs-134	1.20×10^{-2}	2.40×10^{-2}
I-134	8.10×10^{-4}	1.62×10^{-3}	I-135	1.50×10^{-2}	3.00×10^{-2}
Cs-136	2.20×10^{-2}	4.40×10^{-2}	Cs-137	1.80×10^{-2}	3.60×10^{-2}
Cs-138	8.00×10^{-7}	1.60×10^{-6}	Ba-140	5.80×10^{-3}	1.16×10^{-2}
La-140	8.00×10^{-3}	1.60×10^{-2}	Ce-141	2.97×10^{-4}	5.90×10^{-4}
Ce-143	6.10×10^{-4}	1.22×10^{-3}	Pr-143	1.30×10^{-4}	2.60×10^{-4}
Ce-144	5.60×10^{-3}	1.12×10^{-2}	Pr-144	3.16×10^{-3}	6.32×10^{-3}
Nd-147	2.00×10^{-6}	4.00×10^{-6}	W-187	4.60×10^{-4}	9.20×10^{-4}
Np-239	9.49×10^{-3}	1.90×10^{-2}			

Parameter	Staff Value	Comments
Discharge rate	20,000 gal/min 44.56 ft^3/s	Value from ER Table 5.4-3 (PSEG 2015-TN4280)
Source term multiplier	2	To convert single-unit source term to two units.
Site type	Salt water	Discharge to Delaware River
Impoundment Reconcentration Model	None	Value from ER Table 5.4-3 (PSEG 2015-TN4280)
Dilution factors for aquatic food and boating, shoreline, and swimming.	20	ER Table 5.4-3 (PSEG 2015-TN4280)
Transit time to receptor (hr)	0 hr	ER Table 5.4-3 (PSEG 2015-TN4280)

Table G-3. (continued)

Parameter	Staff Value	Comments
Consumption and usage factors for adults, teens, children, and infants	Shoreline usage (hr/yr) 12 (adult) 67 (teen) 14 (child) NA (infant) Boating exposure (hr/yr) 12 (adult) 67 (teen) 14 (child) NA (infant) Fish consumption (kg/yr) 21 (adult) 16 (teen) 6.9 (child) NA (infant)	LADTAP II code default values (NRC 1977-TN90; Strenge et al. 1986-TN82).
50 mi population	8,138,635	ER Table 5.4-3 (PSEG 2015-TN4280)
50 mi sport fishing[(c)]	5.62×10^7	ER Table 5.4-3 (PSEG 2015-TN4280)
50 mi invertebrate ingestion[(c)]	8.14×10^6	ER Table 5.4-3 (PSEG 2015-TN4280)
50 mi shoreline usage[(c)]	3.83×10^8 person-hr/yr	ER Table 5.4-3 (PSEG 2015-TN4280)
50 mi swimming usage[(c)]	7.65×10^7 person-hr/yr	ER Table 5.4-3 (PSEG 2015-TN4280)
50 mi boating usage[(c)]	7.65×10^7 person-hr/yr	ER Table 5.4-3 (PSEG 2015-TN4280)

(a) Single unit is the plant parameter envelope (PPE) bounding value from the SSAR Table 1.3-8 (PSEG 2015-TN4283) and is included for single-unit analysis throughout the section.
(b) Dual unit is the PPE bounding value from the SSAR Table multiplied by the source term multiplier.
(c) Parameter is based on LADTAP II default value.

Table G-4. Comparison of Doses to the Public from Liquid Effluent Releases for a New Nuclear Power Plant

Type of Dose	Value from PSEG ER[(a)]	NRC Staff Calculation	Percent Difference
Total body (mrem/yr)	0.02 (adult)	0.02 (adult)	0
Organ dose (mrem/yr)	0.18 (adult GI-LLI)	0.18 (adult GI-LLI)	0
Thyroid (mrem/yr)	0.04 (adult)	0.04 (adult)	0
Total body population dose from liquid pathway (person-rem/yr)	45.5	45.5	0

Note: GI-LLI = gastrointestinal lining of lower intestine.
(a) Results from PSEG ER Tables 5.4-4 and 5.4-11 (PSEG 2015-TN4280).

G.2.2 Dose Estimates to the Public from Gaseous Effluents

The NRC staff used the dose assessment approach specified in Regulatory Guide 1.109 (NRC 1977-TN90), and the XOQDOQ and GASPAR II computer code (Sagendorf et al. 1982-TN280; Strenge et al. 1987-TN83) to estimate doses to the MEI and to the population within an 80-km (50-mi) radius of the PSEG Site from the gaseous effluent pathway for the new nuclear power plant. The NRC staff used the projected radioactive gaseous effluents release values from the SSAR (PSEG 2015-TN4283).

G.2.2.1 Scope

The NRC staff and PSEG calculated the MEI dose at 2.8 mi northwest (NW) of a new nuclear power plant at the PSEG Site. Pathways included were plume, ground, inhalation, and ingestion of locally grown meat, milk, and vegetables. The NRC staff reviewed the parameters and values used by PSEG (PSEG 2015-TN4283) for appropriateness, including references to the AP1000 Design Control Document (Westinghouse 2011-TN261). Default values from Regulatory Guide 1.109 (NRC 1977-TN90) were used when site-specific input parameters were not available. The NRC staff concluded that the assumed exposure pathways and input parameters were appropriate. These pathways and parameters were used by the NRC staff in its independent calculations using GASPAR II.

Joint frequency distribution data of wind speed and wind direction by atmospheric stability class for the proposed site provided in SSAR Table 2.3-27 (PSEG 2015-TN4283) were used as input to the XOQDOQ code (Sagendorf et al. 1982-TN280) to calculate average atmospheric dispersion factor (χ/Q, the annual average normalized air concentration value[s]) and deposition factor (D/Q, the annual normalized total surface concentration rate[s]) values for routine releases. The NRC staff reviewed the XOQDOQ output files provided by PSEG and concluded they are appropriate for use in dose calculations for the gaseous effluents.

Population doses were calculated for all types of releases (i.e., noble gases, particulates, iodines, H-3, and C-14) using the GASPAR II code for the following: plume immersion; direct radiation from radionuclides deposited on the ground; inhalation; and ingestion of vegetables, milk, and meat.

G.2.2.2 Resources Used

To calculate doses to the public from gaseous effluents, the NRC staff used a personal computer version of the XOQDOQ and GASPAR II codes titled NRCDOSE Version 2.3.15 (CNS 2006-TN102) obtained through the Oak Ridge RSICC with updates to the user interface obtained directly from Chesapeake Nuclear Services.

G.2.2.3 Input Parameters

Table G-5 provides a listing of the major parameters used in calculating dose to the public from gaseous effluent releases during normal operation.

Table G-5. Parameters Used in Calculating Dose to the Public from Gaseous Effluent Releases

Nuclide	Single Unit[a]	Dual Unit[b]	Nuclide	Single Unit[a]	Dual Unit[b]
H-3	3.50×10^{2}	7.0×10^{2}	C-14	1.89×10^{1}	3.78×10^{1}
Na-24	4.05×10^{-3}	8.11×10^{-3}	P-32	9.19×10^{-4}	1.84×10^{-3}
Ar-41	3.40×10^{1}	6.80×10^{1}	Cr-51	3.51×10^{-2}	7.03×10^{-2}
Mn-54	5.41×10^{-3}	1.08×10^{-2}	Fe-55	6.49×10^{-3}	1.30×10^{-2}
Mn-56	3.51×10^{-3}	7.03×10^{-3}	Co-57	8.20×10^{-6}	1.64×10^{-5}
Co-58	2.30×10^{-2}	4.60×10^{-2}	Fe-59	8.11×10^{-4}	1.62×10^{-3}
Co-60	1.30×10^{-2}	2.59×10^{-2}	Ni-63	6.49×10^{-6}	1.30×10^{-5}
Cu-64	1.00×10^{-2}	2.00×10^{-2}	Zn-65	1.11×10^{-2}	2.22×10^{-2}
Kr-83m	8.38×10^{-4}	1.68×10^{-3}	Kr-85	4.10×10^{3}	8.20×10^{3}
Kr-85m	1.50×10^{2}	3.00×10^{2}	Kr-87	5.30×10^{1}	1.06×10^{2}
Kr-88	1.80×10^{2}	3.60×10^{2}	Kr-89	2.41×10^{2}	4.81×10^{2}
Rb-89	4.32×10^{-5}	8.65×10^{-5}	Sr-89	5.68×10^{-3}	1.14×10^{-2}
Sr-90	1.20×10^{-3}	2.40×10^{-3}	Y-90	4.59×10^{-5}	9.19×10^{-5}
Sr-91	1.00×10^{-3}	2.00×10^{-3}	Sr-92	7.84×10^{-4}	1.57×10^{-3}
Y-91	2.41×10^{-4}	4.81×10^{-4}	Y-92	6.22×10^{-4}	1.24×10^{-3}
Y-93	1.11×10^{-3}	2.22×10^{-3}	Zr-95	1.59×10^{-3}	3.19×10^{-3}
Nb-95	8.38×10^{-3}	1.68×10^{-2}	Mo-99	5.95×10^{-2}	1.19×10^{-1}
Tc-99m	2.97×10^{-4}	4.38×10^{-4}	Ru-103	3.51×10^{-3}	7.03×10^{-3}
Ru-106	7.80×10^{-5}	1.56×10^{-4}	Ag-110m	2.00×10^{-6}	4.00×10^{-6}
Sb-124	1.81×10^{-4}	3.62×10^{-4}	Sb-125	6.10×10^{-5}	1.22×10^{-4}
Te-129m	2.19×10^{-4}	4.38×10^{-4}	Te-131m	7.57×10^{-5}	1.51×10^{-4}
Te-132	1.89×10^{-5}	3.78×10^{-5}	I-131	2.59×10^{-1}	5.19×10^{-1}
Xe-131m	2.70×10^{3}	5.40×10^{3}	I-132	2.19	4.38
I-133	1.70	3.41	Xe-133	7.20×10^{3}	1.44×10^{4}
Xe-133m	1.70×10^{2}	3.40×10^{2}	Cs-134	6.22×10^{-3}	1.24×10^{-2}
I-134	3.78	7.57	I-135	2.41	4.81
Xe-135	1.20×10^{3}	2.40×10^{3}	Xe-135m	4.05×10^{2}	8.11×10^{2}
Cs-136	5.95×10^{-4}	1.19×10^{-3}	Cs-137	9.46×10^{-3}	1.89×10^{-2}
Xe-137	5.14×10^{2}	1.03×10^{3}	Cs-138	1.70×10^{-4}	3.41×10^{-4}
Xe-138	4.32×10^{2}	8.65×10^{2}	Ba-140	2.70×10^{-2}	5.41×10^{-2}
La-140	1.81×10^{-3}	3.62×10^{-3}	Ce-141	9.19×10^{-3}	1.84×10^{-2}
Ce-144	1.89×10^{-5}	3.78×10^{-5}	W-187	1.89×10^{-4}	3.78×10^{-4}
Np-239	1.19×10^{-2}	2.38×10^{-2}			

Parameter	Staff Value	Comments
Wind speed and direction	SSAR Table 2.3-72 (PSEG 2015-TN4283)	Site-specific data for 3-yr period 2006–2008
Atmospheric dispersion coefficients	SSAR Table 2.3-35 (PSEG 2015-TN4283)	Site-specific data
Ground deposition coefficient	SSAR Table 2.3-36 (PSEG 2015-TN4283)	Site-specific data
Annual milk production within 50 mi radius of site	3.26×10^{9} L/yr	Site-specific data from ER Table 5.4-7 (PSEG 2015-TN4280)

Table G-5. (continued)

Parameter	Staff Value	Comments
Annual meat production within 50 mi radius of site	8.95×10^8 kg/yr	Site-specific data from ER Table 5.4-7 (PSEG 2015-TN4280)
Receptor locations and dispersion coefficients		Site-specific values ER Table 5.4-5 (PSEG 2015-TN4280)

MEI Location	Atmospheric Dispersion Coefficient χ/Q (s m^{-3}) No Decay/ Undepleted	2.26-Day Half-life/ Undepleted	8-day Half-life/ Depleted	D/Q (m^{-2})
Nearest Meat Animal, 4.9 mi NW	1.1×10^{-7}	1.1×10^{-7}	8.2×10^{-8}	3.5×10^{-10}
Nearest Milk-Producing Animals (Cow/Goat), 4.9 mi NW	1.1×10^{-7}	1.1×10^{-7}	8.2×10^{-8}	3.5×10^{-10}
Nearest Residence, 2.8 mi NW	2.4×10^{-7}	2.4×10^{-7}	1.9×10^{-7}	9.6×10^{-10}
Nearest Vegetable Garden, 4.9 mi NW	1.1×10^{-7}	1.1×10^{-7}	8.2×10^{-8}	3.5×10^{-10}
Nearest Site Boundary, 0.24 mi ENE	1.0×10^{-5}	1.0×10^{-5}	9.5×10^{-6}	4.1×10^{-8}

Consumption factors	Maximum consumption factors; ER Table 5.4-6 (PSEG 2015-TN4280)	Adult	Teen	Child	Infant
	Milk (L/yr)	310	400	330	330
	Meat (kg/yr)	110	65	41	0
	Vegetables(kg/yr)				
	Leafy	64	42	26	0
	Other	520	630	520	0

Parameter	Staff Value	Comments
Fraction of year leafy vegetables are grown	1.0	Site-specific value SSAR Table 11.3-2 (PSEG 2015-TN4283)
Fraction of year milk cows are on pasture	1.0	Site-specific value SSAR Table 11.3-2 (PSEG 2015-TN4283)
Fraction of MEI's vegetable intake from own garden	0.76	Site-specific value SSAR Table 11.3-2 (PSEG 2015-TN4283)
Fraction of year beef cattle on pasture	1.0	Site-specific value SSAR Table 11.3-2 (PSEG 2015-TN4283)

(a) Single unit is the PPE bounding value from the SSAR Table 1.3-7 (PSEG 2015-TN4283) and is included for single-unit analysis throughout the section.
(b) Dual unit is the PPE bounding value from the SSAR Table multiplied by the source term multiplier.

G.2.2.4 Comparison of Doses to the Public from Gaseous Effluent Releases

The NRC staff compared results documented in the SSAR and in PSEG's responses to requests for information (PSEG 2015-TN4283) about doses from noble gases at the site boundary and the exclusion area boundary with the results calculated by the NRC staff. The doses calculated by the NRC staff confirmed the doses calculated by PSEG.

The NRC staff compared its estimates of doses to the MEI calculated by PSEG. Doses to the MEI estimated by PSEG were calculated by summing doses from the maximum locations of each exposure pathway. The doses calculated by the NRC staff confirmed the doses calculated by PSEG.

G.2.2.5 Comparison of Results—Population Doses

The NRC staff performed a comparison of the PSEG population dose estimates taken from Table 5.4-12 of the ER (PSEG 2015-TN4280) with the staff estimates. The staff's independent calculation for population dose yielded results that were comparable to the PSEG SSAR estimates (PSEG 2015-TN4283) for a new nuclear power plant. For calculating the population dose from gaseous effluents, the population distribution used by PSEG and the NRC staff was for year 2056. However, ESRP Section 5.4.1 (NRC 2000-TN614) requires use of "projected population for 5 years from the time of the licensing action under consideration." Assuming the combined construction permit and operating license action occurs in year 2010, adding 5 years yields year 2015. Because the population is increasing, the use of the year 2056 is more conservative than required by the rule and has been used herein. The NRC staff estimates confirmed the estimates by PSEG (2015-TN4280) to two significant digits.

G.2.3 Cumulative and Population Dose Estimates

Based on parameters shown for the liquid and gaseous pathways, Table G-3 and Table G-5, respectively, the NRC staff compared the results documented in the ER (PSEG 2015-TN4280) for cumulative dose estimates to the MEI with those calculated by the NRC staff. Cumulative dose estimates include doses from all pathways (i.e., direct exposure, liquid effluents, and gaseous effluents) for a new nuclear power plant at the PSEG Site, as well as the existing SGS and HCGS units. These cumulative dose estimates were calculated for comparison to the dose standards of 40 CFR Part 190 (TN739). The NRC staff's calculations for cumulative dose confirmed the PSEG estimates (PSEG 2015-TN4280) and are shown in Table G-6.

Table G-6. Comparison of Cumulative Doses to the MEI

Dose	PSEG (a,b,c)	NRC Estimates	Percent Difference
Whole body (adult liquid + child gaseous, mrem/yr)	2.94	2.94	0
Thyroid dose (adult liquid + infant gaseous, mrem/yr)	6.86	6.86	0
Dose to other organ (adult liquid GI-LLI + child gaseous bone, mrem/yr)	3.97	3.97	0

(a) *Source:* PSEG 2015-TN4280.
(b) Doses from direct radiation were from a single-unit Advanced Boiling Water Reactor (ABWR) configuration. The direct doses from the other reactor technology configurations are less than the ABWR.
(c) Sum of doses from liquid effluent, gaseous effluent, and direct radiation.

G.2.4 Dose Estimates to the Nonhuman Biota from Liquid and Gaseous Effluents

The NRC staff performed confirmatory calculations of the doses to biota from liquid and gaseous effluents using the LADTAP II (Strenge et al. 1986-TN82) and GASPAR II (Strenge et al. 1987-TN83). The NRC staff used a personal computer version of the LADTAP II code and GASPAR II code titled NRCDOSE Version 2.3.15 (CNS 2006-TN102) obtained through the Oak Ridge RSICC.

G.2.4.1 Liquid Effluent Pathways

The NRC estimated doses to biota from liquid effluents using fish, invertebrates, and algae as surrogate aquatic biota species. Muskrats, raccoons, herons, and ducks are used as surrogate terrestrial biota species. The NRC staff recognizes the LADTAP II computer program as an appropriate method for calculating dose to the aquatic biota and for calculating the liquid pathway contribution to terrestrial biota. Most of the LADTAP II input parameters are specified in Section G.2.1.3. The NRC staff's dose analysis confirmed the liquid pathway doses to biota estimated by PSEG.

G.2.4.2 Gaseous Effluent Pathways

The NRC staff assessed doses to terrestrial biota from the gaseous effluent pathway based on the results of the GASPAR II calculations for human doses discussed in Section G.2.2. Again, muskrats, raccoons, herons, and ducks are used as surrogate terrestrial biota species. The NRC staff assessed the doses at the site boundary (0.24 mi ENE) to achieve a reasonable estimate of the doses to terrestrial biota that might live on the PSEG Site. It was assumed that doses for raccoons and ducks were equivalent to adult human doses for inhalation, vegetation ingestion, and the plume. The dose from ground exposure was doubled. The doubling of doses from ground deposition reflects the closer proximity of these organisms to the ground. Muskrats and herons do not consume terrestrial vegetation, so that pathway was not included for these organisms. The NRC staff's dose assessment confirmed the gaseous pathway doses to biota estimated by PSEG as shown in Table 5-19 of this EIS.

G.3 References

10 CFR Part 50. 2012. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities." Washington, D.C. TN249.

40 CFR Part 190. 2012. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations." Washington, D.C. TN739.

CNS (Chesapeake Nuclear Services, Inc.). 2006. *NRCDose for Windows, Suite of NRC's Dose Modeling Codes for Reactor Radioactive Effluents.* Annapolis, Maryland. Available at http://www.chesnuc.com/docs/NRCDose%20Datasheet.pdf. TN102.

NRC (U.S. Nuclear Regulatory Commission). 1977. *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I*. Regulatory Guide 1.109, Revision 1, Washington, D.C. Accession No. ML003740384. TN90.

NRC (U.S. Nuclear Regulatory Commission). 2000. *Environmental Standard Review* Plan—Standard *Review Plans for Environmental Reviews for Nuclear Power Plants*. NUREG–1555, Main Report and 2007 Revisions, Washington, D.C. Available at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/toc/. TN614.

PSEG (PSEG Power, LLC). 2015. *PSEG Site Early Site Permit Application; Part 2*, "Site Safety Analysis Report." Revision 4, Newark, New Jersey. Accession No. ML15169A740. TN4283.

PSEG (PSEG Power, LLC). 2015. *PSEG Site Early Site Permit Application; Part 3*, "Environmental Report." Revision 4, Newark, New Jersey. Accession No. ML15169A960. TN4280.

Sagendorf, J.F., J.T. Goll, and W.F. Sandusky. 1982. *XOQDOQ: Computer Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations.* NUREG/CR–2919, Pacific Northwest Laboratory, Richland, Washington. Accession No. ML081360412. TN280.

Strenge, D.L., R.A. Peloquin, and G. Whelan. 1986. *LADTAP II—Technical Reference and User Guide*. NUREG/CR–4013, Pacific Northwest Laboratory, Richland, Washington. Accession No. ML14098A069. TN82.

Strenge, D.L., T.J. Bander, and J.K. Soldat. 1987. *GASPAR II—Technical Reference and User Guide*. NUREG/CR–4653, Pacific Northwest Laboratory, Richland, Washington. Accession No. ML14098A066. TN83.

Westinghouse (Westinghouse Electric Company LLC). 2011. *AP1000 Design Control Document*. APP-GW-GL-700, Revision 19, Pittsburgh, Pennsylvania. Accession No. ML11171A500. TN261.

APPENDIX H

LIST OF AUTHORIZATIONS, PERMITS, AND CERTIFICATIONS

APPENDIX H

LIST OF AUTHORIZATIONS, PERMITS, AND CERTIFICATIONS

Table H-1 contains a list of the environmental-related authorizations, permits, and certifications potentially required by Federal, State, regional, local, and affected Native American Tribal agencies related to site preparation, construction, and operation of a new nuclear power plant at the PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) Site. Table H-1 has been adapted from Table 1.3-2 of the Environmental Report submitted to the U.S. Nuclear Regulatory Commission by the applicant (PSEG 2015-TN4280).

H.1 References

PSEG (PSEG Power, LLC and PSEG Nuclear, LLC). 2015. *PSEG Site Early Site Permit Application; Part 3*, "Environmental Report." Revision 4, Newark, New Jersey. Accession No. ML15169A960. TN4280.

Table H-1. Authorizations, Permits, and Certifications Required for Preconstruction, Construction, and Operation Activities[(a)]

Agency	Authority	Requirement	Activity Covered/Comments
U.S. Nuclear Regulatory Commission	Atomic Energy and Energy Reorganization Acts Title 10 of the *Code of Federal Regulations* (CFR) Part 52 Subpart C (TN251) or 10 CFR 50.10(e)(1) (TN249)	Early Site Permit (ESP) and Combined Construction Permit and Operating License or Limited Work Authorization, in addition to applicable By-Product License, Source Material License, and Special Nuclear Material License	Site licensing, including safety-related construction activities and operation of a nuclear power facility
Federal Aviation Administration	Federal Aviation Act (49 USC 1301 et seq. –TN4315); 14 CFR Part 77-TN4317	Construction Notice	Notice of erection of structures greater than 200 ft high that potentially may impact air navigation
U.S. Department of Transportation	Hazardous MaterialTransportation Act (49 CFR Part 107 Subpart G [TN4316])	Certificate of Registration	Transportation of hazardous materials
U.S. Army Corps of Engineers	Federal Clean Water Act (33 USC 1251 et seq. –TN662); 33 CFR Part 330-TN4318	Section 404 Permit	Disturbance, crossing, or filling-in of wetland areas or navigable waters from site (barge slip modification, maintenance dredging, intake/discharge structures, and proposed causeway construction)
	Rivers and Harbors Appropriation Act (33 USC 403 et seq. –TN660)	Section 10 Permit	Construction and maintenance of intake, discharge, and barge structures in navigable waters of Delaware River
U.S. Coast Guard	Ports and Waterways Safety Act (33 USC 25 et seq. –TN4314)	Private Aids to Navigation Permit	Construction of discharge pipeline in navigable waters of the Delaware River
	Rivers and Harbors Appropriation Act (33 USC 403 et seq. –TN660)	Section 9 Permit	Construction of bridge over navigable waterway (Alloway Creek)
U.S. Environmental Protection Agency (EPA)	Resource Conservation and Recovery Act (42 USC 6901 et seq. –TN1281), Section 3010	Acknowledgement of Notification of Hazardous Waste Activity	Hazardous Waste Generation

Table H-1. (continued)

Agency	Authority	Requirement	Activity Covered/Comments
	EPA Facility Response Plan (Appendix F in 40 CFR Part 112 [TN1041]), and the EPA Hazardous Waste Contingency Plan	Facility Response Plan Approval	Spill/Discharge Response Program
	Spill Prevention, Control, and Countermeasures (SPCC) rule (40 CFR Part 112 [TN1041]), Appendix F, Sections 1.2.1 and 1.2.2	SPCC Plan	Spill/Discharge Prevention Plan
U.S. Fish and Wildlife Service	Migratory Bird Treaty Act 16 USC 703 et seq. – TN3331	Federal Depredation Permit	Potential impacts to protected species or their nests from construction of the proposed causeway
	Endangered Species Act Section 7 (16 USC 1531 et seq. –TN1010)	Incidental Take Permit	Possession and disposition of potential impinged or stranded species (turtles, shortnose sturgeon)
Delaware River Basin Commission	Delaware River Basin Compact, Section 3.8 (DRBC 1961-TN4320); Resolution No. 71-4 (DRBC Res71-4-TN4296)	Water Withdrawal Docket	Additional Delaware River water required for cooling purposes
		Water Withdrawal Docket	Additional groundwater required for a new plant and existing permit modifications
		Water Use Contract	A water use contract may be required for the new plant
		Approval of Wells	New wells required for the new plant
		Oxygen Demand Wasteload Allocations	Allocation for first stage oxygen demand discharge to Delaware River Estuary
	Delaware River Basin Compact, Section 3.8 (DRBC 1961-TN4320)	Industrial Waste Treatment Facility	Waste treatment required for a new plant

Table H-1. (continued)

Agency	Authority	Requirement	Activity Covered/Comments
Salem County Soil Conservation District	Soil Erosion and Sediment Control (SESC) Act, Chapter 251 NJAC 2:90 (NJAC 2:90-TN4322)	Soil Erosion and Sediment Control Plan Approval	SESC Plan approval required for earth disturbance greater than 5,000 ft^2
Lower Alloways Creek Township	Code of Lower Alloways Creek Township, Chapter 156 (Land Development), Section 5.07B2 (LACT 2013-TN4321)	Site Plan Approval	Planning Board and/or Zoning Board of Adjustment approval of the development of the site in compliance with township ordinances
		Construction Permits	Construction of the new plant facilities in compliance with township ordinances
Salem County	Salem County Planning Board	Site Plan Approval	Construction of the new plant facilities in compliance with county ordinances if county facilities or drainage are impacted
New Jersey Department of Community Affairs	New Jersey State Uniform Construction Code Act (NJAC 5:23-TN4323)	Construction Permits	Construction of the new plant facilities in compliance with State of New Jersey construction codes
New Jersey Department of Environmental Protection	Federal Clean Water Act (33 USC 1251 et seq. – TN662), Water Pollution Control Act (NJSA 58:10A et seq. –TN4325 and NJAC 7:14-TN4324)	New Jersey Pollutant Discharge Elimination System (NJPDES) Permit for stormwater discharges associated with construction activities greater than 5 ac	Construction/operation of stormwater control measures (e.g., detention basins)
		NJPDES Permit for Dewatering Activities	Construction dewatering
		Section 401 Certification, NJPDES Permit	Compliance with Federal and State water quality standards, discharges to waters of the state because of construction of the new plant, proposed causeway, switchyards, and on-site transmission lines
	Sewage Infrastructure Improvement Act NJAC 7:14A-22 (TN4324)	Treatment Works Approval	Construction and operation of a treatment system for construction dewatering

Table H-1. (continued)

Agency	Authority	Requirement	Activity Covered/Comments
		Treatment Works Approval	Modification and operation of an existing permanent treatment system for plant wastewater
	Water Quality Management Planning(NJAC 7:15-TN4326)	Water Quality Management Plan Amendment	New discharges or expansion of existing discharges require an amendment
	Federal Clean Water Act (33 USC 1251 et seq. –TN662),Water Pollution Control Act (NJSA 58:10A et seq. –TN4325 and NJAC 7:14-TN4324).	NJPDES Permit for plant operation activities	Cooling water, service water, and runoff discharge from plant operations
	Water Supply Management Act, NJSA 58:1A-1 et seq. –TN4295	Temporary Dewatering Permit	Required for construction dewatering where dewatering rate exceeds 100,000 gpd for 31 consecutive days in a year
		Well Drilling Permit	For construction dewatering wells, permanent water supply wells, and closure of abandoned wells
		Water Allocation Permit	Current permit requires modification to allow additional groundwater use for new plant
New Jersey Department of Environmental Protection (continued)	Coastal Area Facility Review Act (CAFRA), NJSA 13:19-1 (TN4304); NJSA 13:9B-1 (TN4327); NJSA 13:1D-1 (TN4328)	CAFRA Permit[(b)]	Property required for construction of the new plant is in New Jersey coastal zone Portions of the new plant site, proposed causeway, switchyards, and on-site transmission lines may be located in freshwater wetlands and transitional areas
	Flood Hazard Area Control Act (NJSA 58:16A-50 et seq. –TN4329)	Flood Hazard Control Permit	Construction within a flood hazard area (100-yr floodplain)
	New Jersey Freshwater Wetlands Protection Act (NJAC 7:7A-TN4284)	Freshwater Wetland Permit	Portions of the new plant site, proposed causeway, switchyards, and on-site transmission lines may be located in freshwater wetlands and transitional areas

Table H-1. (continued)

Agency	Authority	Requirement	Activity Covered/Comments
	New Jersey Wetlands Act (NJSA 13:9A et seq. - TN3361)	Coastal Wetlands Permit	Portions of new plant site, proposed causeway, and on-site transmission lines constructed in areas designated as coastal wetlands
	Waterfront Development Act, NJSA 12:5-1 et seq. – TN4334; NJSA 13:19-1 [TN4304]; NJSA 13:9B-1 [TN4327]; NJSA 13:1D-1 [TN4328])	Waterfront Development Permit	Required for any activity occurring below mean high water line (dredging/construction)
	Tidelands Act NJSA 12:3 et seq. –TN4330	Grant, Lease, or License	Portions of new plant site, proposed causeway, or on-site transmission lines may be constructed in lands subject to tidelands claims
	Solid Waste Management Act, NJSA 13:1 E-1-TN4335	Beneficial Use Certificate of Authority	Re-use of excavated materials
	Federal Clean Air Act (42 USC 7401 et seq. – TN1141)	Title V Operating Permit; Prevention of Significant Deterioration Preconstruction Permit	Discharge of air pollutants from cooling tower(s), emergency generators, auxiliary boiler(s), and ancillary equipment
	NJAC, Title 7, Chapter 1E (NJAC 7:1E et seq. - TN4331)	Discharge Prevention, Containment, and Countermeasure (DPCC) Plan and Discharge Cleanup and Removal Plan	DPCC/Discharge Cleanup and Removal Program: DPCC Plan, Discharge Cleanup and Removal Plan, SPCC Plan, Hazardous Waste Contingency Plan, and Stormwater Pollution Prevention Plan
South Carolina Department of Health and Environmental Control—Division of Waste Management	South Carolina Radioactive Waste Transportation and Disposal Act (SC Act No. 429-TN4332)	South Carolina Radioactive Waste Transport Permit	Transportation of radioactive waste into the State of South Carolina
State of Tennessee Department of Environment and Conservation Division of Radiological Health	Tennessee Department of Environment and Conservation, Rule (TN 0400-20-10-TN4333)	Tennessee Radioactive Waste License-for-Delivery	Transportation of radioactive waste into the State of Tennessee

Table H-1. (continued)

Agency	Authority	Requirement	Activity Covered/Comments

Notes: NJSA = New Jersey Statutes Annotated; USC = United States Code.

(a) None of the authorizations were applied for at the time of the ESP application, except for the New Jersey Coastal Consistency Determination. which was filed concurrently with the submittal of the ESP and was granted. Subsequently, PSEG applied for a USACE Section 404 and Section 10 permit. The USACE is still conducting its review.

(b) Includes State Planning Commission action to modify state plan to update the heavy industry–transportation–utility node based on revised PSEG property boundary.

APPENDIX I

PSEG SITE CHARACTERISTICS AND PLANT PARAMETER ENVELOPE VALUES

APPENDIX I

PSEG SITE CHARACTERISTICS AND PLANT PARAMETER ENVELOPE VALUES

The specific early site permit (ESP) site characteristics and plant parameter envelope (PPE) values used in this document are from Chapter 3 of the Environmental Report (PSEG 2015-TN4280) and Tables 1.3-1 and 2.0-1 of the Site Safety Analysis Report (PSEG 2015-TN4283) unless otherwise specified. The review team used these characteristics and values in its independent evaluation of the environmental impacts of the proposed new plant. In some cases, as noted, the review team substituted values based on its own analysis. The ESP site characteristics and PPE values used in the review team's evaluation are presented in Table I-1 and Table I-2, respectively.

I.1 References

PSEG (PSEG Power, LLC). 2015. PSEG Site Early Site Permit Application; Part 2, "Site Safety Analysis Report." Revision 4, Newark, New Jersey. Accession No. ML15169A740. TN4283.

PSEG (PSEG Power, LLC). 2015. PSEG Site Early Site Permit Application; Part 3, "Environmental Report." Revision 4, Newark, New Jersey. Accession No. ML15169A960. TN4280.

Table I-1. PSEG Site Characteristics

Site Characteristic		PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Geography and Demography				
Exclusion Area Boundary (EAB)		The EAB is a circle at least 600 m (1,968 ft) from the edge of the power block area in all directions	2.1.1.2	The area surrounding the reactor(s), in which the reactor licensee has the authority to determine all activities, including exclusion or removal of personnel and property from the area
Low Population Zone		The area falling within a 5-mi radius circle from the PSEG Site's new plant site center	2.1.3.4	The area immediately surrounding the exclusion area that contains residents
Population Center Distance		14.8 mi (Wilmington, DE)	2.1.3.5	The distance from the reactor to the nearest boundary of a densely populated center containing more than about 25,000 residents
Meteorology				
Ambient Air Temperature and Humidity				
Maximum Dry-Bulb Temperature (DBT)	2% annual exceedance	88°F (DBT) 73°F (MCWB)	Table 2.3-14	The ambient DBT (and mean coincident wet-bulb temperature [MCWB]) that will be exceeded 2% of the time annually
	1% annual exceedance	90°F (DBT) 75°F (MCWB)	Table 2.3-14	The ambient DBT (and MCWB) that will be exceeded 1% of the time annually
	0.4% annual exceedance	93°F (DBT) 76°F (MCWB)	Table 2.3-14	The ambient DBT (and MCWB) that will be exceeded 0.4% of the time annually
	0% annual exceedance (record)	108°F (DBT) 79°F (MCWB)	2.3.1.7	The highest recorded ambient DBT and MCWB

Table I-1. (continued)

Site Characteristic		PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
	100-year return period	105.9°F (DBT) 82.4°F (MCWB)	2.3.1.7; Table 2.3-13	The ambient DBT (and MCWB) that has a 1% annual probability of being exceeded (100-year mean recurrence interval)
Minimum DBT	99% annual exceedance	14°F	Table 2.3-14	The ambient DBT below which DBTs will fall 1% of the time annually
	99.6% annual exceedance	10°F	Table 2.3-14	The ambient DBT below which DBTs will fall 0.4% of the time annually
	100% annual exceedance (record)	-15°F	2.3.1.7	Lowest recorded DBT
	100-year return period	-18.7°F	Table 2.3-13	The ambient DBT for which a 1% annual probability of a lower DBT exists (100-year mean recurrence interval)
Maximum Wet-Bulb Temperature (WBT)	1.0% annual exceedance	77°F	Table 2.3-14	The ambient WBT that will be exceeded 1.0% of the time annually
	0.4% annual exceedance	79°F	Table 2.3-14	The ambient WBT that will be exceeded 0.4% of the time annually
	0% annual exceedance (record)	86.2°F	Table 2.3-13	Highest recorded WBT
	100-year return period	87.4°F	Table 2.3-13	The ambient WBT that has a 1% annual probability of being exceeded (100-year mean recurrence interval)
Ultimate Heat Sink (UHS) Ambient Air Temperature and Humidity				
Meteorological conditions resulting in the minimum water cooling during any 1 day		82.69°F (WBT) 87.12°F (DBT)	2.3.1.6	Historic worst 1-day daily average WBT and coincident DBT

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Meteorological conditions resulting in the minimum water cooling during any consecutive 5 days	78.02°F (WBT) 83.47°F (DBT)	2.3.1.6	Historic worst 5-day daily average WBT and coincident DBT
Meteorological conditions resulting in the maximum evaporation and drip loss during any consecutive 30 days	75.87°F (WBT) 82.65°F (DBT)	2.3.1.6	Historic worst 30-day daily average WBT and coincident DBT
Basic Wind Speed			
3-Second Gust	117.7 mph	2.3.1.5.1	The nominal 3-s gust wind speeds in miles per hour at 33 ft above ground associated with a 100-year return period
Importance Factors	1.15	2.3.1.5.1	Multiplication factor applied to basic wind speed used to assess wind impacts to structures
Hurricane			
Hurricane Wind Speed	159 mph	2.3.1.5.3	Maximum nominal 3-s gust wind speed at 33 ft above ground over open terrain having a probability of exceedance of 10^{-7} per year
Tornado			
Maximum Wind Speed	200 mph	Table 2.3-5	Maximum wind speed resulting from the passage of a tornado having a probability of occurrence of 10^{-7} per year
Maximum Translational Speed	40 mph	Table 2.3-5	Translation component of the maximum tornado wind speed
Maximum Rotational Speed	160 mph	Table 2.3-5	Rotation component of the maximum tornado wind speed
Radius of Maximum Rotational	150 ft	Table 2.3-5	Distance from the center of the tornado at which

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Speed			the maximum rotational wind speed occurs
Maximum Pressure Drop	0.9 psi	Table 2.3-5	Decrease in ambient pressure from normal atmospheric pressure resulting from passage of the tornado
Rate of Pressure Drop	0.4 psi/s	Table 2.3-5	Rate of pressure drop resulting from the passage of the tornado
Winter Precipitation			
100-year Snowpack	24 lb/ft^2	2.3.1.5.4	The weight of the 100-year return period snowpack (to be used in determining normal precipitation loads for roofs)
48-hr Probable Maximum Winter Precipitation	21 in. of water	2.3.1.5.4	Probable maximum precipitation during the winter months (to be used in conjunction with the 100-year snowpack in determining extreme winter precipitation loads for roofs)
Normal Winter Precipitation Event	24 lb/ft^2	2.3.1.5.4	The highest ground-level weight (in lb/ft^2) among: (1) the 100-year return period snowpack; (2) the historical maximum snowpack; (3) the 100-year return period two-day snowfall event; or (4) the historical maximum two-day snowfall event in the site region (to be used in determining the precipitation loads for roofs)
Extreme Frozen Winter Precipitation Event	20.51 lb/ft^2	2.3.1.5.4	The highest of: (1) the 100-year return period two-day snowfall event; and (2) the historical maximum snowfall event in the site region (to be used in determining the precipitation loads for roofs)

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Short-Term (Accident Release) Atmospheric Dispersion			
0–2 hr χ/Q (atmospheric dispersion factor) (EAB)	4.71×10^{-4} s/m^3	Table 2.3-30	The 0–2 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the EAB
0–8 hr χ/Q (low population zone [LPZ])	8.47×10^{-6} s/m^3	Table 2.3-30	The 0–8 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
8–24 hr χ/Q (LPZ)	5.50×10^{-6} s/m^3	Table 2.3-30	The 8–24 hour atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
1–4 day χ/Q (LPZ)	2.15×10^{-6} s/m^3	Table 2.3-30	The 1–4 day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
4-30 day χ/Q (LPZ)	5.60×10^{-7} s/m^3	Table 2.3-30	The 4–30 day atmospheric dispersion factor to be used to estimate dose consequences of accidental airborne releases at the LPZ
Long-Term (Normal Release) Atmospheric Dispersion			
Annual Average Undepleted/No Decay χ/Q Value at Site Boundary, east-northeast, 0.24 mi	1.00×10^{-5} s/m^3	Table 2.3-34	The maximum annual average site boundary undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/ 2.26-Day Decay χ/Q Value at Site Boundary, east-northeast, 0.24 mi	1.00×10^{-5} s/m^3	Table 2.3-34	The maximum annual average site boundary undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Annual Average Depleted/ 8.00-Day Decay χ/Q Value at Site Boundary, east-northeast, 0.24 mi	9.50×10^{-6} s/m^3	Table 2.3-34	The maximum annual average site boundary depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Relative Deposition Factor (D/Q) Value at Site Boundary, east-northeast, 0.24 mi	4.10×10^{-8} 1/m^2	Table 2.3-34	The maximum annual average site boundary relative D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/No Decay χ/Q Value at Nearest Resident, northwest, 2.8 mi	2.40×10^{-7} s/m^3	Table 2.3-34	The maximum annual average resident undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/ 2.26-day Decay χ/Q Value at Nearest Resident, northwest, 2.8 mi	2.40×10^{-7} s/m^3	Table 2.3-34	The maximum annual average resident undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/8.00-day Decay χ/Q Value at Nearest Resident, northwest, 2.8 mi	1.90×10^{-7} s/m^3	Table 2.3-34	The maximum annual average resident depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value at Nearest Resident, northwest, 2.8 mi	9.60×10^{-10} 1/m^2	Table 2.3-34	The maximum annual average resident D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Undepleted/No Decay χ/Q Value at Nearest Farm, northwest, 4.9 mi	1.10×10^{-7} s/m^3	Table 2.3-34	The maximum annual average farm undepleted/no decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Annual Average Undepleted/2.26-day Decay χ/Q Value at Nearest Farm, northwest, 4.9 mi	1.10×10^{-7} s/m^3	Table 2.3-34	The maximum annual average farm undepleted/2.26-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average Depleted/8.00-day Decay χ/Q Value at Nearest Farm, northwest, 4.9 mi	8.20×10^{-8} s/m^3	Table 2.3-34	The maximum annual average farm depleted/8.00-day decay χ/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Annual Average D/Q Value at Nearest Farm, northwest, 4.9 mi	3.50×10^{-10} 1/m^2	Table 2.3-34	The maximum annual average farm D/Q value for use in determining gaseous pathway doses to the maximally exposed individual
Hydrology			
Proposed Facility Boundaries	SSAR Figure 1.2-3 presents the proposed facility boundary	1.2	PSEG Site boundary map
Maximum Groundwater	10 ft North American Vertical Datum of 1988 (NAVD88)	2.4.12.5	The maximum elevation of groundwater at the PSEG Site
Maximum Stillwater Flood Elevation (including 10 percent exceedance high tide)	24.7 ft NAVD88	Table 2.4.5-4	The stillwater elevation, without accounting for wind-induced waves, that the water surface reaches during a flood event
Wave Run-Up	7.4 ft	Table 2.4.5-4	The height of water reached by wind-induced waves running up on the site
Combined Effects Maximum Flood Elevation	32.1 ft NAVD88	Table 2.4.5-4	The water surface elevation at the point in time where the combination of the still water level and wave run-up is at its maximum

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Local Intense Precipitation	18.4 in./hr	Table 2.4.2-5	The depth of probable maximum precipitation for duration of 1 hr on a 1-mi^2 drainage area. The surface-water drainage system should be designed for a flood produced by the local intense precipitation
Frazil, Surface, or Anchor Ice	The PSEG Site has the potential for frazil and surface ice	2.4.7.1	Potential for accumulated ice formation in a turbulent flow condition
Minimum River Water Surface Elevation	-15.9 ft NAVD88 for less than 6 hr	2.4.11.7	The river surface-water elevation and duration for which the low water level conditions exist at the PSEG Site
Maximum Ice Thickness	17.8 in.	2.4.11.3.3	Maximum potential ice thickness on the Delaware River at the PSEG Site
Hydraulic Conductivity	Table 2.4.12-9	2.4.12	Groundwater flow rate per unit hydraulic gradient
Hydraulic Gradient	Tables 2.4.12-7 and 2.4.12-8	2.4.12	Slope of groundwater surface under unconfined conditions or slope of hydraulic pressure head under confined conditions
Geology, Seismology, and Geotechnical Engineering			
Basic Geological and Seismic Information			
Capable Tectonic Structures	No capable tectonic structures within the site region	2.5.1	The presence of a fault or structure capable of producing both tectonic surface deformation and earthquakes

Table I-1. (continued)

Site Characteristic	PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) Site Value	Site Safety Analysis Report (SSAR) Section	Definition
Vibratory Ground Motion			
Ground Motion Response Spectra (Site Safe Shutdown Earthquake)	SSAR Figure 2.5.2-54	2.5.2	Site specific response spectra
Stability of Subsurface Materials and Foundations			
Liquefaction	Soils below the competent layer are not susceptible to liquefaction	2.5.4.8	Liquefaction potential for the subsurface soils at a site
Minimum Ultimate Bearing Capacity	420,000 lb/ft^2	2.5.4.10	Load bearing capacity of the competent soil layer supporting the loads exerted by plant structures without soil failure
Minimum Shear Wave Velocity	1,613 ft/sec	Table 2.5.4.7-3	The minimum propagation velocity of shear waves through the foundation materials

Table I-2. Plant Parameter Envelope (PPE) Values

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Structure Height	234 ft	Table 1.3-1	The height from finished grade to the top of the tallest power block structures, excluding cooling towers
Structure Foundation Embedment	39 to 84.3 ft	Table 1.3-1	The depth from finished grade to the bottom of the basemat for the most deeply embedded power block structure
Normal Plant Heat Sink			
• **Condenser**			
Max Inlet Temp Condenser	91°F	Table 1.3-1	Design assumption for the maximum acceptable circulating water temperature at the inlet to the condenser
Condenser Heat Rejection	1.508×10^{10} Btu/hr	Table 1.3-1	Design value for the waste heat rejected to the circulating water system (CWS) across the condensers
Maximum Cooling Water Flow Rate Across Condenser	1,200,000 gpm	Table 1.3-1	Design value for the maximum flow rate of the CWS through the condenser tubes
Maximum Cooling Water Temperature Rise Across Condenser	25.2°F	Table 1.3-1	Design value for the maximum temperature differential across the condenser
• **Mechanical Draft Cooling Towers (MDCT)—CWS**			
Acreage	50 ac	Table 1.3-1	The land required for cooling towers, including support facilities
Approach Temperature	14.4°F	Table 1.3-1	The difference between the cold water temperature and the ambient wet-bulb temperature (WBT)
Blowdown Constituents and Concentrations	Various (see SSAR Table 1.3-2)	Table 1.3-2	The maximum expected concentrations for anticipated constituents in the CWS blowdown to the receiving water body

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Blowdown Flow Rate (Normal)	50,516 gpm	Table 1.3-1	The normal flow rate of the blowdown stream from the CWS to the receiving water body for closed system designs during normal operations
Blowdown Temperature (Normal)	91°F	Table 1.3-1	The maximum expected blowdown temperature at the point of discharge to the receiving water body during normal operations
Cycles of Concentration	1.5	Table 1.3-1	The ratio of total dissolved solids in the CWS blowdown to the total dissolved solids in the makeup water
Evaporation Rate (Normal)	25,264 gpm	Table 1.3-1	The expected 1% exceedance design rate at which water is lost by evaporation from the CWS during normal operations
Makeup Flow Rate (Normal)	75,792 gpm	Table 1.3-1	The expected rate of removal of water from a natural source to replace water losses from a closed CWS during normal operations
Noise	58 dBA at 1,000 ft	Table 1.3-1	The maximum expected sound level produced by operation of cooling towers, measured in feet from the noise source
Cooling Tower Temperature Range (Normal)	25.2°F	Table 1.3-1	The temperature difference between the cooling water entering and leaving the towers during normal operations
Cooling Water Flow Rate (Normal)	1,200,000 gpm	Table 1.3-1	The total cooling water flow rate through the condenser/heat exchangers during normal operations
Heat Rejection Rate (Normal)	1.508×10^{10} Btu/hr	Table 1.3-1	The expected heat rejection rate to a receiving water body during normal operations

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Drift	12 gpm	Table 1.3-1	Rate of water lost from the tower as liquid droplets entrained in the vapor exhaust air stream
Exhaust Stack Exit Velocity	1,730 fpm	Table 1.3-1	The exit velocity of water vapor through the cooling tower exhaust stack
Exhaust Stack Exit Diameter	68 cells at 31.6 ft each	Table 1.3-1	The diameter of the cooling tower exhaust stack
Exhaust Stack Height	46 ft	Table 1.3-1	The vertical height above finished grade of cooling towers associated with the CWS
• **Natural Draft Cooling Towers (NDCTs)—CWS**			
Acreage	50 ac	Table 1.3-1	The land required for cooling towers, including support facilities
Approach Temperature	14.4°F	Table 1.3-1	The difference between the cold water temperature and the ambient WBT
Blowdown Constituents and Concentrations	Various (see SSAR Table 1.3-2)	Table 1.3-2	The maximum expected concentrations for anticipated constituents in the CWS blowdown to the receiving water body
Blowdown Flow Rate (Normal)	50,516 gpm	Table 1.3-1	The normal flow rate of the blowdown stream from the CWS to the receiving water body for closed system designs during normal operations
Blowdown Temperature (Normal)	91°F	Table 1.3-1	The maximum expected blowdown temperature at the point of discharge to the receiving water body during normal operations
Cycles of Concentration	1.5	Table 1.3-1	The ratio of total dissolved solids in the CWS blowdown to the total dissolved solids in the makeup water
Evaporation Rate (Normal)	25,264 gpm	Table 1.3-1	The expected 1% exceedance design rate at which water is lost by evaporation from the CWS during normal operations

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Makeup Flow Rate (Normal)	75,792 gpm	Table 1.3-1	The expected rate of removal of water from a natural source to replace water losses from a closed CWS during normal operations
Noise	50 dBA at 1,000 ft	Table 1.3-1	The maximum expected sound level produced by operation of cooling towers, measured in feet from the noise source
Cooling Tower Temperature Range (Normal)	25.2°F	Table 1.3-1	The temperature difference between the cooling water entering and leaving the towers during normal operations
Cooling Water Flow Rate (Normal)	1,200,000 gpm	Table 1.3-1	The total cooling water flow rate through the condenser/heat exchangers during normal operations
Heat Rejection Rate (Normal)	1.508×10^{10} Btu/hr	Table 1.3-1	The expected heat rejection rate to a receiving water body during normal operations
Drift	12 gpm	Table 1.3-1	Rate of water lost from the tower as liquid droplets entrained in the vapor exhaust air stream
Exhaust Stack Exit Velocity	995 fpm	Table 1.3-1	The exit velocity of water vapor through the cooling tower exhaust stack
Exhaust Stack Exit Diameter	242 ft	Table 1.3-1	The diameter of the cooling tower exhaust stack
Exhaust Stack Height	590 ft	Table 1.3-1	The vertical height above finished grade of cooling towers associated with the CWS
• **Fan Assisted NDCT—CWS**			
Acreage	50 ac	Table 1.3-1	The land required for cooling towers, including support facilities
Approach Temperature	14.4°F	Table 1.3-1	The difference between the cold water temperature and the ambient WBT
Blowdown Constituents and Concentrations	Various (see SSAR Table 1.3-2)	Table 1.3-2	The maximum expected concentrations for anticipated constituents in the CWS

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
			blowdown to the receiving water body
Blowdown Flow Rate (Normal)	50,516 gpm	Table 1.3-1	The normal flow rate of the blowdown stream from the CWS to the receiving water body for closed system designs during normal operations
Evaporation Rate (Normal)	25,264 gpm	Table 1.3-1	The expected 1% exceedance design rate at which water is lost by evaporation from the CWS during normal operations
Blowdown Temperature (Normal)	91°F	Table 1.3-1	The maximum expected blowdown temperature at the point of discharge to the receiving water body during normal operations
Cycles of Concentration	1.5	Table 1.3-1	The ratio of total dissolved solids in the CWS blowdown to the total dissolved solids in the makeup water
Makeup Flow Rate (Normal)	75,792 gpm	Table 1.3-1	The expected rate of removal of water from a natural source to replace water losses from a closed CWS during normal operations
Noise	60 dBA at 1,000 ft	Table 1.3-1	The maximum expected sound level produced by operation of cooling towers, measured in feet from the noise source
Cooling Tower Temperature Range (Normal)	25.2°F	Table 1.3-1	The temperature difference between the cooling water entering and leaving the towers during normal operations
Cooling Water Flow Rate (Normal)	1,200,000 gpm	Table 1.3-1	The total cooling water flow rate through the condenser/heat exchangers during normal operations
Heat Rejection Rate (Normal)	1.508×10^{10} Btu/hr	Table 1.3-1	The expected heat rejection rate to a receiving water body during normal operations

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Drift	12 gpm	Table 1.3-1	Rate of water lost from the tower as liquid droplets entrained in the vapor exhaust air stream
Exhaust Stack Exit Velocity	902 fpm	Table 1.3-1	The exit velocity of water vapor through the cooling tower exhaust stack
Exhaust Stack Exit Diameter	255 ft	Table 1.3-1	The diameter of the cooling tower exhaust stack
Exhaust Stack Height	224 ft	Table 1.3-1	The vertical height above finished grade of cooling towers associated with the CWS
UHS			
• **Heat Exchangers**			
Maximum Inlet Temperature to Component Cooling Water (CCW) Heat Exchanger	95°F	Table 1.3-1	The maximum temperature of safety-related service water at the inlet of the UHS component cooling water heat exchanger
CCW Heat Exchanger Duty	2.06×10^8 Btu/hr (Normal) 4.72×10^8 Btu/hr (Peak)	Table 1.3-1	The heat transferred to the safety-related service water system for rejection to the environment in UHS heat removal devices
• **UHS Cooling Towers**			
Blowdown Constituents and Concentrations	Various (see SSAR Table 1.3-2)	Table 1.3-2	The maximum expected concentrations for anticipated constituents in the UHS blowdown to the receiving water body
Blowdown Flow Rate (Normal)	1,140 gpm	Table 1.3-1	The maximum flow rate of the blowdown stream from the UHS system to the receiving water body for closed system designs during normal operations
Blowdown Flow Rate (Accident)	2,280 gpm	Table 1.3-1	The maximum flow rate of the blowdown stream from the UHS system to the receiving water body for closed system designs during accident conditions

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Blowdown Temperature (Normal)	< 95°F	Table 1.3-1	The maximum expected UHS blowdown temperature at the point of discharge to the receiving water body during normal operations
Blowdown Temperature (Accident)	95°F	Table 1.3-1	The maximum expected UHS blowdown temperature at the point of discharge to the receiving water body during accident conditions
Cycles of Concentration	2	Table 1.3-1	The ratio of total dissolved solids in the UHS system blowdown to the total dissolved solids in the makeup water streams
Evaporation Rate (Normal)	1,142 gpm	Table 1.3-1	The maximum rate at which water is lost by evaporation from the UHS system during normal operations
Evaporation Rate (Accident)	2,284 gpm	Table 1.3-1	The maximum rate at which water is lost by evaporation from the UHS system during accident conditions
Cooling Tower Deck Height	63 ft	Table 1.3-1	The height of the cooling tower deck above grade
Exhaust Stack Height	35 ft	Table 1.3-1	The height of the exhaust stacks above the deck
Makeup Flow Rate (Normal)	2,404 gpm	Table 1.3-1	The maximum rate of removal of water from a natural source to replace water losses from the UHS system during normal operations
Makeup Flow Rate (Accident)	4,808 gpm	Table 1.3-1	The maximum rate of removal of water from a natural source to replace water losses from the UHS system during accident conditions

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Noise	57 dBA at 200 ft	Table 1.3-1	The maximum expected sound level produced by operation of mechanical draft UHS cooling towers, measured in feet from the noise source
Cooling Water Flow Rate (Normal)	26,125 gpm	Table 1.3-1	The total cooling water flow rate through the UHS system during normal operations
Cooling Water Flow Rate (Shutdown/Accident)	52,250 gpm	Table 1.3-1	The total cooling water flow rate through the UHS system during shutdown/accident conditions
Heat Rejection Rate (Normal)	2.06×10^8 Btu/hr	Table 1.3-1	The maximum expected heat rejection rate to the atmosphere during normal operations
Heat Rejection Rate (Accident)	3.95×10^8 Btu/hr	Table 1.3-1	The maximum expected heat rejection rate to the atmosphere during accident conditions
Stored Water Volume	30,600,000 gal	Table 1.3-1	The quantity of water stored in the UHS impoundments
Drift	2 gpm	Table 1.3-1	Rate of water lost from the tower as liquid droplets entrained in the vapor exhaust air stream
Potable/Sanitary Water System			
• **Discharge to Site Water Bodies**			
Flow Rate (Normal)	93 gpm	Table 1.3-1	The expected effluent flow rate from the potable and sanitary water systems to the receiving water body
Flow Rate (Maximum)	93 gpm	Table 1.3-1	The maximum effluent flow rate from the potable and sanitary water systems to the receiving water body

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
• **Raw Water Requirements**			
Maximum Use	216 gpm	Table 1.3-1	The maximum short-term rate of withdrawal from the water source for the potable and sanitary waste water systems
Monthly Average Use	93 gpm	Table 1.3-1	The average rate of withdrawal from the water source for the potable and sanitary waste water systems
Demineralized Water System			
• **Discharge to Site Water Bodies**			
Flow Rate	27 gpm	Table 1.3-1	The expected (and maximum) effluent flow rate from the demineralized system to the receiving water body
• **Raw Water Requirements**			
Maximum Use	107 gpm	Table 1.3-1	The maximum short-term rate of withdrawal from the water source for the demineralized water system
Monthly Average Use	107 gpm	Table 1.3-1	The average rate of withdrawal from the water source for the demineralized water system
Fire Protection System			
• **Raw Water Requirements**			
Maximum Use	625 gpm	Table 1.3-1	The maximum short-term rate of withdrawal from the water source for the fire protection water system
Monthly Average Use	5 gpm	Table 1.3-1	The average rate of withdrawal from the water source for the fire protection water system

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Miscellaneous Drain			
• **Discharge to Site Water Bodies**			
Flow Rate (Expected)	39 gpm	Table 1.3-1	The expected effluent flow rate from miscellaneous drains to the receiving water body
Flow Rate (Maximum)	55 gpm	Table 1.3-1	The maximum effluent flow rate from miscellaneous drains to the receiving water body
• **Raw Water Requirements**			
Maximum Use	5 gpm	Table 1.3-1	The maximum short-term rate of withdrawal from the water source for miscellaneous activities, such as floor washing
Monthly Average Use	5 gpm	Table 1.3-1	The average rate of withdrawal from the water source for miscellaneous activities, such as floor washing
Unit Vent/Airborne Effluent Release Point			
• **Release Point**			
Elevation (Normal)	Ground level	Table 1.3-1	The elevation above finished grade of the release point for routine operational releases
Elevation (Post Accident)	Ground level	Table 1.3-1	The elevation above finished grade of the release point for accident sequence releases
• **Source Term**			
Gaseous (Normal)	Various (see SSAR Table 1.3-7)	Table 1.3-7	The expected single unit annual activity, by isotope, contained in routine plant airborne effluent streams

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Gaseous (Post-Accident)	Various (see SSAR Section 15.3)	Section 15.3	The activity, by isotope, contained in post-accident airborne effluent streams
Tritium	Various (see SSAR Table 1.3-7)	Table 1.3-7	The expected single unit annual activity of tritium contained in routine plant airborne effluent streams
Liquid Radwaste System			
• **Release Point**			
Flow Rate	11 gpm	Table 1.3-1	The discharge flow rate of potentially radioactive liquid effluent streams from plant systems to the receiving water body
Minimum Blowdown Rate	20,000 gpm	Table 1.3-1	Minimum flow rate of the effluent stream discharging potentially radioactive liquid effluent to the receiving water body during normal operations
• **Source Term**			
Liquid	Various (see SSAR Table 1.3-8)	Table 1.3-8	The annual activity, by isotope, contained in routine plant liquid effluent streams
Tritium	Various (see SSAR Table 1.3-8)	Table 1.3-8	The annual activity of tritium contained in routine plant liquid effluent streams
Solid Radwaste System			
• **Solid Radwaste**			
Activity	Various (see SSAR Table 1.3-3)	Table 1.3-3	The expected single unit annual activity, by isotope, contained in solid radioactive wastes generated during routine plant operations
Principal Radionuclides	Various (see SSAR Table 1.3-3)	Table 1.3-3	The principal radionuclides contained in solid radioactive wastes generated during routine plant operations.
Volume	16,721.5 ft^3/yr	Table 1.3-1	The expected volume of solid radioactive wastes generated during routine plant operations

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Auxiliary Boiler System			
Exhaust Elevation	150 ft	Table 1.3-1	The height above finished plant grade at which the flue gas effluents are released to the environment
Flue Gas Effluents	Various (see SSAR Table 1.3-4)	Table 1.3-4	The expected combustion products and anticipated quantities released to the environment due to operation of the auxiliary boilers
Fuel Type	No. 2 Fuel Oil	Table 1.3-1	The type of fuel required for proper operation of the auxiliary boilers
Heat Input Rate (Btu/hr)	1.56×10^8 Btu/hr	Table 1.3-1	The average heat input rate (fuel consumption rate)
Onsite/Offsite Electrical Power System			
Switchyard Acreage	63 ac	Table 1.3-1	The land usage required for the high voltage switchyard used to connect the plant to the transmission grid
Standby Power System			
• **Diesel**			
Diesel Capacity (kW)	10,130 kW/unit (emergency diesel generator [EDG]) 5,000 kW/unit (station blackout [SBO] diesel generator)	Table 1.3-1	The total generating capacity of the diesel generating system
Diesel Exhaust Elevation	50 ft	Table 1.3-1	The elevation above finished grade of the release point for standby diesel exhaust releases
Diesel Flue Gas Effluents	Various (see SSAR Table 1.3-5)	Table 1.3-5	The expected combustion products and anticipated quantities released to the environment due to operation of the emergency standby diesel generators

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Diesel Noise	55 dBA at 1,000 ft	Table 1.3-1	The maximum expected sound level produced by operation of diesel generators, measured in feet from the noise source
Diesel Fuel Type	No. 2	Table 1.3-1	The type of diesel fuel required for proper operation of the diesel generator
Exhaust Stack Diameter	68 in.	Table 1.3-1	The nominal diameter of the exhaust stack
Flue Gas Flow Rate	68,960 actual cubic feet per minute (acfm)	Table 1.3-1	The maximum flue gas flow rate exiting the exhaust stack
Flue Gas Temperature	665°F	Table 1.3-1	The temperature of the flue gas exiting the exhaust stack
Number of Units	EDG—4 SBO—2	Table 1.3-1	The number of generator units
Diesel Usage	150 hr/yr per unit (EDG) 100 hr/yr per unit (SBO)	Table 1.3-1	The expected duration of usage for each diesel
Heat Input Rate (Btu/hr)	77,384,160 Btu/hr	Table 1.3-1	The average heat input rate (fuel consumption rate)
• **Gas Turbine**		Table 1.3-1	
Gas Turbine Capacity (kW)	26,000 kW	Table 1.3-1	The total generating capacity of the gas turbine generating system
Gas Turbine Exhaust Elevation	50 ft	Table 1.3-1	The elevation above finished grade of the release point for standby gas turbine exhaust releases
Gas Turbine Flue Gas Effluents	Various (see SSAR Table 1.3-6)	Table 1.3-6	The expected combustion products and anticipated quantities released to the environment due to operation of the standby gas turbine generators
Gas Turbine Noise	64.3 dBA at 1,000 ft	Table 1.3-1	The maximum expected sound level produced by operation of gas turbine generators, measured in feet from the noise source

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Gas Turbine Fuel Type	Diesel oil	Table 1.3-1	The type of fuel required for proper operation of the gas turbines
Exhaust Stack Diameter	59.1 in.	Table 1.3-1	The nominal diameter of the exhaust stack
Flue Gas Flow Rate	128,899 acfm	Table 1.3-1	The maximum flue gas flow rate exiting the exhaust stack
Flue Gas Temperature	940°F	Table 1.3-1	The temperature of the flue gas exiting the exhaust stack
Number of Units	4 (Class 1E); 2 (Non-Class 1E)	Table 1.3-1	The number of generator units
Gas Turbine Usage	48 hr/yr	Table 1.3-1	The expected duration of usage for each gas turbine
Heat Input Rate (Btu/hr)	71,513,906 Btu/hr	Table 1.3-1	The average heat input rate (fuel consumption rate)
Plant Characteristics			
• **Permanent Acreage**			
Parking Lots	8 ac	Table 1.3-1	The land area required to provide space for parking lots
Permanent Support Facilities	8 ac	Table 1.3-1	The land area required to provide space for permanent support facilities
Power Block	70 ac	Table 1.3-1	The land area required to provide space for power block facilities. Power block is defined as all structures, systems, and components that perform a direct function in the production, transport, or storage of heat energy, electrical energy, or radioactive wastes. Also included are structures, systems, and components that monitor, control, protect, or otherwise support the above equipment

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
Other Areas	26.4 ac	Table 1.3-1	The land area required to provide space for plant facilities not included above in the categories of parking lots, permanent support facilities, and power block
• **Megawatts Thermal (MW[t])**	4,614 MW(t) (single unit); 6,830 MW(t) (dual unit)	Table 1.3-1	The thermal power generated by the nuclear steam supply system
• **Megawatts Electric (MW[e]) (net)**	1,350 to 1,600 MW(e) (single unit) 2,200 MW(e) (dual unit)	Table 1.3-1	The nominal electric output to the electrical grid. This value does not include the plant's house loads
• **Plant Design Life**	60 yr	Table 1.3-1	The operational life for which the plant is designed
• **Plant Population**			
Operation	600 people	Table 1.3-1	The number of people required to operate the plant
Refueling/Major Maintenance	1,000 people	Table 1.3-1	The additional number of temporary staff required to conduct refueling and major maintenance activities
• **Station Capacity Factor**	85 to 96.3%	Table 1.3-1	The percentage of time that a plant is capable of providing power to the grid. Values within this range are conservatively applied as necessary in the ER analyses
• **Plant Operating Cycle**	18 or 24 mo	Table 1.3-1	The normal plant operating cycle length
Construction			
• **Acreage**			
Laydown Area	128 ac	Table 1.3-1	The land area required to provide space for the construction laydown area
Temporary Construction Facilities	77 ac	Table 1.3-1	The land area required to provide space for temporary construction support facilities
• **Noise**	102 dBA at 50 ft	Table 1.3-1	The maximum expected sound level due to construction activities, measured in feet from the noise source

Table I-2. (continued)

Item	Design Parameter	Site Safety Analysis Report (SSAR) Section	Description and References
• **Construction Population**	3,950–4,100 people	Table 1.3-1	The number of onsite workers for construction of the new plant
Miscellaneous Parameters			
• **Maximum Fuel Enrichment**	5 wt %	Table 1.3-1	Concentration of ^{235}U in the fuel
• **Maximum Average Assembly Burnup**	54,200 MWd/MTU	Table 1.3-1	Maximum assembly average burnup at end of assembly life
• **Peak Fuel Rod Burnup**	62,000 MWd/MTU	Table 1.3-1	Peak fuel rod exposure at end of life
• **Rated Thermal Power**	4,590 MW(t) (single unit); 6,800 MW(t) (dual unit)	Table 1.3-1	Maximum core thermal power
• **Liquid-Containing Tank Failure Radionuclide Concentrations**	Various (see SSAR Table 1.3-9)	Table 1.3-9	The concentrations of radionuclides and associated tank volumes for the analysis of liquid-containing tank failure

APPENDIX J

PSEG REPRESENTATIONS AND ASSUMPTIONS

APPENDIX J

PSEG REPRESENTATIONS AND ASSUMPTIONS

If an early site permit (ESP) for the PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) Site is issued and an applicant references that ESP in a subsequent application for a construction permit (CP) or a combined construction permit and operating license (COL), the applicant would have to demonstrate that the design selected for the site falls within the bounds of the Nuclear Regulatory Commission's (NRC's) ESP analysis in this environmental impact statement (EIS). With regard to the environmental impacts associated with construction and operation of a new nuclear power plant at the PSEG Site, PSEG made a number of representations in its application. As listed in this appendix, the staff used these representations and staff-developed assumptions in assessing the environmental impacts associated with construction and operation of a new nuclear power plant. As such, fulfillment of these representations and assumptions provides part of the basis for the final impact assessment. Should a CP or COL applicant reference the ESP, and the staff ultimately determines that a representation or assumption has not been satisfied at the CP/COL stage, that information would be considered new and potentially significant, and the affected impact area could be subject to re-examination.

Table J-1 references PSEG's representations and the NRC staff's assumptions in this EIS about design (Appendix I); authorizations, permits, and certifications (Appendix H); and mitigation (Sections 4.11 and 5.12). Table J-2 contains references to representations and assumptions organized by technical area, without repeating the information in Table J-1.

Within the Environmental Report (ER) (PSEG 2015-TN4280), PSEG provides:

1. representations to address certain issues in the design, construction, and operation of the facility;
2. representations of planned compliance with current laws, regulations, and requirements;
3. representations of future activities and actions that it would take should it receive an ESP and decide to apply for a COL for the PSEG Site; and
4. representations of PSEG's estimates of future activities and actions of others and the likely environmental impacts of those activities and actions that would be expected should PSEG decide to apply for a CP or COL.

The following tables are meant to aid the staff and the applicant in the event this EIS is referenced in a CP or COL application. The tables are not meant to replace the analyses in the EIS.

Table J-1. Appendix I, Appendix H, Section 4.11, and Section 5.12 Assumptions and Commitments

Area	Representation/Assumption
Site characteristics	An applicant referencing this EIS will demonstrate its application is bounded by the site characteristics contained in Table I-1
Plant parameter envelope (PPE) values	An applicant referencing this EIS will demonstrate its application is bounded by the PPE values contained and referenced in Table I-2
Authorizations and permits	An applicant referencing this EIS will provide the status of the authorizations and permits specified in Appendix H
Mitigation of construction impacts	An applicant referencing this EIS will address whether its application contains the mitigation measures contained in Section 4.11
Mitigation of operational impacts	An applicant referencing this EIS will address whether its application contains the mitigation measures contained in Section 5.12
New and significant information	An applicant referencing this EIS will provide, in its application, in accordance with Title 10 of the *Code of Federal Regulations* (CFR) 51.50(c)(1) (TN250), any new information that could affect the technical basis or conclusions for determination of an impact level in the EIS

Table J-2. Assumptions by Technical Area Not Covered in Table J-1

Technical Area	Representations/Assumptions	Source
Land Use—PSEG Site		
	The PSEG Site is located immediately north of and partially within the existing site of PSEG's Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS)	ER Section 3.1[(a)]
	The PSEG Site construction footprint is shown in Figure 3.1-2 in the Environmental Report	ER Figure 3.1-2[(a)]
	The PSEG Site would total 819 ac. Of this total, 734 ac is within PSEG's existing SGS/HCGS site, and 85 ac is within the U.S. Army Corps of Engineers' (USACE's) existing Artificial Island Confined Disposal Facility (CDF). PSEG would obtain the 85 ac through a land exchange with the USACE. Also, during plant construction, PSEG would temporarily lease from the USACE 45 ac of the Artificial Island CDF as the location of the concrete batch plant and a construction laydown area	ER Section 2.2.1.1[(a)]
	An estimated 302 ac of the existing 734-ac SGS/HCGS site would be affected by the construction of a new nuclear power plant	ER Figure 3.1-2[(a)]
	Permanent facilities and structures (primarily the power block area, cooling tower area, and intake structures and their associated pipelines) for a new nuclear power plant would occupy approximately 225.4 ac, and temporary facilities would occupy approximately 205.1 ac	ER Table 4.1-1[(a)]
	Of the approximately 430.5 ac estimated for the construction of a new nuclear power plant, almost all of the acreage overlaps areas that previously have been altered by activities associated with the construction or operation of the SGS/HCGS site or the Artificial Island CDF	ER Figure 3.1-2[(a)]
	The size of the existing barge slip facility would be increased for use during the construction and operation of a new nuclear power plant. The increased size would require dredging approximately 61 ac in the Delaware River. Dredging to a depth of 4.5 ft would result in the removal of approximately 440,000 yd^3 of soil	ER Section 4.2.1.1.4[(a)]
	Land use and land cover (LULC) types and acreages associated with the PSEG Site are described in the ER (PSEG 2015-TN4280)	ER Sections 2.2 and 4.1[(a)]
	No significant agricultural, crops, or dairy production are or will be located at or immediately adjacent to the PSEG Site	ER Section 2.2[(a)]
	No mining activities would be possible at the PSEG Site	ER Section 2.2[(a)]
	Salt drift from any cooling tower design would be localized and well below NRC guidance thresholds	ER Section 5.3.3.3.1[(a)]
	A new switchyard would be constructed for use with a new nuclear power plant at the PSEG Site	ER Section 3.7.1[(a)]
	Potential areas for borrow pits have been identified at several locations in New Jersey, Pennsylvania, and Maryland; however, the extent of land required has not been determined	ER Section 4.1.1[(a)]; Request for Additional Information (RAI) Response Env-02 (Land Use)

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	Potential areas for the temporary storage of earthwork and excavation spoils have been identified on the site; however, the extent of land required has not been determined. The excavated material would be managed with the appropriate erosion and sediment control measures, and best management practices (BMPs) would be used as necessary for these storage areas	ER Section 4.1.1[(a)]
	Development of a new plant would result in some building inside the existing 100-year flood plain on the PSEG Site. The estimated filling of 152 ac of onsite and offsite 100-year flood plain could change the flood carrying capacity of the flood plain	EIS Section 4.2.1
Land Use—Causeway Corridor and Offsite Areas		
	PSEG has not provided a specific design for the proposed causeway. This EIS assesses the environmental impacts of a “pilings and span” causeway design	EIS Section 2.2.3.
	LULC types and acreages associated with the proposed causeway and the four alternative sites, as well as in the vicinity and the region of the PSEG Site and the alternative sites, are described in the ER	ER Sections 2.2, 4.1, and 9.3[(a)]
	Permanent disturbance related to the proposed causeway would be approximately 45.5 ac, and temporary disturbance would be approximately 23.5 ac	ER Table 4.1-2[(a)]
	PSEG would obtain releases on lands preserved as County Preserved Farmlands and/or protected under Deeds of Conservation Restriction along the proposed causeway	ER Section 4.1.2[(a)]; Response to RAI Env-02 (Land Use); EIS Section 4.1.2
Water Use and Quality		
	Stormwater runoff from the area filled (ponds and marsh creeks) would be collected in engineered detention basins and would be released to the Delaware River in a controlled manner	EIS Section 4.2
	The altered shoreline would be protected from erosion using placement of concrete or riprap	EIS Section 4.2
	The material dredged from the Delaware River would be disposed of on the site or at another approved upland disposal site	EIS Section 4.2
	Vertical low-permeability barriers would be used to reduce horizontal groundwater flow into the excavation during dewatering operations. Water withdrawn from open surface excavations would be pumped to an onsite settling basin before discharge through a permitted New Jersey Pollutant Discharge Elimination System (NJPDES) outfall	EIS Section 4.2
	To support construction of a new nuclear power plant, an additional 119 gpm (average) of groundwater would be pumped from two new production wells located within the Potomac-Raritan-Magothy (PRM) aquifer system	EIS Section 4.2

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	The Vincentown aquifer is not used as a source of potable water near the site	EIS Section 4.2
	Groundwater levels would be monitored in existing shallow wells to confirm that the HCGS and SGS facilities are not adversely affected by dewatering and to evaluate any changes in water quality to the alluvium and Vincentown aquifers. Monitoring of the Wenonah-Mount Laurel and PRM aquifers required by the HCGS and SGS water allocation permit would continue during preconstruction and construction activities, providing data on groundwater heads and salinity in these aquifers	EIS Section 4.2
	The Delaware River would be used to supply makeup water for a new plant's circulating water system. Biocides would be injected to control biofouling in the circulating water system and its associated piping. Additional chemicals would be added in the cooling tower basins to control scaling, corrosion, and solids deposition	EIS Section 5.2
	Consumptive use of Delaware River water would be a small percentage of the river flow, even under drought conditions	EIS Section 5.2
	If the reactor technology selected for the PSEG Site requires surface-water withdrawals from the Delaware River that would cause the currently permitted PSEG allocation in the Merrill Creek reservoir to fall short, PSEG would revise the consumptive water use allocations of other plants it owns or would acquire additional storage from the existing rights of other Merrill Creek co-owners	EIS Section 5.2
	The average groundwater withdrawal rate for operations would be 210 gpm, and larger maximum withdrawal rates would be temporary, as they would occur only during abnormal conditions	EIS Section 5.2
	The nearest offsite groundwater users are located approximately 3 mi from the PSEG Site	EIS Section 5.2
	A new nuclear power plant at the PSEG Site would have a blowdown discharge to the Delaware River upstream of, and similar to, that of the HCGS discharge, with similar thermal impacts to water quality	EIS Section 5.2
	To minimize potential scour, the river bottom near the outlet of the discharge pipe would be armored with riprap or other engineered features	EIS Section 5.2
	Dredging of the intake channel and the barge canal area would be infrequent, and any sediment disturbed would quickly settle upon cessation of the activities	EIS Section 5.2
	The site grade would contain engineered fill with a low permeability to limit the risk of groundwater contamination from accidental releases to the land surface	EIS Section 5.2
	A monitoring plan would be developed for the final selected plant design to monitor potential impacts of plant operations on the groundwater	EIS Section 5.2
	When the reactor technology is selected, the existing New Jersey Department of Environmental Protection (NJDEP) groundwater withdrawal permit may be modified to account for a new nuclear power plant, or a new permit with a different withdrawal rate may be obtained	EIS Section 7.2

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
Terrestrial Ecology		
	Habitat and vegetative cover acreage associated with construction areas are described in the PSEG response to RAI No. Env-02 (PSEG 2012-TN2282)	RAI Env-02 (Land Use); EIS Section 4.1.1
	No important species, as described in NUREG–1555 (NRC 2000-TN614), currently live on, or are likely to live on, the PSEG Site. In addition, except for a few small, potential wetlands, no important habitats are present on the PSEG Site	ER Section 2.4.1[(a)]
	An updated description would be provided of the important terrestrial biota in the vicinity of the site before or during the CP or COL stage. These descriptions will be consistent with Chapter 2.4.2 in NUREG–1555 (NRC 2000-TN614)	EIS Section 2.4.1.3
	A biological assessment (BA) documenting potential impacts on the Federally listed threatened and endangered plant and wildlife species is provided in Appendix F. Assume an updated review of Federally listed species would be performed before or during the CP or COL stage to determine if preparation of a new BA is necessary	EIS Appendix F
	The approximately 500-ac construction site includes approximately 99 ac of urban or built-up lands, 13 ac of agricultural lands, 93 ac of forestland, 48 ac of water, 213 ac of wetlands, 31 ac of barren land, and 3 ac of managed wetlands	EIS Section 4.3.1.2
	The disturbance along the shoreline of the Delaware River at the location of the new cooling water intake, discharge pipeline, and barge unloading areas would be approximately 9.5 ac of coastal wetland and shallow open water	ER Section 4.2.1.1.4[(a)]
	Based on the results of the evaluation performed for this ESP application, the guidance provided in NUREG–1555 (NRC 2000-TN614), and the results of the Cooling Tower Drift Program performed for the existing SGS and HCGS facilities, no adverse impact to the surrounding vegetation from salt deposition because of the operation of the cooling towers for a new nuclear power plant is anticipated	ER Section 5.3.3.2.4[(a)]
	A BA documenting the potential impacts on the Federally listed threatened and endangered terrestrial species within the vicinity of the proposed PSEG Site is provided in Appendix F. Assume an updated review of Federally listed species would be performed before or during the CP or COL stage to determine if preparation of a new BA is necessary	EIS Appendix F
	Erosion control devices would be installed around the construction site to prevent sediment from affecting surrounding wetlands	ER Section 4.3.1.1[(a)]
	Wetlands mitigation measures would be completed for jurisdiction wetlands that could be affected by the building and operating of a new nuclear power plant at the PSEG Site as described in Section 4.3.1.4 of the EIS	ER Section 4.3.1.6.2[(a)]
	After construction, temporary impacts would be restored to natural cover types	ER Section 4.3.1.6.1[(a)]

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	Construction work mats would be used in wetland areas along the proposed causeway	ER Section 4.3.1.1.2[(a)]
	BMPs would be used during construction to reduce artificial nighttime illumination	ER Section 4.3.1.2[(a)]
Aquatic Ecology		
	Onsite and offsite descriptions of aquatic resources for the PSEG Site, consistent with NUREG–1555, are provided in Sections 2.4.2.1 and 2.4.2.2, respectively. Updated descriptions would be provided before or during the CP or COL stage	EIS Sections 2.4.2.1 and 2.4.2.2
	Important aquatic species are discussed in Section 2.4.2.3 of the EIS. Assume an updated review and discussion of important aquatic species would be performed	EIS Section 2.4.2.3
	A BA and supplemental BA documenting the potential impacts on the Federally listed threatened and endangered aquatic species and an essential fish habitat (EFH) assessment and supplemental EFH documenting potential impacts on EFH and relevant Federally managed species and their prey within the action area are provided in Appendix F. Assume an updated review of Federally listed species and designated EFH would be performed before or during the CP or COL stage to to prepare a new BA and EFH assessment	EIS Appendix F
	Building activities that could directly affect onsite and offsite aquatic ecosystems include site preparation for installation of plant structures, cooling towers, switchyard, and temporary laydown area; improvements to the HCGS barge slip; building the barge storage area and unloading facility; installing a haul road bulkhead; installing the cooling water system intake and discharge structures; and building the proposed causeway. Shoreline installation and site preparation activities would require a stormwater pollution prevention plan, developed as part of the NJPDES stormwater permit, which would describe BMPs to control sedimentation and erosion and provide stormwater management. Dredging and in-water building activities (e.g., pile driving, caisson installation, and in-filling) would comply with the terms and conditions (e.g., dredging methodology, seasonal restrictions, and dredged material disposal requirements) included in the Department of the Army permit issued by the USACE and the NJDEP State 401 water-quality certification	EIS Section 4.3.2
	The location, design, construction, and capacity of the cooling water intake structure reflects the best technology available for minimizing environmental impacts and would be compliant with EPA 316(b) Phase I requirements (40 CFR Part 125-TN254). For example, the new plant at the PSEG Site would have a closed-cycle cooling system and traveling intake screens with a through-mesh velocity of less than 0.5 ft/s. The intake structure would be would be located flush with the east shoreline of the Delaware River Estuary	EIS Section 5.3.2.1

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
Socioeconomics		
	General growth of the regional economy and population would occur within the times and in the locations projected in the ER. Baseline data from the 2010 Census were used in the analyses of potential impacts. Projections are based on information from the State of New Jersey and Delaware Population Consortium	ER Section 2.5.1[(a)]
	State and local governments would continue to expand and upgrade infrastructure and public services to meet general population growth	EIS Sections 4.4 and 5.4
	Site preparation and construction activities would continue for approximately 6 years and would employ as many as 4,100 construction workers. PSEG would employ 600 operations workers	EIS Sections 4.4.2 and 5.4.2; ER Sections 4.4.2.1 and 5.8.2.1[(a)]
	The in-migrating building and operations work force would be distributed geographically in a manner similar to the existing SGS and HCGS workforce	ER Sections 4.4.2.2 and 5.8.2[(a)]; EIS Sections 4.4.2 and 5.4.2
	Although noise would not cause adverse offsite impacts, a noise study would be performed as part of the final selection of the cooling systems for any new nuclear power plant, and the results would be described in the CP or COL application	ER Section 5.8.1.2[(a)]
	Assumed 2.68 persons household size for in-migrating workers	EIS Sections 4.4.2 and 5.8.2
	Assumed largest MW(e) reactor type in PPE (two-unit AP1000). Assumed $4,490.61 per kW(e) for cost of reactors. Used the Bureau of Economic Analysis' Regional Input-Output Modeling System II multipliers for indirect workforce	EIS Sections 4.4.3.1 and 5.4.3.1
	Assumed construction worker annual income of $52,200 and operations worker income of $95,869. Delaware state income tax of $1,001 + 5.55% per worker and assumed a tax rate of 6.279%, which is the average of 1.4% to 8.97% income tax rates for New Jersey. Assumed sales tax rate of 7% in New Jersey and 6% in Pennsylvania. Delaware has no sales tax rate. Assumed 9% New Jersey corporate income tax rate and Salem County's $1.207 per hundred dollars of assessed value property tax	EIS Sections 4.4.3.2 and 5.4.3.2
	Based traffic assumptions from PSEG traffic impact analysis. Traffic impact analysis assumed peak construction workforce, full HCGS/SGS workforce, and an outage workforce all at once	EIS Sections 4.4.4.1 and 5.4.4.1; ER Sections 4.4.1.5 and 5.8.1.2[(a)]
	Aesthetic impacts assume 590-ft-tall natural draft cooling towers (NDCTs), associated plumes, two reactor buildings, and the elevated causeway	EIS Sections 4.4.1.6 and 5.4.1.6
	Water and wastewater services assume 100 and 75 gpd, respectively	EIS Sections 4.4.4.4 and 5.4.4.4

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
Environmental Justice		
	Baseline data from 2010 Census were used in the analyses of potential impacts. Minority and low-income populations will continue to exist in the same proportions and locations as populations increase	EIS Section 2.6
Historic and Cultural Resources		
	The area of potential effect evaluated in the ESP EIS bounds the area of potential effect for the combined license application. Section 106 consultation at the combined license stage would be conducted in accordance with the executed Memorandum of Agreement (NRC 2015-TN4377).	EIS Section 4.6
	PSEG would implement the necessary administrative steps to notify the New Jersey Historic Preservation Officer and or the applicable Tribal Historic Preservation Officer in the event of any unanticipated discovery of an historic resource	EIS Section 4.6
Meteorology and Air Quality		
	Specific dust-control measures to control fugitive dust during construction would be identified in a dust-control plan, or similar document, prepared before construction. These mitigation measures could include any or all of the measures identified in Section 4.7.1 of this EIS	ER Section 4.4.1.3[a]; EIS Section 4.7.1
	Meteorological data for the PSEG Site are presented in the Site Safety Analysis Report (SSAR, (PSEG 2015-TN4283). The data from 2006 to 2008 are assumed to be representative	SSAR Section 2.3.2.2[b]
	Air emissions from the PSEG Site would be bounded by those listed in EIS Sections 4.7, 5.7, 6.1.3, 6.3, and 7.6. Greenhouse gas emissions would be bounded by those in Appendix K over the life cycle of the facility	Various
	Auxiliary boilers and diesel generators and/or gas turbines are assumed to be required for a new nuclear power plant, and these devices would release permitted pollutants to the air. The ER describes the annual estimated emissions, and these emissions have been considered in EIS Table 5-13	EIS Section 5.7
	A general conformity applicability analysis per 40 CFR Part 93, Subpart B (TN2495), will be performed at the COL stage because Salem County is in nonattainment for 8-hour ozone National Ambient Air Quality Standards.	EIS Section 4.7 EIS Section 5.7
	The normal heat sink that would be used to dissipate heat from the turbine cycle for a new nuclear power plant would use cooling towers to reject that heat directly into the atmosphere	ER Section 3.4.1.1[a]
	Water droplets drifting from the cooling towers would have the same concentration of dissolved solids and suspended solids as the water in the cooling tower basin. The water fed into the cooling tower is assumed to have solid concentrations about twice that of the Delaware River, the source of the cooling water makeup	ER Section 5.3.3.2.4[a]

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	Cooling towers would have drift eliminators comparable in effectiveness to the drift eliminators in current-generation cooling towers	ER Section 5.3.3.1.1[(a)]
	The distance between the proposed cooling towers and the existing cooling towers would be about 3,200 ft. The maximum salt deposition rate from all linear mechanical draft cooling towers combined was estimated as 0.80 lb/ac per month and would occur at a distance of 2,300 ft east of the towers. The maximum salt deposition rate from all NDCTs combined was estimated as 0.021 lb/ac per month, occurring between 4,265 and 7,546 ft north of the towers	ER Section 5.3.3.2.4[(a)]; RAI Response Env-08S
	The Seasonal and Annual Cooling Tower Impact model predicts that the majority of fogging due to operation of the linear mechanical draft cooling towers would be confined to within about 0.5 mi (800 m) to the northwest of the towers with occasional fogging (maximum 7 hr/yr) up to about 0.7 mi (1,100 m) to the east–southeast of the towers (this area is mostly within the property boundary of the site). Fogging is not a concern for NDCTs because of their considerably greater release height, and the Seasonal and Annual Cooling Tower Impact model does not calculate fogging for NDCTs as such. Therefore, it is predicted that the operation of the cooling towers would result in limited increased fogging at, and immediately around, the PSEG Site	RAI Response Env-08S
	The meteorological monitoring program would continue throughout the construction and operational phases of the project. The monitoring program would be a continuation of the ongoing meteorological monitoring program for the SGS and HCGS sites	ER Section 6.4[(a)]
Human Health		
	Radioactive waste management systems would be designed to minimize releases from reactor operations to values as low as reasonably achievable. These systems would be designed and maintained to meet the requirements of 10 CFR Part 20 (TN283) and Appendix I in 10 CFR Part 50 (TN249)	ER Section 3.5[(a)]
	Nonradioactive solid wastes are addressed by local regulation under “truck-and-haul” permitting. Hazardous wastes are handled by permitted contractors and are addressed on the site in compliance with Federal regulations	ER Section 3.6.3.3[(a)]
	The expected single unit annual activities by isotope contained in the airborne effluent, liquid effluent, and solid radioactive waste streams generated during routine plant operations are based on the configuration of the four reactor designs designated in the ER (PSEG 2015-TN4280) and SSAR (PSEG 2015-TN4283) at the time of this EIS	SSAR Section 1.3[(b)]; ER Section 5.4.1[(a)]

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	The exposure pathways considered and the analytical methods used to estimate doses to the maximally exposed individual and to the population surrounding a new nuclear power plant are based on NRC Regulatory Guide 1.109, *Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50*, Appendix I (Rev.1, October 1977) (RG 1.109, NRC 1977-TN90) and NRC Regulatory Guide 1.111, *Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors* (Revision 1, July 1977) (RG 1.111, NRC 1977-TN91)	SSAR Chapter 11[b]; ER Section 5.4.1[a]
	ER Table 5.4-9 estimates the single-unit total body and organ doses to the maximally exposed individual from liquid effluents and gaseous releases from potentially up to two new nuclear units for analytical endpoints prescribed in 10 CFR Part 50, Appendix I (TN249)	ER Section 5.4.3[a]
	The estimated annual doses from all pathways are summarized in ER Table 5.4-10. ER Table 5.4-10 compares these doses to the public dose criteria in 40 CFR Part 190 (TN739). PSEG states by meeting the requirements of 40 CFR Part 190 (TN739), they also meet the requirements of 10 CFR 20.1301 (TN283)	ER Section 5.4.3[a]
	The calculated construction worker doses are based on available dose rate measurements and calculations. It is possible that these dose rates would increase in the future as site conditions change. However, the site would be monitored continually during the construction period, and appropriate actions would be taken as necessary to ensure that the construction workers are protected from radiation	ER Section 4.5.4.4[a]
	The construction worker dose from independent spent fuel storage installation direct radiation is within the bounds of evaluation in the EIS, which depends on the specific cask loading during the construction period	EIS Section 4.9
	The new nuclear power plant would release liquid effluents to the Delaware River via the cooling water discharge stream	ER Section 5.4.1.1[a]; EIS Sections 5.9.1 and G.2.1
	The structure of the site radiological environmental management program would be based on the necessary components of the monitoring program established for the existing units, which encompasses the entire SGS/HCGS site and would be expanded to include radiological environmental monitoring for a new nuclear power plant. This expanded radiological environmental management program would continue to be in accordance with the existing units' Offsite Dose Calculation Manual (PSEG 2015-TN4280). It would be implemented through the existing units' Technical Specifications/Offsite Dose Calculation Manual via administrative and technical procedures	ER Section 6.2.1[a]; EIS Section 5.9.6

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	The short-term noise levels associated with construction activities could be as high as 102 dBA at a distance of 50 ft; however, these noise levels would not extend beyond the boundaries of the PSEG Site	ER Section 4.4.1.2[(a)]
	The noise levels from cooling tower operations and diesel generators are anticipated to be approximately 60 dBA at a distance of 1,000 ft	ER Section 5.8.1.3[(a)]
Transportation		
	Unirradiated fuel assemblies would be shipped to the PSEG Site by truck only shortly before they would be needed	ER Section 5.7.2[(a)]; EIS Section 6.2.1
	Radioactive waste and spent fuel would be shipped from the PSEG Site by truck only. The number of radioactive waste shipments was based on 2.34 m^3/shipment. The number of spent fuel shipments was based on 0.5 MTU/shipment	ER Section 5.7.2[(a)]; EIS Section 6.2.3
	The transportation impact analysis used information from INEEL (2003-TN71) to estimate the unirradiated and spent fuel shipping cask capacities	EIS Section 6.2.2
	Doubling the estimated number of truck shipments to account for empty return shipments would result in a number of shipments well below the one-shipment-per-day condition	ER Section 5.7.2[(a)]; EIS Section 6.2.3
	The new nuclear power plant would have storage capacity exceeding that needed to accommodate five-year cooling of irradiated fuel before transport offsite	ER Section 5.7.2[(a)]; EIS Section 6.2.2
	The transportation impact analysis for advanced reactor spent fuel shipments assumed the radiation dose rate emitted from the shipments is at the maximum allowed by Federal regulations	EIS Section 6.2.2
	It was assumed that shipping casks for advanced reactor spent fuel would provide equivalent mechanical and thermal protection of the spent fuel cargo (relative to the current light water reactor [LWR] spent fuel shipping cask designs)	EIS Section 6.2.2
	For this assessment, release fractions for current-generation LWR fuels were used to approximate the impacts from advanced reactor spent fuel shipments. This essentially assumes that the behavior of fuel materials and containment systems (e.g., cladding and fuel coatings) is similar to that of the current-generation LWR fuel under applied mechanical and thermal conditions	EIS Section 6.2.2
	The proposed geologic repository at Yucca Mountain was used as a surrogate destination for spent fuel shipments	ER Sections 5.7.2 and 7.4[(a)]; EIS Section 6.2.2
	It was assumed that no shipments of unirradiated fuel, irradiated fuel, or radioactive waste would be made by barge or rail	ER Sections 5.7.2 and 7.4[(a)]; EIS Section 6.2

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
	It was assumed that shipments of spent nuclear fuel would be directly to a geologic repository. Shipment of spent nuclear fuel to an interim storage facility followed by shipment to a geologic repository was not analyzed	ER Sections 5.7.2 and 7.4[(a)]; EIS Section 6.2
Decommissioning		
	Impacts from decommissioning new reactor unit(s) designs are bounded by those in NUREG–0586, Supplement 1 (NRC 2002-TN665)	EIS Section 6.3
Nuclear Fuel Cycle and Fuel Storage		
	All of the LWR technologies considered have a design storage capacity for spent fuel pools that far exceeds that needed to accommodate 5-year cooling	ER Section 3.8.2[(a)]
	After a sufficient decay period, the fuel will be removed from the pool and packaged in spent fuel shipping/storage casks, licensed in accordance with 10 CFR Part 72 (TN1684), “Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Waste, and Reactor-Related Greater than Class C Waste,” and transferred either to an independent spent fuel storage installation facility on-site or an offsite disposal facility.	ER Section 3.8.2[(a)]
Waste Management		
	PSEG’s existing pollution prevention and waste minimization program would apply to the new nuclear power plant	ER Section 5.5.3[(a)]
	PSEG generates small quantities of hazardous wastes and is classified as a small-quantity generator. PSEG maintains a waste minimization plan for hazardous wastes, and all hazardous waste activities are performed in compliance with State and Federal regulations. PSEG’s existing waste management procedures address the minimization of impacts in the unlikely event of a hazardous waste spill	ER Section 5.5.1[(a)]
	Non-radioactive resins and sludges would be disposed of in a permitted industrial landfill. Universal wastes, scrap metal, and used oil and antifreeze would be managed for recycling or recovery. Office wastes and aluminum cans would be recycled locally. Putrescible wastes would be disposed of in an offsite permitted disposal facility. PSEG practices pollution prevention, including waste minimization. Solid wastes generated by the construction and operation of a new nuclear power plant would be handled in the same manner as current wastes are handled	ER Section 5.5.1.2[(a)]
	PSEG would also develop and implement contingency plans, emergency preparedness plans, and spill prevention procedures similar to the procedures and plans for the existing units that would be implemented in the event of a waste spill. Personnel who are designated to handle waste or to respond to waste emergency spills would receive appropriate training to enable them to perform their work properly and safely	ER Section 5.5.2.3[(a)]

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
Accidents		
	The exclusion area boundary is greater than 0.5 mi in all directions from the footprint of the new nuclear power plant. No major roads, public buildings, or residences are located within the exclusion area	ER Section 2.5.1[(a)]; EIS Section 3.1
	Population growth in the vicinity of the PSEG Site would not alter the population distribution in the region	ER Section 2.5.1[(a)]; EIS Section 2.5.1
	Impacts relating to postulated accidents determined by the applicant were based on earlier versions of the respective design certification/control documents (DCDs) for the Advanced Boiling Water Reactor, Advanced Passive 1000 (pressurized water) reactor, U.S. Advanced Pressurized Water Reactor, and U.S. Evolutionary Power Reactor designs. However, the staff conclusions were based on the latest versions of each DCD available at the time of the staff's review	ER Sections 7.1 and 7.2[(a)]; EIS Section 5.11
	External events are a design-specific issue; therefore, they were not addressed in the PSEG ESP application. For a COL application, 10 CFR 52.79(a)(46) (TN251) requires that the application includes a description of the PRA. The submitted PRA should follow Regulatory Guide 1.206, "Combined License Applications for Nuclear Power Plants" (NRC 2007-TN3035),with a Level 1 and Level 2 PRA that includes internal and external events and addresses all plant operating modes. The scope should be sufficient to enable the applicant to utilize it as discussed in Section C.I.19.2. The scope of the PRA may need to be expanded if it supports other risk-informed applications. The environmental review at the COL stage relies upon the risk analysis and PRA performed for the safety review (i.e., Chapter 19 of the FSAR). In addition, NUREG–0800, Standard Review Plan (NRC 2007-TN613) also states the following: The applicant's analyses should be comprehensive in scope, and address all applicable internal and external events and all plant operating modes. Since some aspects of the applicant's approach may involve non-PRA techniques to address specific events (e.g., PRA-based seismic margins), the PRA staff review should ensure that the scope of the applicant's analyses is appropriate for their identified uses and applications, which may involve a scope, level of detail, and/or technical adequacy for the affected areas that is greater than that needed for a COL application	ER Section 7.2[(a)]; EIS Section 5.11.2
Need for Power		
	In the need-for-power analysis, PSEG has identified the relevant service area as the entire State of New Jersey	ER Sections 8.0 and 8.1[(a)]
	PSEG has identified the need for an additional baseload generation in the State of New Jersey (i.e., within the relevant service area) which will be partially met by up to 2,200 MW(e) from the project no later than 2021	ER Section 8.4[(a)]; EIS Chapter 8

Table J-2. (continued)

Technical Area	Representations/Assumptions	Source
Energy Alternatives		
	The analysis of energy alternatives for this ESP application assumes that PSEG's desired net electrical output for the new nuclear power plant is 2,200 MW(e) at a capacity factor of 90%	ER Sections 1.2.3 and 9.2.2.1[(a)]
System Design Alternatives		
	PSEG considered any of three designs (i.e., MDCTs, NDCTs, and fan-assisted NDCTs) as options for its heat dissipation system. If one of these is chosen, it should be compared to the other two designs to determine if either of the other two designs is environmentally preferable to the chosen design	ER Section 9.4.1[(a)]; EIS Section 9.4.1
Cumulative Impacts		
	The proposed nearby projects and activities that could have a cumulative effect upon the construction or operation of a new nuclear power plant at the PSEG Site are those identified in EIS Sections 2.12 and 7.0	ER Sections 2.8.1 and 2.8.2[(a)]; RAI Response No. Env-14; EIS Section 7.0
Transmission Lines		
	Assumed the existing transmission lines have sufficient capacity to carry the total output of the existing SGS and HCGS units and a new nuclear power plant. A system study (load flow and grid stability) modeling these lines with the new plant's power contribution would need to be performed to confirm this assumption, if and when PSEG decided to proceed with the development of a new nuclear power plant at the site through the submittal of a COL application	EIS Section 3.2.2.2

(a) PSEG 2015-TN4280
(b) PSEG 2015-TN4283

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APPENDIX K

GREENHOUSE GAS FOOTPRINT ESTIMATES FOR A REFERENCE 1,000-MW(E) LIGHT WATER REACTOR (LWR)

APPENDIX K

GREENHOUSE GAS FOOTPRINT ESTIMATES FOR A REFERENCE 1,000-MW(E) LIGHT WATER REACTOR (LWR)

The review team has estimated the greenhouse gas (GHG) footprint of various activities associated with nuclear power plants. These activities include building, operating, and decommissioning a nuclear power plant. The estimates include direct emissions from the nuclear facility and indirect emissions from workforce transportation and the fuel cycle.

Preconstruction/construction equipment estimates listed in Table K-1 are based on hours of equipment use estimated for a single nuclear power plant at a site requiring a moderate amount of terrain modification (UniStar 2007-TN1564).

Preconstruction/construction equipment carbon monoxide (CO) emission estimates were derived from the hours of equipment use, and carbon dioxide (CO_2) emissions were then estimated from the CO emissions using a scaling factor of 172 tons of CO_2 per ton of CO. The scaling factor is based on the ratio of CO_2 to CO emission factors for diesel fuel industrial engines as reported in Table 3.3-1 of AP-42 (EPA 2012-TN2647). A CO_2 to total GHG equivalency factor of 0.991 is used to account for the emissions from other GHGs, such as methane (CH_4) and nitrous oxide (N_2O). The equivalency factor is based on non-road/construction equipment (Chapman et al. 2012-TN2644). Equipment emissions estimates for decommissioning are assumed to be one half of those for preconstruction/construction. Data on equipment emissions for decommissioning are not available; the one-half factor is based on the assumption that decommissioning would involve less earthmoving and hauling of material, as well as fewer labor hours, when compared with preconstruction/construction.

Table K-1. GHG Emissions from Equipment Used in Preconstruction/Construction and Decommissioning (MT CO_2e)

Equipment	Preconstruction/Construction Total[a]	Decommissioning Total[b]
Earthwork and Dewatering	12,000	6,000
Batch Plant Operations	3,400	1,700
Concrete	5,400	2,700
Lifting and Rigging	5,600	2,800
Shop Fabrication	1,000	500
Warehouse Operations	1,400	700
Equipment Maintenance	10,000	5,000
Total[c]	39,000	19,000

(a) Based on hours of equipment usage over a 7-year period.
(b) Based on equipment usage over a 10-year period.
(c) Results are rounded.

Table K-2 lists the review team's estimates of the CO_2 equivalent (CO_2e) emissions associated with workforce transportation. Workforce estimates for new plant preconstruction/construction are conservatively based on estimates in various combined license applications (Chapman et al. 2012-TN2644), and the operational and decommissioning workforce estimates are based on Supplement 1 to NUREG–0586 (NRC 2002-TN665). The table lists the assumptions used to estimate total miles traveled by each workforce and the factors used to convert total miles to metric tons (MT) CO_2e. The workers are assumed to travel in gasoline-powered passenger vehicles (cars, trucks, vans, and sport utility vehicles) that get an average of 21.6 mi per gallon of gasoline (FHWA 2012-TN2645). Conversion from gallons of gasoline burned to CO_2e is based on EPA emission factors (EPA 2012-TN2643).

Table K-2. Workforce GHG Footprint Estimates

	Preconstruction/ Construction Workforce	**Operational Workforce**	**Decommissioning Workforce**	**SAFSTOR Workforce**
Commuting Trips (round trips per day)	1,000	550	200	40
Commute Distance (miles per round trip)	40	40	40	40
Commuting Days (days per year)	365	365	250	365
Duration (years)	7	40	10	40
Total Distance Traveled (miles)[(a)]	102,000,000	321,000,000	20,000,000	23,000,000
Average Vehicle Fuel Efficiency[(b)] (miles per gallon)	21.6	21.6	21.6	21.6
Total Fuel Burned[(a)] (gallons)	4,700,000	14,900,000	900,000	1,100,000
CO_2 Emitted Per Gallon[(c)] (MT CO_2)	0.00892	0.00892	0.00892	0.00892
Total CO_2 Emitted[(a)] (MT CO_2)	42,000	133,000	8,000	10,000
CO_2 Equivalency Factor[(c)] (MT CO_2/MT CO_2e)	0.977	0.977	0.977	0.977
Total GHG Emitted[(a)] (MT CO_2e)	43,000	136,000	8,000	10,000

(a) Results are rounded.
(b) *Source:* FHWA 2012-TN2645.
(c) *Source:* EPA 2012-TN2643.

10 CFR 51.51(a) (TN250) states that every environmental report prepared for the combined license stage of a light-water-cooled nuclear power reactor shall take Table S-3 from 10 CFR 51.51(b) (TN250) as the basis for evaluating the contribution of the environmental effects of the uranium fuel cycle in licensing the nuclear power reactor. 10 CFR 51.51(a) (TN250) further states that Table S-3 shall be included in the environmental report and may be supplemented by

a discussion of the environmental significance of the data set forth in the table as weighted in the analysis for the proposed facility.

Table S-3 does not provide an estimate of GHG emissions associated with the uranium fuel cycle; it only addresses pollutants that were of concern when the table was promulgated in the 1980s. However, Table S-3 states that 323,000 MWh is the assumed annual electric energy use for the reference 1,000 MW(e) nuclear power plant and that this 323,000 MWh of annual electric energy is assumed to be generated by a 45 MW(e) coal-fired power plant burning 118,000 MT of coal. Table S-3 also assumes that approximately 135,000,000 standard cubic feet (scf) of natural gas is required per year to generate process heat for certain portions of the uranium fuel cycle. The review team estimates that burning 118,000 MT of coal and 135,000,000 scf of natural gas per year results in approximately 253,000 MT of CO_2e being emitted into the atmosphere per year because of the uranium fuel cycle (Harvey 2013-TN2646).

The review team estimated GHG emissions related to plant operations from a typical usage of various onsite diesel generators (UniStar 2007-TN1564). Carbon monoxide emission estimates were derived assuming an average of 600 hours of emergency diesel generator operation per year (four generators, each operating 150 hr/yr) and 200 hours of station blackout diesel generator operation per year (two generators, each operating 100 hr/yr). A scaling factor of 172 was then applied to convert the CO emissions to CO_2 emissions, and a CO_2 to total GHG equivalency factor of 0.991 was used to account for the emissions from other GHGs such as methane (CH_4) and nitrous oxide (N_2O).

Given the various sources of GHG emissions discussed above, the review team estimates the total life-cycle GHG footprint for a reference 1,000 MW(e) nuclear power plant with an 80 percent capacity factor to be about 10,500,000 MT. The components of the footprint are summarized in Table K-3. The uranium fuel cycle component of the footprint dominates all other components. It is directly related to power generated. As a result, it is reasonable to use reactor power to scale the footprint to larger reactors.

Table K-3. Nuclear Power Plant Lifetime GHG Footprint

Source	Activity Duration (yr)	Total Emissions (MT CO_2e)
Preconstruction/Construction Equipment	7	39,000
Preconstruction/Construction Workforce	7	43,000
Plant Operations	40	181,000
Operations Workforce	40	136,000
Uranium Fuel Cycle	40	10,100,000
Decommissioning Equipment	10	19,000
Decommissioning Workforce	10	8,000
SAFSTOR Workforce	40	10,000
TOTAL[(a)]		10,500,000

(a) Results are rounded

The IPCC released a special report on renewable energy sources and climate change mitigation in 2012 (IPCC 2012-TN2648). Annex II of the IPCC report includes an assessment of previously published works on life-cycle GHG emissions from various electric generation technologies, including nuclear energy. The IPCC report included in its assessment only material that passes certain screening criteria for quality and relevance. The IPCC screening yielded 125 estimates of nuclear energy life-cycle GHG emissions from 32 separate references. The IPCC-screened estimates of the life-cycle GHG emissions associated with nuclear energy, as shown in Table A.II.4 of the report, ranged more than two orders of magnitude, from 1 to 220 grams (g) of CO_2e per kWh, with 25th percentile, 50th percentile, and 75th percentile values of 8 g CO_2e/kWh, 16 g CO_2e/kWh, and 45 g CO_2e/kWh, respectively. The range of the IPCC estimates is due, in part, to assumptions regarding the type of enrichment technology employed, how the electricity used for enrichment is generated, the grade of mined uranium ore, the degree of processing and enrichment required, and the assumed operating lifetime of a nuclear power plant.

The review team's life-cycle GHG estimate of approximately 10,500,000 MT CO_2e for the reference 1,000 MW(e) nuclear plant is equal to about 37.5 g CO_2e/kWh, which places the review team estimate between the 50th and 75th percentile values of the IPCC estimates in Table A.II.4 of the report.

In closing, the review team considers the footprint estimated in Table K-3 to be appropriately conservative. The GHG emissions estimates for the dominant component (uranium fuel cycle) are based on 30-year-old enrichment technology, assuming that the energy required for enrichment is provided by coal-fired generation. Different assumptions related to the source of energy used for enrichment or the enrichment technology that would be just as reasonable could lead to a significantly reduced footprint.

Emissions estimates presented in this EIS have been scaled to values that are appropriate for the proposed project. The uranium fuel cycle emissions have been scaled by reactor power and plant capacity factor using the scaling factor determined in Chapter 6 and by the number of reactors to be built. Plant operations emissions have been adjusted to represent the number of large GHG emissions sources (diesel generators, boilers, etc.) associated with the project. The workforce emissions estimates have been scaled to account for differences in workforce numbers and commuting distance. Finally, equipment emissions estimates have been scaled by estimated equipment usage. As can be seen in Table K-3, only the scaling of the uranium fuel-cycle emissions estimates makes a significant difference in the total carbon footprint of the project.

K.1 References

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U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9 SPONSORING ORGANIZATION - NAME AND ADDRESS (If NRC, type "Same as above", if contractor, provide NRC Division, Office or Region, U. S Nuclear Regulatory Commission, and mailing address)
Same as above

10 SUPPLEMENTARY NOTES
Docket No. 52-043

11. ABSTRACT (200 words or less)

This environmental impact statement (EIS) has been prepared in response to an application to the U.S. Nuclear Regulatory Commission (NRC) by PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG), for an early site permit (ESP). The proposed action requested in the PSEG application is the NRC issuance of an ESP for the PSEG Site located adjacent to the existing Hope Creek and Salem Generating Stations.

This final environmental impact statement includes the preliminary analysis that evaluates the environmental impacts of the proposed action and alternatives to the proposed action .

After considering the environmental aspects of the proposed NRC action, the NRC staff's preliminary recommendation to the Commission is that the ESP be issued as requested. The recommendation is based on (1) the application submitted by PSEG, including Revision 4 of the Environmental Report (ER), and the PSEG responses to requests for additional information from the NRC and USACE staffs; (2) consultation with Federal, State Tribal , and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments related to the environmental review that were received during the public scoping process and the public comment period following the publication of the draft EIS; and (5) the assessments summarized in the EIS, including the potential mitigation measures identified in the ER and this EIS.

12 KEY WORDS/DESCRIPTORS (List words or phrases that will assist researchers in locating the report.)
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