COASTAL ZONE MANAGEMENT ACT CONSISTENCY CERTIFICATION

NEW NUCLEAR PLANT AT THE PSEG SITE
PSEG POWER LLC and PSEG NUCLEAR, LLC
Lower Alloways Creek Township, NJ

MAY 2010

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ABWR	Advanced Boiling Water Reactor
AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
AP1000	Advanced Passive 1000
BTA	best technology available
BWR	boiling-water reactor
CAFRA	Coastal Area Facility Review Act
CDF	confined disposal facility
cf	cubic feet
CFR	Code of Federal Regulations
cfs	cubic feet per second
COL	combined license
CWIS	circulating water intake structure
CWS	circulating water system
dBA	decibels
DCA	Department of Community Affairs
DE	Delaware
DOE	Department of Energy
DOT	Department of Transportation
DRBC	Delaware River Basin Commission
DTM	digital terrain model
DWDS	demineralized water distribution system
EAB	Exclusion Area Boundary
EEP	Estuary Enhancement Program
e.g.	for example
EIS	Environmental Impact Statement
EMAAC	Eastern Mid-Atlantic Area Council
EMAP	Environmental Monitoring and Assessment Program
ER	Environmental Report
ESA	Endangered Species Act
ESP	early site permit
Estuary	Delaware River Estuary
et al.	and others
et seq.	and the following

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
fps	feet per second
FPS	fire protection system
ft	feet
GIS	Geographical Information System
gpd	gallon per day
gpm	gallons per minute
HCGS	Hope Creek Generating Station
HPO	Historic Preservation Office
HUC	Hydrologic Unit Code
IA	Ichthyological Associates
IGCC	Integrated Gasification Combined Cycle
km	kilometer(s)
kV	kilovolts
LACT	Lower Alloways Creek Township
LLC	Limited Liability Company
LMP	locational marginal prices
LOS	level of service
LULC	land use and land cover
MD	Maryland
mgd	million gallons per day
mgm	million gallons per month
mgy	million gallons per year
MHWL	mean high water line
msl	mean sea level
MTU	metric ton of uranium
MWe	megawatts electrical
MWd	megawattdays
MWt	megawatts thermal
NAAQS	National Ambient Air Quality Standards
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NGVD29	National Geodetic Vertical Datum of 1929
NJ	New Jersey

NJAAQS	New Jersey Ambient Air Quality Standards
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NJEMP	New Jersey Energy Master Plan
NJPDES	New Jersey Pollutant Discharge Elimination System
N.J.S.A.	New Jersey Statutes Annotated
NMFS	National Marine Fisheries Service
No.	number
NOAA	National Oceanic and Atmospheric Administration
NRHP	National Register of Historic Places
NRC	U.S. Nuclear Regulatory Commission
NSSS	nuclear steam supply system
NWP	Nationwide Permit
OSHA	Occupational Safety and Health Administration
PA	Pennsylvania
PCB	polychlorinated biphenyls
PJM	PJM Interconnection, LLC
P.L.	Public Law
ppt	parts per thousand
PSD	Prevention of Significant Deterioration
PRM	Potomac-Raritan-Magothy
PSEG	PSEG Power, LLC and PSEG Nuclear, LLC
PSEG Site	Artificial Island
PSE&G	Public Service Electric and Gas Company
PSWS	potable & sanitary water system
PWR	pressurized-water reactor
Radwaste	radioactive waste
RCRA	Resource Conservation and Recovery Act
RGGI	Regional Greenhouse Gas Initiative
RIS	representative important species
RM	river mile
ROI	Region of Interest
RTO	Regional Transmission Organization
RTP	rated thermal power
SGS	Salem Generating Station

SIL	significant impact levels
SIP	State Implementation Plan
SWS	service water system
UHS	ultimate heat sink
USACE	U.S. Army Corps of Engineers
US-APWR	U.S. Advanced Pressurized Water Reactor
U.S.C.	U.S. Code
USCG	U.S. Coast Guard
USEPA	U.S. Environmental Protection Agency
U.S. EPR	U.S. Evolutionary Power Reactor
USFWS	U.S. Fish & Wildlife Service
USGS	United States Geological Survey

I. PURPOSE

Section 307 of the federal Coastal Zone Management Act of 1972 (Public Law [P.L.] 92-583) as amended, and the Coastal Zone Management Act Federal Consistency Regulations (Title 15, Code of Federal Regulations (CFR), Part 930 [15 CFR 930]) require an applicant applying for a federal license or permit for an activity affecting any coastal use or resource to provide a certification that the proposed activity complies with and will be conducted in a manner consistent with the applicable state coastal management program. Activities requiring federal approval are deemed to affect coastal uses and resources, if the state coastal management program has "listed" the particular federal license, permit, or approval in its federally approved coastal management program document. The New Jersey Coastal Management Program lists construction and operation of a nuclear power plant licensed by the U.S. Nuclear Regulatory Commission (NRC) in accordance with the Atomic Energy Act of 1954, as amended, and NRC implementing regulations as an activity requiring coastal zone consistency certification.

In accordance with the provisions of 10 CFR 52, *Licenses, Certifications, and Approvals for Nuclear Power Plants*, and supporting guidance, PSEG Power, LLC and PSEG Nuclear, LLC (PSEG) have developed an application for an early site permit (ESP). NRC issuance of an ESP represents its approval of a site or sites for one or more nuclear power plants. This is separate from the filing of an application for a construction permit or combined license for such a facility. An ESP allows the applicant and the NRC to identify and resolve potential safety, environmental, and emergency planning issues that are unique to the proposed site.

The PSEG ESP application is for a new nuclear power plant (new plant) adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station, (SGS) in Lower Alloways Creek Township, Salem County, New Jersey (NJ) at Artificial Island (PSEG Site) (Figure 1). In accordance with NRC regulations, PSEG has prepared an Environmental Report (ER) that analyzes impacts to the local and regional environment from construction and operation of one or two additional nuclear power plants at this site, as part of its ESP application. The NRC will use this ER to fulfill its National Environmental Policy Act of 1969 (NEPA) requirement to consider the environmental impacts that could result from the construction and operation of one or two new nuclear power units at the PSEG Site.

The ESP application describes in detail the activities or plant effluents that could directly affect the environment if a subsequent NRC license is issued for the construction and operation of the new plant. The ESP application also discusses the environmental impacts of alternatives capable of supplying equivalent baseload electricity. The ESP, which provides the technical data to support discussions of New Jersey Coastal Zone Management Rules, is a "bounding" document, i.e., it provides conservative estimates of the impacts of proposed development on environmentally sensitive resources within New Jersey's Coastal Zone. When a specific reactor technology is selected, it is expected that the actual environmental impacts will be less than those included within the ESP and this Coastal Zone Compliance Statement. The ESP application concludes that most of the adverse environmental impacts associated with the construction and operation of the new plant and supporting infrastructure at the PSEG Site are "small" or "reduced to small" through the application of appropriate mitigation and control measures.[1]

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[1] The terms "small", "moderate", and "large" in this context are consistent with the criteria established in 10 CFR 51 for environmental reviews:

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, any important attribute of the resource.

The ESP application also concludes that if the new plant is not constructed, the adverse impacts of likely alternatives are the same or greater than those associated with construction and operation of the new plant. The relevant service area for the new plant is NJ. Based on the 2009 PJM load forecast, the projected 2009 peak load within the new plant relevant service area was 20,200 megawatts electric (MWe). The forecasted peak demand in 2021, the projected date of new plant commercial operation, is 24,400 MWe. The forecasted baseload demand for 2021 is determined to be 10,400 MWe. Based on existing baseload resources, there is currently a need for 7,900 MWe of additional baseload capacity for NJ.[2] The new plant at the PSEG Site will operate as a merchant baseload plant producing up to 2,200 MWe.

Due to its location and operating characteristics, the new plant provides several ancillary benefits that supplement the overall need for baseload capacity. As a baseload nuclear plant, the new plant will operate at a high capacity factor and produce essentially no greenhouse gas or other air emissions in the generation of electricity. Its output will be connected to the 500 kV transmission network in NJ. Consequently, operating the new plant:

- Reduces the amount of CO_2 generating imports needed to meet baseload demand in NJ;
- Lowers locational marginal prices (LMP) due to reduced generation from fossil fueled resources in NJ. Fossil fueled resources are projected to have increased generation costs due to pending costs associated with carbon legislation;
- Reduces potential for transmission congestion;
- Reduces emissions in New Jersey from fossil fueled generation and imports;
- Reduces reliance on imported petroleum to the extent that generation from oil-fired resources is reduced;
- Increases the diversity of the NJ generation portfolio, which is currently comprised of 72 percent fossil fuel-fired plants; and,
- Increases NJ reserve margins to improve the capability of generating resources within NJ to meet the summer peak load.

PSEG concludes that the national interest in, and environmental benefits from, the construction of the new plant at the PSEG Site clearly outweighs any potentially adverse coastal effects, both in terms of meeting regional baseload electric demand and reducing emissions of air pollutants and greenhouse gases.

NRC issuance of an ESP for a new plant also may be of national interest within the meaning of Section 307(c)(3)(A) of the Coastal Zone Management Act (16 U.S.C. 1456(c)(3)(A)) and 15 CFR 930.121. New plant construction and operation is particularly important to meeting the energy needs in the densely populated northeastern United States.

LARGE–Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

[2] Calculated values based on 2009 PJM load forecast data.

II. APPLICANT'S CERTIFICATION

PSEG Power, LLC and PSEG Nuclear, LLC conclude that NRC issuance of the ESP for the new plant at the PSEG Site complies with the enforceable policies of the approved New Jersey Coastal Zone Management Program. All activities necessary for the ESP will be conducted in a manner consistent with such program.

PSEG Power, LLC and PSEG Nuclear, LLC

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III. OWNERSHIP AND OPERATION

The Applicants for the new plant are PSEG Power, LLC and PSEG Nuclear, LLC. PSEG Power, LLC is a Delaware (DE) limited liability company, which is wholly owned by Public Service Enterprise Group Incorporated, a corporation formed under the laws of NJ. It is anticipated that PSEG Power, LLC will be the owner of any new nuclear plant.

PSEG Nuclear, LLC is a DE limited liability company formed to own and operate nuclear generating stations and is a wholly owned subsidiary of PSEG Power, LLC. PSEG Nuclear, LLC is the owner and licensed operator of the HCGS and the partial owner and licensed operator of the SGS. These existing nuclear generating stations are located on the PSEG Site that is the subject of the ESP application. PSEG Nuclear, LLC will be the licensed operator of the new plant at the PSEG Site.

IV. PROJECT DESCRIPTION

A. Need for Project

The relevant service area (RSA) for the new plant is the State of New Jersey (NJ), which is part of PJM, the Regional Transmission Organization (RTO) for the area. The RSA for the new plant is based on the region where the majority of current and expected energy is delivered and where the greatest benefit from the new plant is received. Electricity in the region is bought and sold in competitive wholesale markets into which the new plant is expected to be bid. On an annual basis, NJ imports more than half of its baseload power needs. The ESP provides a detailed analysis of the models and calculations used to support New Jersey's need for electrical demand.

PJM serves to maintain the bulk electricity power supply system reliability for 13 states and the District of Columbia. PJM serves 51 million people and includes the major U.S. load centers from the western border of Illinois to the Atlantic coast including the metropolitan areas in and around Baltimore, Chicago, Columbus, Dayton, Newark, and northern NJ, Norfolk, Philadelphia, Pittsburgh, Richmond and Washington, D.C. (PJM Interconnection LLC, 2009).

New Jersey is part of a larger region of PJM known as the Eastern Mid-Atlantic Area Council (EMAAC). The EMAAC region of PJM includes Delaware (DE) and parts of Maryland (MD) and Pennsylvania (PA) as well as NJ. This area includes the service territories of the electric delivery companies of PECO Energy (PECO) and Delmarva Power & Light (DPL) as well as the electric delivery companies in NJ. The EMAAC region also imports power to serve its needs.

The new plant increases power grid reliability by adding 1350 to 2200 MWe of baseload generation within NJ. The agreements that PJM holds with adjacent NERC regions and sub-regions allow the new plant to support and potentially alleviate conditions that can create localized areas of congestion in the region. The U.S. Department of Energy (DOE) has identified NJ and EMAAC as part of a larger region within PJM having congestion problems adversely effecting consumers and local economies, or, Critical Congestion Areas (U.S. Department of Energy, 2009). PJM expects expanded power exports into NY, further challenging the situation. Limitations in the west-to-east transmission of energy across the Allegheny Mountains and the growing demand for baseload power at load centers in NJ and along the east coast are also contributing to localized areas of congestion.

Since 2003, a number of factors have continued to challenge system reliability in NJ. These factors include load growth, power exports to New York City and Long Island, deactivation and retirement of generation resources, modest development of new generation facilities due to low energy prices and heightened environmental requirements, and reliance on transmission to meet load deliverability requirements and to obtain access to economical, yet CO_2 intensive, sources of power from the west (PJM Interconnection LLC, 2009a). On an annual basis, NJ imports more than half of its baseload power needs. PJM projects that NJ will rely on transmission import capability to replace retired generation and to meet growth in demand.

The current NJ baseload capacity need is being met through imports and by increased use of peaking and intermediate resources. Utilization of higher operating cost (and often higher emitting) peaking and intermediate units is a likely cause for higher LMPs in NJ. In addition, the imports and the current fleet of intermediate and peaking resources are predominantly fossil fueled plants, with associated greenhouse gas and other air emissions that are projected to carry increased regulatory costs. Exports from NJ to New York City are also increasing imports to NJ, which results in greater air and greenhouse gas emissions from generating units to the west of NJ and can increase the potential for transmission congestion resulting in higher LMPs.

The new plant is intended to serve the PJM market and, in addition to imports, addresses a portion of the projected baseload capacity need in NJ. The new plant is expected to become operational in 2021 and operate as a merchant baseload plant producing up to approximately 2200 MWe. There currently is a need for 5800 MWe of additional baseload capacity in NJ to serve baseload demand. This need may be met with western imports and their associated CO_2 emissions, and/or new baseload generation that the new plant provides. The need for additional baseload is forecasted to grow to 7900 MWe by the year 2021. The need for additional baseload capacity within NJ is currently over twice the maximum output of the new plant, and will grow to almost three times the new plant capacity by 2021. The New Jersey Energy Master Plan, citing PJM Interconnection data projected in January 2008 that peak demand in New Jersey will continue to grow from 2008 through 2018 at an annual rate of about 1.75%. The projected growth in peak demand is about 2-1/2 times as fast as supply has grown in recent years. (State of New Jersey, 2008). In addition to supplying needed power, the new plant provides benefits to the market area in terms of reducing conditions that can create localized areas of congestion in the region; reduced power costs; reduced and avoided emissions and greenhouse gases from fossil fueled generation; and increased reserve margins.

B. Site Location

The PSEG Site is located in Lower Alloways Creek Township, Salem County, NJ, at River Mile (RM) 52 on the Delaware River, about 15 miles south of the Delaware Memorial Bridge (Figure 1). The entire site area is within the Delaware River's Estuary Transition zone (as defined by the U.S. Environmental Protection Agency's (USEPA) Delaware Estuary Program Scientific and Technical Advisory Committee), and Delaware River Basin Commission (DRBC) Zone 5 (PSEG 2006). The project site is situated on land known as Artificial Island on the eastern shore of the River. It is bordered by the River to the west and south, by extensive marshes and uplands to the east and northeast, and to the north by lands developed by the United States Army Corps of Engineers (USACE) as a confined disposal facility (CDF) for the disposal of dredge material. The River in the area of the PSEG Site is approximately 2.5 miles wide. The maximum tidal flow of the Delaware River past the PSEG Site is approximately 800,000 cfs with average flows of 400,000 to 472,000 cfs. The salinity of the River varies with both the tides and season from almost freshwater to mostly saltwater. The River in the vicinity of the PSEG Site has high turbidity and swift current velocities. Prominent features in the area (and their approximate distances) are the Chesapeake and Delaware Canal (3 miles to the northwest), Hope Creek Jetty (1.5 miles to the southeast), and Augustine Beach, DE (about 3 miles due west).

Artificial Island, which includes lands owned by PSEG, the State of New Jersey, and the federal government, was created, beginning early in the twentieth century, by disposing of hydraulic dredge spoils within a progressively enlarged diked area established around a natural sandbar that projected into the river. The elevation of Artificial Island generally ranges from 5 to 15 feet North American Vertical Datum 1988 (NAVD 88). Developed areas of the site are nominally 10 to 12 feet NAVD. Habitats can best be characterized as tidal marsh and grassland. (AEC 1973, PSEG 2006)

The SGS occupies about 220 acres of 734 acres owned by PSEG on Artificial Island. The SGS is a two unit electric generating facility. Units 1 and 2 are essentially identical pressurized water reactor (PWR) designs. Each consists of a 4-loop Westinghouse PWR with a Nuclear Steam Supply System (NSSS) licensed for 3,459 megawatts thermal (MWt). They are designed to operate continuously at their licensed thermal power rating as base-loaded electrical generating units. At 100 percent reactor power, the net electrical output is 1,195 megawatts electrical (MWe) for Unit 1 and 1,196 MWe for Unit 2 (PSEG 2007c). A small air-cooled combustion turbine, Salem Unit 3, rated at approximately 40 MWe is also located onsite.

The adjacent HCGS occupies 153 acres. HCGS is a General Electric boiling water reactor (BWR) design. The HCGS has a non-contact, closed cycle condenser cooling water system. HCGS operates as a base-load electrical generating unit. The original licensed core power for HCGS was 3,293

MWt. HCGS underwent a 1.4 percent (46 MWt) measurement uncertainty recapture uprate in 2001 and a 15 percent (501 MWt) extended power uprate in 2008. HCGS's current licensed thermal power is 3,840 MWt. At 100 percent reactor power, the net electrical output is approximately 1,265 MWe.

The remaining 361 PSEG-owned acres are uncommitted land. The rest of Artificial Island, which is owned by the federal government and NJ, is not occupied (AEC 1973). There are no major highways or railroads within 7.5 miles of the PSEG Site. The only land access is a road that PSEG constructed to connect its property with an existing secondary road 3.6 miles to the east. Barge traffic has access to the site by way of the channel maintained in the Delaware River (AEC 1973).

C. Site Development Plans

The new plant will be constructed adjacent to the existing HCGS and SGS. The site is remote from regional population centers. The nearest residences in DE and NJ are about 2.8 miles distant on the western shore of the Delaware River, and about 3.4 miles to the east-northeast, respectively. The nearest community is Hancock's Bridge, NJ, which is about 4.8 miles to the east of the new plant's center point. The new plant will be bounded by the existing HCGS and SGS to the south, the Delaware River on the west, coastal marshes to the east, and the remainder of Artificial Island to the north. A general layout that is based on an integrated combined area footprint for the four reactor technologies under consideration by PSEG is shown in the Site Utilization Plan (Figure 2).

PSEG is developing an agreement in principle with the USACE to acquire an additional 85 acres immediately to the north of HCGS from the USACE. With the land acquisition, the entire PSEG Site will be 819 acres. The specific timing of land acquisition is not currently known and is subject to further PSEG and USACE actions. However the agreement in principle with the USACE will serve to establish the basis for eventual land acquisition and Exclusion Area Boundary (EAB) control.

Subsequent to the agreement in principle with the USACE, PSEG will develop a lease agreement for the USACE CDF land to the north of the PSEG Site to be used for the concrete batch plant and temporary construction/laydown area (Figure 2). At the completion of construction, the leased land will be returned to the USACE, subject to any required long-term EAB control conditions.

Under the agreement in principle with the USACE, PSEG will design and license another CDF to offset the loss of capacity from the existing USACE CDF. At this time, a specific location and design have not been determined.

The location and layout of the new plant on the PSEG Site is shown on Figure 2, including the EAB minimum distance of 1,968.5 feet (600 m) as measured from the new plant power block footprint.

1. Reactor Technology

PSEG has not yet selected a specific reactor technology. The certified designs under consideration are conventional-style light water reactor plants, based on single-unit or dual-unit construction, with individual turbine and reactor buildings for each unit. 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).

The AP1000 plant consists of two units and associated turbines and power conversion equipment. The ABWR, U.S. EPR, and US-APWR consist of one unit and associated turbine and power conversion equipment. The ABWR is a BWR, while the AP1000, U.S. EPR, and US-APWR are PWRs. The initial licensed operating plant life will be 40 years based on the Atomic Energy Act and current regulations.

All nuclear power plants generate electricity by harnessing the heat released during controlled nuclear fission reactions to generate steam that is used to turn turbines connected to an electrical generator. All of the proposed reactor designs use uranium as their fissile material. The maximum uranium-235 enrichment is five weight percent for the initial fuel load. The maximum average assembly discharge burnup is 54,200 megawattdays per metric ton of uranium (MWd/MTU). The peak fuel rod burnup is 62,000 MWd/MTU.

The rated thermal power (RTP) generated by a single-unit plant will not be greater than 4,590 MWt, with a net electrical output of approximately 1,600 MWe. For a dual-unit plant, the RTP generated will not be greater than 6,800 MWt, with a net electrical output of approximately 2,200 MWe.

The Site Utilization Plan (Figure 2) was prepared by developing site layouts for each of the four reactor technology configurations considered for the PSEG Site. The primary power generation areas (i.e., power block area, switchyard, cooling tower area, etc.) are located in the same general area on the PSEG Site for each layout considered. After the layouts were established, the bounding footprint for each specific area (e.g. power block area) was developed by determining the maximum east/west and north/south dimensions. For example, to define the power block area, the east/west dimension of the U.S. EPR and north/south dimension of the dual unit AP1000 are utilized to establish the power block footprint area. This approach leads to a bounding and conservative estimate of overall land usage on the PSEG Site. Accordingly, estimates of impacts contained within this coastal zone consistency evaluation are conservative (i.e., actual impacts are bounded by and may be less than estimated).

The location of permanent land impact is shown on the Site Utilization Plan (Figure 2) as a cross-hatched area. The land utilized during construction is presented as diagonal hatching. The specific areas utilized for permanent and construction support features will not be defined until after a reactor technology is selected, but will be within the overall established boundary.

To conform with NRC regulations for new nuclear facilities (10 CFR 50, Appendix A), PSEG is raising the new plant's grade to 36.9 feet NAVD 88 elevation using structural fill. The design basis for this elevation is the protection of the facility against extreme (well beyond the regulated 100 year flood event) natural phenomena such as flooding, and considers the maximum tidal surge from the open coast as propagated to the site, with coincident 10% exceedance of maximum high tide and coincident wind set-up and wave run-up, and long term sea level rise. The ultimate power block structure heights vary depending upon the reactor technology selected. The bounding structure height (excluding cooling towers) from finished grade to the top of the tallest power block structure is approximately 234 feet. In general, buildings will be constructed with concrete, metal with metal siding, or wood with metal, vinyl, or other aesthetically acceptable siding.

The circulating water system for the new plant includes one or two natural draft, mechanical draft or fan-assisted natural draft wet cooling towers. The new plant will also include smaller mechanical draft cooling towers for service water system cooling. The Delaware River is used as make-up water for the cooling water systems. The new plant river intake and discharge structures are described in detail below.

Existing infrastructure will be modified to integrate the new plant with the existing units; however, none of the existing units' structures or facilities that directly support power generation will be shared or modified. Two new switchyards will be required for the new plant, and the existing onsite transmission lines will be modified as required to incorporate the new generation capacity into the electric grid.

One new potential offsite transmission line may be required depending on future studies to be conducted by the Regional Transmission Organization (RTO) – PJM Interconnection. A general regional plan for a new transmission corridor has been proposed in the ESP that originates to the north of the proposed facility, proceeds north for a short distance in NJ before crossing the Delaware River and paralleling the coast line of DE. The plan is conceptual at this stage and is subject to change as site development plans evolve. No routing studies have been performed at this time.

The existing security perimeter will be expanded to include the new plant. The existing sewage treatment facility, training, administrative buildings, warehouses, and other support facilities will be used, expanded, or replaced, to support the new plant, based on economic and operational considerations.

During construction, the laydown area and temporary construction support facilities will require approximately 141 acres. After the completion of the new plant, areas used for construction support will be physically returned, where appropriate, to match the overall site appearance or be used for other necessary site/support purposes. These areas include equipment laydown and module fabrication areas, batch plant area, areas around completed structures, and construction parking that is not required following completion of construction.

2. Water Withdrawals

Water is required to support the new facility during construction and operation, including the condenser cooling system, circulating water system (CWS), cooling water systems for plant auxiliary components (e.g., the service water system [SWS]), and makeup for the Ultimate Heat Sink (UHS) cooling system. The new plant uses a recirculating (closed-cycle) cooling water system that includes natural draft, mechanical or fan-assisted 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 accordance with New Jersey Pollutant Discharge Elimination System (NJPDES) permit requirements. The Potomac-Raritan-Magothy (PRM) aquifer will supply fresh water for general site purposes, including: the potable and sanitary water system (PSWS), demineralized water distribution system (DWDS), fire protection system (FPS), and other miscellaneous systems.

The CWS functions as the normal heat sink for routine plant processes and is required for power generation. It provides a continuous supply of cooling water from the normal plant heat sink to the main condensers to remove the heat rejected by the turbine cycle. The main condenser receives exhaust steam from the turbines and cooled water is pumped from the cooling tower through the main condenser and back to the cooling tower, where heat is rejected to the atmosphere by evaporation. The cooling towers use evaporative cooling to transfer up to 1.508E10 Btu/hr of heat to the atmosphere.

The SWS provides essential cooling to safety-related equipment and may also cool non-safety related auxiliary components used for normal plant operation. It removes heat from plant components by providing cooling water flow during normal operation, safe shutdown of the reactor, and following a design basis accident. Cooling water from the SWS cooling towers is provided to the component cooling water system heat exchangers, emergency diesel generator

heat exchangers and pump room coolers. For safety-related (essential SWS) cooling, the UHS supplies cooling water to the reactor cooling structures, systems and components important to safety that are necessary for normal shutdown and cool down, anticipated operational events, and accident conditions. Depending on the reactor technology, an active external safety-related UHS system may not be required to reach safe shutdown.

The average and maximum water consumption and discharge rates by the various cooling and water systems are provided in Table 1. This includes maximum and average makeup water flow rates, evaporation rates, drift rates, and blowdown rates for the CWS and SWS; and water makeup for the PSWS, DWDS, FPS, and floor wash drain. Also included is the discharge flow rate for applicable systems, including miscellaneous drains and liquid radioactive waste (radwaste). The average values are the expected limiting values for normal plant operation and the maximum values are those expected for upset or abnormal conditions. The makeup water supply source for the CWS, SWS, and UHS is the Delaware River. Depending on the reactor technology, the UHS may not require a safety-related makeup system or an active safety-related makeup system. For the PSWS, DWDS, FPS, and other miscellaneous systems, plant makeup flows are from an onsite freshwater aquifer. The blowdown and discharge water flow is discharged to the Delaware River. Figure 3 provides a water balance diagram to illustrate the average and maximum flows. The total intake from the Delaware River is 78,196 gallons per minute (gpm) (average) and 80,600 gpm (maximum). The bounding CWS flows were determined for site specific Delaware River water quality and PSEG site meteorological conditions, and the bounding SWS flows are modified for site specific river water quality.

The combined plant blowdown consists of discharge flows from the CWS, SWS, PSWS, DWDS, miscellaneous drains, liquid radwaste, and SWS makeup filter backwash. The combined plant blowdown flow discharges into the Delaware River at a flow rate of 51,946 gpm (average) and 53,222 gpm (maximum), the majority of which is non-contact cooling water.

Additional plant systems require freshwater. The PSWS supplies water needed for plant operation including potable water, sanitary water, and miscellaneous systems. The DWDS supplies makeup water of reactor coolant quality and treated water for other station operating requirements including reactor coolant makeup. The FPS supplies water to the PSEG Site fire suppression systems.

During construction activities, the plant requires freshwater for potable and sanitary use, concrete mixing and curing, and dust control. The total freshwater requirement for construction is 171,932 gallons per day (gpd), or 119 gpm. The sanitary discharge is 123,000 gpd or 85 gpm. The remainder of the supply is consumed. These construction flows are bounded by the total fresh water requirements and potable and sanitary flows during operation.

The current SGS and HCGS groundwater withdrawal permits allow for a maximum withdrawal rate of 2,900 gpm, and total diversion limits of 43.2 million gallons per month (Mgm) and 300 million gallons per year (Mgy). The groundwater withdrawal for the new plant is 210 gpm, which equals 110.4 Mgy. The additional average groundwater withdrawal for construction is within the permitted amounts. The cumulative maximum withdrawal for operations, including SGS and HCGS average historic withdrawals is 309 Mgy, which is 3 percent above the current SGS and HCGS site permitted annual water withdrawal. The highest SGS and HCGS historic groundwater withdrawal is 232.5 Mgy (1995).

After the reactor technology is selected and a final site water balance is developed, PSEG will reevaluate total PSEG Site (SGS, HCGS, and new plant) water use against the site water allocation permit limits. The current permits and authorizations will be modified as necessary to include the new plant, or new permit(s) for water withdrawal will be obtained.

Treatment systems are required for systems supplied by surface water and groundwater, including circulating water makeup, reactor water makeup, service water makeup, condensate, potable water, radwaste, and fire protection. The majority of the water is withdrawn from the Delaware River via an intake structure. The intake structure is located at approximately RM 52 and is situated in the tidal estuary zone of the Delaware River, where it is subject to tidal saltwater intrusion and at the turbidity maxima on the Delaware River. The water is hard and brackish with elevated levels of total dissolved solids and chlorides, elevated levels of both calcium and magnesium, and moderately high suspended solids levels.

a. Intake System

The intake structure is designed to meet the bounding makeup requirements of normal and safety-related (reactor technology dependent) cooling systems by drawing water directly from the Delaware River. Makeup water flow rates drawn into the intake structure are discussed above. The intake structure will be located along the east shoreline of the Delaware River. This location will be approximately 2,800 feet north of the existing Hope Creek service water intake structure (Figure 4). The approximate dimensions of the intake structure are 110 feet x 200 feet, which is necessary to meet the requirements of the bounding CWS and SWS intake flow requirements for the reactor technologies under consideration. The forebay for the intake will extend into the river and the area in front of the intake structure will be dredged to an elevation of -19' 10" NAVD 88. Figure 5 shows the plan view of the intake along the river with the bathymetry of the river around the intake.

The intake structure bay and intake screens will be sized so that the average intake through-screen flow velocity will 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. In accordance with these rules, this design value is subject to conditions of maximum flow (i.e., all pumps in the bay operating at full capacity) so as to enhance the performance of the debris-filtering system and minimize organism mortality due to impingement and entrainment. Debris and aquatic life accumulated by the traveling water screens will be returned to the Delaware River at or near the intake structure.

The bounding combined cooling water intake flow from the Delaware River by CWS makeup and SWS makeup is provided in Table 1.

b. Discharge System

The plant discharge will consist of cooling tower blowdown and other site wastewater streams, including the domestic water treatment and circulating water treatment systems. The volume and concentration of each constituent discharged to the environment will meet requirements established in the new plant's NJPDES Permit. The location and layout of the discharge system is shown in Figure 6. Dilution and dissipation of the discharge heat as well as other effluent constituents are affected by both the design of the discharge structure and the flow characteristics of the receiving water. The bounding combined blowdown flow discharges into the Delaware River are provided in Table 1. Discharge constituents are discussed below. The discharge point is located approximately 100 ft from the present shoreline.

c. Heat Dissipation System

Heat dissipation for the CWS occurs by means of wet cooling tower(s) within a closed loop system. The circulating water system cooling tower basins will be used as the normal heat sink. Makeup water to replenish losses from evaporation, blowdown, and drift is from the Delaware River. The quantity of water makeup, evaporation, and discharge is discussed above. As water evaporates and heat is rejected to the atmosphere, solids will drop out and reenter the CWS, increasing the amount of total dissolved solids. To sustain the heat transfer efficiency and maintain cooling tower water chemistry, a portion of the basin inventory will be continuously discharged through the plant blowdown path to the Delaware River. The cooling towers will utilize mechanical draft, natural draft, or fan-assisted natural draft wet cooling tower design. A mechanical draft cooling tower creates air flow through the use of motor driven fans. Heat from the system is released to the environment by fans forcing air to flow through the cooling tower. A natural draft cooling tower utilizes the properties of air to create air flow. Warm, moist air naturally rises due to the density differential between the cool, dry air outside of the cooling tower. Thereby, the heat from the system is naturally released to the environment. Fan-assisted natural draft cooling towers combine characteristics of a natural draft tower with forced draft fans. They utilize short stacks relative to natural draft towers and are equipped with fans to augment air flow. A tabulation of CWS cooling tower design specifications are in Table 2.

The new plant requires SWS cooling towers. Depending on the reactor technology selected, these cooling towers will also function as the safety-related UHS. These are mechanical draft cooling towers located in the power block area. Makeup for the cooling towers is from the Delaware River. Blowdown discharges will be sent to the Delaware River. A tabulation of SWS/UHS cooling tower design specifications are in Table 3.

3. Radioactive Waste Management Systems

This section provides a general discussion of the new plant radwaste management systems. Detailed information regarding the description of the liquid and gaseous radioactive waste management and effluent control systems, instrumentation and process flow diagrams, release points, and sources of waste will be provided following the selection of a reactor technology. Bounding parameters from the plant parameter envelope (PPE) and site-specific characteristics were used to establish radioactive waste management system descriptions.

The quantities of radioactive waste that are projected to be generated and processed and then stored or released annually as liquid or gaseous effluents or as solid waste are provided in this section. Radioactive waste management and effluent control systems are designed to minimize releases from reactor operations to values *as low as reasonably achievable* (ALARA). These systems are designed to meet the requirements of 10 CFR 20 and 10 CFR 50, Appendix I and are maintained in accordance with ALARA principles, be protective of the environment, to minimize radiological doses to the public.

a. Liquid Radioactive Waste Management System

Liquid radioisotopes are produced during the normal operation of nuclear reactors. The liquid radwaste system is designed to control, collect, process, handle, store, and dispose of liquid radioactive waste generated during normal operation. The system is designed to gather liquids that may leak from radioactive and potentially radioactive sources and store those liquids for further processing. The sources of liquid

waste include leakage from the reactor coolant system, detergent wastes, cleanup and purification systems, chemical wastes, and other similar sources.

After processing, small quantities of radioactive effluents may be released to the environment at release points, typically in the cooling water discharge stream, and will be monitored to measure the activity released. The flow rate at the discharge release point of potentially radioactive liquid effluent streams is 11 gpm.

b. Gaseous Radioactive Waste Management System

Gaseous radioisotopes are produced during the normal operation of nuclear reactors. The gaseous radwaste system is designed to control, collect, process, store, and dispose of potentially radioactive gases including noble gases, radioactive particulates, tritium, and iodine during normal operation. The system is designed to retain these gases and remove them in a controlled fashion through a gaseous waste collection system that collects waste from multiple sources and then stores the gas to allow short-lived isotopes to decay.

The remaining activity is released to the environment through a waste gas processing system designed to minimize the release to and the impact on the environment through a monitored release point. The system is designed to store and process released waste to maintain radiation exposure ALARA.

c. Solid Radioactive Waste Management System

Solid radioactive wastes are produced during the normal operation of nuclear reactors. Solid radioactive wastes can be either dry or wet solids. The source can be from an operational activity, maintenance, or other functions. The solid radwaste system is designed to receive, collect, and store any solid radioactive wastes prior to their processing and packaging for onsite storage or shipment offsite.

The system design will ensure that the solid radioactive wastes are collected, monitored, segregated, stored, and packaged for shipment in a manner that minimizes exposure to plant personnel and the public in accordance with 10 CFR 20 and 10 CFR 50, Appendix I. The bounding expected annual volume of radioactive solid waste is 16,721.5 cubic feet per year (ft^3/yr). Radioactive solid waste generated from the project will be shipped to the PSEG Site repository in Barnwell, South Carolina. New Jersey is a member of the Atlantic Interstate Low Level Radioactive Waste Management Compact.

4. Non-Radioactive Waste Systems

This section provides a general discussion of typical non-radioactive waste streams of the new plant, including cooling water and auxiliary boiler blowdown that may contain water-treatment chemicals or biocides, water-treatment wastes, floor and equipment drains, storm water runoff, laboratory waste, trash, hazardous waste, effluents from the sanitary sewer system, and miscellaneous gaseous, liquid and solid effluents.

Non-radioactive liquid wastes will be collected in the wastewater treatment system. The system will be designed to stop the discharge of wastewater upon detection of high radiation in the stream to the discharge point.

Detailed information describing the non-radioactive waste management and effluent control systems, process/instrumentation diagrams, and system process flow diagrams are dependant on

the specific reactor technology. All discharges will be in compliance with applicable Title V, NJPDES, and solid waste requirements.

a. Effluents Containing Chemicals or Biocides

Water chemistry for plant operation includes the treatment of water used in various secondary systems. Effluents from these water systems in the new plant will be processed to minimize release of these treatment chemicals. However, they might still contain some low-level chemicals and/or biocides. The chemical concentrations within effluent streams from the new plant will be controlled through engineering and operational/administrative controls to meet NJPDES Permit requirements, as well as requirements and limitations set by appropriate federal, regional, or local regulatory agencies at the time of construction and operation.

b. Sanitary System Effluents

The sewage treatment system will treat the daily flow from the new plant as well as the existing site. Conceptually, the facility will be a package plant equipped with an extended aeration activated sludge system. Two units, each with a capacity of 70,000 gpd, will be provided. Each unit includes an aeration tank and clarifier followed by a chlorine contact chamber. A single surge tank common to both treatment units is provided to equalize variations in influent flows to the treatment units. A sludge holding tank is provided for waste sludge. Residuals will be disposed offsite in a manner similar to current practices at the existing facility. Performance of the sewage treatment system will conform to NJPDES permit requirements.

c. Gaseous Effluents

Non-radioactive gaseous effluents result from the seasonal and intermittent operation of the auxiliary boilers, and from intermittent testing and operation of the standby power system, which may be diesel and/or gas turbine generators. These effluents commonly include particulates, sulfur oxides, carbon monoxide, hydrocarbons and nitrogen oxides. The cooling towers will emit particulates due to the salt content of the cooling water. All gaseous emissions will be in compliance with Title V permit requirements for the site.

d. Liquid Effluents

Non-radioactive liquid effluents that could potentially drain to the Delaware River will be limited under the NJPDES permit. These liquid effluents primarily include discharge of site storm drainage and other power block discharges, such as oily waste, acid/caustic wastes, and normal waste. Existing site storm drainage outfalls may be modified and new outfalls to the Delaware River will be constructed to accommodate adjusted flow paths, or volumes created by the construction and operation of the new plant. Liquid effluents from the power block of the new plant will be combined with the cooling tower blowdown and sanitary system effluent, and routed to the common plant outfall that discharges to the Delaware River. The design of the storm water systems for the new plant will comply with relevant federal, state, and local storm water regulations.

e. Solid Effluents

Non-radioactive solid wastes include typical industrial wastes such as metal, wood, and paper, as well as process wastes such as non-radioactive resins and sludge. PSEG is currently a conditionally exempt small-quantity hazardous waste generator, generating less than 100 kilograms/month (220 pounds/month). PSEG maintains the program required of a small-quantity generator and monitors the amount of hazardous waste generated each month. Hazardous waste is disposed of through licensed disposal facilities. Universal waste, such as paint waste, lead-acid batteries, used lamps, and mercury-containing switches, is segregated and disposed of through licensed disposal facilities.

Normal station waste (e.g., paper, plastic, glass, river vegetation) is segregated and, as much as possible and processed for recycling. Approximately two thirds (2/3) of the normal station waste is transferred to recycling vendors, with the remainder either incinerated or landfilled. It is anticipated that there will be no change to the method for handling solid wastes created by the new plant and waste processing procedures will be consistent with those at SGS and HCGS.

5. Power Transmission System

The new plant will be located adjacent to the HCGS and SGS. The electric power systems for these plants generate and transmit power into the PJM Interconnection LLC (PJM) power grid. PJM is a RTO that manages the high-voltage power grid and coordinates the movement of wholesale electricity in a market that serves 13 states and the District of Columbia. PJM coordinates the planning and operation for its members within its service area as well as for adjacent nonmember utilities and power pools, under a wide range of normal and emergency conditions. This section describes the new plant systems that are required to safely distribute the generated electrical power to the regional electric transmission and distribution system.

a. Switchyard Interfaces

Switchyards allow the transfer of electrical energy generated within a power plant to the regional power grid through high-voltage transmission lines. HCGS and SGS have separate, dedicated switchyards near the stations' power blocks. Both switchyards operate nominally at 500 kilovolts (kV). The switching station designs at each plant incorporate a breaker-and-a-half configuration for high reliability. Two new switchyards are required to support operation of the new plant. The new plant's switchyard will be electrically integrated with the existing switchyards via a new interposing switchyard. This arrangement reduces the number of potential new transmission lines and provides additional 500 kV connections to the four existing 500 KV circuits from SGS and HCGS. Electric power generated by the new plant is fed through an isolated phase bus to main transformer bank(s), where it is stepped up to 500 kV and delivered to the new switchyard. Electricity will be delivered to the grid via connections from the new switchyard to the interposing switchyard. The bounding land usage required within the PSEG Site for the two new switchyards is 63 acres. The proposed location of the new switchyards is shown on the Site Utilization Plan (Figure 2).

The configuration of the new switchyards is dependent on the reactor technology, number of units, and the approach for integration with the HCGS and SGS switchyards. The new switchyards require additional support services and structures for grounding, lightning protection, switchyard control power, and area lighting.

b. Transmission System

Presently, there are two 500 kV transmission lines to the HCGS switchyard from offsite, and one 500 kV tie line from HCGS to the SGS switchyard. One offsite line is a 17-mi. tie to the Red Lion Substation, located northwest in New Castle County, DE, and the other line is a 39-mi. tie to the New Freedom Switching Station, located northeast in Camden County, NJ. All three lines are physically independent sources of offsite power to HCGS.

In addition, there are two 500 kV transmission lines to the SGS switchyard from offsite, and one 500 kV tie line from SGS to the HCGS switchyard. One offsite line is a 42-mi. tie to the New Freedom Switching Station. The second offsite line is a 43-mi. tie to the New Freedom Switching Station. During 2008, a new substation (Orchard) was installed along this line, dividing it into two segments. All three lines are physically independent sources of offsite power to SGS and are available for either or both units.

The existing transmission lines servicing the PSEG Site have adequate thermal capacity to accommodate the additional new plant generation. Depending upon final reactor technology selection and other PJM activities and projects, one additional offsite transmission line may be required for transient stability purposes. Formal PJM analyses are required to identify any transmission system upgrades that may be necessary to accommodate a new nuclear plant at the PSEG Site. These PJM analyses have not been initiated, but formal entry into the PJM generation queue and commencement of these analyses is anticipated when a reactor technology is selected. PJM will evaluate the additional new plant generation along with the regional transmission system configuration and independent projects in the planning cycle at that time.

Considering that an additional offsite transmission line may be required, PSEG has performed a study to evaluate the magnitude of potential environmental impacts associated with two conceptual 500-kV transmission macro-corridors from the PSEG Site (Figure 7).

c. Transmission Macro-corridors

In order to summarize the potential effects of developing off-site transmission, PSEG has analyzed the potential impacts of a new 5 mile wide off-site macro-corridor. The area evaluated for this analysis is limited to lands within New Jersey. The length of the simplified conceptual route for the Macro-Corridor is approximately 12.23 miles; however, the actual length along the existing ROW's is approximately 12.87 miles. From the PSEG Site, the potential macro-corridor extends north and then west across the Delaware River to the Red Lion Substation. From this location, the potential macro-corridors diverge extending to the west (Peach Bottom) or south (Indian River).

The corridor in New Jersey was analyzed to provide a summary of the number and type of wetland resources within the 5 mile wide corridor. The resource coverages were then scaled from the total macro-corridor values to a "projected" impact value of a potential 200 foot wide (typical 500kV) right-of-way.

In the potential 200 foot wide right-of-way, the amount of wetlands and/or water area crossings is approximately 232 acres. The majority of this acreage will not be physically impacted except for the footprints for towers, the conversion of forested areas (if present), and any fill and stream impacts that can not be avoided / minimized during design. PSEG is also evaluating alternative means to address transmission grid stability to avoid the need for new transmission lines.

6. Proposed Causeway

The only route for vehicular access to the PSEG Site is the existing plant access road (Figure 8). This road extends through coastal wetlands from the PSEG Site in an easterly and east-northeasterly direction for about 3.6 miles, where it connects to Alloway Creek Neck Road (an existing secondary road). Alloway Creek Neck Road continues through uplands to the town of Hancock's Bridge. The existing right-of-way for the access road is variable, ranging from 350 feet to about 450 feet wide through state-owned lands.

Additional access road capacity is needed to address the current and future transportation needs for the PSEG Site, and to eliminate congestion due to operational/outage traffic and new plant construction traffic at rural intersections near Hancock's Bridge and Salem City. The proposed causeway will provide redundant means of evacuation and emergency access to and from the PSEG Site. The proposed causeway is conceptually designed as a three-lane causeway to be constructed on elevated structures for its entire length through coastal wetlands. The proposed causeway extends northeast from the PSEG Site along or adjacent to the existing transmission corridor right-of-way to the intersection of Money Island Road and Mason Point Road (Figures 9 and 10). The alignment runs roughly 200 feet east of, and parallel to, the existing Red Lion transmission line for most of its length. Through the coastal wetlands, the proposed causeway will be constructed on elevated structures, thereby reducing environmental impacts.

7. In-Water Construction Activities

To facilitate construction of the new plant, a new barge unloading facility will be required along the Delaware River shoreline of the PSEG Site. The new barge unloading area is approximately 300 feet long and 58 feet wide, and the barge mooring area is up to 1,250 feet long (Figure 2). Construction of the new barge unloading facility and mooring area requires lowering the river bottom an average of 4.5 feet for an area of about 61 acres (dredging of about 440,000 cubic yards of sediment). In addition, approximately seven barge mooring caissons will be constructed. Each caisson is 20 feet in diameter resulting in the loss of about 0.05 acres of river bottom habitat for the seven caissons.

Construction of the new intake structure requires dredging of an approximately 31 acre area by an average of 4.5 feet (dredging of approximately 150,000 cubic yards of sediment). The new intake structure area is approximately 200 feet long and 110 feet wide, housing the trash racks, traveling screens, and intake pumps (Figures 2 and 11).

Construction of the barge facility and intake structure will occur along the eastern shore of the Delaware River in the northern part of the PSEG Site. The intake structure is located adjacent to the power block area, and the barge facility is located adjacent to the cooling tower area. The maximum areal extent of the Delaware River bottom to be dredged for this project is approximately 92 acres. Technology used for dredging of this area has not been determined but is expected to utilize a combination of suction and bucket dredges. The materials dredged from these areas will be disposed of in an approved CDF or other appropriate upland disposal facility in accordance with the conditions of the applicable environmental permits for these activities.

D. Schedule

The ESP does not constitute a decision or approval to build a new plant. NRC regulations (10 CFR 50.10, *License Required; Limited Work Authorization,* and 10 CFR 52.25, *Extent of Activities Permitted*) allow performance of site preparation (pre-construction) activities. Should PSEG decide to initiate site preparation activities, it is estimated that such activities will take 12 to 36 months to complete, prior to the start of NRC-regulated construction activities. If PSEG decides to submit a COL application

and the NRC grants a COL, it is estimated that construction of a new nuclear plant will occur over an additional 5- to 7-year period.

V. ALTERNATIVES

PSEG has assessed alternatives to the new plant in terms of power (e.g., nuclear, fossil fuel, solar power, etc.) and location. The following summaries identify and describe the alternatives analyzed for siting, constructing, and operating the new plant at the PSEG Site, which is designed and operated as a baseload generator. The descriptions provide sufficient detail to facilitate evaluation of the impacts of the no-action alternative, energy alternatives, alternative sites, and alternative plant and transmission systems for the new plant proposed by PSEG Power, LLC and PSEG Nuclear, LLC (PSEG).

A. Power Alternatives

No-Action Alternative

The No-Action Alternative presupposes that no other generating station, either nuclear or non-nuclear, would be constructed in place of the new plant. The No-Action Alternative also presupposes that no additional conservation measures beyond current levels would be enacted to decrease the amount of electrical capacity that would otherwise be required.

Under the No-Action Alternative, the NRC does not issue an ESP, the construction and operation of the new plant at the PSEG Site would not occur, and the benefits of the ESP program would not be realized. If the new plant were not constructed or operated, the environmental impacts associated with construction and operation would be avoided, but there would be negative consequences, including the loss of up to 2200 MWe additional baseload generating capacity and the loss of ancillary benefits of the new plant. The ancillary benefits that would not be realized include reduced electricity imports, reduced local transmission constraints resulting from reductions in imported power, lower LMPs, reduced air pollution and CO_2 emissions, the avoidance of anticipated higher fossil-based generating costs in light of pending carbon legislation, reduced reliance on imported petroleum, increased diversity of generating resources, and increased reserve margins and improved system reliability in NJ.

Under the No-Action Alternative, the new plant would not be available to help avoid the economic, reliability, and environmental consequences of the business as usual scenario identified in the New Jersey Energy Master Plan (NJEMP). The NJEMP estimates that NJ will use 97,800 gigawatt hours (GWh) of electricity and 542 trillion British thermal units (Btu) of natural gas or heating oil in 2020 if no changes in energy supply and demand trends are made. This total energy consumption will cost consumers more than $30.7 billion in 2020, which is 96 percent more than the total annual energy expenditures in 2005. The NJEMP also indicates that if no changes in energy supply and demand trends are made, greenhouse gas emissions will increase, with CO_2 emissions totaling 84 million metric tons in 2020 (State of New Jersey, 2008). The new plant at the PSEG Site reduces LMPs and greenhouse gas emissions in NJ. These benefits are not realized under the No-Action Alternative.

If the No-Action Alternative is enacted, the current reliance on electricity produced by fossil-fueled generation would continue for the states participating in the Regional Greenhouse Gas Initiative (RGGI). The RGGI was developed by ten Northeast and Mid-Atlantic States to cap and then reduce power plant CO_2 emissions. New Jersey is one of the ten participating states. Under the RGGI agreement, states must stabilize CO_2 emissions from 2009 to 2014 and then reduce the emissions by 2.5 percent per year from 2015 to 2018 (10 percent total) (RGGI, 2009).

Under the No-Action Alternative, the new plant would not be available to provide an alternative source of electric generation that produces almost none of the greenhouse gases subject to pending federal regulatory and legislative initiatives. The U.S. Environmental Projection Agency (EPA) has issued a

finding that greenhouse gases contribute to air pollution that may endanger public health or welfare. This finding could result in regulations to reduce greenhouse gases under the Clean Air Act (USEPA, 2009). In addition, the U.S. House of Representatives has passed the American Clean Energy and Security Act of 2009, which sets goals and establishes a cap-and-trade system for reductions in greenhouse gas emissions (U.S. Congress, 2009). Both the EPA finding and the House bill are indicative of an intention to require reductions in greenhouse gases. The new plant at the PSEG Site can replace generating sources that emit significant amounts of greenhouse gases affected by these initiatives, but would not be available under the No-Action Alternative.

Alternatives Not Requiring Generating Capacity

Energy conservation measures and programs to reduce energy demand can be characterized as (1) energy efficiency programs, designed to permanently reduce the consumption of energy by residential, commercial and industrial users; (2) demand side management (DSM) programs, designed to reduce peak power demand by temporarily reducing load or by shifting peak period load to off-peak periods; and (3) distributed generation programs, designed to encourage the use of renewable technologies by end users to self-supply some of their electricity need. The overall impact of these programs is not adequate to obviate the need for the new plant. The effect of these programs on future projections of power demand has been incorporated into PJM planning indirectly through the development of the load forecast and directly through the bidding of Energy Efficiency (EE) and Demand Response (DR) resources into the annual Reliability Pricing Model (RPM) auctions. PJM uses an econometric modeling approach to forecasting of future peak power demand and energy use. The effect of energy efficiency, DSM and distributed generation programs affect the forecast to the extent that the historical data used to develop the econometric model reflects the impact of the programs. The EE and DR resources that clear the RPM auction become part of the regional power supply and reduce the need for additional generation.

After including the impact of conservation programs, 7,900 MWe of additional baseload capacity is still needed by 2021, the expected year of commercial operation of the new plant at the PSEG Site. This means that conservation programs alone cannot replace the need for baseload capacity in NJ and therefore do not satisfy the purpose of the project. Accordingly, energy conservation is not a viable alternative to the construction of a merchant baseload generating facility, because it cannot reduce the use of electricity enough to eliminate the need for additional baseload capacity.

Alternatives Requiring New Generating Capacity

This section assesses wind, geothermal, hydro, solar, biomass, petroleum liquids, fuel cells, coal, natural gas and Integrated Gasification Combined Cycle generation sources. Competitive alternatives are identified based on availability in NJ, overall feasibility, ability to generate baseload power and environmental consequences.

Wind - Due to its low capacity factor, wind is not a competitive alternative energy source because it cannot reliably supply baseload-generating capacity equivalent to the proposed new plant. Capacity factor is an indication of how much energy a plant is able to produce compared to the plant's capacity, and is therefore related to the reliability of plant equipment, how often the plant is dispatched, fuel availability, and other factors that keep the plant from operating. For thermal power plants, fuel availability does not typically impact capacity factor because fuel can be purchased, transported, and stored. By its nature, wind is a limited and intermittent resource, and cannot be purchased, transported or stored. Overall, the typical capacity factor for wind generation is 30 percent (Center for Energy Efficiency & Renewable Energy 2009). Accordingly, wind power, by itself, cannot generate baseload power.

It should be noted that wind cannot become competitive solely by adding more facilities in the region to compensate for the low capacity factors. The capacity factor of a thermal power facility is typically independent of other thermal power facilities; i.e., equipment reliability problems at one plant do not impact the capacity factor at another plant. However, because wind acts over a large area or region, the low capacity of wind energy plants is not independent. In other words, the cause for a low capacity factor at one facility can also result in a low capacity factor at another facility.

In general, wind areas identified as Class 4 and above are regarded as potentially economical for energy production with current technology. As a result of technological advances and the current level of financial incentive support, other areas with a slightly lower wind resource (Class 3) could be suitable for wind development. Class 3 resource sites operate at a lower annual capacity factor than Class 4 areas. The majority of the wind resources along the NJ shoreline are rated as Class 3 resources. Offshore areas are rated as Class 4 and in limited areas, Class 5 (U.S. Department of Energy, 2009). In June 2009, the first five renewable energy leases for the Outer Continental Shelf were granted to three NJ based wind developers to build meteorological testing facilities off the coast. PSEG is currently developing offshore wind energy resources in NJ and DE with one of these developers.

In terms of direct costs, larger wind farms in more favorable areas are now considered economically competitive with conventional fossil-fueled power plants in many locations (U.S. Department of Energy, 2009). Even though large wind farms may be an economic alternative to traditional fossil fuel plants, there are several characteristics that make it unsuitable as a baseload resource:

- Wind generation is not considered dispatchable, meaning that the wind turbine generator cannot be controlled to match load and economic requirements. Energy from wind turbines is available as long as wind speeds are above a minimum threshold and below a maximum threshold, and hence is highly variable. If wind velocity is very high, wind turbines shut down to avoid overspeed conditions that can damage turbine equipment. Wind generation cannot provide baseload capacity without backup generation capabilities because of these characteristics.

- Wind generation is best sited where higher winds are most prevalent. These areas often are remote and valued for scenic quality:

    - Visual impacts – Critics of large-scale offshore wind farms, or wind farms located on the coastline, consider them to be an aesthetic problem. Local residents near the wind farms might lose what they consider their pristine scenic view of the area. High-speed wind turbine blades can also be noisy, although technological advancements continue to lessen this problem.

    - Interconnection of wind farms located in offshore areas requires new transmission lines to connect the wind farm to the grid. Existing transmission infrastructure might need to be upgraded to handle the additional supply. The choice of a location might be limited by land use regulations and the ability to obtain the required permits from local, regional, and national authorities. The farther a wind energy development project is from transmission lines, the higher the cost of connection to the transmission system.

- Wind farms occupy large amounts of land not only for the physical footprint of the wind turbine facilities themselves but also to allow sufficient spacing to avoid interference among turbines and to maximize capture of the available wind energy. If the turbines are too close together, one turbine can affect the efficiency of another turbine. Approximately 2025 2-MWe wind turbines operating at a typical capacity factor of 30 percent would be needed to replace the energy

equivalent of a 1350 MWe nuclear unit operating at a capacity factor of 90 percent at the PSEG Site. The turbines would be distributed over an area of 243,000 acres to avoid interference between turbines, and approximately 12,150 acres would be disturbed to accommodate the physical turbine equipment and facilities. To replace the energy equivalent of 2200 MWe of nuclear capacity operating at a 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. As a point of comparison, the lower bound of this land area is almost 15 times the area of the city of Newark.

Geothermal - Geothermal energy is not a competitive alternative to the new nuclear plant at the PSEG Site. Geothermal technologies such as geothermal heat pumps are considered a candidate renewable energy technology at the residential or commercial level as part of ongoing energy efficiency programs. However, based on the known geothermal regions of the United States, the NJ is not a candidate for geothermal generation technologies and could not produce the proposed 1,350 to 2,200 MWe of baseload energy (PSEG 2010). Geothermal plants are best located in the western continental United States, Alaska, and Hawaii, where hydrothermal reservoirs are prevalent.

Hydro - Hydropower is not a competitive alternative to the new nuclear plant at the PSEG Site because the feasible hydropower available for development in NJ would not provide an adequate amount of baseload generation. New Jersey was evaluated to determine the total amount of MWe that is feasible for hydropower development. The evaluation is based on a January 2006 U.S. Department of Energy (DOE) study, *Feasibility Assessment of the Water Energy Resources for the United States for New Low Power and Small Hydro classes of Hydroelectric Plants*. The study examined all sources of hydropower, including large scale hydropower development opportunities (defined as greater than 30 MWe of equivalent annual energy), but found that 99 percent of sites across the U.S. were suitable only for small or low hydropower. No large scale hydro opportunities were found in NJ. Only 64 MWe was found to be feasible for development including 44 MWe for small hydropower projects (greater than 1 MWe in size) and 20 MWe for low power technologies (less than 1 MW) (U.S. Department of Energy, 2006).

Technologies are being developed to convert waves, tides and ocean thermal gradients into electric energy. These technologies have only been recently demonstrated on a small exploratory scale and are not commercially available, and thus are noncompetitive alternatives.

Solar - Solar thermal technologies include linear concentrator (trough) systems, dish/engine systems, and power tower systems. Trough and tower systems produce electric power by using various mirror configurations to transfer solar energy into high temperature heat transfer systems. The heat transfer systems are routed through heat exchangers where the heat is used to produce steam, which is subsequently used to generate electricity via a steam turbine driven generator. The southwest part of the U.S. is the most favorable region for development of solar thermal technologies due to the extensive period of intense sunlight and high solar-to-electric conversion efficiencies. Potential locations with insolation values below approximately 6.75 kWh/m^2 per day are typically eliminated as they generally have a higher cost of electricity (PSEG 2010). Insolation levels in the southwest U.S. are typically between 6 to 8 kWh/m^2 per day (PSEG 2010).

The annual average solar thermal insolation for NJ is less than 4 kWh/m2 per day for solar thermal technologies. Accordingly, CSP is not viable in the EMAAC region.

Solar Photovoltaic (PV) technologies convert sunlight directly into electricity by using photons from the sun's light to excite electrons into higher states of energy. Solar PV is not a competitive alternative to the proposed new plant because the resource is not suitable in the region for

baseload power and the economics of solar PV power generation make it an impractical alternative compared to the proposed new plant.

The annual average PV insolation value is 4.7 kWh/m^2/day in Atlantic City, NJ. The PV capacity factor in NJ, where the PSEG Site is located, is estimated to be 15 percent, which is significantly less than the capacity factor required for a baseload power plant (Wiser and Bolinger , 2005). Similar to wind generation, the low capacity factor associated with solar PV in NJ precludes it from replacing baseload generation, making solar PV an uncompetitive alternative energy source.

Based on the annual average PV insolation value for NJ and technology efficiencies, it is estimated that 66,000 ac. of photovoltaic panels would be required to replace the energy equivalent of a 1350 MWe nuclear unit at the PSEG Site. To replace the energy equivalent of 2200 MWe of nuclear capacity, approximately 107,000 ac. of photovoltaic panels would be required.

Biomass - Biomass energy includes a wide variety of sources and materials including agricultural crop residues and wastes, energy crops, forest residues, urban wood wastes, municipal solid waste, landfill gas, and refuse-derived fuel. A study completed in 2007 for the New Jersey Board of Public Utilities by Rutgers University estimated the maximum potential for biomass generation in NJ based on modifications to collection infrastructure, development of supporting governmental policies, development of biomass technologies, and cost reductions in generation technology and collection infrastructure (Rutgers, 2007). If the ideal conditions to produce the maximum potential as identified by the Rutgers study were in place, then 1124 MWe of biomass generation would be available in NJ. However, given that biomass energy production is costly and time-consuming to develop, the 240 MWe estimate developed using National Renewable Energy Laboratory (NREL) data is a more realistic representation of current potential for biomass generation in NJ.

Petroleum Oils - Oil-fired generation is not a competitive option with the new plant at the PSEG Site due to its environmental impacts and the increasingly high cost of petroleum-based fuels. While capital costs for new petroleum-fired plants are similar to the cost of a new gas-fired plant, petroleum-fired operation is more expensive due to the high cost of petroleum. Future increases in petroleum prices are expected to make petroleum-fired generation increasingly more expensive relative to other alternatives. The high cost of petroleum has prompted a steady decline in its use for electricity generation in recent decades and no new oil-fired steam electric units have been constructed in the U.S. since 1981 (PSEG 2010). Due to the constant fluctuations and the steady rise in oil prices experienced over the years, oil-fueled power (including units fired by distillate fuel oil, residential fuel oil, petroleum coke, jet fuel, kerosene, other petroleum and waste oil) continues to experience a decline.

Overall, an oil-fired power generation plant is not a competitive alternative to the new plant at the PSEG Site because of the unfavorable economics and environmental impacts associated with oil-fired generation.

Fuel Cells - Based on technical immaturity, high costs, and limited generation potential, fuel cell technology is not a competitive alternative for the proposed new plant. Fuel cells have not been developed to the point where they are technologically mature. Phosphoric acid fuel cells are the most mature fuel cell technology, but they are only in the initial stages of commercialization. Fuel cells are not cost effective when compared with other generation technologies, both renewable and fossil-based. However, the projected size of natural gas fuel cell plants (in the 50 to 100 MWe range as market acceptance and manufacturing capacity increase) is insufficient to meet the baseload demand that would be provided by the new plant.

Coal - Coal is an affordable technology for reliable, near-term development. Coal can currently produce more energy than most forms of clean or renewable energy and is a competitive alternative to the new nuclear plant at the PSEG Site. Although coal has been a reliable energy source for decades, the substitution of renewable energy and other alternatives with lower emissions and environmental impacts has caused a decrease in coal-fired power production in the U.S. Based on the well-known technology, fuel availability and generally understood environmental impacts associated with constructing and operating a coal-fired power generation plant, new coal capacity is considered a potential replacement for nuclear power.

Table 4 presents the environmental impacts associated with the coal-fired alternative as discussed above as well as the impacts of the new plant. By comparison, it can be seen that a coal-fired generating facility is not environmentally preferable to the new nuclear plant at the PSEG Site.

Natural Gas - Based on well-known technology, fuel availability, and known environmental impacts associated with constructing and operating a natural gas-fired power generation plant, this source of energy is considered a competitive alternative to development of the new nuclear plant at the PSEG Site. While environmental impacts of constructing natural gas-fired power generating plants are similar to those of other large power generating stations; natural gas is considered the cleanest of the fossil fuels (PSEG 2010).

Table 4 shows the environmental impacts associated with the gas-fired alternative as discussed above as well as the impacts of the proposed new plant. By comparison, the gas-fired generating facility is not environmentally preferable to the new nuclear plant at the PSEG Site.

Integrated Gasification Combined Cycle - Integrated Gasification Combined Cycle (IGCC) power generation has not been demonstrated to achieve an acceptable level of reliability and cost competitiveness to be a competitive alternative to the construction of the new nuclear plant at the PSEG Site.

IGCC, also known as clean coal, is an emerging, advanced technology for generating electricity with coal that combines modern coal gasification technology with both gas turbine and steam turbine power generation. The technology is substantially cleaner than conventional pulverized coal plants because major pollutants can be removed from the gas stream before combustion.

IGCC technology has not been demonstrated to achieve an acceptable level of reliability and cost competitiveness, therefore, an IGCC facility is not a competitive alternative to the construction of the new nuclear plant at the PSEG Site.

Conclusion

Overall, the new nuclear plant is environmentally preferable to an alternative power generating facility fueled by coal, natural gas, or a combination of alternatives including biomass, wind and/or PV solar power together with coal or gas-fired generating facilities. Furthermore, each of these types of alternatives has a greater environmental impact on air quality than a new nuclear power generating facility. Therefore, neither a power generating facility fueled by coal, natural gas, nor a combination of coal-fired or natural gas generation with biomass, wind and/or solar PV alternatives, is environmentally preferable to the new nuclear plant at the PSEG Site to provide baseload generation. An expanded alternative analysis in accordance with NEPA guidelines has been provided to the NRC as part of the ESP application.

B. Site Alternatives

PSEG conducted a comprehensive site selection study in 2008 and 2009. The objective of this study was to select a Proposed Site for the new plant using a systematic process that considered relevant factors related to nuclear licensing, environmental acceptability, and engineering/cost issues. This section provides an evaluation of alternatives to the proposed PSEG Site for new plant construction and operation. The basic parameters of the site selection study were determined based on regulatory guidance, benchmarking, and previous nuclear power plant experience. These basic parameters included the following:

- Site acreage and make-up water requirements should bound the requirements of the four reactor designs being considered by PSEG.
- Sites should be able to support one large unit (e.g., U.S. EPR) or two smaller units (i.e., AP1000) of the designs being considered.
- The potential to expand sites with additional units in the future should not be considered.
- The new plant has a maximum generating capacity of 2200 megawatts (MWe) (the nominal capacity of two AP1000 units).
- The new plant must interconnect with a transmission line or substation with a voltage of 500 kilovolts (kV) (the maximum voltage currently available in NJ, and the voltage considered necessary to provide maximum margin against thermal overloads).
- The minimum make-up water requirement for the new plant is 35,000 gpm (conservative estimate of cooling tower and essential service water make-up for one U.S. EPR unit).

The site selection study included the following major tasks, as defined in NUREG-1555:

- **Establish the Region of Interest (ROI)** - The ROI is the area to be considered in searching for potential power plant sites. The ROI is typically selected based on geographic boundaries (e.g., the state in which the proposed site is located) or the relevant service area for the proposed plant. Given Public Service Enterprise Group's long corporate history (over 100 years) and strong presence in NJ, the new plant is expected to supply much of its output to important load centers in NJ via existing transmission circuits. Locating the facility in NJ facilitates the delivery of power to these load centers and allows Public Service Enterprise Group to make optimal use of its existing resources in the state. Locating the facility in NJ also promotes the state's energy self-sufficiency, which is one of the objectives of the New Jersey Energy Master Plan (New Jersey 2008). Based on the considerations discussed above, NJ was established as the ROI for the site evaluation study.

- **Identify Candidate Areas** - Candidate Areas are areas within the ROI that remain after unsuitable areas are eliminated. Candidate Areas were identified by constructing digitized Geographic Information System (GIS) maps of the entire ROI and applying exclusionary criteria to eliminate areas considered unsuitable for nuclear power plant siting. Exclusionary criteria included distances to highways, railroad or barge transportation, transmission, and water sources. In addition, proximity to designated lands (parks, recreational areas, natural areas, etc.) was considered, as was population density.

- **Identify Potential Sites** - Potential Sites are specific locations within the Candidate Areas that are identified for preliminary assessment in establishing Candidate Sites. Potential Sites were identified by examining topographic maps and aerial photographs of the Candidate Areas to find specific locations that appeared, on the basis of high-level screening criteria, to be suitable for nuclear power plant siting. A key consideration was the availability of sufficient land suitable for arrangement of the power plant and other required facilities, as well as a reasonable site boundary. Preliminary plant footprint blocks were developed and arranged on each Potential Site to confirm the adequacy of the available land.

- **Identify Candidate Sites** - Candidate Sites are those Potential Sites that are considered to be among the best sites that can reasonably be found for the siting of a nuclear power plant. Candidate Sites were identified by examining the Potential Sites to determine whether they had any environmental or other issues that would make them impractical or undesirable for licensing, permitting, or development with a nuclear power plant. The issues evaluated during this screening were primarily environmental, combined with a qualitative assessment of the level of environmental impact and the necessary activities or considerations to mitigate or avoid the impact. Issues considered in this evaluation include the following:

  Environmental Acceptability - The sites were reviewed with regard to major environmental issues, such as proximity to designated lands or waters and potential encroachment on sensitive land uses.

  Nuclear Licensing - The sites were reviewed with regard to major nuclear licensing issues, such as proximity to capable faults, hazardous land uses, and population centers.

  Engineering - The sites were reviewed with regard to major engineering issues, such as the length and difficulty of required water, transmission, and rail connections, cooling water pumping head, and the ability to deliver large components to the site.

- **Evaluate Candidate Sites** - The Candidate Sites were evaluated in more detail, in order to provide a quantifiable basis for comparison. The primary purpose of the evaluation was to develop numerical scores that would allow the Candidate Sites to be ranked according to their overall suitability for development of a nuclear power plant. In order to support the numerical scoring, various specific aspects of the Candidate Sites were investigated and assessed, including the following:

  Environmental and Permitting Conditions - Factors related to environmental acceptability and permitability were evaluated in more detail than considered previously for the Potential Sites. Maps were obtained showing the property parcels on and near each Candidate Site. Information on zoning and land use planning was collected. Reviews were conducted of applicable state and local regulations concerning air quality, ambient noise, water withdrawal, land use, and other environmental, regulatory, and permitting issues. Site-specific information on threatened and endangered species and cultural resources was obtained from appropriate state and federal government agencies.

  Transmission Interconnection and Stability - The feasibility of obtaining transmission interconnection for the Candidate Sites was evaluated through modeling of thermal overloads. The risk of transmission upgrades being required in order to maintain system stability was qualitatively evaluated. These evaluations allowed the sites to be scored based on potential interconnection and stability impacts.

  Field Reconnaissance - Field reconnaissance site visits were conducted. The field reconnaissance was intended to supplement and confirm the information collected from maps, aerial photographs, and other publicly available sources. Observations focused on issues such as the condition of wetlands and other natural habitats, recent residential developments, transportation routes, and constructability characteristics.

  Refinement of Site Layouts - Based on the information collected through the environmental evaluations and field reconnaissance, the preliminary site layouts

developed earlier were revised to make the best use of existing property parcels and reduce impacts on environmentally sensitive areas.

Select the Proposed Site - PSEG considered the preceding evaluations and other relevant factors in order to select the Proposed Site and Alternative Sites. PSEG considered business and other qualitative factors in addition to the numerical evaluations in making the final site selection. The PSEG Site was selected as the Proposed Site because it was the highest-ranked site using objective numerical criteria and it has additional benefits in community support, emergency response, existing infrastructure, and operational synergies.

The ESP includes additional discussion of the alternative site evaluation.

C. Proposed Causeway Alternatives

To support the construction of the new plant, PSEG is proposing a new access road on an elevated causeway that extends from the PSEG Site north to the terminus of Money Island Road in Elsinboro Township, NJ. The proposed causeway is planned to alleviate traffic related impacts at critical junctions in and near Hancock's Bridge and to provide redundant means of access to the PSEG Site. This redundancy ensures that access to and from the PSEG Site is maintained in the event that the existing access road is blocked (e.g., traffic accident, fire, etc.), and also provides multiple routes for emergency access/egress. The redundant route also allows for separation between traffic associated with the operating HCGS and SGS plants and the new plant's construction traffic.

PSEG has considered alternatives to the proposed causeway. One alternative consisted of constructing a two or three lane construction access roadway adjacent to the existing access road. This roadway would be built-up using fill, culverts, and bridges similar to the existing roadway. A second alternative included a two or three lane access road following the same route as the proposed causeway, but also built-up using fill, culverts, and bridges similar to the existing roadway. The final alternative is the proposed elevated causeway. These alternatives are presented in Figure 12.

The alternative of paralleling the existing access road was rejected because this route would not alleviate the traffic congestion at Hancock's Bridge and would not provide a redundant access route to the PSEG Site. The additional construction-related traffic through Hancock's Bridge and the center of Salem City would result in traffic delays and congestion during peak use periods without modification to the existing infrastructure (KLD 2009).

The route for the alternatives between the PSEG Site and the terminus of Money Island Road was selected because this road represents the closest approach of a public roadway to the PSEG Site that is both north of the PSEG Site and west of the existing access road. It also routes traffic to the northern portion of Salem City, limiting traffic impacts through the center of town. The route follows the existing PSEG Red Lion transmission line right-of-way, and is nearly a straight line between the PSEG Site and Money Island Road, thus minimizing impacts. Any alternate route to a public roadway would have a larger footprint in regulated resource areas (e.g., coastal wetlands).

The fill-supported access road alternative was rejected because although there is a large cost disparity between construction on fill and construction on structure, impacts to regulated resources (e.g. coastal wetlands) are higher with the fill alternative. The fill alternative would result in an estimated footprint of 93.5 acres, while the elevated causeway will result in a permanent footprint (e.g., piles and shading) of only 20.9 acres, with an additional 20.1 acres of potential temporary construction impacts. In addition, the elevated alternative will not represent a physical barrier to wildlife traversing the area.

VI. DESCRIPTION OF THE DELAWARE ESTUARY SYSTEM

The Delaware Estuary watershed encompasses portions of Pennsylvania, New Jersey, New York, and Delaware, draining a basin approximately 13,600 square mile in area (PSE&G 1999). The Estuary possesses many of the same characteristics as other U.S. East coast estuaries, including similar morphology, hydrology, hydrodynamics, and biology.

A. Morphology

One of the major physical features of the Estuary is its variable width. It has a classic funnel shape, widening from the ocean entrance (about 11 miles across) to the Delaware Bay where the width is greatest (about 27 miles), and then funneling to much narrower widths toward the freshwater Tidal River Zone (about 0.20 miles) at Trenton, NJ. This funnel shape strongly influences the hydrodynamics, and consequently the hydrology of the Estuary system as a whole. Tidal heights increase from the Delaware Bay entrance (4.2 feet) to Trenton, NJ (8.2 feet); tidal height reaches 5.3 feet at Reedy Point, DE, approximately 3 miles upstream of the PSEG Site. The tidal amplification enhances flushing and exchange of waters with the other sections of the Estuary.

The Estuary extends from the ocean entrance to the head of the Estuary in Trenton, NJ at approximately RM 133. It has a mean depth of 19 feet, with a maximum depth of nearly 148 feet in Delaware Bay. A 30 to 40 foot deep dredged navigation channel extends from Trenton, NJ to Philadelphia, PA. From Philadelphia, a 40 foot deep channel extends to the mouth of the Bay. The surface area of the main stem of the Estuary is about 725 square miles, with tidal creeks adding about another 33 square miles. Wetlands bordering the Estuary measure approximately 247 square miles, located primarily in the lower part of the Estuary below the Chesapeake & Delaware Canal.

The volume of the Estuary is roughly 450 billion cubic feet (cf), and the tidal prism alone is about 140 billion cf. The majority of the Estuary's volume is contained between RM 19 and the ocean entrance (RM 0), which is the widest portion of the Delaware Bay and contains some of the deepest waters. Tidal flushing times for the portion of the Estuary below Philadelphia, PA vary between about 46 days under high-flow conditions and 228 days under low-flow conditions (Appendix C, PSE&G 1999).

B. Hydraulic processes

The annual average freshwater flow to the Estuary is approximately 22,783 cfs from all sources combined. Most of this flow comes from the non-tidal Delaware River (58 percent) and the Schuylkill River (14 percent). Annual mean flows from these two sources are 11,700 cfs and 2,746 cfs, respectively. Only a small portion (10.3 percent) of the annual mean inflow is discharged below RM 59 (the Chesapeake & Delaware Canal). Of this small portion, 6.8 percent is discharged along the New Jersey shore, and 3.5 percent is discharged along the Delaware shore (Appendix C, PSE&G 1999).

Maximum and minimum annual mean flows for the Estuary at Trenton, NJ are greater than 18,000 cfs (calendar year 2004) and 4,708 cfs (calendar year 1965), respectively (USGS 2008). Highest monthly average flows occur during March and April; lowest monthly average flows occur in August and September.

The Delaware River Basin is a major source of water supply for approximately 15 million people living in New York, New Jersey, Pennsylvania, and Delaware. In 1986, estimated basin-wide water withdrawal for domestic, industrial, commercial, and agricultural uses and power generation amounted to 11,900 cfs, roughly equal to the mean annual river flow at Trenton, NJ (Phelan and Ayers, 1992).

C. Water Quality

The USEPA's Delaware Estuary Program Scientific and Technical Advisory Committee (now managed by the Partnership for the Delaware Estuary) has delineated three zones of the Estuary based on patterns of salinity, turbidity, and biological productivity (Appendix C, PSE&G 1999): the freshwater Tidal River Zone (or Upper Zone), the Transition Zone, and the Delaware Bay Zone (or Lower Zone). The Delaware Bay Zone extends from RM 50 to RM 0. The Delaware Bay Zone is characterized by high salinity, low turbidity, and high biological productivity. The Transition Zone extends from RM 80 to RM 50, and includes the PSEG Site (located at RM 52). The Tidal River Zone is one of variable salinity that extends 53 river miles, from the head-of-tide at Trenton, NJ (RM 133, the head of the Estuary) down to Marcus Hook, PA (RM 80), and is characterized by high turbidity and relatively low biological productivity. Although the freshwater Tidal River Zone is the area most impacted by human use; its quality has been improving during the past two to three decades due to improvements in discharge process controls, reduced point and non-point discharges to the system, and regulatory programs.

D. Pollution

The Estuary has a long history of serious water pollution problems primarily attributable to discharges from human population centers, industrial activity, historical and current land use, and consumption and diversion of water from the watershed. Pollution sources include point source discharges, such as municipal and industrial wastewater treatment facilities, and non-point discharges, including urban and agricultural runoff.

Overall, the water quality of the Estuary improved during the past 30 years. In 1996-97, 95 percent of areas of the Estuary, including the vicinity of the PSEG Site, were at least partially supporting of the aquatic life designated use, and 69 percent of the same area was fully supporting of aquatic life (DRBC 1998). However, the most recent Delaware River and Bay Integrated List Water Quality Assessment Report lists Water Quality Management Zone 5, along which the PSEG Site is located, as being not fully supportive of aquatic life with respect to Dissolved Oxygen. Furthermore, fish consumption limits exist in all water quality management zones in the Delaware Bay or River, based on consumption advisories issued primarily due to the presence of polychlorinated biphenyls (PCBs) and mercury in fish tissue samples (DRBC 2008).

E. Consumptive use

During the 20th century, 24 reservoirs have been constructed within the Delaware River Basin to store water for human uses, with a combined permanent storage capacity totaling over 410 billion gallons. Approximately 1,100 cfs of water are exported from the Basin and an additional 465 cfs are consumptively used within the Basin (Appendix C, PSE&G 1999).

The storage of storm water in reservoirs, out-of-basin diversion, and consumption has affected the hydrology of the Estuary. Reductions in freshwater discharge to the Estuary have resulted in the intrusion of saltwater upstream and into groundwater aquifers, as well as reduced dilution and flushing of pollutants.

Basin-wide management of competing water uses is required to minimize these risks. The Good Faith Agreement of 1983 between DRBC and New York City assures a minimum freshwater flow of 3,000 cfs in the Delaware River at Trenton, NJ (DRBC 2007).

F. Other impacts

The USACE dredges the Estuary as necessary to maintain federally authorized shipping channel depths. Large-scale dredging may alter the tidal range and the salinity distribution in the Estuary. Dams are located on many of the tributaries of the Estuary and at the headwaters of the Delaware River above Hancock, NY. These dams can impede the migration and spawning of anadromous fish species,

including American shad (*Alosa sapidissima*), blueback herring (*A. aestivalis*), and alewife (*A. pseudoharengus*).

The historic conversion of wetlands to agricultural and other uses has also affected water quality and habitat for aquatic organisms. Between 1953 and 1975, New Jersey lost 25 percent (61,675 acres) of its tidal wetlands. The area lost was greatest in southern New Jersey, particularly in the counties bordering the Estuary (Tiner 1985).

G. Ecology

The Estuary contains a diverse array of habitats. It is an open-ended system that interacts with both the coastal marine habitat and the freshwater habitat from tributary streams and ponded waters lying above the tide line. Limited aquatic species thrive in the full range of salinity (0 to 32 parts per thousand [ppt]) that occurs in the Estuary.

The strong currents moving in both directions between the Delaware Bay and the contiguous open ocean transport many organisms. Planktonic forms (including early life-stages of many macroinvertebrates and fish) and small pelagic fish are not capable of sustained swimming at speeds that allow them to oppose these currents, so they are carried with the flow. Certain larger fish and turtles with greater control of their horizontal movement also travel between the Delaware Bay and nearshore areas of the ocean. Bay-ocean exchange is particularly significant for the common species with known spawning movements into the ocean (e.g., American eel [*Anguilla rostrata*], Atlantic menhaden [*Brevoortia tyrannus*], summer flounder [*Paralichthys dentatus*], bluefish [*Pomatomus saltatrix*], spot [*Leiostomus xanthurus*]) or anadromous species, which move into the ocean during summer through spring (e.g., American shad, blueback herring, alewife, striped bass [*Morone saxatilis*]).

Partly because of the wide variety of habitats and seasonal utilization, the Estuary contains a diverse biological community comprised of thousands of species. Several hundred species of phytoplankton have been recorded in the Estuary, with diatoms, chlorophytes, cryptomonads, and cyanobacteria being the dominant taxa (Marshall 1992). Levels of phytoplankton primary production in the Estuary have been reported in the middle of the range measured for other East Coast estuaries. The open waters of the Estuary contain few areas with submerged aquatic vegetation, and the saline portions do not contain the eelgrass (*Zostera marina*) beds that are common elsewhere.

In the higher salinity of the Delaware Bay Zone, smooth cordgrass (*Spartina alterniflora*) and salt hay (*S. patens*) predominate. Big cordgrass (*S. cynosuroides*), various sedges (*Scirpus* spp.), cattails (*Typha* spp.), salt marsh fleabane (*Pluchea purpurascens*), and other plants appear with increasing abundance in the brackish water tidal marshes further up-bay and into the Transition Zone. Freshwater tidal marshes in the Tidal River Zone occur largely along tributaries. They are dominated by arrowhead (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*), arrow arum (*Peltandra virginica*), and cattails. During the past 50 years, an invasive strain of common reed (*Phragmites australis*) has increased in freshwater and brackish water tidal marshes to levels that challenge biodiversity (Sutton et al. 1996; Able et al. 2003).

Bivalves, including northern dwarf tellin (*Tellina agilis*), Atlantic nutclam (*Nucula proxima*), and amethyst gemclam (*Gemma gemma*), dominate the benthos in the lower Bay (Sutton et al. 1996). Oligochaete worms and chironomid larvae dominate the benthic community in lower salinity regions of the Transition and Tidal River Zones of the Estuary.

Predatory fish are among the principal upper-level aquatic consumers in the Estuary. About 200 species occur within the Estuary, mostly on a seasonal basis. The predominantly estuarine types include hogchoker (*Trinectes maculatus*), white perch, bay anchovy, Atlantic and tidewater (*Menidia beryllina*) silversides, naked goby (*Gobiosoma bosc*), and mummichog. Predominantly marine species that use the Estuary include weakfish, spot, Atlantic croaker, bluefish, summer flounder, and Atlantic menhaden. The

notable diadromous migratory species are American eel, blueback herring, American shad, striped bass, and alewife. Two Estuary diadromous species, the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*A. oxyrinchus*), are listed as federal and/or state endangered.

The Estuary provides habitat for a number of vertebrate groups other than fish. Over 300 species of birds are found annually throughout the Estuary; among them are numerous species of waterfowl, wading birds, and shorebirds. These aquatic birds are found on the beaches, tidal flats, and tidal marshes. More than 70 species of amphibians and reptiles live in the Estuary watershed, most inhabiting upland terrestrial habitats, and freshwater ponds and streams. The only estuarine-dependent members of this group are five species of sea turtles: Atlantic green turtle (*Chelonia mydas*), Atlantic hawksbill turtle (*Eretmochelys imbricata*), Atlantic leatherback turtle (*Dermochelys coriacea*), Atlantic loggerhead turtle (*Caretta caretta*), and Kemp's ridley turtle (*Lepidochelys kempii*). All the sea turtles are both federally-listed and listed by New Jersey Department of Environmental Protection (NJDEP) as threatened or endangered species. They are marine pelagic species that prefer warm areas of the open ocean, but range into temperate areas and shallow water, including the Delaware Estuary, during the summer months.

VII. COASTAL ZONE MANAGEMENT ACT CONSISTENCY REVIEW

New Jersey has established rules regarding the use and development of coastal resources to be used primarily by the Division of Land Use Regulation for making Federal Consistency Determinations (Section 307 of the Federal Coastal Zone Management Act). The Coastal Zone Management rules, as set forth below, are enforceable policies of New Jersey's Coastal Management Program as approved under the Federal Coastal Zone Management Act (16 U.S.C. 1450).

As noted, the design for the new plant is based upon the PPE bounding conditions. Detailed engineering design has not been completed. Accordingly, analysis of the project based on New Jersey Coastal Zone Management Rules is based on the PPE bounding conditions provided to the NRC in the ESP application.

Any site development is subject to a variety of New Jersey Division of Land Use Regulation permits including Coastal Area Facility Review Act, Waterfront Development, Flood Hazard Area Control Act, Wetlands Act of 1970, Tidelands, and Freshwater Wetland Protection Act approvals. Accordingly, as detailed design plans are finalized, another review of compliance with New Jersey Coastal Zone Management Rules will occur under the formal permitting process.

For the purposes of the consistency review for a new plant at the PSEG Site, the rules under New Jersey's Coastal Zone Management program are each provided in whole or in part (depending upon applicability to the NRC's issuance of the new plant's ESP) in italicized font. The rule is followed by a description of how the proposed ESP is consistent with the Coastal Zone Management program. In many cases, rules established as part of the program are not directly applicable to the proposed plant. Nevertheless, every rule in effect on February 21, 2010 has been identified and addressed.

A. Location Rules - Special Areas

1. 7:7E-3.2 Shellfish Habitat

Shellfish habitat is defined as an estuarine bay or river bottom that has a history of production for hard clams (Mercenaria mercenaria), soft clams (Mya arenaria), eastern oysters (Crassostrea virginica), bay scallops (Argopecten irradians), or blue mussels (Mytilus edulis).

Development which would result in the destruction, condemnation (downgrading of the shellfish growing water classification) or contamination of shellfish habitat is prohibited, unless the proposed development is a dock, pier, or boat mooring constructed in accordance with appropriate regulations.

The NJDEP identifies the waters adjacent to the PSEG Site as shellfish waters classified as "special restriction" for shellfish harvest (Figure 13). This "special restriction" area is immediately south of the southern tip of Artificial Island, and abuts the southern end of the SGS cooling water intake structure.

The PSEG Site is located in the oligohaline portion of the Estuary (i.e., mean salinities ranging from 0.5 to 5.0 ppt). For this reason, most listed shellfish species do not occur near the PSEG Site because they are intolerant of the low salinity; however, eastern oysters are known to better tolerate low salinities, and they do occasionally settle on hard substrates provided by in-water structures at both SGS and HCGS, especially in warm, dry years. Even so, the typical salinities in this region of the Estuary are too low to support the permanent settlement and growth of these species (Wilson et al. 2006).

In the Delaware Bay, oysters are found from the mouth to areas just south of Artificial Island on the NJ shore. Populations, as inferred from commercial harvests, decreased from the early 1900s through the rest of the 20th century, in large part due to protozoan parasites and disease. Since 2001, oyster abundance has continued to decline despite careful management and harvest restrictions; but stock assessments released in 2007 indicated at least modest improvement. Oysters attach to many hard substrates, but generally colonize by attaching to other oysters and dead shells. Large aggregations are referred to as oyster "reefs". They can tolerate a wide range of temperatures, and prefer waters of relatively high salinity. Although adults can tolerate 5–32 ppt salinity, embryo development and growth are optimal within a narrower (approximately 15–23 ppt) range. They were occasionally found near Artificial Island in benthic surveys from the Delaware River in the 1970s. The PSEG Site is at the extreme upriver end of the zone of the Estuary in which oyster survival is possible, and it is unlikely that oysters will be present without the hard substrate provided by the facilities at the PSEG Site and rip-rap surrounding Artificial Island (Wilson et al. 2006).

The remainder of the species identified as "shellfish" at **N.J.A.C. 7:7E-3.2** occur in mesohaline and polyhaline (partly salty or nearly oceanic salinity, respectively) areas of the Estuary, or (in the case of bay scallops) in the Atlantic Ocean and Coastal Bays (Gosner 1971), and are not present at the new plant's location. As such, there is no history of substantial shellfish production in the area.

With respect to the potential effects of in-water construction activity on shellfish in nearby waters, the ecological effects associated with suspended sediments depends on a variety of factors, including the type of dredge used, the timing and duration of the dredging, the particle size of the suspended sediment, the presence of biotoxins in the sediments, the success of the control measures to contain the suspended sediments, and the life stage of the species that may be present. Dredging for the barge and intake structure facilities may result in a localized temporary increase in suspended sediment in the immediate vicinity of the dredge operation. Drift of suspended material may occur beyond the immediate dredge site based on sediment composition; however, results of surficial sediment grain size analyses in these areas suggests that most of the sediments present comprise of coarser sandy material which is less likely to be re-suspended by tidal currents (Cook et al. 2006). Furthermore, the PSEG Site is at or near the natural turbidity maximum of the Delaware Estuary (PSE&G 1999, Cook et al. 2006). The amount of suspended sediment in the area can vary widely by season and tide stage, but is nevertheless higher on average than at any other location in the Estuary. Any organisms inhabiting this zone of the Estuary are necessarily adapted to live in areas of high and variable turbidity.

Dredging and other in-stream construction activities will comply with applicable NJDEP and USACE permits. Impacts associated with the limited required dredging include constructing the barge slip and intake structures at the PSEG Site, and are not expected to adversely impact shellfish habitat

because shellfish habitat does not occur on the PSEG Site and the effects of dredging are localized. Similarly, the proposed causeway is not located in shellfish habitat. NRC issuance of the ESP will be consistent with the **N.J.A.C. 7:7E-3.2** because issuance would not authorize activities at the PSEG Site that would result in destruction, condemnation, or contamination of any shellfish habitat.

2. 7:7E-3.3 Surf Clam Areas

Surf clam areas are coastal waters which can be demonstrated to support significant commercially harvestable quantities of surf clams (Spisula solidissima), or areas important for recruitment of surf clam stocks. This includes areas where fishing is prohibited for research sanctuary or conservation purposes by N.J.A.C. 7:25-12.1(d)4. Surf clams are a marine fish and therefore are also subject to the marine fish and fisheries rule, N.J.A.C. 7:7E-8.2.

Development which would result in the destruction, condemnation, or contamination of surf clam areas is prohibited, except for development that is of national interest or sand and gravel mining to obtain material for beach nourishment.

Surf clams do not occur in the tidal Delaware River (Gosner 1971) or at the PSEG Site. NRC issuance of the ESP will be consistent with the **N.J.A.C. 7:7E-3.3** because issuance will not authorize activities at the PSEG Site that will result in destruction, condemnation, or contamination of any surf clam area.

3. 7:7E-3.4 Prime Fishing Areas

Prime fishing areas include tidal water areas and water's edge areas which have a demonstrable history of supporting a significant local intensity of recreational or commercial fishing activity. These areas include all coastal jetties, groins, public fishing piers or docks, and artificial reefs. Prime fishing areas also include features such as rock outcroppings, sand ridges or lumps, rough bottoms, aggregates such as cobblestones, coral, shell and tubeworms, slough areas and offshore canyons. Prime fishing areas also include areas identified in "New Jersey's Recreational and Commercial Fishing Grounds of Raritan Bay, Sandy Hook Bay and Delaware Bay and The Shellfish Resources of Raritan Bay and Sandy Hook Bay" Figley and McCloy (1988) and those areas identified on the map titled, "New Jersey's Specific Sport Ocean Fishing Grounds." This map is available through the Coastal Management Program's website at www.nj.us/dep/cmp.

Standards relevant to prime fishing areas are as follows:

1. Permissible uses of prime fishing areas include recreational and commercial finfishing and shellfishing, as presently regulated by the Department's Division of Fish and Wildlife, scuba diving and other water related recreational activities.

2. Prohibited uses include sand or gravel submarine mining which would alter existing bathymetry to a significant degree so as to reduce the high fishery productivity of these areas. Disposal of domestic or industrial wastes must meet applicable State and Federal effluent limitations and water quality standards.

The new plant will be located on a secured site that is not accessible to the public. Furthermore, the existing site does not meet the definition of a Prime Fishing Area identified in **N.J.A.C. 7.7E-3.4**.

Both recreational and commercial fishing occur in the Estuary in the vicinity of the site. New plant activities do not include uses that are prohibited in Prime Fishing Areas (that is, there is no sand or gravel submarine mining). Furthermore, the new plant will comply with any applicable State and Federal effluent limitations and water quality standards for discharges of wastewater.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.4** because issuance will not authorize activities that will reduce the fishery productivity of the area.

4. 7:7E-3.5 Finfish Migratory Pathways

Finfish migratory pathways are waterways (rivers, streams, creeks, bays and inlets) which can be determined to serve as passageways for diadromous fish to or from seasonal spawning areas, including juvenile anadromous fish which migrate in autumn and those listed by H.E. Zich (1977) "New Jersey Anadromous Fish Inventory" NJDEP Miscellaneous Report No. 41, and including those portions of the Hudson and Delaware Rivers within the coastal zone boundary. Species of concern include: alewife or river herring (Alosa pseudoharengus), blueback herring (Alosa sapidissima), American shad (Alosa sapidissima), striped bass (Morone saxatilis), Atlantic sturgeon (Acipenser oxyrhynchus), Shortnose sturgeon (Acipenser brevirostrum) and American eel (Anguilla rostrata).

Development, such as dams, dikes, spillways, channelization, tide gates and intake pipes, which creates a physical barrier to the movement of fish along finfish migratory pathways is prohibited, unless acceptable mitigating measures such as fish ladders, erosion control, or oxygenation are used. Development which lowers water quality to such an extent as to interfere with the movement of fish along finfish migratory pathways or to violate State and Delaware River Basin Commission water quality standards is prohibited.

The new plant is located adjacent to a finfish migratory pathway. PSEG collects and maintains an extensive, long-term dataset on the distribution and occurrence of finfish species of concern in the portion of the Estuary near the PSEG Site. Data collection has continued since 1968. Expanded reports summarizing the results of these monitoring activities have been submitted to the NJDEP annually since 1995 in accordance with the SGS's NJPDES Permit No. NJ005622 (PSEG 2009).

The new plant will have a shoreline intake structure that withdraws water for use in the CWS and SWS. SWS use is primarily non-contact cooling water. The CWS intake is for makeup to the closed-cycle condenser cooling system consisting of a cooling tower(s) with make-up, blowdown, basin bypass systems, circulating water pumps; one or more condensers; and a closed loop circulating water piping arrangement.

The new plant's intake structure will be located parallel to, and nearly flush with, the Delaware Estuary shoreline. This location increases tidal flushing of the forebay and eliminates long intake canals and blind pockets, thus reducing finfish entrapment potential. In addition to the low approach velocities and the intake structure's traveling screens, the intake structure will be equipped with a fish return system that will include screen panel buckets, a low pressure fish removal system, a high pressure debris removal system, and a trough to return debris and fish to the river.

The intake flow velocities through the traveling screens are less than 0.5 fps. This velocity reduces the swim speed necessary for a fish to escape the intake's flow and allow many organisms to escape impingement. The 0.5 fps intake velocity and closed-cycle cooling has also been specified by the USEPA's Section 316(b) Phase I rulemaking for new power plants as being best technology available (BTA) for the protection of aquatic life from the effects of impingement and entrainment (40 CFR Parts 9, 122, 123, 124, & 125).

The new plant will withdraw approximately 112 mgd of water from the Estuary during normal operations. Water usage at new plant during normal operations accounts for less than about 0.02 percent of the typical tidal flow of the Estuary.

The proposed causeway will cross Alloway Creek and several associated smaller creeks, a tidal tributary system of the Delaware Estuary. Alloway Creek is a known finfish migratory pathway for anadromous river herring. The proposed causeway will cross the creek near its mouth on the Delaware Estuary, and is being designed to minimize the disturbance footprint to wetlands and tidal waters by being situated on overhead spans. Several other existing bridges are present along the course of the tidal portion of Alloway Creek, and do not comprise a barrier or disturbance to anadromous fish migration.

NRC issuance of the new plant's ESP will be consistent with established rules and guidance regarding the protection of aquatic organisms at power plant intake structures. The combination of closed cycle cooling and an intake velocity less than 0.5 fps will ensure the protection of anadromous fish. The proposed causeway will not impede migratory finfish movements in Alloway Creek. All in-water construction activities will conform to seasonal restriction periods to minimize impacts to anadromous fish.

5. 7:7E-3.6 Submerged Vegetation Habitat

A Submerged vegetation special area consists of water areas supporting or documented as previously supporting rooted, submerged vascular plants such as widgeon grass (Ruppia maritima), sago pondweed (Potamogeton pectinatus), horned pondweed (Zannichellia palustris) and eelgrass (Zostera marina). In New Jersey, submerged vegetation is most prevalent in the shallow portions of the Navesink, Shrewsbury, Manasquan and Metedeconk Rivers, and in Barnegat, Manahawkin and Little Egg Harbor Bays. Other submerged vegetation species in lesser quantities include, but are not limited to, the following: water weed (Elodea nuttalli), Eriocaulon parkeri, Liaeopsis chinesis, Naja flexilis, Nuphar variegatum, Potamogeton crispus, Potamogeton epihydrus, Potamogeton perfoliatus, Potamogeton pusillus, Scirpus subterminalis and Vallisneria americana. Detailed maps of the distribution of the above species for New Jersey, and a method for delineation, are available from DEP in the New Jersey Submerged Aquatic Vegetation Distribution Atlas (Final Report), February, 1980, conducted by Earth Satellite Corporation and also on "Eelgrass Inventory" maps prepared by the Division of Fish and Wildlife, Bureau of Shellfisheries, 1983. If the Department is presented with clear and convincing evidence that a part of its mapped habitat lacks the physical characteristics necessary for supporting or continuing to support the documented submerged vegetation species, such a site would be excluded from the habitat definition.

Development in submerged vegetation habitat is prohibited except for the following:

1. Trenching for utility pipelines and submarine cables in the public interest, provided there is no practicable or feasible alternative alignment, the impact area is minimized and that, following pipeline or cable installation, the disturbed area is restored to its preconstruction contours and conditions.

2. New dredging of navigation channels maintained by the State or Federal government provided that there is no practicable or feasible alternative to avoid the vegetation;

3. Maintenance dredging as defined at N.J.A.C. 7:7E-4.6, of previously authorized, existing navigation channels maintained by the State or Federal government and associated disposal areas;

4. New and maintenance dredging as defined at N.J.A.C. 7:7E-4.6 and 4.7, of previously authorized operating marinas and any necessary access channels to the expanded portion of such marinas (this exception does not include the boat basin of the expanded portion of the marina) and existing launching facilities with 25 or more dockage, storage or trailer parking units and their associated access channels;

5. Maintenance dredging as defined at N.J.A.C. 7:7E-4.6, to regain access to existing private docks, piers, boat ramps and mooring piles not associated with marinas that were previously dredged to an authorized channel and/or mooring depth, width and length;

6. Construction of a single noncommercial dock or pier.

7. The extension of existing piers or floating docks through submerged vegetation habitat to water at least four feet deep at mean low water, for the purpose of eliminating dredging or boating through submerged vegetation habitat.

Development in upland or water areas adjacent to submerged vegetation habitat or in submerged vegetation habitat which results in erosion or turbidity increases in the waters supporting submerged

vegetation or prop or hull scour through use of the development is prohibited unless mitigating measures are provided.

The PSEG Site is not located adjacent to submerged vegetation habitat. It is located near the turbidity maximum in the Estuary (PSE&G 1999, Cook et al. 2006), which is an area where light penetrates no more than a few feet below the water's surface. Coupled with variable salinities, energetic tidal currents, and depth, the turbidity near the PSEG Site creates an aquatic environment that precludes establishment of submerged aquatic vegetation (SAV). SAV has not been considered an important resource in the Delaware River near the PSEG Site either presently or historically. Neither a 2007 side-scan sonar survey of the approaches to the SGS and HCGS intake structures (Dolan 2007) nor a 2009 survey of the area of the new plant revealed the presence of SAV near the PSEG Site. In addition, tidal marshes traversed by the proposed causeway exhibit similarly high turbidities, and are dominated by intertidal emergent wetland plants rather than by SAV.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.6** because the issuance will not authorize development in upland or water areas adjacent to submerged vegetation habitat or in submerged vegetation habitat.

6. 7:7E-3.7 Navigation Channels

Navigation channels are tidal water areas including the Atlantic Ocean, inlets, bays, rivers and tidal guts with sufficient depth to provide safe navigation. Navigation channels include all areas between the top of the channel slopes on either side. These navigation channels are often marked with buoys or stakes. Major navigation channels are shown on NOAA/National Ocean Service Charts.

Standards relevant to navigation channels are as follows:

1. Development which would cause terrestrial soil and shoreline erosion and siltation in navigation channels shall utilize appropriate mitigation measures.

2. Development which would result in loss of navigability is prohibited.

3. Any construction which would extend into a navigation channel is prohibited.

4. The placement of structures within 50 feet of any authorized navigation channel is discouraged, unless it can be demonstrated that the proposed structure will not hinder navigation.

The new plant will be largely located on the upland portions of Artificial Island. All supporting infrastructure, including intake and discharge structures, are located beyond the limits of the existing Delaware River navigation channel and NOAA Chart 12311 General Anchorage No. 2 (NOAA 2010). The proposed causeway and potential transmission line crossing Alloway Creek will be constructed at such a height to ensure that normal navigability for small vessels that currently utilize the creek is maintained. The overhead clearance of the proposed causeway in this channel will also be established in consultation with the United States Coast Guard (USCG) and the USACE. In addition, the bridge and any associated aids to navigation (e.g., lights, fenders, etc.) will be designed in consultation with these agencies to ensure safe navigability. Similarly, any potential transmission line will be designed to prevent conflicts with maritime navigation.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.7** because issuance will not authorize new development or construction that will adversely affect any navigation channels or the navigability of a navigation channels.

7. 7:7E-3.8 Canals

Canals are navigation channels for boat traffic through land areas that are created by cutting and dredging or other human construction technique sometimes enlarging existing natural surface water channels. The Cape May, Point Pleasant, and Delaware and Raritan Canals are the principal examples in the New Jersey Coastal zone.

In canals presently used for navigation, any use that will interfere with existing or proposed canal boat traffic is prohibited. In the Delaware and Raritan Canal, and in the surrounding Review Zone established by the Delaware and Raritan Canal Commission, development must be consistent with the rules and regulations of the Review Zone of the Delaware and Raritan Canal State Park (N.J.A.C. 7:45).

There are no canals at, or near, the PSEG Site. The Cape May, Point Pleasant, and Delaware and Raritan Canals are located more than 40 miles from the PSEG Site. The Chesapeake and Delaware Canal is located approximately 7 miles to the northwest of the PSEG Site, and is not in NJ. NRC issuance of the ESP will be consistent with **N.J.A.C. 7.7E-3.8** because issuance will not authorize any activities that interfere with canal boat traffic.

8. 7:7E-3.9 Inlets

Inlets are natural channels through barrier islands allowing movement of fresh and salt water between the ocean and the back bay system. Inlets naturally have delta fans of sediment seaward and landward, deposited by the ebb and flow of the tide.

Development in inlets shall comply with the following:

1. Filling is prohibited; and

2. Submerged infrastructure is discouraged.

There are no inlets at or near the PSEG Site. By definition, inlets are natural channels through barrier islands. Barrier islands are defined as elongated accumulations of sand that are separated from the mainland by open water in the form of estuaries, bays, or lagoons (NOAA 2010).

The PSEG Site location does not meet the definition of a barrier island and consequently, there are no inlets present at or near the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.9** because issuance will not authorize development in any inlet.

9. 7:7E-3.10 Marina Moorings

Marina moorings are areas of water that provide mooring, docking and boat maneuvering room as well as access to land and navigational channels for five or more recreational boats.

Non-water dependent development in a marina mooring area is prohibited. Any use that would detract from existing or proposed recreational boating use in marina mooring areas is discouraged.

Although the PSEG Site maintains a barge slip where commercial vessels may be temporarily docked to support operations and maintenance and a new barge unloading area will be required for new plant construction, the area is prohibited to recreational traffic by the security provisions required for the site. Accordingly, there are no marina moorings at the site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.10** because issuance will not authorize non-water dependent activities in a marina mooring area.

10. 7:7E-3.11 Ports

Ports are water areas having, or lying immediately adjacent to, concentrations of shoreside marine terminals and transfer facilities for the movement of waterborne cargo (including fluids), and including facilities for loading, unloading and temporary storage. Port locations in New Jersey include, among others, Newark, Elizabeth, Bayonne, Jersey City, Weehawken, Hoboken, Woodbridge, Perth Amboy, Camden, Gloucester City, Paulsboro and Salem.

Any use which would preempt or interfere with port uses of this water area is prohibited.

The City of Salem is the closest port to the PSEG Site. It is approximately 7-1/2 miles to the north of the location of the new plant. Even though the barge slips at the PSEG Site host transient work vessels that support PSEG Site operations and maintenance, such activities do not involve the transport,

transfer, or storage of commercial cargo. PSEG may use existing facilities at the Port of Salem for materials delivery or staging/fabrication. However, plans are reactor technology specific and will not be developed until a technology decision is made.

NRC issuance of the ESP is consistent with **N.J.A.C. 7:7E-3.11** because issuance will not authorize activities that could interfere with operation or use of a port.

11. 7:7E-3.12 Submerged Infrastructure Routes

A submerged infrastructure route is the corridor in which a pipe or cable runs on or below a submerged land surface. Any activity which would increase the likelihood of infrastructure damage or breakage, or interfere with maintenance operations is prohibited.

Existing submerged infrastructure in the vicinity of the PSEG Site is limited to intake and discharge structures associated with the operation of the SGS and the adjacent HCGS (NOAA 2010). The discharge pipes associated with the new plant will outlet 100 feet from shore in approximately 12 feet of water and will be armored with rip-rap or rock to prevent damage to them.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.12** because issuance will not authorize activities within infrastructure routes that could increase the likelihood of infrastructure damage or that could interfere with infrastructure maintenance.

12. 7:7E-3.13 Shipwreck and Artificial Reef Habitats

The shipwreck and artificial reef habitats special area includes all permanently submerged or abandoned remains of vessels, and other structures including but not limited to, artificial reefs, anchors, quarry rocks or lost cargo, which serve as a special marine habitat or are fragile historic and cultural resources. An artificial reef is a manmade imitation of a natural reef created by placing hard structures on the sea floor for the purpose of enhancing fish habitat and fish stock. In time, an artificial reef will attain many of the biological and ecological attributes of a natural reef. Artificial reefs do not include shore protection structures, pipelines and other structures not constructed for the sole purpose of fish habitat.

Any use, except archeological research, which would significantly adversely affect the usefulness of this special area as a fish habitat is prohibited. Persons conducting archeological research which significantly affects the usefulness of a shipwreck for fisheries purpose shall compensate for this loss by creation of an artificial reef of equal habitat value.

Sunken Ship Cove is a series of wooden vessels intentionally sunken in the area south of Artificial Island during the creation of Artificial Island. Although not placed for the purpose of creating artificial reef habitat, the wooden hulks may provide structure and other fish-attracting habitat. Nevertheless, Sunken Ship Cove is sufficiently distant that the new plant will not impact biological resources found in the area. The SGS and HCGS intake structures and the barge slip at HCGS have been repeatedly dredged (in accordance with applicable NJDEP and USACE Permits) without affecting Sunken Ship Cove. Similarly, the new plant construction and operation is not expected to impact any aquatic resources of Sunken Ship Cove. The new intake and discharge structures are located over 3,900 feet from Sunken Ship Cove.

A submerged cultural resources remote sensing survey was completed for the proposed dredging area. The survey area included approximately 100 acres in the Delaware River, immediately adjacent to the western shore of Artificial Island, just north of the HCGS. The survey identified a total of 84 magnetic anomalies and 17 sidescan sonar targets. Three clusters of magnetic anomalies and two associated acoustic images (Target Cluster 1) exhibit characteristics indicative of vessel remains. Cluster 2 is comprised of five magnetic anomalies with a sonar image indicative of an area of small debris. The complex nature of the anomalies and debris on the bottom surface should be considered to have a potential association with vessel remains. Cluster 3 is composed of four magnetic anomalies. The

complex nature of the magnetic signature could suggest shipwreck remains. If avoidance of these areas is not possible, additional investigation will be conducted to assess National Register of Historic Places (NRHP) significance.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.13** because issuance will not authorize any activities that will have an adverse impact on fish or biological habitats associated with Sunken Ship Cove. In addition, it will not authorize any unacceptable or prohibited activities in other shipwreck or artificial reef habitats.

13. 7:7E-3.14 Wet Borrow Pits

Wet borrow pits are scattered artificially created lakes that are the results of surface mining for coastal minerals extending below groundwater level to create a permanently flooded depression. This includes, but is not limited to, flooded sand, gravel and clay pits, and stone quarries. Where a wet borrow pit is also a wetland and/or wetlands buffer, the Wetlands rule, N.J.A.C. 7:7E-3.27, and/or Wetlands Buffers rule, N.J.A.C. 7:7E-3.28, shall apply.

All proposed dredging and filling activities shall comply with any applicable Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). In addition, such activities must receive a Water Quality Certificate pursuant to N.J.S.A. 58:10A et seq. and Section 401 of the Federal Clean Water Act if a Federal permit is required for the activities.

There are no wet borrow pits on the PSEG site. Although there are open waters and wetlands associated with the existing CDF that will be impacted by fill associated with the new plant, these features are the result of the historic disposal of dredged material and are perched well above the groundwater table. Artificial Island was created entirely by fill, therefore the groundwater at the PSEG Site is influenced by the Delaware River. Artificial ponds within the desilt basin and CDF containment berms are shallow systems that are perched and isolated from groundwater. Thus, these areas do not meet the definition of wet borrow pits.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.14** because issuance will not authorize conditionally acceptable, unacceptable, or prohibited activities in any wet borrow pit.

14. 7:7E-3.15 Intertidal and Subtidal Shallows

Intertidal and subtidal shallows mean all permanently or temporarily submerged areas from the spring high water line to a depth of four feet below mean low water.

Development, filling, new dredging or other disturbance is discouraged but may be permitted in accordance with (c), (d), (e), and (f) below and with N.J.A.C. 7:7E-4.2 through 4.22.

(c) Maintenance dredging of intertidal and subtidal shallows is acceptable to maintain adequate water depths in accordance with N.J.A.C. 7:7E-4.6.

(d) New dredging in intertidal and subtidal shallows is discouraged.

(e) The installation of submerged infrastructure within intertidal and subtidal shallows is conditionally acceptable.

(f) The filling of intertidal and subtidal shallows for beach nourishment is conditionally acceptable provided it meets the requirements of the Filling rule at N.J.A.C. 7:7E-4.10(f) and the Coastal Engineering rule at N.J.A.C. 7:7E-7.11(d).

As detailed above, the new plant requires construction of a barge facility, intake structure, and a new causeway. Portions of these features will occupy intertidal and subtidal shallows. Construction of the barge facility and intake structure will occur along the eastern shore of the Delaware River in the northern part of the PSEG Site. Development along the Delaware River also includes the construction of

a new heavy haul/access road along the site boundary and across the tidal wetlands associated with Alloway Creek to support the movement of materials during construction. The intake structure is located adjacent to the power block area, and the barge facility is located adjacent to the cooling tower area. Barge mooring caissons will be constructed along the shoreline upstream of the cooling tower area. The new barge unloading area is approximately 300 feet long and 58 feet wide, and the barge mooring area is up to 1,250 feet long (Figure 2). The new intake structure area is approximately 600 feet long and 300 feet wide, housing the trash racks, traveling screens, and intake pumps (Figures 2, 4, 5, and 11).

The benthic organisms present within the accumulated sediments of the Delaware Estuary near the PSEG Site represent colonial, ephemeral, or ubiquitous invertebrate taxa that are highly tolerant to extremes of estuarine water quality parameters such as salinity and turbidity. These taxa include infaunal polychaetes, nematodes, oligochaetes, and epifaunal crustaceans (e.g., amphipods, mud crabs, and blue crabs).

In 1997, the USEPA sampled the benthic invertebrate communities in the Delaware Estuary as part of its Environmental Monitoring and Assessment Program (EMAP), which is a research program designed to develop the tools necessary to monitor and assess the status and trends of national ecological resources. The benthic invertebrate assemblage from EMAP Station MA97-0454 (closest to the PSEG Site) indicated that the predominant taxon was *Heteromastus filiformis* (an annelid polychaete) at a density of 33 individuals per grab, *Cyathura polita* (an isopod crustacean) at 9 individuals per grab, *Streblospio benedicti* (a polychaete worm) and *Macoma balthica* (a bivalve mollusk) at a density of 1 individual per grab. Other taxa present at densities of 1–3 individuals per grab included representatives of the phylum Rhynchocoela (a group of worm-like animals) and the families Bodotriidae (cumacean crustaceans) and Capitellidae (another crustacean taxon) (USEPA 2008). Overall, the density of infaunal species was 50 individuals per grab sample.

The benthic species assemblage observed in the EMAP sampling is typical of the invertebrate assemblages within the project area. The location along the long axis of the Estuary is a stronger determinant of invertebrate species assemblage than is cross-river location due to gradients in salinity, temperature, and sediment load (Llansó et al. 2002). The species in the EMAP data were neither unique, nor found in particularly high densities (other Stations in the Delaware Estuary produced grabs with more than 1,800 individuals per sample). The tidal waters near the PSEG Site are particularly stressful to organisms due to variable salinity, high sediment load, and energetic tidal currents; only a few species have evolved the capability to extract a full-time living in this dynamic environment (Martino and Able 2003).

Benthic organisms associated with the tidal marshes surrounding the PSEG Site include those organisms that comprise the faunal community of estuarine salt marshes. These species include ribbed mussels (*Geukensia demissa*), blue crabs, fiddler crabs (*Uca* spp.), and mud crabs (e.g. *Sesarma* spp.) in addition to the host of invertebrates found in the aquatic habitat of the mainstem Delaware Estuary. Surveys of the benthic macroinvertebrates inhabiting the smaller marsh creeks on or near the PSEG Site were performed from winter 2009 through winter 2010. A ponar grab sampler was used to collect macroinvertebrates. Macroinvertebrate communities in small marsh creeks were largely comprised of oligochaetes (*Limnodrilus* and other tubificids) and amphipods (primarily *Gammarus daiberi* and *Leptocheirus plumulosus*). Total richness ranged from four to seven taxa in these samples. In 2009, samples of macroinvertebrate communities from large marsh creek segments, amphipods are numerically dominant; primarily represented by *Corophium* sp. and *Gammarus daiberi* (Table 5). The amphipod, *Leptocheirus plumulosus*, the isopod *Cyathura polita*, and the polychaete worm *Nereis succinea* are occasionally common. Richness was low in these samples, varying from three to seven taxa. Macroinvertebrate abundance and taxonomic richness values were much lower in the fall than in the spring.

PSEG expects that the new causeway will constitute the largest impacts to intertidal and sub-tidal shallows (Figure 10). The proposed causeway is being designed on overhead structure, rather than fill at grade, to minimize environmental impacts. As such, the primary impacts associated with the proposed causeway will be the filling of wetland areas by bridge/causeway piers. While most of the impacted area constitutes vegetated tidal wetlands, some of the proposed causeway impacts may affect regulated intertidal and subtidal shallows. The overall impacts of the causeway on tidal wetlands (conservatively calculated as the areal coverage of the causeway rather than the area of the piers) are discussed in detail below under **N.J.A.C. 7:7E-3.27 Wetlands**. The area of intertidal and subtidal shallows impacted will be a subset of this acreage. As impacts to intertidal and subtidal shallows are quantified in detail through the design process for the new plant, these impacts will be included in a project-specific mitigation plan for intertidal and subtidal shallows, wetlands, and riparian zone impacts at a ratio agreed upon with NJDEP. Thus, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.15** because impacts to intertidal and subtidal shallows will be addressed through approved onsite or offsite mitigation at the required ratios.

15. 7:7E-3.16 Dunes

A dune is a wind or wave deposited or man-made formation of sand (mound or ridge), that lies generally parallel to, and landward of, the beach and the foot of the most inland dune slope."Dune" includes the foredune, secondary or tertiary dune ridges and mounds, and all landward dune ridges and mounds, as well as man-made dunes, where they exist.

Development is prohibited on dunes, except for development that has no practicable or feasible alternative in an area other than a dune, and that will not cause significant adverse long-term impacts on the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities. In addition, the removal of vegetation from any dune, and the excavation, bulldozing or alteration of dunes is prohibited, unless these activities are a component of a Department approved beach and dune management plan.

Based upon mapping completed by the Hazardous Materials Response and Assessment Division of the National Oceanic and Atmospheric Administration (NOAA 1996), there are no dunes on or near the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.16** because issuance will not authorize activities on any dune.

16. 7:7E-3.17 Overwash Areas

An overwash area is an area subject to accumulation of sediment, usually sand, that is deposited landward of the beach or dune by the rush of water over the crest of the beach berm, a dune or a structure. An overwash area may, through stabilization and vegetation, become a dune.

Development is prohibited on overwash areas, except for development that has no prudent or feasible alternative in an area other than an overwash area, and that will not cause significant adverse long-term impacts on the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities.

The PSEG Site is located on the Delaware Estuary. Overwash areas by definition are limited to oceanfront areas. Therefore, no overwash areas are located within the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.17** because issuance will not authorize activities in any overwash area.

17. 7:7E-3.18 Coastal High Hazard Areas

Coastal high hazard areas are flood prone areas subject to high velocity waters (V zones) as delineated on the Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA), and areas within 25 feet of oceanfront shore protection structures, which are subject to wave run-up and overtopping. The Coastal High Hazard Area extends from offshore to the inland limit of

a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The inland limit of the V zone is defined as the V zone boundary line as designated on the FIRM or the inland limit of the primary frontal dune, whichever is most landward.

Residential development, including hotels and motels, is prohibited in coastal high hazard areas except for single family and duplex infill developments that meet the standards of N.J.A.C. 7:7E-7.2(e). In general, commercial development is discouraged in coastal high hazard areas. Beach use related commercial development in coastal high hazard areas is conditionally acceptable within areas that are already densely developed. All permanent structures shall be set back a minimum of 25 feet from oceanfront shore protection structures, typically including bulkheads, revetments and seawalls and occasionally jetties and groins if constructed at inlets. This condition is applicable only to shore protection structures that are of sufficient height and strength to provide resistance to storm waves.

The PSEG Site is located on the Delaware Estuary. According to FEMA Flood Insurance Rate Maps 3404160009B (04/18/1983) and 3404160010B (04/18/1983), this portion of the Delaware River has not been identified as a Coastal High Hazard Area. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.18** because issuance will not authorize activities in any coastal high hazard area.

18. 7:7E-3.19 Erosion Hazard Areas

Erosion hazard areas are shoreline areas that are eroding and/or have a history of erosion, causing them to be highly susceptible to further erosion, and damage from storms. Development is prohibited in erosion hazard areas.

All development (other than the proposed causeway and potential new offsite transmission lines) associated with the new plant, is confined to Artificial Island, a man-made island with a shoreline fully armored with rock, riprap, sheet pile, and PSEG Site structures. The protection measures implemented at the PSEG Site preclude the site from meeting the definition of an erosion hazard area. The proposed causeway traverses tidal marshes, which are not erosion high hazard areas. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.19** because issuance will not authorize activities in any erosion hazard area.

19. 7:7E-3.20 Barrier Island Corridor

Barrier island corridors are the interior portions of oceanfront barrier islands, spits and peninsulas. Along the New Jersey Coast, headlands are located between Monmouth Beach, Monmouth County and Pt. Pleasant Beach, Ocean County.

New or expanded development within the oceanfront barrier island corridor is conditionally acceptable provided that the development complies with the requirements for impervious cover and vegetative cover that apply to the site under N.J.A.C. 7:7E-5 and 5B.

The PSEG Site is located on the Delaware Estuary in Salem County, NJ. This location is not on the oceanfront. Thus, it is not within the defined barrier island corridor. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.20** because issuance will not authorize activities within the barrier island corridor.

20. 7:7E-3.21 Bay Islands

Bay islands are islands or filled areas surrounded by tidal waters, wetlands, beaches or dunes, lying between the mainland and barrier island. Such islands may be connected to the mainland or barrier island by elevated or fill supported roads. Existing lagoon edges (N.J.A.C.7:7E-3.24) are not bay islands.

On bay islands which abut either a paved public road or a conveyance component of an offsite treatment, conveyance and disposal system with adequate capacity to convey, treat and dispose of the sewage generated from the proposed development, or which abut neither a paved public road nor such a

conveyance, non-water dependent development is prohibited, unless it is redevelopment and meets the standards under this section. Water dependant development is conditionally acceptable.

The PSEG Site is not located between the mainland and an oceanic barrier island and thus does not meet the definition of a Bay Island. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.21** because issuance will not authorize activities on bay islands.

21. 7:7E-3.22 Beaches

Beaches are gently sloping areas of sand or other unconsolidated material, found on all tidal shorelines, including ocean, bay and river shorelines that extend landward from the mean high water line to either:

1. A man-made feature generally parallel to the ocean, inlet, or bay waters such as a retaining structure, seawall, bulkhead, road or boardwalk, except the sandy areas that extend fully under and landward of an elevated boardwalk are considered beach areas; or

2. The seaward or bayward foot of dunes, whichever is closest to the bay, inlet or ocean waters.

Development is prohibited on beaches, except for development that has no prudent or feasible alternative in an area other than a beach, and that will not cause significant adverse long-term impacts to the natural functioning of the beach and dune system, either individually or in combination with other existing or proposed structures, land disturbances or activities.

Based upon mapping completed by the Hazardous Materials Response and Assessment Division of the NOAA (NOAA 1996), there are no beaches on or near the PSEG Site. Issuance by the NRC of the ESP will be consistent with **N.J.A.C. 7:7E-3.22** because issuance will not authorize activities on beaches.

22. 7:7E-3.23 Filled Water's Edge

Filled water's edge areas are existing filled areas lying between wetlands or water areas, and either the upland limit of fill, or the first paved public road or railroad landward of the adjacent water area, whichever is closer to the water. Some existing or former dredged material disposal sites and excavation fill areas are filled water's edge.

The "waterfront portion" is defined as a contiguous area at least equal in size to the area within 100 feet of navigable water, measured from the Mean High Water Line (MHWL). This contiguous area must be accessible to a public road and occupy at least 30 percent of its perimeter along the navigable water's edge.

On filled water's edge sites with direct water access development, the waterfront portion of the site is to be developed with a water dependent use, as defined at N.J.A.C. 7:7E-1.8; and developed with an at-grade deck open to the general public. A public walkway must be provided around the deck landward of the mean high water line at the water's edge. Alternatively, these areas can be left undeveloped for future water dependent uses. On the remaining non-waterfront portion of the site, provision of additional area devoted to water dependent or water-oriented uses may be required as a special case at locations which offer a particularly appropriate combination of natural features and opportunity for waterborne commerce and recreational boating. On large filled water's edge sites, of about 10 acres or more upland acres, where water-dependent and water-oriented uses can co-exist with other types of development, a greater mix of land uses may be acceptable or even desirable. In these cases, a reduced waterfront portion, that is, less than that provided by a 100 foot setback, may be acceptable provided that non-water related uses do not adversely affect either access to or use of the waterfront portion of the site. On filled water's edge sites without direct access to navigable water, the area to be devoted to water related uses will be determined on a case-by-case basis.

The PSEG Site is considered a filled water's edge as it meets the definition under **N.J.A.C. 7:7E-3.23.** The area is a man-made land area that was created from sediments dredged from the Delaware River beginning in the late 1800's. The site is being developed with a water dependant use, as defined under **N.J.A.C. 7:7E-1.8** and as designated by NJDEP on December 2, 2002, as part of the PSE&G Energy Facility Node. Water is required to support the needs of a new facility during construction and operation, including the requirements of the condenser cooling system, CWS, cooling water systems for plant auxiliary components (e.g., the SWS), and makeup for the UHS cooling system.

Public access is not being proposed on this site, due to safety and security issues. Specifically, PSEG is required to maintain a security isolation zone in all outdoor areas adjacent to the physical security barrier at the perimeter of the site's protected area. The isolation zone must be large enough to permit observation of the activities of people on either side of that barrier in the event of its penetration. However, PSEG has constructed sufficient offsite public access sites in the vicinity of the subject site as found in Table 6 of this document and under **7:7E-8.11 Public Trust Rights**.

The proposed activities will be consistent with **N.J.A.C. 7:7E-3.23** because the use is a water dependent use and the applicant has provided offsite public access in a manner consistent with the Coastal Zone Management Rules.

23. 7:7E-3.24 Existing Lagoon Edges

Existing lagoon edges are defined as existing man-made land areas resulting from the dredging and filling of wetlands, bay bottom and other estuarine water areas for the purpose of creating waterfront lots along lagoons for residential and commercial development.

1. Existing Lagoon Edges extend upland to the limit of fill, or the first paved public road or railroad generally parallel to the water area, whichever is less.

Development of existing lagoon edges is acceptable provided the proposed development is compatible with existing adjacent land and water uses; existing retaining structures are adequate to protect the proposed development; new or reconstructed retaining structures are consistent with the filling rule at N.J.A.C. 7:7E-4.10 and structural shore protection rule N.J.A.C. 7:7E-7.11(e); and the development complies with the requirements for impervious cover and vegetative cover that apply to the site under N.J.A.C. 7:7E-5 and either N.J.A.C. 7:7E-5A or 5B.

By definition, there are no lagoon edges at the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.24** because the PSEG Site is an energy/industrial facility and is not on an existing lagoon edge.

24. 7:7E-3.25 Flood Hazard Areas

Flood hazard areas are areas subject to flooding from the flood hazard area design flood, as defined by the Department under the Flood Hazard Area Control Act rules at N.J.A.C. 7:13. Flood hazard areas include those areas mapped as such by the Department, areas defined or delineated as an A or a V zone by the Federal Emergency Management Agency (FEMA), and any unmapped areas subject to flooding by the flood hazard area design flood. Flood hazard areas are subject to either tidal or fluvial flooding and the extent of flood hazard areas shall be determined or calculated in accordance with the procedures at N.J.A.C. 7:13-3.

In a tidal flood hazard area below the mean high water line, this rule applies only to the development of habitable buildings and the construction of railroads, roadways, bridges and/or culverts. Dedication of flood hazard areas for purposes of public open space is encouraged. In an undeveloped portion of a flood hazard area that is within 100 feet of a navigable water body, development is prohibited unless the development is for water dependent use. In a portion of an undeveloped flood hazard area that is 100 feet or farther from a navigable waterway, development is conditionally

acceptable provided the development would not prevent potential water-dependent use in any portion of the flood hazard area within 100 feet of a navigable water body.

Development in flood hazard areas shall conform with the applicable design and construction standards of the Flood Hazard Area Control Act, N.J.S.A. 58:16A-50 et seq., and implementing rules at N.J.A.C. 7:13, (except in lands regulated under the Wetlands Act of 1970, N.J.S.A. 13:9A-1 et seq., pursuant to N.J.S.A. 58:16A- 60); the Uniform Construction Code, N.J.A.C. 5:23; and the Federal flood reduction standards, 44 C.F.R. Part 60.

Development in a flood hazard area shall also comply with the requirements for impervious cover and vegetative cover under N.J.A.C. 7:7E-5 and either N.J.A.C. 7:7E-5A or 5B, as applicable. If endangered and/or threatened wildlife or species habitat is present in the flood hazard area such that the area is also an endangered or threatened wildlife or plant species habitat special area in accordance with N.J.A.C. 7:7E-3.38, then the requirements of N.J.A.C. 7:7E-3.38, Endangered or threatened wildlife or plant species habitats, shall apply.

PSEG intends to raise the new plant's plant grade to elevation 36.9 feet NAVD 88 elevation for power block structures, including filling of approximately 40 acres of artificial ponds internal to the PSEG desilting basin and the USACE CDF. This height meets NRC regulations considering maximum tidal surge from the open coast. The design basis for this elevation is the protection of the facility against extreme (well beyond the regulated 100 year flood event) natural phenomena such as flooding, and considers the maximum tidal surge from the open coast as propagated to the site, coincident with a 10% exceedance of maximum tide, coincident wind set-up, wave run-up, and future sea level rise (10 CFR 50, Appendix A).

According to the provisions of N.J.A.C. 7:13, the flood hazard area design flood elevation shall be equal to the FEMA 100-year flood elevation and the floodway limit shall be determined as follows:

- If a FEMA floodway map exists for the section of regulated water in question, the floodway limit shall be equal to the floodway limit shown on the FEMA floodway map; or
- If no FEMA floodway map exists for the section of regulated water in question, the floodway limit shall be equal to the limits of the channel. The Atlantic Ocean and other non-linear tidal waters such as bays and inlets do not have a floodway.

According to the FEMA Flood Insurance Rate Map 340416 0009B (dated April 18, 1983) for the location of the new plant, the 100-year flood elevation is 9.0 feet (referenced to National Geodetic Vertical Datum of 1929). The new plant structures are designed to be well above this elevation.

Because of its location on a wide tidal estuary, tidal storm surges generate higher water levels at the PSEG Site than do rainfall runoff events from the watershed. In accordance with the requirements of Executive Order 11988 (Floodplain Management) the potential impact to the area inundated by the 1 percent annual risk flood (100-year flood) has been evaluated.

Based on the Site Utilization Plan, the total onsite and adjacent offsite floodplain area to be potentially altered by the placement of fill material is 152 acres. Lands subject to the placement of fill material will result in a minor reduction in the available flood storage in the vicinity. However, riverine flood conditions are not a primary flooding concern at the PSEG Site, because the flow conveyance capacity of the tidal estuary at this location is large compared to riverine generated flow rates, and the ultimate flood storage capacity for tidal tributaries is the Atlantic Ocean. A grading plan for the site has not yet been developed.

The minimum design and performance standards for groundwater recharge are listed at N.J.A.C. 7:8-5.4(a)2 and state that recharge is discouraged in areas of high pollutant loading and that exacerbating a naturally or seasonally high water table should be avoided. All of the areas within the project limits either contain fill, made land, or include 'D' type soils and/or wetlands or have a seasonally high water table. In general, the site conditions make the entire project area unsuitable for groundwater recharge. Therefore, no provisions for the recharge of groundwater are proposed.

Soil erosion and sediment control provisions are proposed for all work areas that will disturb existing ground and where construction vehicles will access unpaved areas of the site. In general, stabilized construction access pads are proposed at all areas where vehicles will transition from unpaved areas to existing paved areas and silt fence and/or hay bales are proposed downstream of work areas that will disturb existing ground. Stabilized construction access pads and silt fence and/or hay bales are proposed in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey.

The proposed causeway is located within both a floodplain and riparian zone (see N.J.A.C. 7:7E-3.26 below). The proposed causeway will be designed to accommodate 100-year or higher flood levels without compromising automotive safety and with no disruption to service. The Flood Hazard Area Design Elevation (100-year floodplain) was obtained from the FEMA Flood Insurance Rate Mapping. The 100-year flood elevation is 9.0 feet (NGVD 1929) in areas traversed by the proposed causeway. Neither NJDEP nor FEMA have established a delineated floodway for this portion of the Alloway Creek Watershed. Therefore, the floodway is assumed to be coincident with the top of the bank.

The proposed causeway is designed as elevated, fixed structures on piers set higher than the existing, nearby access road. The NJDEP Flood Hazard Area Control Act Rules (**N.J.A.C. 7:13**) require the minimization of obstructions in the river and associated channel impacts, and the maintenance of river flow through the bridges to the maximum extent practicable. Flow maximization limits impacts on fish migration, and helps maintain flood flows to preconstruction levels. Limiting activity in the river channel also reduces the amount of disturbance required during bridge construction. The proposed causeway is being designed to minimize support piers in tidal channels.

The locations of the proposed causeway support piers are generally being designed outside of tidal channels, therefore only minor effects to the river bed as related to bridge scour will occur. A detailed scour analysis will be conducted as specific pier locations are determined. Any scour countermeasures recommended to the piers will be conducted in a similar manner to other bridges along the river, and will be implemented to simulate the existing conditions as much as possible, while maintaining the maximum possible area for fish passage.

The proposed plant and causeway are located entirely within the tidal floodplain, therefore no flood storage displacement will occur because the Atlantic Ocean represents the ultimate flood storage capacity. As the design for the new plant and causeway is developed, PSEG will ensure that the designs conform to the applicable requirements of **N.J.A.C. 7:13**.

25. 7:7E-3.26 Riparian Zones

A riparian zone exists along every regulated water, except there is no riparian zone along the Atlantic Ocean nor along any manmade lagoon, stormwater management basin, or oceanfront barrier island, spit or peninsula. Regulated waters are defined in the Flood Hazard Area Control Act rules at N.J.A.C. 7:13-2.2.

The riparian zone includes the land and vegetation within each regulated water, as well as the land and vegetation within a certain distance of each regulated water. The portion of the riparian zone that lies outside of a regulated water is measured landward from the top of bank. If a discernable bank is not present along a regulated water, the portion of the riparian zone outside the regulated water is measured as described in this section.

Development in riparian zones shall conform with the requirements for a flood hazard area individual permit under the Flood Hazard Area Control Act rules at N.J.A.C. 7:13-9, 10 and 11 or, in the alternative as applicable, a flood hazard area permit-by-rule at N.J.A.C. 7:13-7 or a flood hazard area general permit at N.J.A.C. 7:13-8.

In accordance with N.J.A.C. 7:13, "The Flood Hazard Area Control Act Rules", the riparian zone along the Delaware River would be 50 feet from the top of bank as there are no Category One waters, no trout production or trout maintenance waters, no potential for acid soils, and no threatened or endangered plant or animal species that are listed as being critically dependant on the waters on site or within a mile downstream. However, some of the eastern tributaries to the Delaware River in this area are classified as Category One waters, which means the riparian zone from these waters and all upstream tributaries situated in the same Hydrologic Unit Code (HUC) 14 watershed is 300 feet from the top of the bank. The 300 foot riparian zone would impact the north and east portions of the subject site, as well as the proposed causeway. These waters are classified as Category One and the project will be considered a "major development" under the Stormwater Rules (N.J.A.C. 7:8), therefore a Special Water Resources Protection Area - Functional Value Analysis will be required for impacts to the 300 foot riparian zone vegetation. Section N.J.A.C. 7:7E-8.7 Stormwater supplies additional information on the Functional Value Analysis.

As impacts to riparian zone vegetation are quantified in detail through the new plant design process, these impacts will be included in a project-specific mitigation plan for intertidal and subtidal shallows, wetlands, and riparian zone impacts at a ratio agreed upon with NJDEP. Thus, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.26** because impacts to riparian zones will be addressed through approved onsite or offsite mitigation at the required ratios.

26. 7:7E-3.27 Wetlands

Wetlands or wetland means an area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly known as hydrophytic vegetation.

Development in wetlands defined under the Freshwater Wetlands Protection Act is prohibited unless the development is found to be acceptable under the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). Development of all kinds in all other wetlands is prohibited unless the Department can find that the proposed development requires water access or is water oriented as a central purpose of the basic function of the activity (this rule applies only to development proposed on or adjacent to waterways); has no prudent or feasible alternative on a non-wetland site; will result in minimum feasible alteration or impairment of natural tidal circulation (or natural circulation in the case of non-tidal wetlands); and will result in minimum feasible alteration or impairment of natural contour or the natural vegetation of the wetlands.

Wetlands have been identified as important terrestrial habitat at the PSEG Site and adjacent areas, and are regulated under the authority and jurisdiction of the USACE and NJDEP. Section 404 of the Clean Water Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to regulate (via a permit system) the discharge of dredged or fill material into the waters of the United States, including wetlands. In NJ, coastal wetlands are regulated under the Wetlands Act of 1970 whereas freshwater wetlands are regulated under the New Jersey Freshwater Wetlands Protection Act. Development in coastal or freshwater wetlands requires authorization in the form of permits from the NJDEP.

Wetlands plant communities onsite and in the vicinity are variably represented by artificial wetlands within CDFs, disturbed wetlands, degraded coastal marsh communities, freshwater tidal wetlands, and coastal salt marsh. Jurisdictional wetlands are often more narrowly defined relative to

wetlands identified as part of NJDEP's Land Use and Land Cover (LULC) classification system. Wetlands herein include the following land cover types as depicted in Figure 14:

- Deciduous scrub/shrub wetlands
- Mixed Scrub/shrub wetlands (coniferous dominated)
- Disturbed wetlands (modified)
- Herbaceous wetlands
- Managed wetlands in maintained lawn greenspace
- *Phragmites*-dominated interior wetlands
- *Phragmites*-dominated coastal wetlands
- Saline marsh
- Freshwater tidal marshes
- Wetland rights-of-way
- Agricultural wetlands (modified)
- Former agricultural wetlands

On Artificial Island, wetlands and other aquatic habitats are principally found in the extreme eastern and northern portions of the PSEG Site (Site Utilization Plan - Figure 2). Approximately 151.2 acres of this habitat type will be permanently impacted by onsite construction activities. Another approximately 36.5 acres are temporarily impacted by construction related activities within onsite areas and in immediately adjacent offsite areas (current USACE CDF lands). Most wetlands in this area are represented by *Phragmites*-dominated plant communities consisting of near-monocultures of common reed (*Phragmites australis*). *Phragmites* is an aggressive wetland invader forming dense monotypic plant communities that reduce wetland diversity and habitat quality for resident wildlife. Conversely, *Phragmites*-dominated areas may provide marginal habitat when its stands are interspersed with open water or other vegetation, which is generally not the case for the PSEG Site. Table 7 summarizes the amount of onsite wetland habitat that will be impacted by construction of onsite facilities.

A network of marsh creeks, *Phragmites*-dominated coastal wetlands, and restored coastal salt marsh comprise the majority of the proposed causeway route. Table 7 presents the amount of permanent offsite wetland habitat that will be impacted by construction of the proposed causeway bridge and site access area. Potential fill impacts to plant communities due to causeway construction will be minimized as this causeway is designed as an elevated structure. The estimated permanent wetland impact (including fill and shading) associated with the proposed causeway is 20.9 acres. Permanent impacts to these plant communities are limited to placement of piers within wetlands and direct shading. Direct shading potentially results in some alteration of plant communities under the bridge and a reduction in primary productivity.

The construction methodology for the proposed causeway has not yet been determined, but construction work mats are expected to be used within a 50 foot wide easement. Therefore, additional temporary impacts of similar wetland plant communities occur during construction. The estimated temporary wetland impact associated with the construction of the proposed causeway is 20.1 acres. Access-related impacts to wetland plant communities consist of plant damage, compaction of wetland soils and short-term reductions in productivity. Such reductions in primary productivity are small considering the large area of adjacent coastal wetlands within the project vicinity.

Guidelines for Section 404(b)(1) of the Clean Water Act, require that actions proposed within "waters of the United States" 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 considered.

It is the goal of PSEG to select the least environmentally damaging practicable alternative for construction activities. Measures taken during development of the Site Utilization Plan and offsite features to avoid and minimize adverse impacts to "waters of the United States" included the following considerations:

- Minimization of encroachment on coastal wetlands.
- Minimization of encroachment on NJDEP regulated wetlands.
- Utilization of 90 acres of previously developed sediment disposal basins for plant development (both PSEG's permitted disposal facility and the USACE's CDF).
- Revision of the Site Utilization Plan to completely avoid a 23 acre wetland area originally intended for use as a lay down area.
- Causeway construction on piers or bridges to span tidal wetlands instead of construction on fill. This measure reduces impacts to wetlands and avoids impacts to tidal creeks.

Additional measures to avoid and minimize potential impacts to wetlands will be implemented after the selection of a reactor technology and throughout the design phase as detail site layouts are developed. For example, based on technology selection and future decisions regarding soil management and use, additional reductions in the limit of construction (i.e., fill areas) may be achieved to reduce the impact footprint from that shown in the Site Utilization Plan.

Offsite impacts associated with the proposed causeway will be minimized through the use of an elevated road and bridge design thus reducing the width and magnitude of impact when compared to construction on fill. Within a 50-foot width of impact, wetland impacts resulting from construction fill are limited to the areas directly affected by pier placement. Some plant community alteration is expected due to shading effects, as such, the entire 50-foot wide corridor is assumed to be permanently impacted for the purposes of conservative estimation of impacts. It is also assumed that construction methods include the use of low ground-pressure equipment and work mats to support heavy equipment (e.g., pile drivers). Work mats are used within a 50-foot wide construction easement and removed after construction. Temporary impacts within these areas are therefore minimized, but result in limited compaction and disturbance to wetland soils and substrates. Consequently, only temporary disturbance in these areas is anticipated and recovery following the construction phase is expected to be rapid.

Potential effects to vegetation from cooling tower salt drift may include acute damage (e.g. necrotic tissue and other deformities) and/or less visible chronic effects (e.g. reduced growth and increased susceptibility to disease). However, based on its study of salt drift at a number of sites, the NRC has concluded that salt deposition from drift from natural draft cooling towers is typically small and below the rates that affect even sensitive vegetation. The effect on soil salinization is even less significant, usually with undetectable measurement levels (NUREG-1437) - see discussion under **7:7E-8.10 Air Quality**.

The majority of plant communities within the cooling tower salt drift zone consist of salt marsh or brackish marsh ecosystems that are dominated by medium- to high-salinity tolerant species. Most of the salt marsh and brackish marsh ecosystems surrounding the PSEG Site are dominated by *Phragmites australis* and *Spartina alterniflora*, which are high-salinity tolerant plant species. Prior surveys conducted at the PSEG Site (NUREG-1437) have shown no impact from salt deposition due to drift from the existing HCGS natural draft cooling tower on any specific plant species.

The surrounding terrestrial ecosystems at the PSEG Site are mainly salt marsh or brackish marsh ecosystems, dominated by *Phragmites australis* and *Spartina alterniflora*, so any salt deposition due to drift is expected to have little to no impact. Surveys conducted at the PSEG Site (NUREG-1437) have

shown no impact from salt deposition due to drift from the existing HCGS cooling tower on any terrestrial ecosystems.

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 at required ratios. PSEG, through its Estuary Enhancement Program (EEP), has extensive experience and demonstrated success implementing coastal salt marsh and freshwater wetland restoration and rehabilitation programs. In fact, the proposed causeway traverses a potion of the Alloway Creek Wetland Restoration Site, an EEP site that was restored under the program. This familiarity with local wetland systems was used to identify appropriate candidate mitigation sites and will be used to develop and implement the final approved mitigation plan.

Factors typically considered when selecting a site for wetland mitigation include 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.

Opportunities for mitigation exist in 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 hydrology. Once a candidate mitigation site has been selected, wetland mitigation will be achieved through a series of rehabilitation and/or restoration methods as outlined below. Methods are tailored to the selected site and may include the control of *Phragmites*, restoration of hydrology (levee removal, channel design, and re-establishing a connection of upland areas to tidal influences), and wetland enhancement including restoration of desirable and native vegetation.

Wetland mitigation plan details are primarily driven by conditions established within Clean Water Act Section 404 permits issued by the USACE or NJDEP Division of Land Use Regulation, and Section 401 Water Quality Certifications issued by the NJDEP. Accordingly, specific wetland mitigation efforts will be determined as part of such authorizations.

Several candidate mitigation areas have been tentatively identified that have the potential to meet some or all of PSEG's wetland mitigation needs. Candidate mitigation areas include:

- The existing PSEG Site
- Mannington Meadow
- Mason's Point
- Alloway Creek Watershed

Wetland mitigation concepts for each of these areas are described below and include the enhancement and/or development of coastal and freshwater wetland systems. A network of marsh creeks are intrinsic to the restoration of coastal marsh and will address the loss of marsh creeks within the existing marsh as described above.

a. Onsite

Although much of the PSEG Site is either developed or is proposed to be developed, approximately 149 acres of *Phragmites*-dominated wetlands onsite could be utilized for wetland mitigation activities (Figure 15). PSEG is currently in the process of acquiring additional acreage to the north of the site, a large portion of which is degraded, *Phragmites*-dominated, mapped coastal wetlands. Upon completion of the acquisition, this area will be considered for onsite mitigation. Most of the wetlands onsite are tidally influenced coastal wetlands where *Phragmites* control may allow *Spartina* and other desirable marsh species to re-vegetate.

b. Mannington Meadow

Mannington Meadow is a brackish tidal wetland located on the Salem River in Salem County, NJ (Figure 15). Mannington Meadow is a migrating, wintering and breeding site for numerous species of birds including but not limited to waterfowl, shorebirds, and raptors. A brackish and freshwater-based fishery also exists in the area. Mannington Meadow includes open water, emergent wetland, and adjacent farmland. The potential exists to restore this degraded marsh to a functional tidal brackish ecosystem. Keys to this restoration include increasing the incoming freshwater flow from the Salem River and reducing the coverage of *Phragmites* in the degraded wetlands to allow *Spartina* and other desirable marsh species to re-vegetate Mannington Meadow is large enough (approximately 3,812 acres) to provide mitigation opportunities for the PSEG project, but much of it is under private, state or federal ownership.

c. Mason's Point

Mason's Point is located in Elsinboro Township near Alloway Creek approximately 2.5 miles upstream from the creek's confluence with the Delaware River (Figure 15). In the mid-1990s, Mason's Point existed as an impounded coastal marsh with near monotypic stands of *Phragmites*. Since that time, levee failure has opened the system to limited and inefficient tidal flow from Alloway Creek into portions of the site. The potential for full salt marsh restoration exists through levee removal and channel installation to restore the natural daily tidal exchange. Additionally, *Phragmites* control promotes the re-vegetation of the site by *Spartina* and other desirable marsh species. Mason's Point is primarily owned by NJ and is approximately 1,000 acres in area.

d. Alloway Creek Watershed

The western portion of PSEG's Alloway Creek Watershed site is not included in the EEP restoration area. It is located in Elsinboro and Lower Alloways Creek townships in Salem County, NJ. This site, as depicted in Figure 15, was originally part of the over 2,800 acre Alloway Creek site in PSEG's EEP. As such, herbicide control was applied at the beginning of the program. Subsequently, the Alloway Creek EEP site was reduced in size leaving over 1,400 acres unrestored. As it exists today, this site is a non-impounded coastal marsh with monotypic stands of *Phragmites*. The key restoration component consists of *Phragmites* control to allow *Spartina* and other desirable marsh species to re-vegetate.

In summary, this rule is applicable because the new plant and causeway will have unavoidable impacts to regulated wetlands. PSEG will minimize these impacts through the design of the new plant and causeway to the extent that is safely practicable. Mitigation for impacted wetlands will be undertaken at approved mitigation ratios. Thus, the NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.27** because impacts to wetlands will be minimized and mitigated for at the required ratios.

27. 7:7E-3.28 Wetlands Buffers

Wetlands buffer or transition area means an area of land adjacent to a wetland which minimizes adverse impacts on the wetlands or serves as an integral component of the wetlands ecosystem. Wider buffers than those noted below may be required to establish conformance with other Coastal Rules, including, but not limited to, 7:7E-3.38 and 3.39.

1. A wetlands buffer or transition area of up to 150 feet in width shall be established adjacent to all wetlands defined and regulated under the Freshwater Wetlands Protection Act.

2. For all other wetlands, including wetlands regulated under the Coastal Wetlands Act of 1970, a wetlands buffer of up to 300 feet shall be established.

All wetlands buffers associated with wetlands subject to the Freshwater Wetlands Protection Act shall be regulated in accordance with the Freshwater Wetlands Protection Act Rules, N.J.A.C. 7:7A Development is prohibited in a wetlands buffer around all other wetlands, unless it can be demonstrated that the proposed development will not have a significant adverse impact and will cause minimum feasible adverse impact, through the use of mitigation where appropriate on the wetlands, and on the natural ecotone between the wetlands and surrounding upland. The precise geographic extent of the actual wetlands buffer required on a specific site shall be determined on a case-by-case basis using these standards.

The proposed new plant, causeway, and temporary construction staging areas are expected to impact wetland buffers along with direct wetland impacts. As the design of the new plant and causeway is developed, PSEG will quantify these impacts in greater detail.

PSEG will minimize these impacts through the design of the new plant and causeway to the extent that is safely practicable. Mitigation for impacted wetland buffers will be undertaken at approved mitigation ratios. Thus, the NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.28** because impacts to wetland buffers will be minimized and mitigated for at the required ratios.

28. 7:7E-3.31 Coastal Bluffs

A coastal bluff is a steep slope (greater than 15 percent) of consolidated (rock) or unconsolidated (sand, gravel) sediment which is adjacent to the shoreline or which is demonstrably associated with shoreline processes.

1. The waterward limit of a coastal bluff is a point 25 feet waterward of the toe of the bluff face, or the mean high water line, whichever is nearest the toe of the bluff.

2. The landward limit of a coastal bluff is the landward limit of the area likely to be eroded within 50 years, or a point 25 feet landward of the crest of the bluff, whichever is farthest inland (see Appendix, Figures 7 and 8, incorporated herein by reference).

3. Steep slopes (N.J.A.C. 7:7E-3.34) are isolated inland areas with slopes greater than 15 percent. All steep slopes associated with shoreline processes or adjacent to the shoreline and associated wetlands, or contributing sediment to the system, will be considered coastal bluffs.

Development is prohibited on coastal bluffs, except for linear development which meets the rule on the Location of Linear Development (N.J.A.C. 7:7E-6.1), shore protection activities which meet the appropriate Coastal Engineering Use rules (N.J.A.C. 7:7E-7.11), and single family homes and duplexes which are not located along the shorelines of the Atlantic Ocean, Delaware Bay, Raritan Bay or Sandy Hook Bay and comply with N.J.A.C. 7:7E-7.2(e) or (f).

There are no coastal bluffs on, or within close proximity to the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.31** because issuance will not authorize activities on any coastal bluffs.

29. 7:7E-3.32 Intermittent Stream Corridors

Intermittent stream corridors are areas including and surrounding surface water drainage channels in which there is not a permanent flow of water and which contain an area or areas with a seasonal high water table equal to or less than one foot. The inland extent of these corridors is either the inland limit of soils with a seasonal high water table depth equal to, or less than one foot, or a disturbance of 25 feet measured from the top of the channel banks, whichever is greater.

Uses that promote undisturbed growth of native vegetation and wildlife habitat value are encouraged. Cutting, filling, damming, detention basins for runoff recharge, paving, structures or any other activities that would directly degrade the function of intermittent stream corridors, except for linear infrastructure for which there is no feasible alternate route, is prohibited.

Intermittent streams not subject to the ebb and flow of the tide shall also comply with the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A).

Based on aerial photography, the Salem County Soil Survey, and inspection of USGS quad maps, intermittent streams are not present on the site or within the proposed causeway alignment. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.32** because issuance will not authorize activities in intermittent stream corridors.

30. 7:7E-3.33 Farmland Conservation Areas

Farmland conservation areas are defined as any contiguous area of 20 acres or more (in single or multiple tracts of single or multiple ownership) with soils in the Capability Classes I, II and III or special soils for blueberries and cranberries as mapped by the United States Department of Agriculture, Soil Conservation Service, in National Cooperative Soil Surveys, which are actively farmed, or suitable for farming, unless it can be demonstrated by the applicant that new or continued use of the site for farming or farm dependent purposes is not economically feasible. Farming or farm-dependent purposes include nurseries, orchards, vegetable and fruit farming, raising grains and seed crops, silviculture (such as Christmas tree farming), floriculture (including greenhouses), dairying, grazing, livestock raising, and wholesale and retail marketing of crops, plants, animals and other related commodities.

Farmland conservation areas shall be maintained and protected for open space or farming purposes. Farming or farm-dependent uses are permitted uses in farmland conservation areas. Housing is permitted only if it is an accessory use to farming. Mining is permitted only in accordance with a reclamation plan which meets the requirements of the Mining Use rule (N.J.A.C. 7:7E-7.8).

Farmland conservation areas do not occur on the site of the proposed plant. Although the soil types on Artificial Island are classified as Mf (Made land, dredged river materials, Class III) in the Salem County Soil Survey, farming is not economically feasible as the site is adjacent to an existing nuclear facility, and a portion of the site is currently a USACE CDF. The majority of the lands where the proposed causeway will be located is mapped as Tm (Tidal Marsh), which is classified as Class VIII, and not suitable for farming. However, proposed improvements to Money Island Road, which is the northern end of the proposed causeway, travels along lands that are mapped as MqB (Mattapex silt loam, Class II), OtA (Othello silt loam, Class III), and MoB (Matapeake silt loam, Class II). The proposed road improvements may impact these existing agricultural lands. If any proposed activities are located within areas that are protected under a conservation restriction (i.e. farmland preservation site), the appropriate steps will be taken, including seeking release of a conservation easement pursuant to the New Jersey Conservation Restriction and Historic Preservation Restriction Act, N.J.S.A. 13:8B-1 et seq. Mitigation to replace any impacted farmland preservation lands will be implemented as needed.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.33** as farmland conservation areas do not occur on the PSEG Site. If impacts to existing farmland preservation areas result from the proposed road improvements, appropriate measures will be taken to mitigate for the loss.

31. 7:7E-3.34 Steep Slopes

Steep slopes are land areas with slopes greater than 15 percent, which are not adjacent to the shoreline and therefore not coastal bluffs (see N.J.A.C. 7:7E-3.31). Steep slopes include natural swales and ravines, as well as manmade areas, such as those created through mining for sand, gravel, or fill, or road grading. Slopes of less than 15 percent are not considered to be steep slopes.

Development on steep slopes is discouraged where wetlands, wetland buffers, intermittent stream corridors, threatened and endangered species habitats, riparian zones or water areas are located adjacent to or at the base of the slope and on steep slopes which are forested as defined at N.J.A.C. 7:7E-5.5(c).

Steep slopes do not occur on the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.34** because issuance will not authorize development on any steep slopes.

32. 7:7E-3.35 Dry Borrow Pits

Dry borrow pits are excavations for the purpose of extracting coastal minerals which have not extended below the groundwater level. This includes, but is not limited to, dry sand, gravel and clay pits, and stone quarries.

Surface mining is conditionally acceptable, provided the mining use rule at N.J.A.C. 7:7E-7.8 is satisfied. Channeling clean surface runoff into dry sand and gravel pits for the purposes of aquifer recharge is encouraged. Pavement runoff may be channeled into dry borrow pits provided that it is adequately filtered to remove pavement contaminants. Discharge of clean effluent from liquid waste treatment facilities for aquifer recharge is encouraged (e.g., tertiary sewage effluent), provided groundwater quality is monitored and maintained. Storing water in impermeable dry borrow pits is conditionally acceptable. Dredged material disposal is conditionally acceptable provided that the dredged material will not degrade groundwater quality; the dredged material is of a particle size that will not disturb groundwater hydrology; and dredged material disposal is compatible with neighboring uses. Solid waste disposal is conditionally acceptable on a case-by-case basis.

Dry borrow pits do not occur on the PSEG Site or along the proposed causeway alignment. PSEG has not yet determined the source of the structural fill required for the grading of power block areas. The source of this fill may involve dry borrow pits at an offsite location. If PSEG obtains structural fill from a dry borrow pit in NJ, then PSEG will comply with all applicable provisions of **N.J.A.C. 7:7E-3.35**. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.35** because issuance will not authorize the development or use of new borrow pits within NJ's coastal zone.

33. 7:7E-3.36 Historic and Archaeological Resources

Historic and archaeological resources include objects, structures, shipwrecks, buildings, neighborhoods, districts, and man-made or man-modified features of the landscape and seascape, including historic and prehistoric archaeological sites, which either are on or are eligible for inclusion on the New Jersey or National Register of Historic Places.

Development that detracts from, encroaches upon, damages, or destroys the value of historic and archaeological resources is discouraged. Development that incorporates historic and archaeological resources in sensitive adaptive reuse is encouraged.

The new plant will be located on Artificial Island, a man-made land area that was created from sediments dredged from the Delaware River beginning the late 1800's. A Phase I evaluation, Paleosol evaluation, visual impact evaluation, and underwater survey have been completed and are currently under review in respective state historic preservation offices (NJ and DE).

No historic properties were found on the PSEG Site. However, the wetlands and uplands along the proposed causeway are known to have both pre-Colonial and post-Colonial historic resources in the

vicinity. Previously unrecorded archaeological sites were also identified along the proposed causeway as part of a Phase I field investigation. All of these sites are potentially eligible for inclusion on the NRHP.

Phase I Archaeology Survey

Site 28SA179 is a multicomponent site located in a proposed parking lot area on the east side of Money Island Road. The historic component consists of 76 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no above ground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA179 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 15 artifacts that include cord marked or fabric impressed ceramics which most likely represent a Kipp Island or Webb Phase campsite. Although prehistoric sites are known to exist in the area, little work has been conducted to determine the temporal, functional, and organizational attributes of these sites.

Site 28SA180 is a multicomponent site located in a proposed parking lot area on the east side of Money Island Road. The historic component consists of 107 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no above ground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA180 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 12 artifacts that include cord marked or fabric impressed ceramics that most likely represent a Kipp Island or Webb Phase campsite. Although prehistoric sites are known to exist in the area, little work has been conducted to determine the temporal, functional, and organizational attributes of these sites.

Site 28SA181 is a multicomponent site located in a proposed parking lot area located on the east side of Money Island Road. The historic component consists of 50 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no above ground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA181 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of four artifacts that include lithic debitage and one ceramic sherd. No further work on the prehistoric component is recommended.

Site 28SA182 is a multicomponent site located in a proposed parking lot area located on the west side of Money Island Road. The historic component consists of 44 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no above ground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA182 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 26 artifacts that include ceramics, lithic debitage, and tools. Although prehistoric sites are known to exist in the area, little work has been conducted to determine the temporal, functional, and organizational attributes of these sites.

Site 28SA183 is a multicomponent site located in a proposed parking lot area located on the west side of Money Island Road. The historic component consists of 11 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no above ground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA183 is located in close proximity to the previously identified Elsinboro/Lower

Alloway Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 39 artifacts that include ceramics, lithic debitage, and tools. Although prehistoric sites are known to exist in the area, little work has been conducted to determine the temporal, functional, and organizational attributes of these sites.

Site 28SA186 is a historic site identified during a pedestrian survey of the area designated as Field C. The field was plowed agricultural field at the time of the survey with surface visibility at 75% to 100%. The site measures approximately 295 feet (90 meters) east/west by 197 feet (60 meters) north/south and encompasses 1.4 acres (ha). The site was identified on a small rise that contained a surface scatter of historic artifacts. The site boundaries were determined by the distribution of artifacts that were contained to the small rise. The 1842 coastal map depicts a structure located in the approximate area of the artifact concentration. The historic component consisted of ceramics, glass, and metal artifacts that date the site to the mid-eighteenth century to the nineteenth century. Additionally, Site 28SA186 is located in close proximity to the previously identified Elsinboro/Lower Alloway Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area.

Visual Impact Assessment

As a result of consultation with the New Jersey Historic Preservation Office (HPO) and the Delaware State Historic Preservation Office, a GIS-based visual impact analysis was performed to evaluate the potential visibility of the new plant from historic sites listed on the NRHP. A Digital Terrain Model (DTM) was developed in GIS using U.S. Geological Survey (USGS) topographic information. The cooling tower bounding elevation was then analyzed in GIS to identify listed NRHP properties from which the cooling towers may be visible. Two natural draft cooling towers were assumed to be located north of the power block. The model included a base terrain elevation of 10 feet above existing grade, cooling tower height of 590 feet, and a tree canopy height of 50 feet.

A total number of 91 NRHP properties are located within the 10 mile radius (80 located in DE and 11 in NJ). Based on the GIS analysis, 65 of the 91 NRHP-listed sites (71 percent) considered in this analysis are determined to potentially be in a setting from which the new plant cooling tower is visible.

Using information from the DTM, selected areas and historic properties within the 10 mile radius were visited to support the predictions made by the DTM. Because NJ contained a relatively small number of properties, all listed sites in NJ were visited, whereas representative sites were investigated in Delaware. A total of 51 properties were identified for this survey and included individual structures, historic districts, and one archaeological site. Five sites could not be located in the field. In addition to the 11 listed properties in NJ, an additional three properties were visited that were not included on the NRHP list but were of similar age and design as the included properties. A total of 37 properties were visited in Delaware. Based on the results of field surveys, the visibility of the existing and similarly sized HCGS cooling tower is variable depending on local topography and vegetation near each property. The terrain of the vicinity in NJ is relatively flat, therefore relatively small obstructions cause the cooling tower to be out of view.

Thirty-four of the 46 sites located in the field were predicted to be in settings where the cooling tower is visible. However, the cooling tower was not visible from 34 of these sites (e.g., Alloways Creek Meetinghouse, Hancock House, and Broadway Historic District in NJ; Achmeister, Monterey, Misty Vale in DE) due to obstructions (buildings or trees) that were not accounted for by the GIS terrain model. However, because of the large distance of the new plant from known historic sites, and the physical similarity of the new plant cooling towers with the existing HCGS cooling tower, the impact of the new cooling towers on the viewshed of historic properties is minimal, and does not warrant mitigation.

Submerged Cultural Resources Survey

A submerged cultural resources remote sensing survey was completed for the proposed dredging area. The survey area included approximately 100 acres in the Delaware River, immediately adjacent to the western shore of Artificial Island, just north of the HCGS. The results of the survey identified a total of 84 magnetic anomalies and 17 sidescan sonar targets. Three clusters of magnetic anomalies and two associated acoustic images (Target Cluster 1) exhibit characteristics indicative of vessel remains. Cluster 2 is comprised of five magnetic anomalies with a sonar image indicative of an area of small debris. The complex nature of the anomalies and debris on the bottom surface should be considered to have a potential association with vessel remains. Cluster 3 is composed of four magnetic anomalies. The complex nature of the magnetic signature could suggest shipwreck remains. If avoidance of these areas is not possible, additional investigation will be conducted to assess NRHP significance.

Summary

Direct impacts to historic or cultural resources during operations are less than the impacts of construction. No historic properties are associated with the PSEG Site, therefore no cultural resource management guidelines are needed. For offsite areas (dredging areas, potential transmission line and proposed causeway) that require permitting, PSEG will comply with regulations that prescribe actions to be taken if significant archaeological or paleontological artifacts are encountered. The potential for effects on historic or cultural resources from new plant operations are minimal and likely will not require mitigation.

Consultations are ongoing with NJHPO to avoid or minimize impacts to any areas that are on, or eligible for inclusion on, the NJ or National Register of Historic Places. Phase II assessments are a probable next step, after ESP application submittal. With the aid of the respective historic preservation offices, the proposed activities will be consistent with **N.J.A.C. 7:7E-3.36**.

34. 7:7E-3.37 Specimen Trees

Specimen trees are the largest known individual trees of each species in New Jersey. The Department's Division of Parks and Forestry maintains a list of these trees (see "New Jersey's Biggest Trees", published by the Department's Division of Parks and Forestry, Summer 1991 for a listing of specimen trees). In addition, large trees approaching the diameter of the known largest tree shall be considered specimen trees. Individual trees with a circumference equal to or greater than 85 percent of the circumference of the record tree, as measured 4.5 feet above the ground surface, for a particular species shall be considered a specimen tree.

Development is prohibited that would significantly reduce the amount of light reaching the crown, alter drainage patterns within the site, adversely affect the quality of water reaching the site, cause erosion or deposition of material in or directly adjacent to the site, or otherwise injure the tree. The site of the tree extends to the outer limit of the buffer area necessary to avoid adverse impacts, or 50 feet from the tree, whichever is greater.

No trees on the site or within the footprint of the proposed plant or causeway are identified in "New Jersey's Biggest Trees" nor are there any trees on the site or proposed causeway with a circumference equal to or greater than 85 percent of the circumference of the NJDEP specified record tree. With respect to the potential transmission line, a detailed natural resources inventory will be conducted to assess the potential for specimen trees. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.37** because issuance will not authorize activities that will impact specimen trees.

35. 7:7E-3.38 Endangered or Threatened Wildlife or Plant Species Habitats

Endangered or threatened wildlife or plant species habitats are areas known to be inhabited on a seasonal or permanent basis by or to be critical at any stage in the life cycle of any wildlife or plant identified as "endangered" or "threatened" species on official Federal or State lists of endangered or

threatened species, or under active consideration for State or Federal listing. The definition of endangered or threatened wildlife or plant species habitats include a sufficient buffer area to ensure continued survival of the population of the species. Absence of such a buffer area does not preclude an area from being endangered or threatened wildlife or plant species habitat.

Development of endangered or threatened wildlife or plant species habitat is prohibited unless it can be demonstrated, through an Endangered or Threatened Wildlife or Plant Species Impact Assessment as described at N.J.A.C. 7:7E-3C.2, that endangered or threatened wildlife or plant species habitat would not directly or through secondary impacts on the relevant site or in the surrounding area be adversely affected.

Table 8 lists protected animal and plant species recorded in the coastal environments immediately surrounding the PSEG Site or having the potential to occur in the project area. The species listed on Table 9 are those that are state- or federally listed as endangered or threatened, and those that are candidates or proposed for federal listing. Except shortnose sturgeon, Atlantic sturgeon, and five species of sea turtles, all of which are not included on county lists but are listed (or are being considered for listing) by the USFWS in 50 CFR 17.11 and are known to occur in the Delaware River, the species shown in Table 9 were taken from county and municipality records maintained by the U.S. Fish and Wildlife Service (USFWS 2010) and the NJDEP (NJDEP 2010). In addition, PSEG has conducted site-specific surveys for listed species in 2009. As the following paragraphs explain, most of the species have not been observed on the PSEG Site. None of the state-listed plant species included in Table 9 has been observed on the PSEG Site or in the adjacent coastal wetlands. This assessment only includes portions of the proposed project that occur in NJ; potential impacts associated with the possible macro-transmission corridors in DE, MD or PA are not included here.

Bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*) are occasionally seen in the vicinity of PSEG Site (NRC 1984) but are not known to nest on the HCGS or SGS structures (NJDEP 2008d, NJDEP 2008e); however, elevated structures and open fields near the PSEG Site could support nesting. Due to its successful recovery, the bald eagle has been de-listed and is no longer a federally listed species by the USFWS. The bald eagle was identified as important because of its status as a federally protected species (Migratory Bird Treaty Act, and Bald and Golden Eagle Protection Act) and state listed threatened species. Although bald eagles were occasionally observed during the 2009 field surveys onsite, there are no known bald eagle nests or suitable roosting habitat at the PSEG Site, primarily due to the absence of large trees or suitable structures that support nesting activities. Therefore, the proposed construction footprint of the plant and proposed causeway is not anticipated to impact bald eagle nesting or roosting habitat.

The northern harrier, a state-listed endangered species in NJ and DE, is commonly observed foraging in the coastal wetlands onsite and near the site. Nests were not observed onsite during the 2009 field surveys but nesting habitat in the coastal marsh is present onsite and in the vicinity. Construction-related impacts to onsite habitat potentially utilized by the northern harrier includes 9.9 acres of *Phragmites*-dominated old field, 58.3 acres of *Phragmites*-dominated coastal wetlands, 44.6 acres of *Phragmites*-dominated interior wetlands, 25.3 acres of old field, and 0.2 acres of saline marsh. Permanent impacts to northern harrier habitat within the proposed causeway include 11.3 acres of agricultural lands, 3.4 acres of old field habitats, and 25.1 acres of wetlands. The vast majority of these construction-related impacts are incurred in areas consisting of near monocultures of the invasive reed, *Phragmites australis*, which offers poor-quality northern harrier habitat because it forms dense, impenetrable stands. Abundant foraging and nesting habitat will remain in the vicinity of the existing plant site after project completion.

The red shouldered hawk, a NJ listed endangered species, has been identified in recent years in Salem County during the Audubon Christmas Bird Count (http://www.audubon.org/bird/cbc/, last accessed May 11, 2010). No red shouldered hawks were observed onsite during the 2009 field surveys. Preferred habitat (deciduous and mixed forest communities adjacent to water) is absent onsite but present

in the vicinity. As such, no construction-related impacts to red shouldered hawks as a result of the new plant and associated causeway are expected.

Peregrine falcons were removed from the federal list of endangered and threatened wildlife in 1999 (USFWS 1999), but the species remains on the NJ list of endangered species (Table 9). Peregrine falcons continue to do well throughout NJ (NJDEP 2008e).

Osprey, a threatened species in NJ, was occasionally observed both onsite and in the vicinity of the PSEG Site during the 2009 surveys. Active osprey nests were observed on transmission towers along the current access road, on the transmission towers that run from the plant north towards Money Island Road, and on man-made nesting platforms constructed by PSEG along Alloway Creek. Natural osprey nesting sites such as large trees are not present onsite. Impacts to osprey, if any, are small because existing nesting platforms are not expected to be impacted by construction. Although there may be some short-term displacement during construction, nesting structures in the form of additional transmission towers may be more plentiful after construction. Furthermore, food and foraging habitat (fish in the Delaware Estuary and tributary systems) will remain abundant during and after construction.

The Cooper's hawk (*Accipiter cooperii*), bobolink (*Dolichonyx oryzivorus*), and grasshopper sparrow (*Ammodramus savannarum*) have been observed within 6 miles of the PSEG Site (AEC 1973). None of these birds is federally-listed. The Cooper's hawk and bobolink are state-listed as threatened. NJDEP classifies the breeding population of grasshopper sparrows as threatened, and the migratory or winter population of grasshopper sparrows as stable in number (NJDEP 2008a). Cooper's hawks prefer large tracts of forested land where they nest in large mature trees. Cooper's hawk is listed as threatened in NJ and one was observed in a small tree onsite in the Fall of 2009. The preferred habitat is not present onsite, therefore Cooper's hawks are more likely residents of forested habitat in the vicinity of the PSEG Site. None of the remaining state-listed avian species included in Table 9 has been observed on the PSEG Site.

The red-headed woodpecker is not a federally listed species, but its breeding and non-breeding populations are listed by NJ as threatened. No red-headed woodpeckers were observed during the 2009 field surveys nor have they been reported in the USGS Breeding Bird Survey or the Audubon Society's Christmas Bird count. Due to the lack of appropriate habitat (i.e., open woods, deciduous forests, forest edges, river bottoms, orchards, grasslands with scattered trees and clearings, dead or dying trees) within the PSEG Site and vicinity, construction-related impacts, if any, are small.

PSEG has a successful history of working with the NJDEP Endangered Species Program for a number of years, and particularly through the EEP. The EEP has included a number of improvements to benefit listed species, including the creation of high marsh islands for northern harrier nesting within the EEP sites and osprey nesting platforms. Through the development of the new plant and causeway, PSEG will continue this relationship in order to incorporate similar enhancements as part of mitigation measures for impacted resources (e.g., wetlands, wetland buffers, etc.).

Five federally listed species of sea turtle may occur in Delaware Bay: the threatened loggerhead sea turtle (*Caretta caretta*), threatened Atlantic green turtle (*Chelonia mydas*), endangered Kemp's ridley sea turtle (*Lepidochelys kempi*), endangered hawksbill turtle (*Eretmochelys imbricata*), and endangered leatherback turtle (*Dermochelys coriacea*). The NJDEP classifies these turtle species as endangered, except the Atlantic green turtle, which is state-listed as threatened. Young sea turtles move from the open waters of the Atlantic Ocean into near-shore coastal areas where they forage and mature into adults. The young turtles make occasional forays into the shallow waters of mid-Atlantic estuaries in late summer to feed and rest. While no nesting occurs along Delaware Bay beaches, all five sea turtle species can move into the Bay and may travel up the Estuary as far as Artificial Island (Delaware Estuary Program 1996). Most of the sea turtles found in Delaware Bay are sub-adults that were hatched on beaches in the Caribbean, Florida, and the Carolinas and have migrated north to nursery grounds in the mid-Atlantic

region. The vast majority of the sea turtles observed in Delaware Bay are loggerheads, with smaller numbers of Kemp's ridley and Atlantic green turtles occasionally observed.

Of the five threatened or endangered turtle species, only the loggerhead and Kemp's ridley sea turtles have been encountered at the cooling water intake of SGS. Mitigation measures to reduce the incidental capture of sea turtles at SGS were implemented in 1992 and 1993. Since then, only six loggerhead sea turtles and no Kemp's Ridley sea turtles have been encountered. Moreover, collection of sea turtles has not occurred at the HCGS closed-cycle cooling water intake due to its low approach velocity and general configuration, and is not expected to occur at the new plant with a substantially similar intake design.

One federally-listed fish, the shortnose sturgeon (*Acipenser brevirostrum*), occurs in Delaware Bay. In the Delaware River system, adult shortnose sturgeons spend most of their lives in the upper tidal freshwater portion of the river (the most heavily used portion of the river is that between RM 118 and RM 137). However, shortnose sturgeon often move further upstream to spawn (O'Herron et al. 1993). After spawning, some adults move downstream into low-salinity reaches of the river (including Delaware Bay), primarily in spring and summer (O'Herron et al. 1993; NMFS 1998). This is in sharp contrast to sturgeon in southeastern rivers, which spend most of the year in the lower Estuary and move upstream in spring into the middle and upper reaches of natal rivers to spawn. Based on surveys conducted in the 1980s, the Delaware River shortnose sturgeon population is one of the largest along the eastern seaboard, with population estimates ranging from 6,408 to 14,080 individuals (NMFS 1998).

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) occurs in the Delaware River. In 2006, the NMFS initiated a status review for Atlantic sturgeon to determine if listing as threatened or endangered under the Endangered Species Act (ESA) is warranted. The Status Review Report was published on February 23, 2007 (NMFS 2007). NMFS is currently considering the information presented in the Status Review Report to determine if any listing action pursuant to the ESA is warranted at this time. If it is determined that listing is warranted, a final rule listing the species could be published. As a candidate species, Atlantic sturgeon receive no substantive or procedural protection under the ESA; however, NMFS recommends that project proponents consider implementing conservation actions to limit the potential for adverse effects on Atlantic sturgeon from any proposed project. The Atlantic sturgeon is a state endangered species in NJ.

The Atlantic Sturgeon is a member of the Acipenseridae family as is the short-nosed sturgeon and sturgeon are among one of the oldest fish species in the world. Its range extends from New Brunswick, Canada to the eastern coast of Florida. Atlantic sturgeon have not been recorded in the 2002 through 2004 PSEG biological monitoring program in the bottom trawl, pelagic trawl, ichthyoplankton and macrozooplankton sampling, impingement sampling, nor as eggs, larvae, juveniles or adults in entrainment sampling. A single Atlantic sturgeon was reported in PSEG's 2003 beach seine sampling. These data suggest that a robust population of Atlantic sturgeon that will be of particular concern is not present in the vicinity of the PSEG Site.

In 1980, 1991, 1993, and 1999, the NMFS issued biological opinions and incidental take statements, each determining that the continued operation of the existing facilities at the PSEG Site will affect but not jeopardize the continued existence of threatened or endangered species, including sea turtles and shortnose sturgeon (NMFS 1999).

Since the last NMFS consultation in early 1999, seven shortnose sturgeon and four sea turtles have been collected from the vicinity of the SGS CWIS. The 1999 revision of the NMFS biological opinion and incidental take statement for SGS CWIS explicitly acknowledged prior studies conducted (e.g., radio turtle tracking studies) and praised proactive measures taken by PSEG to reduce sea turtle take at the SGS CWIS. These measures included the proceduralized removal of ice barriers at the CWIS in summer months (when turtles may be present). This measure greatly reduced turtle encounters at the intake structure (from around 25 incidents in 1991 to only 4 incidents of live takes from 1993 through

2007). The NMFS included in the 1999 revised incidental take statement a reduction in allowable take at the CWIS, citing the marked improvement due to the implementation of proceduralized removal of ice barriers, and changed the NMFS requirement for meetings from "annual" to "as-needed." The incidental take statement advanced the NMFS determination that the level of anticipated take is not likely to result in jeopardy for the regulated species at the SGS, and specifically acknowledged PSEG for furthering the state of knowledge of sea turtle and sturgeon biology in the Estuary and furthering the intent of the ESA. The causes of recent mortalities (e.g., ship propeller strikes) were predominately non-SGS related. The historic determination that the once-through cooling water system at the SGS does not adversely affect listed aquatic species suggests that the lower capacity intake system for the new plant will also not adversely affect these species.

The threatened and endangered aquatic species known to occur in the project area are two species of sturgeon and five species of sea turtles. The sea turtles in the Delaware Bay system are summer foraging populations and do not nest in the area. Spawning habitat for the shortnose sturgeon in the Delaware River system is located substantially upstream of the Artificial Island site. Consequently, the benthic eggs and larvae are unlikely to be affected by project dredging operations distant from the spawning area. Larger individuals are known to occur in this reach of the river but are likely to be capable of swimming away from any suspended sediments or from dredging equipment. It is not likely that Atlantic sturgeon spawn in the project vicinity in the Delaware River; however appropriate habitat for juveniles does exist in the project area. Direct impacts to Atlantic sturgeon are limited to exposure to fine sediments, or collisions with propellers or water borne equipment that may occur. However, such impacts are unlikely as the impacted areas are small compared with the expanse of similar suitable habitat in the Delaware River in the vicinity and region. Additionally, dredging activities will likely displace this and other fish from the immediate dredge zone, thereby minimizing impact potential. Neither healthy sea turtles nor sturgeon are expected within the marsh creeks impacted by the proposed causeway.

In summary, the impacts of the new plant and causeway are minimal to all terrestrial, avian, and aquatic listed species reported in the area. The NJ portions of the potential macro-transmission corridors may increase available nesting sites for osprey and roosting sites for other foraging raptors.

36. 7:7E-3.39 Critical Wildlife Habitats

Critical wildlife habitats are specific areas known to serve an essential role in maintaining wildlife, particularly in wintering, breeding, and migrating. These include:

1 Rookeries for colonial nesting birds, such as herons, egrets, ibis, terns, gulls, and skimmers; stopovers for migratory birds, such as the Cape May Point region; and natural corridors for wildlife movement merit a special management approach through designation as a Special Area.

2. Ecotones, or edges between two types of habitats, are a particularly valuable critical wildlife habitat. Many critical wildlife habitats, such as salt marsh waterfowl wintering areas, and muskrat habitats, are singled out as water or water's edge areas.

3. Definitions and maps of critical wildlife habitats are currently available only for colonial waterbird habitat in the 1979 Aerial Colony Nesting Waterbird Survey for New Jersey (NJDEP, Division of Fish and Wildlife). Until additional maps are available, the Division of Fish Wildlife will consider sites on a case-by-case basis.

Development that would directly or through secondary impacts on the relevant site or in the surrounding region adversely affect critical wildlife habitats is discouraged, unless minimal feasible interference with the habitat can be demonstrated; there is no prudent or feasible alternative location for the development; and the proposal includes appropriate mitigation measures. The NJDEP reviews proposals on a case-by-case basis.

The wetland and upland areas surrounding the PSEG Site provide wildlife habitat for a variety of birds and other terrestrial wildlife. The existing plants at PSEG Site have been in operation for over three decades. Wildlife within the area has become acclimated to the presence of the PSEG Site. The facility itself is a developed site with minimal habitat value. There have been no documented adverse impacts to wildlife habitats during the operation of the PSEG Site, and continued operation will not directly or indirectly impact critical wildlife habitats.

The northern pintail, green-winged teal, mallard, American black duck, ring-necked duck, greater scaup, Canada goose, bufflehead, snow goose, American coot, hooded merganser, common merganser, and red-breasted merganser are waterfowl that have been identified as important species at or near the PSEG Site. These thirteen species of waterfowl are considered important species based on their recreational value as game species that are hunted in the vicinity of the PSEG Site. Although protected by the Migratory Bird Treaty Act, hunting provisions allow for sport harvest.

Waterfowl habitat is relatively abundant throughout the PSEG Site and vicinity. The invasion of *Phragmites australis* however, has historically altered the structure and function of the historically diverse marsh ecosystems by changing species composition, nutrient cycles and hydrological regimes. Dense stands of *Phragmites* decrease native biodiversity and quality of wetland habitat, particularly for migrating waterfowl species. Although a few of these waterfowl species may occasionally nest, most migrate through the Atlantic Flyway stopping to rest and feed. Therefore, they primarily utilize open water areas such as the CDF/disposal basins and tidal creeks. Construction-related impacts will include 90 acres of unmapped coastal–CDF/disposal basin wetlands. These basins are mostly surrounded by nearly impenetrable monotypic stands of *Phragmites* and are generally shallow, containing minimal assemblages of aquatic vegetation and benthic macroinvertebrate communities. As such, the basins offer resting habitat but provide generally poor foraging and nesting habitat for waterfowl. Construction activities are expected to result in waterfowl displacement but tidal creeks will remain abundant in the vicinity of the PSEG Site after construction, as well as approximately 25,000 acres of wetland habitat.

The river otter is considered an important species because it is commercially harvested for its pelt. River otters inhabit both freshwater and coastal environments and were observed in the Delaware River at the PSEG Site during the 2009 field surveys. Although some temporary displacement may occur during construction, appropriate habitat will remain abundant in the Delaware River, Alloway Creek, Hope Creek, and various unnamed tidal creeks in the vicinity of the PSEG Site after construction.

The muskrat is considered an important species at the PSEG Site because it is commercially harvested for its fur. Muskrats are abundant in the coastal wetlands and freshwater wetlands surrounding the PSEG Site and were observed during the 2009 field surveys. Permanent impacts to wetland land cover potentially utilized by muskrat include about 151.2 acres onsite and about 20.9 acres offsite (includes access road shading). Although construction impacts result in temporary displacement and some permanent impacts to muskrat habitat on the PSEG Site and proposed causeway, approximately 25,000 acres of wetland remain in the vicinity after construction.

White-tail deer are considered an important species due to their game species status and recreational value to hunters. This important species is abundant in the upland agricultural areas within the vicinity where they were commonly observed during the 2009 ecological field studies. Onsite, white-tail deer were occasionally observed in the upland old field habitat east of the existing HCSG and SGS. Impacts to potential white-tail deer habitat onsite in upland rights-of-way undeveloped and forest/old field land cover types includes 9 ac. of permanent impacts and 100 ac. of temporary impacts. Impacts to potential white-tail deer habitat within the proposed causeway (agriculture, forest/old field, upland rights of-way undeveloped, agricultural wetlands, and former agricultural wetlands) include 18 ac. of permanent impacts and 0.3 ac. of temporary impacts. Portions of the impacted area are located near the existing

facility where buildings, pavement, and the noise of operations provide unsuitable or marginal wildlife habitat. Construction activities may also increase the potential for additional temporary white-tail deer mortality due to vehicle collisions related to displacement and movement toward appropriate upland habitat east of the site in the vicinity. Over 16,000 acres of agriculture habitat and over 2,500 acres of forest/old field habitat remain in the vicinity post construction. Due to the abundance of available habitat in the vicinity and the temporary impacts associated with displacement during construction, impacts to the white-tailed deer are small.

The most common herpetofauna species observed or heard during 2009 field surveys included the eastern painted turtle (*Chrysemys picta picta*), northern spring peeper (*Pseudacris crucifer*), and southern leopard frog (*Rana sphenocephala*). In July 2009, green tree frogs (*Hyla cinerea*) were also observed at the PSEG Site in ponds within the de-silt basins in the northwestern portion of the site. It is a resident species of DE and has not been recorded in NJ.

Wildlife species potentially impacted from construction activities are generally common in the region. Suitable replacement habitat is readily available for most onsite wildlife species in lands surrounding the PSEG Site and proposed causeway. Furthermore, any losses of individual animals in the project study area during construction activities are small and are not expected to substantially alter local populations.

a. Traffic/Roadway Impacts

The proposed causeway, constructed on piers instead of embankment, is an elevated roadway structure that minimizes habitat fragmentation and impacts to wildlife. Due to its elevated nature, the proposed causeway will not prevent the movement of wildlife in the manner that a roadway built on embankment does, and will therefore not result in significant wildlife habitat fragmentation. For terrestrial wildlife species, typical roadways built on embankment become crossing hazards for wildlife. As such, the proposed causeway allows for wildlife movement under the elevated roadway and eliminates or greatly reduces the number of wildlife/vehicle incidents.

b. Noise Impacts

Wildlife species have the potential to be affected by construction noise during the construction of the new plant and associated causeway. Typical noise levels from equipment commonly used during construction range from 80–90 decibels at 50 feet. High noise levels within this range may be expected to exhibit varying responses from nearby wildlife. Noise levels are expected to attenuate with distance such that noise levels within coastal wetlands and other nearby terrestrial habitats are anticipated to be near 50 decibels, a level that is similar to ambient noise levels measured near the boundary of the PSEG Site. For example, a source with a noise level of 50 A weighted decibels (dBA) at 1,000 feet has a noise level of 44 dBA at 2,000 feet from the source, and a source with a noise level of 60 dBA at 1,000 feet has a noise level of 54 dBA at the same distance. Thus, the impacts of noise from construction of the new plant on wildlife utilizing adjacent coastal marsh are small.

The bounding noise level for operational noise emissions is associated with the fan-assisted natural draft cooling towers. The estimated A-weighted noise emission for this type of cooling tower is 60 dBA at 1,000 feet. Noise measurements recorded onsite demonstrated that existing noise levels attenuated to a maximum of 51.6 dBA (a value typical of ambient low noise environments) near the site boundary.

Noise from onsite sources associated with the new plant attenuate with distance. For example, a source with a noise level of 50 dBA at 1,000 feet has a noise level of 44 dBA at 2,000 feet from the source, and a source with a noise level of 60 dBA at 1,000 feet has a dBA of 54 at

the same distance. A 2009 baseline ambient noise survey indicates that the noise from sources at the existing plant attenuate to levels that generally represent background noise values in natural environments. This noise level is similar to that measured near the PSEG Site boundary. Noise sources within the adjacent marsh environment include wind, rustling of grasses (*Phragmites*), and periodic animal noises (breeding frogs, bird song, etc.) Thus, the impacts of noise from operation of new plant cooling towers are minimal.

c. Collisions with Structures

Avian collisions with man-made structures are the result of 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. The number of bird collisions with construction equipment, such as cranes, or with new structures has not been quantitatively assessed. However, based on surveys conducted over several years at the existing HCGS natural draft cooling tower, which showed few instances of bird collisions, and the findings of NUREG-1437, which demonstrated that the effects of avian collisions with existing structures at nuclear power plants are small, the impacts of such collisions during the construction phase are small.

d. Artificial Lighting

Wildlife species also have the potential to be affected by the use of artificial lighting at nighttime during construction of the new plant. For example, frogs have been found to inhibit their mating calls when exposed to excessive light at night and the feeding behavior of some bat species may also be altered by artificial lighting (Chepesiuk 2009). In addition, artificial lighting could create or exacerbate an avian-collision hazard if tall cranes are illuminated for work during nighttime construction of the new plant. According to Ogden (Ogden 1996), a large proportion of migrating birds affected by human-built structures are songbirds, apparently because of their propensity to migrate at night, their low flight altitudes, and their tendency to be trapped and disoriented by artificial light, making them vulnerable to collision with obstructions. During nighttime construction for the new plant and/or proposed causeway, best management practices will be used to mitigate the hazards to wildlife associated with artificial nighttime illumination. Furthermore, shielding will be used to direct light down to the work areas preventing unnecessary illumination of the sky and sensitive environmental areas such as wetlands or ponds. Based on the background nighttime illumination levels of the existing HCGS and SGS, and the best management practices to mitigate effects to wildlife, the impacts of artificial illumination at nighttime during the construction phase are small.

In summary, the new plant and causeway are not expected to affect critical wildlife habitats. The effects of habitat fragmentation are minimized through the construction of the elevated access road. Noise impacts are localized, and the effects of structure collisions and artificial lighting are not expected based on observations of existing plants at the PSEG Site. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.39** because issuance will not authorize development affecting any critical wildlife habitats.

37. 7:7E-3.40 Public Open Space

Public open space constitutes land areas owned or maintained by State, Federal, county and municipal agencies or private groups (such as conservation organizations and homeowner's associations) and used for or dedicated to conservation of natural resources, public recreation, visual or physical public access or, wildlife protection or management. Public open space also includes, but is not limited to, State Forests, State Parks, and State Fish and Wildlife Management Areas, lands held by the New Jersey Natural Lands Trust (N.J.S.A. 13:1B-15.119 et seq.), lands held by the New Jersey Water Supply

Authority (N.J.S.A. 58:1B-1 et seq.) and designated Natural Areas (N.J.S.A. 13:1B-15.12a et seq.) within DEP-owned and managed lands.

New or expanded public or private open space development is encouraged at locations compatible or supportive of adjacent and surrounding land uses. Development that adversely affects existing public open space is discouraged.

The proposed new plant will not be located on lands that are used for or dedicated to conservation natural resources, public recreation, visual or physical public access, wildlife protection or management. The proposed causeway will be located within areas owned by NJ and PSEG for the purpose of conservation of natural resources. However, there is an existing PSEG Right-of-Way that traverses through this area. The proposed causeway will be located within or adjacent to the PSEG Right-of-Way. Where the proposed causeway deviates from the existing Right-of-Way, the appropriate steps will be taken, including seeking release of a conservation easement on the State's property pursuant to the New Jersey Conservation Restriction and Historic Preservation Restriction Act, N.J.S.A. 13:8B-1 et seq. and acquiring the necessary Tidelands conveyances.

Accordingly, the proposed activities will be consistent with **N.J.A.C. 7:7E-3.40** because the activities will not occur on areas that are public open spaces, once the above steps are completed.

38. 7:7E-3.41 Special Hazard Areas

Special hazard areas include areas with a known actual or potential hazard to public health, safety, and welfare, or to public or private property, such as the navigable air space around airports and seaplane landing areas, potential evacuation zones and areas where hazardous substances as defined at N.J.S.A. 58:10-23.11b-k are used or disposed, including adjacent areas and areas of hazardous material contamination.

Coastal development, especially residential and labor-intensive economic development, within special hazard areas is discouraged. All development within special hazard areas must include appropriate mitigating measures to protect the public health and safety.

The PSEG Site contains operating nuclear powered electrical generating stations with attendant potential radiological and non-radiological hazards. The existing radioactive waste systems at the PSEG Site are designed to collect, process, and release radioactive materials in a controlled and safe manner. The design bases for these systems assure that releases of radioactivity during normal operation are controlled in accordance with standards established in 10 CFR 20 and satisfy the design objectives of 10 CFR 50, Appendix I. The NRC license renewal process verified that this will continue for the period of extended operation.

The new plant will include radioactive solid waste, liquid waste, and gaseous waste management systems. Solid and hazardous materials are handled at the PSEG Site as described in Section **7:7E-8.22 Solid and Hazardous Waste**. If any hazardous substance investigations or cleanup activities become necessary, approval from the NJDEP will be obtained in accordance with applicable regulations.

Public health and safety will be protected by the design of the new plant and waste management practices, procedures and activities, as it is for existing units. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.41** because issuance will not authorize new coastal development within a special hazard area.

39. 7:7E-3.42 Excluded Federal Lands

Excluded Federal lands are those lands, the use of which is, by law, subject solely to the discretion of or held in trust by the Federal Government, its officers or agents. These lands are excluded from the coastal zone as required by Section 304 of the Federal Coastal Zone Management Act.

Federal actions on excluded Federal lands that affect any land or water use, or natural resource of the coastal zone shall be consistent with the Coastal Zone Management rules to the maximum extent practicable. The effects on the land or water use or natural resource maybe direct, indirect, cumulative, secondary or reasonably foreseeable effects.

Artificial Island, which includes lands owned by PSEG, NJ, and the federal government, was created, beginning early in the twentieth century, by disposing of hydraulic dredge spoils within a progressively enlarged diked area established around a natural sandbar that projected into the river. The existing 734 acre PSEG property is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township. PSEG is developing an agreement in principle with the USACE to acquire an additional 85 acres immediately to the north of Hope Creek Generating Station. Therefore, with the land acquisition, the entire PSEG Site will be 819 acres. The specific timing of land acquisition is not currently known and is subject to further PSEG and USACE actions. However the agreement in principle with the USACE will serve to establish the basis for eventual land acquisition and EAB control, necessary to support the issuance of a future Combined Operating License.

Subsequent to the agreement in principle with the USACE, PSEG will develop a lease agreement for the USACE CDF land to the north of the PSEG Site, depicted on the Site Utilization Plan for the concrete batch plant and temporary construction/laydown use. At the completion of construction, the leased land will be returned to the USACE, subject to any required long-term EAB control conditions. As part of this process, PSEG will work with the USACE to develop replacement CDF capacity that will be consistent with all coastal zone rules and will be developed under appropriate state and federal permits. Specific sites for the replacement CDF have not been identified.

All proposed activities will be on land owned or controlled by PSEG either through a lease or easement and will not be considered "excluded Federal land." Accordingly, these activities will be consistent with **N.J.A.C. 7:7E-3.42**.

40. 7:7E-3.43 Special Urban Areas

Special urban areas are those municipalities defined in urban aid legislation (N.J.S.A. 52:27D-178) qualified to receive State aid to enable them to maintain and upgrade municipal services and offset local property taxes. Under N.J.S.A. 52:27D-178 et seq., the Department of Community Affairs (DCA) establishes a list of qualifying municipalities each fiscal year. DCA's list of qualifying municipalities may be obtained on request from the Department's Land Use Regulation Program, PO Box 439, Trenton, New Jersey 08625-0439, (609) 292-0060.

Development that will help to restore the economic and social viability of special urban areas is encouraged. Development that would adversely affect the economic well being of these areas is discouraged, when an alternative which is more beneficial to the special urban areas is feasible. Development that would be of economic and social benefit and that serves the needs of local residents and neighborhoods is encouraged.

There are no Special Urban Areas near the proposed project. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.43** because the issuance does not involve Special Urban Areas.

41. 7:7E-3.44 Pinelands National Reserve and Pinelands Protection Area

The Pinelands National Reserve includes those lands and water areas defined in the National Parks and Recreation Act of 1978, Section 502 (P.L. 95-625), an approximately 1,000,000 acre area ranging from Monmouth County in the north, south to Cape May County and from Gloucester and Camden County on the west to the barrier islands of Island Beach State Park and Brigantine Island along the Atlantic Ocean on the east (see Appendix, Figure 10, incorporated herein by reference). The "Pinelands Area" is a slightly smaller area within the Pinelands National Reserve. It was designated for

State regulation by the Pinelands Protection Act of 1979 (N.J.S.A. 13:18-1 et seq.). The Pinelands Commission adopted a Comprehensive Management Plan in November, 1980. Within the Pinelands Area, the law delineates a Preservation Area, where the plan shall "preserve an extensive and contiguous area of land in its natural state, thereby insuring the continuation of a Pinelands environment ..." (Section 8c).

Coastal development shall be consistent with the intent, policies and objectives of the National Parks and Recreation Act of 1978, P.L. 95-625, Section 502, creating the Pinelands National Reserve, and the State Pinelands Protection Act of 1979 (N.J.S.A. 13:18A-1 et seq.).

The PSEG Site is not located in the Pinelands National Reserve or the Pinelands Protection Area. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.44** because issuance will not authorize development affecting the Pinelands National Reserve or the Pinelands Protection Area.

42. 7:7E-3.45 Hackensack Meadowlands District

The "Hackensack Meadowlands District" is a 19,485 acre area of water, coastal wetlands and associated uplands within the boundaries described in the Hackensack Meadowlands Reclamation and Development Act (N.J.S.A. 13:17-1 et seq.).

A coastal activity or development for which the New Jersey Meadowlands Commission requires a zoning certificate shall be consistent with the New Jersey Meadowlands Master Plan, as evidenced by receipt of a zoning certificate from the New Jersey Meadowlands Commission.

The PSEG Site is not located in the Hackensack Meadowlands District. Accordingly, issuance by the NRC of the ESP will be consistent with **N.J.A.C. 7:7E-3.45** because issuance will not authorize development affecting the Hackensack Meadowlands District.

43. 7:7E-3.46 Wild and Scenic River Corridors

Wild and scenic river corridors are all rivers designated into the National Wild and Scenic Rivers System and any rivers or segments thereof being studied for possible designation into that system pursuant to the National Wild and Scenic Rivers Act (16 U.S.C. 1271-1278). For rivers designated into the national system, the wild and scenic river corridor shall include the river and adjacent areas located within one-quarter mile from the mean high water line on each side of the river until a Federal River Management Plan has been adopted, after which time the wild and scenic corridor shall be the area defined in the adopted plan. For rivers under study for possible designation into the national system, the wild and scenic river corridor shall include the river and adjacent areas extending one-quarter mile from the mean high water line on each side of the river.

Development that would have a direct and adverse effect on any "outstandingly remarkable resource value" for which the river was designated or is being studied for possible designation into the National Wild and Scenic Rivers System is prohibited.

The PSEG Site is located on the estuarine portion of the Delaware River. The proposed causeway traverses Alloway Creek and associated wetlands. The lower portion of the Delaware River and Alloway Creek in the vicinity of the PSEG Site are not classified as a wild, scenic, or recreational river segments under the criteria of the National Wild and Scenic Rivers System (National Wild and Scenic Rivers System 2009). Therefore, the PSEG Site is not located in a Wild and Scenic River Corridor, and NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.46** because issuance will not authorize development affecting any wild and scenic river corridor.

44. 7:7E-3.47 Geodetic Control Reference Marks

Geodetic control reference marks are traverse stations and benchmarks established or used by the New Jersey Geodetic Control Survey pursuant to P.L.1934, c.116.

The disturbance of a geodetic control reference mark is discouraged. When a geodetic control reference mark must be moved, raised or lowered to accommodate construction, the New Jersey Geodetic Control Survey shall be contacted at least 60 days prior to disturbance, and arrangements shall be made to protect the position. If the position can not be protected, it may be altered in position after approval by the New Jersey Geodetic Control Survey and under the supervision of a licensed professional engineer or land surveyor using standard methods.

The establishment of (and reference to) geodetic reference marks will be critically important during the construction of both the new plant and proposed causeway. PSEG will coordinate with the New Jersey Geodetic Control Survey if the proposed project affects any established geodetic controls, to ensure protection or replacement of these marks. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.47** because issuance will provide for the protection of existing geodetic control reference marks, or their subsequent replacement, as necessary.

45. 7:7E-3.48 Hudson River Waterfront Area

"The Hudson River Waterfront Area" extends from the George Washington Bridge in Fort Lee, Bergen County to the Bayonne Bridge in Bayonne, Hudson County, inclusive of all land within the municipalities of Bayonne, Jersey City, Hoboken, Weehawken, West New York, Guttenberg, North Bergen, Edgewater and Fort Lee subject to the Waterfront Development Law.

Non-industrial development within the Hudson River Waterfront Area shall conform with specified criteria which govern allowable building height, massing and public access. Industrial development, including water dependent transportation (passenger and vehicular) and cargo handling facilities, shall conform with the criteria to the extent practical consistent with public safety and the operational requirements of such facilities.

The PSEG Site is not located on the Hudson River. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.48** because issuance will not authorize development affecting the Hudson River Waterfront Area.

46. 7:7E-3.49 Atlantic City

Atlantic City is those lands within the municipal boundary of the City of Atlantic City.

Development within Atlantic City must conform to the standards set forth in this rule.

The PSEG Site is not located in Atlantic City. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-3.49** because issuance will not authorize development within Atlantic City.

47. 7:7E-3.50 Lands and Waters Subject to Public Trust Rights

Lands and waters subject to public trust rights are tidal waterways and their shores, including both lands now or formerly below the mean high water line, and shores above the mean high water line. Tidal waterways and their shores are subject to the Public Trust Doctrine and are held in trust by the State for the benefit of all the people, allowing the public to fully enjoy these lands and waters for a variety of public uses.

Development that adversely affects lands and waters subject to public trust rights is discouraged. Public access to lands and waters subject to public trust rights shall be provided in accordance with the public trust rights rule, N.J.A.C. 7:7E-8.11.

The subject site is located on the shore of the Delaware River, which is a tidal waterway subject to public trust rights. Artificial Island was constructed by filling open waters of the State, therefore PSEG and the USACE have received NJDEP Bureau of Tidelands Management conveyances for these lands. In addition, mapped Tideland claims within PSEG's ROW have been conveyed.

The NRC will require the new plant, as a nuclear power reactor site, to establish and maintain an onsite physical protection system and security organization providing high assurance of protection against the threat of radiological sabotage. The physical protection system must include a protected area surrounded by physical barriers that limit personnel and vehicle access. Only authorized personnel may enter the protected area. An isolation zone adjacent to the protected area, which allows monitoring and observation of the activities of people on either side of the barrier, is also required (10 CFR 73.55). As a result of these requirements, public access to waterfront areas within the protected area has not been practicable in the past on the adjacent site nor will it be practicable for the proposed plant.

The proposed plant will be consistent with **N.J.A.C. 7:7E-3.50** because the proposed activities will not reduce the amount of waterfront property now accessible to the public. Additionally, PSEG sponsors a program that has increased public access elsewhere throughout the Delaware Estuary. A full discussion of public access is provided under **7:7E-8.11 Public Trust Rights**.

B. General Water Areas

1. 7:7E-4.2 Aquaculture

Aquaculture is the use of permanently inundated water areas, whether saline or fresh, for the purposes of growing and harvesting plants or animals in a way to promote more rapid growth, reduce predation, and increase harvest rate. Oyster farming in Delaware Bay is a form of aquaculture.

Aquaculture is encouraged in all General Water Areas as defined at N.J.A.C. 7:7E-4.1, provided it does not unreasonably conflict with resort or recreation uses; it does not cause significant adverse offsite environmental impacts; and it does not present a hazard to navigation.

The PSEG Site involves no existing aquaculture activities, and none are proposed for the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.2** because issuance will not authorize any aquaculture activity.

2. 7:7E-4.3 Boat Ramps

Boat ramps are inclined planes, extending from the land into a water body for the purpose of launching a boat into the water until the water depth is sufficient to allow the boat to float. Boat ramps are most frequently constructed of asphalt, concrete or crushed shell.

Boat ramps are conditionally acceptable provided there is a demonstrated need that cannot be met by existing facilities; they cause minimal practicable disturbance to intertidal flats or subaqueous vegetation; boat ramps shall be constructed of environmentally acceptable material, such as concrete or oyster shells; and garbage cans are provided near the boat ramp.

There is an existing, unimproved private concrete boat ramp on PSEG's property east of Sunken Ship Cove. PSEG utilizes this boat ramp intermittently, for example when responding to and monitoring the Athos 1 oil spill of 2004. Regardless, no changes to the existing boat ramp are proposed for the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.3** because issuance will not entail any additional boat ramps.

3. 7:7E-4.4 Docks and Piers for Cargo and Commercial Fisheries

Docks and piers for cargo and passenger movement and commercial fisheries are structures supported on pilings driven into the bottom substrate or floating on the water surface, used for loading and unloading passengers or cargo, including fluids, connected to or associated with, a single industrial or manufacturing facility or to commercial fishing facilities.

Docks and piers for cargo and passenger movement and commercial fisheries are conditionally acceptable provided the width and length of the dock or pier is limited to only what is necessary for the proposed use; the dock or pier will not pose a hazard to navigation; and the associated use of the adjacent land meets all applicable Coastal Zone Management rules.

Although PSEG is proposing to construct a barge unloading area to facilitate the construction of the new plant, similar to the existing HCGS barge slip, there are no docks or piers for cargo and passenger movement or commercial fisheries at the PSEG Site, and none are proposed to support the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.4** because issuance will not authorize additional docks or piers for cargo and commercial fisheries.

4. 7:7E-4.5 Recreational Docks and Piers

Recreational and fishing docks and piers are structures supported on pilings driven into the bottom substrate, or floating on the water surface or cantilevered over the water, which are used for recreational fishing or for the mooring of boats or jet skis used for recreation or fishing, except for commercial fishing, and house boats.

Recreational docks and piers, including jet ski ramps, and mooring piles, are conditionally acceptable provided. There is a demonstrated need that cannot be satisfied by existing facilities; the construction minimizes adverse environmental impact to the maximum extent feasible; the docks and piers and their associated mooring piles are located so as to not conflict with overhead transmission lines; there is minimum feasible interruption of natural water flow patterns; space between horizontal planking is maximized and width of horizontal planking is minimized to the maximum extent practicable; and the width of the structure shall not exceed twice the clearance between the structure and the surface of the ground below or the water surface at mean high tide (measured from the bottom of the stringers), except for floating docks whose width shall not exceed eight feet.

There are no existing recreational docks or piers at the PSEG Site, and none are proposed at the new plant because of the onsite physical protection system required by 10 CFR 73.55 (section **7:7E-3.50 Lands and Waters Subject to Public Trust Rights**). The PSEG Site is within the nuclear security zone, and is neither accessible to the public nor used for recreational purposes. PSEG has established public access facilities, including a boat ramp, at its Alloway Creek Wetland Restoration Site. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.5** because issuance will not authorize any recreational docks or piers.

5. 7:7E-4.6 Maintenance Dredging

Maintenance dredging is the removal of accumulated sediment from previously authorized and legally dredged navigation and access channels, marinas, lagoons, canals or boat moorings for the purpose of maintaining a previously authorized water depth and width for safe navigation.

Maintenance dredging is conditionally acceptable to the authorized depth, length and width within all General Water Areas to ensure that adequate water depth is available for safe navigation, provided:

1. An acceptable dredged material placement site, with sufficient capacity will be used;

2. Pre-dredging chemical and physical analysis of the dredged material and/or its elutriate may be required where the Department suspects contamination of sediments;

3. Turbidity concentrations and other water quality parameters at, downstream, and upstream of the dredging site, and slurry or decant water overflows shall meet applicable State Surface Water Quality Standards at N.J.A.C. 7:9B;

4. If predicted water quality parameters are likely to exceed State Surface Water Quality Standards, or if pre-dredging chemical analysis of dredged material or elutriate reveals significant contamination, the Department will work cooperatively with the applicant to fashion acceptable control measures and will impose seasonal restrictions;

5. For mechanical dredges such as clamshell bucket, dragline, grab, or ladders, deploying silt curtains at the dredging site may be required, if feasible based on site conditions. Where the use of

silt curtains is infeasible, dredging using closed watertight buckets or lateral digging buckets may be required;

6. For hydraulic dredges specific operational procedures designed to minimize water quality impacts, such as removal of cutter head, flushing of pipeline sections prior to disconnection, or limitations on depth of successive cuts may be required;

7. The Department may authorize dredging on a seasonally restricted basis only;

8. Propwash dredging, which is the movement of sediment by resuspending accumulated material by scouring the bottom with boat propellers or specially designed equipment with propellers, is prohibited.

Deposition of river sediments from natural processes occurs in and around the PSEG Site and existing intake structures and barge slips. Maintenance dredging of these areas is conducted on an as-needed basis in order to remove the accumulation of the naturally occurring sediments. It is important to maintain unobstructed flow to the water intake structures to allow for full and safe operation of the nuclear generating station. The NJDEP authorized such dredging in a waterfront development permit (Permit No. 1704-02-0001.6) issued July 21, 2009. The USACE Permit No. CENAP-OP-R-2006-6232-45 (NWP 3) (effective July14, 2008) also approved maintenance dredging activities to support SGS and HCGS operations. It is expected that similar maintenance dredging will be required to support new plant operations. PSEG will apply to both the USACE and NJDEP for additional maintenance dredging permits necessary to support new plant operations.

Maintenance dredging activities at the PSEG Site are performed using a hydraulic dredge or mechanical clamshell dredge, with sediment-reducing measures in place in accordance with the guidelines and regulations set forth in the NJDEP's publication *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (NJDEP 1997).

It is expected that the barge unloading area and intake structure for the new plant will require a similar level of maintenance dredging throughout the plant's operational life. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.6** because all maintenance dredging associated with new facility operation will be conducted consistent with permits and conditions issued by NJDEP under the Coastal Area Facility Review Act (N.J.S.A. 13:19) and the Waterfront Development Act (N.J.S.A. 12:5-3) as well as by the USACE under its permitting programs to implement Section 10 of the Rivers and Harbors Act of 1899 (33 CFR 322) and Section 404 of the Clean Water Act (33 CFR 323).

6. 7:7E-4.7 New Dredging

New dredging is the removal of sediment that does not meet the definition of maintenance dredging at N.J.A.C. 7:7E-4.6.

New dredging is conditionally acceptable in all General Water Areas for boat moorings, navigation channels or anchorages provided:

1. There is a demonstrated need that cannot be satisfied by existing facilities;

2. The facilities served by the new dredging satisfy the location requirements for Special Water's Edge Areas;

3. The adjacent water areas are currently used for recreational boating, commercial fishing or marine commerce;

4. The dredge area causes no significant disturbance to Special Water or Water's Edge Areas;

5. The adverse environmental impacts are minimized to the maximum extent feasible;

6. The dredge area is reduced to the minimum practical;

7. The maximum depth of the newly dredged area shall not exceed that of the connecting access or navigation channel necessary for vessel passage to the bay or ocean;

8. Dredging will have no adverse impacts on groundwater resources;

9. No dredging shall occur within 10 feet of any wetlands. The proposed slope from this 10 foot buffer to the nearest edge of the dredged area shall not exceed three vertical to one horizontal; and,

10. Dredging shall be accomplished consistent with all of the conditions specified by the rule, as appropriate to the dredging method:

Construction of the new barge unloading facility and mooring area will require lowering of the river bottom an average of 4.5 feet for an area of about 61 acres (dredging of about 440,000 cubic yards of sediment). Approximately seven barge mooring caissons will be constructed. Each caisson is 20 feet in diameter resulting in the loss of about 0.05 acres of river bottom habitat for the seven caissons. Construction of the new intake structure requires dredging of an approximately 31 acre area for an average depth of 4.5 feet dredging of approximately 150,000 cubic yards of sediment (Figure 11).

The maximum areal extent of the Delaware River bottom to be dredged for this project is 92 acres (61 acres for barge mooring area and 31 acres for intake structure), which accounts for 0.4 percent of the total Delaware River bottom within a 6 mile vicinity. Technology used for dredging of this area has not been determined but will likely use a combination of suction and bucket dredges. Dredged material will be disposed of onsite or in an approved upland location with sediment-reducing measures in place in accordance with the guidelines and regulations set forth in the NJDEP's publication *The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters* (NJDEP 1997).

The ecological effects associated with suspended sediments depends on a variety of factors, including the type of dredge used, the timing and duration of the dredging, the particle size of the suspended sediment, the presence of biotoxins in the sediments, the success of the control measures to contain the suspended sediments, and the life stage of the species present. Dredging for the barge and intake structure facilities could result in a temporary increase in suspended sediment in the immediate vicinity of the dredge operation. Drift of suspended material is expected to occur beyond the immediate dredge site based on sediment composition. However, results of surficial sediment grain size analysis in these areas suggest that most sediment is comprised of coarser sandy material.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.7** because all new dredging associated with new facility operation will be conducted consistent with permits and conditions issued by NJDEP under the Coastal Area Facility Review Act (N.J.S.A. 13:19) and the Waterfront Development Act (N.J.S.A. 12:5-3) as well as by the USACE under its permitting programs to implement Section 10 of the Rivers and Harbors Act of 1899 (33 CFR 322) and Section 404 of the Clean Water Act (33 CFR 323).

7. 7:7E-4.8 Dredged Material Disposal

Dredged material disposal is the discharge of sediments removed during dredging operations.

Dredged material disposal is prohibited in tidal guts, man-made harbors, medium rivers, creeks and streams, and lakes, ponds and reservoirs. Dredged material disposal is discouraged in open bays, semi-enclosed and backbays where the water depth is less than six feet. Disposal of dredged materials in the ocean and bays deeper than six feet is conditionally acceptable provided that there is no feasible beneficial use or upland placement site available and it is in conformance with the USEPA and US Army Corps of Engineers Guidelines. Dredged material disposal in water areas shall conform to applicable State Surface Water Quality Standards at N.J.A.C. 7:9B. Overboard disposal (also known as aquatic, open water, side casting, subaqueous, or wet) of uncontaminated sediments into unconfined disposal sites in existing anoxic dredge holes, shall comply with standards detailed in this rule.

Maintenance dredging will continue, as needed, for the operating life of the adjacent SGS and HCGS units. All materials removed during routine maintenance dredging activities are currently placed in an approved upland desilting basin, owned by PSEG, and located in the northwest portion of the PSEG owned property. As a result of PSEG's desilting basin and a portion of the USACE's CDF being filled to accommodate the new plant, PSEG is working with the USACE to identify replacement CDF capacity for the proper disposal of future dredged materials. Any new CDF will be designed in accordance with PSEG standards, NJDEP and USACE requirements, and/or local site plan approval(s) as appropriate.

8. 7:7E-4.9 Solid Waste or Sludge Dumping

The dumping of solid waste or sludge is the discharge of solid or semi-solid waste material from industrial or domestic sources or sewage treatment operations into a water area.

The dumping of solid or semi-solid waste of any type in any General Water Area is prohibited.

Solid radioactive wastes are produced during the normal operation of nuclear reactors. Solid radioactive wastes can be either dry or wet solids. The source can be from an operational activity, maintenance, or other functions. The solid radwaste system is designed to receive, collect, and store any solid radioactive wastes prior to their processing and packaging for onsite storage or shipment offsite.

The PSEG Site currently has a solid radwaste system in place for the HCGS and SGS units. The low-level solid waste storage from the new plant will be coordinated with that from the existing plants. The solid radwaste system will be designed to handle the following waste types: dry active waste, spent filter elements, spent resin, spent activated carbon, oil and sludge. The system will be designed to store and process the waste to maintain ALARA radiation exposure. Radiation monitors will be used to monitor the area as well as the waste to ensure that applicable requirements are met.

The system design will ensure that the solid radioactive wastes are collected, monitored, segregated, stored, and packaged for shipment in a manner that minimizes exposure to plant personnel and the public in accordance with 10 CFR 20 and 10 CFR 50, Appendix I. The bounding expected annual volume of radioactive solid waste is 16,721.5 cubic feet per year (ft^3/yr).

Non-radioactive solid wastes include typical industrial wastes such as metal, wood, and paper, as well as process wastes such as non-radioactive resins and sludge. PSEG is currently a conditionally exempt small-quantity hazardous waste generator, generating less than 100 kilograms/month (220 pounds/month). PSEG maintains the program required of a small-quantity generator and monitors the amount of hazardous waste generated each month. Hazardous waste is disposed of through licensed disposal facilities. Universal waste, such as paint waste, lead-acid batteries, used lamps, and mercury-containing switches, is segregated and disposed of through licensed disposal facilities.

Normal station waste (e.g., paper, plastic, glass, river vegetation) is segregated and, as much as possible, processed for recycling. Approximately two thirds (2/3) of the normal station waste is transferred to recycling vendors, and the remainder either incinerated or landfilled. It is anticipated that there will be no change to the method for handling solid wastes created by the new plant.

The new plant will not discharge any solid or semi-solid wastes into any water area. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.9** because issuance will not authorize dumping of solid or semi-solid wastes into any water area.

9. 7:7E-4.10 Filling

Filling is the deposition of material including, but not limited to, sand, soil, earth, and dredged material, into water areas for the purpose of raising water bottom elevations to create land areas.

Filling is prohibited in lakes, ponds, reservoirs and open bay areas at greater than 18 feet as defined at N.J.A.C. 7:7E-4.1, unless the filling is consistent with the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and Freshwater Wetlands Protection Act rules, N.J.A.C. 7:7A. Filling in a

man-made lagoon as defined at N.J.A.C. 7:7E-1.8, is discouraged. Filling is discouraged in all other water areas. In cases where there is no alternative to filling, filling is conditionally acceptable provided the detailed requirements of this rule are met.

There are several freshwater ponds located on the PSEG Site that have a combined surface area of 40 acres. These artificial ponds consist of perched water bodies that are within the actively permitted CDF facilities (USACE CDF and PSEG's onsite de-silting basin authorized under waterfront development Permit No. 1704-02-0001.6 issued July 21, 2009.), and are themselves on a previously authorized filled area (Artificial Island). These ponds are generally shallow and have no connection to the Delaware River or adjacent marsh creeks. The NJ LULC classification system identifies these as "artificial lakes". In their current role as CDF for USACE and PSEG dredging activities, these areas may become partly or completely filled by authorized activities prior to the construction of the new plant.

Surveys of these ponds indicate that they are warmwater systems mainly supporting centrarchids (e.g., pumpkinseed and bluegill sunfish) and small forage fish (sheepshead minnow, mummichog, and banded killifish). These ponds have demonstrated the ability to provide resting and marginal foraging habitat for waterfowl and other waterbirds, but do not support populations of important aquatic species, nor do they represent essential fish habitat. Based on the Site Utilization Plan, construction activities for the new plant result in complete conversion of these artificial pond habitats to industrial land use. In consideration of the artificial nature of these habitats, their location on existing filled land in approved and active CDFs, the abundance of other shallow water habitats within the vicinity, and the eventual loss of these habitats as a result of licensed placement of dredged material, the loss of these artificial ponds does not have an adverse impact on aquatic resources in the vicinity or region. Impacts to wetlands and wetland buffers are addressed under **N.J.A.C. 7:7E-3.27** and **3.28**.

Although the new plant will require filling, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.10** because issuance will only authorize filling of perched, artificial ponds that are currently authorized as fill area on an area that is already filled land.

10. 7:7E-4.11 Mooring

A boat mooring is a temporary or permanently fixed or floating anchored facility in a water body for the purpose of attaching a boat.

Temporary or permanent boat mooring areas are conditionally acceptable provided there is a demonstrated need that cannot be satisfied by existing facilities; adverse environmental impacts are minimized to the maximum extent practicable; and the mooring area is adequately marked and is located so as not to hinder navigation.

There are moorings in the waters adjacent to the PSEG Site, including the existing SGS and HCGS barge slips (section **7:7E-3.10 Marina Moorings**). Using these existing mooring facilities for the new plant construction has the potential to interfere with the operation of the SGS and HCGS units. The locations of the existing moorings at the PSEG Site are physically distant from the site of the new plant, thereby requiring a new barge mooring area. As discussed above under **7:7E-4.7**, the new dredging to facilitate this mooring will be conducted in such a way to minimize disturbance. This mooring area will be marked appropriately in consultation with the USCG, USACE, and NOAA. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.11** because issuance will authorize construction of moorings that conform to the provisions of the rule.

11. 7:7E-4.12 Sand and Gravel Mining

Sand and gravel mining is the removal of sand or gravel from the water bottom substrate, usually by suction dredge, for the purpose of using the sand or gravel at another location.

Sand and gravel mining is prohibited in lakes, ponds and reservoirs, man-made harbors and tidal guts as defined at N.J.A.C. 7:7E-4.1, unless the water body was created by the mining process, in which case the use is conditionally acceptable under the conditions set forth in this rule. Sand and gravel mining for the purposes of beach nourishment is also conditionally acceptable under the conditions set forth in this rule.

No sand or gravel mining is proposed as part of the new plant. PSEG has not yet determined the source of the structural fill required for the grading of power block areas. The source of this fill may involve sand or gravel mining at an offsite location. If PSEG obtains structural fill from a sand or gravel mine in NJ, then PSEG will comply with all applicable provisions of **N.J.A.C. 7:7E-3.35**.

12. 7:7E-4.13 Bridges

A bridge is any continuous structure spanning a water body, except for an overhead transmission line.

Bridges are conditionally acceptable provided there is a demonstrated need that cannot be satisfied by existing facilities; pedestrian and bicycle use is provided for unless it is demonstrated to be inappropriate; and fishing catwalks and platforms are provided to the maximum extent practicable.

The proposed causeway to the PSEG Site will require a bridge over Alloway Creek and other minor tributaries in its watershed. The proposed causeway is necessary to eliminate traffic conflicts between construction and operational traffic on the existing access road, and to relieve a traffic bottleneck at rural intersections near Hancock's Bridge. The proposed causeway also provides a redundant means of access to the PSEG Site that will enhance evacuation and/or emergency access to Artificial Island. Nuclear security requirements prevent public access to the PSEG Site, therefore pedestrian and bicycle use of the bridge is limited. However, fishing and access platforms may be incorporated into the bridge design, especially near PSEG's Alloway Creek Wetland Restoration Site at the end of Money Island Road, where similar public access improvements have been developed under the EEP.

Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.13** because issuance will involve a bridge that conforms to the requirements of this rule to the maximum extent that is safely practicable.

13. 7:7E-4.14 Submerged Pipelines

Submerged pipelines (pipelines) are underwater pipelines that transmit liquids or gas, including crude oil, natural gas, water, petroleum products, or sewerage.

Submerged pipelines are conditionally acceptable provided the pipelines are not sited within Special Areas, unless no prudent and feasible alternate route exists; directional drilling is used unless it is demonstrated that the use of directional drilling is not feasible; the pipeline is buried to a sufficient depth to avoid exposure or hazard; all trenches are backfilled to preconstruction depth with naturally occurring sediment; and the proposed development has been designed to minimize impacts to the water area.

As described in **7:7E-3.12 Submerged Infrastructure Routes**, submerged water intake and discharge pipes exist to support operation of HCGS and SGS. An additional submerged pipeline is proposed as part of the new plant to accommodate cooling tower blowdown discharge. This pipeline terminates 100 feet from the shore of Artificial Island. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.14** because issuance will not result in development of any submerged pipelines across open water areas.

14. 7:7E-4.15 Overhead Transmission Lines

Overhead transmission lines are wires hung between supporting pylons for transmission from the site of origin to the site of consumption. Overhead transmission lines include electrical, telecommunication and cable television lines.

Overhead transmission lines are prohibited over open bays, semi-enclosed and back bays, lakes, ponds and reservoirs as defined at N.J.A.C. 7:7E-4.1. Overhead transmission lines are discouraged over large rivers as defined at N.J.A.C. 7:7E-4.1. Overhead transmission lines are conditionally acceptable over rivers, streams, creeks, and tidal guts as defined at N.J.A.C. 7:7E-4.1, provided there is a demonstrated need that cannot be satisfied by existing facilities; there is no feasible alternative route that avoids crossing water bodies; the transmission line provides adequate vertical clearance for masts; and visual impacts are minimized to the maximum extent practicable.

A series of 500 kV transmission lines transmit electricity from the PSEG Site to the New Freedom switchyard in Camden County, NJ and to the Red Lion substation in New Castle County, DE where it is further dispersed by PJM to the regional electrical transmission grid. PJM is a RTO that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM is responsible for maintaining the integrity of the regional transmission grid and for managing changes and additions to the grid to accommodate new generating plants, substations and transmission lines. PJM analyzes and forecasts the future electricity needs of the region, and ensures that the growth of the electric system takes place efficiently and in an orderly, planned fashion and that reliability is maintained (PJM 2008).

In order to summarize the potential effects of developing off-site transmission, PSEG has analyzed the potential impacts of a new 5 mile wide off-site macro-corridor. The area evaluated for this analysis is limited to lands within New Jersey. The length of the simplified conceptual route for the Macro-Corridor is approximately 12.23 miles; however, the actual length along the existing ROW's is approximately 12.87 miles. The conceptual macro-corridor is illustrated in Figure 7. From the PSEG Site, the potential macro-corridor extends north and then west across the Delaware River to the Red Lion Substation. From this location, the potential macro-corridor diverge extending to the west (Peach Bottom) or south (Indian River).

PSEG conducted a review of the corridor to determine the extent of impact to wetlands should a new transmission line be required. Because the specific location of a transmission ROW has not been determined, a 5 mile wide corridor was selected and impacts to wetlands prorated to a 200 foot wide (typical 500kV) right-of-way. Due to the general nature of the corridor analyses, this CZMA has limited its assessment of impacts to Special Areas to wetland areas. Upon formalization of a transmission corridor, if needed, PSEG will complete a thorough environmental analysis of impacts to all environmental resources.

In the potential 200 foot wide right-of-way, the amount of wetlands and/or water area crossings is approximately 232 acres. The majority of this acreage will not be physically impacted except for the footprints for towers, the conversion of forested areas (if present), and any fill and stream impacts that can not be avoided / minimized during design. PSEG is also evaluating alternative means to address transmission grid stability to avoid the need for new transmission lines.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.15** because issuance will not specifically authorize a new overhead transmission line or change the existing transmission line system. If a new transmission line is required in the future, PSEG will evaluate routing and environmental impacts for the various states involved (DE, MD or PA and NJ) and apply for the necessary permits to mitigate any impacts in accordance with the terms of those permits.

15. 7:7E-4.16 Dams and Impoundments

Dams and impoundments are structures that obstruct natural water flow patterns for the purpose of forming a contained volume of water. Impoundments include dikes with sluice gates and other structures to control the flow of water.

Except for medium rivers, creeks and stream as defined at N.J.A.C. 7:7E-4.1, the construction of dams and impoundments is prohibited. The construction of these structures is conditionally acceptable in medium rivers, creeks and streams as defined at N.J.A.C. 7:7E-4.1, provided the structures are essential for water supply purposes or for the creation of special wildlife habitats; adverse impacts are minimized; and the structures will not adversely affect navigation routes.

No dams or impoundments are proposed as part of the new plant or causeway. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.16** because issuance will not authorize construction of any dam or impoundment.

16. 7:7E-4.17 Outfalls and Intakes

Outfalls and intakes are pipe openings that are located in water areas for the purpose of intake of water or discharge of effluent including sewage, stormwater, and industrial effluents.

Outfalls and intakes are conditionally acceptable provided that the use associated with the intake or outfall meets applicable Coastal Zone Management rules.

The new plant will have a shoreline intake structure that withdraws water for use in the CWS and SWS. The water is utilized as makeup water for the CWS, which is a closed-cycle condenser cooling system consisting a cooling tower or towers with make-up, blowdown, basin bypass systems, circulating water pumps; one or more condensers; and a closed loop circulating water piping arrangement. As discussed above, the total intake from the Delaware River for the new plant is 78,196 gallons per minute (gpm) (average) and 80,600 gpm (maximum). The combined plant blowdown consists of CWS blowdown, SWS blowdown, PSWS blowdown, DWDS blowdown, miscellaneous drains blowdown, liquid radwaste blowdown, and SWS makeup filter backwash. The combined plant blowdown flows discharge into the Delaware River at a flowrate of 51,946 gpm (average) and 53,222 gpm (maximum).

The new plant's intake structure will be located parallel to, and nearly flush with, the Delaware River shoreline. This location increases tidal flushing of the forebay and eliminates long intake canals and blind pockets, thus reducing the entrapment potential. In addition to the low approach velocities and the intake structure's traveling screens, the intake structure will be equipped with a fish return system that includes screen panel buckets, a low pressure fish removal system, a high pressure debris removal system, and a trough to return debris and fish to the river.

The intake flow velocities through the traveling screens are less than 0.5 fps. This velocity reduces the swim speed necessary for a fish to escape the intake's flow and allows many organisms to escape impingement, especially the larger finfish and blue crabs (i.e. greater than 20 mm, depending upon species). The 0.5 fps intake velocity and closed-cycle cooling has also been specified by the USEPA's Section 316(b) rulemaking as being protective of aquatic life from the effects of impingement and entrainment (40 CFR 125).

The new plant will withdraw approximately 112 mgd of water from the Delaware River during normal operations. At this flow volume, the number of organisms susceptible to entrainment and impingement is low. Water usage at new plant during normal operations will account for less than 0.02 percent of the typical Delaware River tidal flow.

Discharge of the blowdown and other effluents will occur along the shoreline of the PSEG Site in approximately 12.9 feet of water (Figure 6). The discharge pipes will be armored with rock or other hard structure to prevent accidental damage. This outfall will be substantially similar to that of the adjacent HCGS.

Under Section 316(b) of the Clean Water Act [33 U.S.C 1326(b)], the NJDEP must determine whether the location, design, construction, and capacity of a power plant's intake structure reflects BTA for minimizing adverse environmental impact. In 2003, the NJDEP (NJDEP 2003) determined that the adjacent HCGS closed-cycle condenser cooling system reflects BTA. The new plant's closed cycle cooling system is substantially similar to that of the HCGS, and will be equally protective of anadromous finfish.

The intake and discharge associated with the new plant will require a New Jersey Pollutant Discharge Elimination System (NJPDES) Permit for both the intake and outfall and a Delaware River Basin Commission (DRBC) Docket for surface water withdrawal. PSEG will operate the new plant in accordance with effluent limitations and other conditions set forth in the applicable permits for new intakes and outfalls. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.17** because new outfalls and intakes will be constructed and operated in accordance with applicable environmental regulations, including Coastal Zone Management Rules.

17. 7:7E-4.18 Realignment of Water Areas

Realignment of water areas means the physical alteration or relocation of the surface configuration of any water area. This does not include the rebulkheading of a previously bulkheaded water area or the bulkheading at or above the spring high water line.

Realignment of naturally occurring water areas is discouraged. Discouraged uses can only be approved if it can be demonstrated that the proposed development is in the public interest and mitigation for the impact is provided. Realignment of previously realigned water areas is conditionally acceptable.

Realignment of water areas is not proposed as part of the new plant or proposed causeway. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.18** because issuance will not authorize realignment of any water areas.

18. 7:7E-4.19 Breakwaters

Breakwaters, including, but not limited to, those constructed of concrete, rubble mound and timber, are structures designed to protect shoreline areas or boat moorings by intercepting waves and reducing the wave energy which would normally impact the adjacent shoreline areas or boat mooring areas. Typically, timber breakwaters are designed and utilized to protect boat moorings. In most cases concrete or rubble mound breakwaters are designed and utilized to protect shoreline areas which are subject to storm waves and associated erosion.

Construction of breakwaters is conditionally acceptable provided timber, vinyl or plastic breakwaters are at least 18 inches above the bottom of the waterway and provide a minimum of three inch spacing between planks. For detached breakwaters which are not fixed directly to a dock or pier structure, marking with photocell lights and/or reflectors is required. The construction of breakwater structures must be consistent with the acceptability conditions for Filling, N.J.A.C. 7:7E-4.10 and Structural Shore Protection N.J.A.C. 7:7E-7.11.

The western shoreline of Artificial Island is entirely armored with rip-rap, pilings, and concrete or steel bulkheads. New plant structures and barge access will be substantially similar to the existing shoreline armoring. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.19** because issuance will not authorize construction of any breakwaters.

19. 7:7E-4.20 Submerged Cables

Submerged cables (cables) are underwater telecommunication cables, and shall include all associated structures in the water such as repeaters.

Submerged cables, or portions thereof, which are not located in the Atlantic Ocean, shall not be sited within Special Areas, unless no prudent and feasible alternate route exists.

Directional drilling for the installation of cables is encouraged over the use of trenching.

The cable route should minimize areas where anchors are likely to foul the cable; and the alignment of the cable route must be marked at the landfall. This provision does not apply to cables that are directionally drilled.

The PSEG Site does not use submerged cables as part of existing operations, and submerged cables are not proposed as part of the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.20** because issuance will not authorize installation of any submerged cables.

20. 7:7E-4.21 Artificial Reefs

Artificial Reefs are man-made structures intended to simulate the characteristics and functions of natural reefs created by placing hard structures on the sea-floor for the purpose of enhancing fish habitat and/or fisheries. In time, an artificial reef will attain many of the biological and ecological attributes of a natural reef. Artificial reefs do not include shore protection structures, pipelines, fish aggregating devices, and other structures not constructed for the sole purpose of fish habitat.

Construction of new or expanded artificial reefs is conditionally acceptable provided that at the time of deployment, and at all times after creation, the detailed conditions identified in this rule are met.

No artificial reefs exist at the PSEG Site, and none are proposed as part of the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.21** because issuance will not authorize construction of new or expanded artificial reefs.

21. 7:7E-4.22 Miscellaneous uses

Miscellaneous uses are uses of Water Areas not specifically defined in this section or addressed in the Use rules (N.J.A.C. 7:7E-7). Water dependent uses of Water Areas not identified in the Use rules will be analyzed on a case-by-case basis to ensure that adverse impacts are minimized. Non-water dependent uses are discouraged in all Water Areas.

No miscellaneous uses occur at the PSEG Site. All uses at the PSEG Site are either specifically defined in **N.J.A.C. 7:7E-4** or addressed in **N.J.A.C. 7:7E-7**. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-4.22** because issuance will not authorize any miscellaneous uses. Also, issuance of the ESP has been determined to be consistent with the enforceable rules defined in **N.J.A.C. 7:7E-4** and addressed in **N.J.A.C. 7:7E-7** that apply to uses at the PSEG Site.

C. Requirements for Impervious Cover and Vegetative Cover for General Land Areas and Certain Special Areas

1. 7:7E-5.1 Purpose and scope

(a) This subchapter sets forth requirements for impervious cover and vegetative cover on sites in the upland waterfront development area, as defined at N.J.A.C. 7:7E-5.2, and in the CAFRA area, as defined at N.J.A.C. 7:7E-5.2. In addition:

1. For a site in the upland waterfront development area, the applicable impervious cover limits and vegetative cover percentages are determined under N.J.A.C. 7:7E-5A, based on the site's growth rating, development potential, and environmental sensitivity;

and

2. For a site in the CAFRA area, the applicable impervious cover limits and vegetative cover percentages are determined under N.J.A.C. 7:7E-5B, based on the site's location in a coastal center; in a Coastal Planning Area; in a CAFRA center, CAFRA core, or CAFRA node; or on a military installation.

The subject site is located within the Coastal Area Facility Review Act (CAFRA) area as defined in the jurisdictional mapping provided by the CAFRA, N.J.S.A. 13:19-1 et seq. (as amended to July 19, 1993). The applicable impervious cover percentages and vegetative cover percentages are found in 7:7E-5B.4 and 7:7E-5B.5, respectively.

2. 7:7E-5.3 Impervious cover requirements that apply to sites in the upland waterfront development and CAFRA areas

This section sets forth impervious cover requirements that apply to sites in the upland waterfront development and CAFRA areas. Impervious cover limits, specific to each of these areas, are found at N.J.A.C. 7:7E-5A and 5B. The impervious cover allowed on a site shall be placed on the net land area on the site, and in addition, for an unforested site under N.J.A.C.7:7E-5A.9(b)3 or N.J.A.C. 7:7E-5B.3(e) 2, the impervious cover shall be placed on the area covered by buildings and/or asphalt or pavement legally existing on the site at the time the application is submitted to the Department.

To determine the acreage of the net land area on a site:

1. Determine the acreage of the total land area on the site.

2. Identify all areas on the site that are classified as one of the following Special Water's Edge Areas: Dunes 7:7E-3.16, Bay Islands 7:7E-3.21, Beaches 7:7E-3.22, Wetlands 7:7E-3.27, Wetland Buffers 7:7E-3.28, Coastal Bluffs 7:7E-3.31 and Intermittent Stream Corridors 7:7E-3.32.

3. Sum the acreage of the land areas identified in 2 above.

4. Subtract 3 above from 1 above.

5. The result is the net land area to be used in calculating the impervious cover limits in N.J.A.C. 7:7E-5A and 5B; and.

3. 7:7E-5.4 Vegetative cover requirements that apply to sites in the upland waterfront development and CAFRA areas

This section sets forth vegetative cover requirements that apply to sites in the upland waterfront development and CAFRA areas. Vegetative cover percentages, specific to each of these areas, are found at N.J.A.C. 7:7E-5A and 5B. More trees may be planted or preserved than required, and if so, the herb/shrub area shall be reduced proportionately. If a site is located in the northern waterfront region or urban area region in the upland waterfront development area; or if a site is located in a CAFRA center, CAFRA core, or CAFRA node; the vegetative requirements with respect to trees are described in this section.

The area (in acres) of the site that shall be planted in trees and/or preserved in trees is calculated under N.J.A.C. 7:7E-5A.10 or 5B.4. The vegetative cover required on a site shall be planted or preserved only on the net land area determined under N.J.A.C. 7:7E-5.3(d).

The total land area owned by PSEG will be 819 acres (734 acres currently owned by PSEG and 85 acres to be acquired from USACE). Upon finalization of the agreement with the USACE, PSEG will calculate useable acreage on the site based upon thorough analysis of existing conditions including a determination by appropriate regulatory authorities as to the characterizations of the existing CDFs. PSEG will also be seeking an amendment to the existing CAFRA Node designation that incorporates the acquisition of the USACE property and addresses the recently issued LOI (April 21, 2010) for the site.

4. 7:7E-5.5 Determining if a site is forested or unforested

The vegetative cover percentage that applies to a site under N.J.A.C. 7:7E-5A or 5B varies depending on whether the site is forested. If only a portion of a site is forested, separate vegetative cover percentages shall be calculated for the forested and unforested portions of the site.

The site is presently not forested. Currently mapped land use types present on the USACE and PSEG CDF area include Altered land, Artificial Lakes, Deciduous brush/shrub, Deciduous scrub/shrub wetlands, Herbaceous wetlands, and Old field (<25% brush).

D. Impervious Cover Limits and Vegetative Cover Percentages in the CAFRA Area

1. 7:7E-5B.3 Boundaries for Coastal Planning Areas, CAFRA centers, CAFRA cores, and CAFRA nodes; Non-mainland coastal centers

(a) The boundaries of the Planning Areas, the community development boundaries of centers, and the boundaries of cores and nodes formally approved by the State Planning Commission as of August 1, 1999 are incorporated by reference in this subchapter. These boundaries are the boundaries of the Coastal Planning Areas, CAFRA centers, CAFRA cores and CAFRA nodes and shall be operative for the purposes of applying the requirements impervious cover and vegetative cover under N.J.A.C. 7:7E-5 and this subchapter, unless the Department accepts a State Planning Commission formally approved new or changed boundary, or unless the Department rejects a State Planning Commission formally approved new or changed boundary and subsequently promulgates a revised boundary.

The portion of the subject site currently owned by PSEG is within the PSEG Energy Facility Node within the Coastal Environmentally Sensitive Planning Area. The land to the north of this site, currently owned by USACE, which PSEG is developing an agreement in principle for a proposed land exchange, is located within Coastal Environmentally Sensitive Planning Area, outside of the PSEG Energy Facility Node. The total amount of land in the proposed land exchange is 85 acres adjacent to the current SGS. With the additional land obtained from the USACE, the total land area owned by PSEG will be 819 acres.

The lands owned by PSEG, (in which SGS and HCGS are located, and the PSEG owned land north of them), are in the Coastal Environmentally Sensitive Planning Area. On July 24, 2002, the New Jersey State Planning Commission adopted Resolution 2002-11 approving an amendment of the New Jersey State Development and Redevelopment Plan (referred to as the State Plan Policy Map) to delineate a "Heavy Industry-Transportation-Utility Node" within the Environmentally Sensitive Planning Area 5. Further, the State Planning Commission adopted the NJDEP's recommendation that the boundary of the Node include 501 acres of the approximately 734 acre PSEG-owned property that contains both the HCGS and SGS. On December 2, 2002, NJDEP amended the CAFRA Planning Map to include the PSEG Energy Facility Node corresponding to the Heavy Industry Transportation-Utility Node as adopted by the State Planning Commission.

PSEG will be seeking to include the 85 acres currently owned by USACE (under which an agreement in principle is pending) into the existing CAFRA Node boundaries through the State Planning Commission and Department of Community Affairs (DCA) Office of Smart Growth. This process will be initiated well before any formal permit applications are submitted to NJDEP for construction of the new plant. PSEG believes that a change to the CAFRA Node is warranted based on the following:

- The CDF presently operated by the USACE represents a historically and continually disturbed area The PSEG Site is uniquely suited for development of a nuclear power plant, given the presence of existing security and infrastructure. Including the USACE CDF site in the CAFRA Node will aid in the development of a needed new power source.
- Expansion of the CAFRA Node to include the USACE CDF facilities will enable the project to minimize wetland impacts.

- The functional value of wetlands impacted immediately adjacent to the existing CAFRA node is generally of low habitat value, comprising *Phragmites*-dominated wetlands. *Phragmites* was historically a comparatively minor component of healthy, diverse coastal wetlands in North America (Niering and Warren 1977). In the early part of the 20th Century, *Phragmites* expanded its range and began monopolizing large swaths of coastal wetlands, becoming the dominant wetland plant in many areas (Hauber et al. 1991; Besitka 1996). Although the invasive strain of *Phragmites* is thought to be a non-native Eurasian genotype (Saltonstall 2002), the initial conditions for the invasion of this species were likely set by anthropogenic disturbances of these tracts of marsh, including filling, excavation, and dike construction (Byers 2002).
- PSEG will provide the needed mitigation to offset the impacts of wetlands lost as part of the expansion of the CAFRA Node.

2. 7:7E-5B.4 Impervious Cover Limits for a Site in the CAFRA area

(a) The impervious cover limit for a site in the CAFRA Areas shall be determined based on its planning area.

The impervious cover limit for a site in the CAFRA area located in a CAFRA Node is 80% of the net land area. The impervious cover limit for a site in the CAFRA area located in a Coastal Environmentally Sensitive Planting Area is 3% of the net land area. The project will be designed to fit within the 80% impervious cover limit and the 3% impervious cover limit in their respective planning areas.

3. 7:7E-5B.5 Vegetative cover percentages of a site in the CAFRA area

(a) The area in acres on a site in the CAFRA area in which tree and/or herb/shrub vegetation shall be planted/preserved is calculated under this subchapter.

The vegetative cover limit for an unforested site in the CAFRA area located in a CAFRA Node is 0% of the net land area. The vegetative cover limit for an unforested site in the CAFRA area located in the Coastal Environmentally Sensitive Planning Area is 5% of the net land area. Therefore, no tree preservation or planting is required on the lands located within the Node. The project will be designed to accommodate the 5% of tree planting in the Coastal Environmentally Sensitive Planning Area.

E. General Location Rules

4. 7:7E-6.1 Rule on Location of Linear Development

A linear development as defined at N.J.A.C. 7:7E-1.8, shall comply with the specific location rules to determine the most acceptable route, to the maximum extent practicable.

The proposed causeway and potential transmission line are considered linear development as defined under this section. The proposed causeway will extend from the PSEG Site toward the north-northeast to the intersection of Money Island Road and Mason Point Road. The conceptual design specifies a 200 foot wide right-of-way in upland areas at the north and south termini, and a 48 foot wide structure for the elevated portions of the road within lowland areas. For impact assessment purposes, a 50 foot wide right-of-way is assumed to be permanently impacted by the elevated causeway. It is also assumed that an additional 50 foot wide area along the elevated portion of the causeway will be temporarily impacted during the construction period. Temporary impacts result from the temporary placement of work mats on the wetlands to support equipment, materials, and personnel. Permanent impacts result from the placement of structures (piers, pilings or other support structures) in the wetlands, and shading from the 50 foot wide causeway.

The site of the proposed plant is completely surrounded by water and/or wetlands, so there is no other feasible alternative than situating the proposed causeway and potential transmission lines through waters and/or wetlands. Mitigation will be performed for potential impacts to wetlands, intertidal/subtidal shallows, and/or riparian zones as necessary. The proposed causeway and potential transmission line will be consistent with **N.J.A.C. 7:7E-6.1** because there are no other feasible or prudent locations.

5. 7:7E-6.2 Basic Location Rule

A location may be acceptable for development under N.J.A.C. 7:7E-3, 4, 5, 5A, 5B, and 6, but the Department may reject or conditionally approve the proposed development of the location as reasonably necessary to:

1. Promote the public health, safety, and welfare;

2. Protect public and private property, wildlife and marine fisheries; and

3. Preserve, protect and enhance the natural environment.

Both the New Jersey State Planning Commission and the NJDEP have recognized the importance of the Artificial Island site location. As described in Subchapter 5, the New Jersey State Planning Commission had designated a Heavy Industry-Transportation-Utility Node that encompasses portions of the subject site and adjacent sites. Subsequently, the NJDEP amended the CAFRA map to include the Heavy Industry-Transportation-Utility Node as the PSEG Energy Facility Node. Assuming that the CAFRA Node is expanded, the proposed activities will be consistent with **N.J.A.C. 7:7E-6.2** because it will preserve for NJ energy planning decision makers, such as the New Jersey State Planning Commission and NJDEP, the option to allow the construction of a facility at a location that the decision makers have already determined to be suitable for such use.

6. 7:7E-6.3 Secondary Impacts

Secondary impacts are the effects of additional development likely to be constructed as a result of the approval of a particular proposal. Secondary impacts can also include traffic increases, increased recreational demand and any other offsite impacts generated by onsite activities which affect the site and surrounding region.

Coastal development that induces further development shall demonstrate, to the maximum extent practicable, that the secondary impacts of the development will satisfy the Coastal Zone Management rules. The Department may restrict coastal development from connecting to an approved infrastructure in order to prevent adverse impacts to special areas and to protect and preserve coastal resources.

The assessment of potential operational effects on land use in the vicinity assumes that the residences of the employees associated with the new plant are distributed across the region in the same proportion as those of the current PSEG employees. PSEG estimates that the work force for the new plant will be approximately 600 additional onsite employees. Increased tax revenues could introduce local land use changes and/or increased property taxes.

Approximately 82.6 percent of the new employees are expected to reside in the four-county socioeconomic Region of Influence (New Castle, Salem, Cumberland, and Gloucester counties). Most of the new employees from the three NJ counties are likely to come from the higher population communities such as Bridgeton, Glassboro, Millville, Pennsville Township, Penns Grove, Pitman, Quinton, Salem, and Vineland. Land use changes in these counties will be influenced by a variety of socioeconomic forces (e.g., closer proximity to major population centers or employers). Those forces dilute potential land use impacts created by the operation of the new plant.

Housing vacancy is adequate in the four-county area outside the 6 mile vicinity of the PSEG Site, and it is likely that those new employees that do relocate to the area will purchase existing homes. While some of the new employees may construct new houses, this is limited and dispersed over a large area within a number of political jurisdictions. Additionally, most new construction is likely to be within lots previously zoned for new residential development by local planning agencies and consistent with the Rules on Coastal Zone Management (**N.J.A.C. 7:7E et seq.**).

Salem County is the county where the new plant is located and is expected to receive the largest percentage of the new workforce. Salem County has several measures in place to provide sustainable economic development while protecting its rural character. These measures are organized under a Smart Growth Plan that focuses on directing future commercial and industrial growth toward the western side of the county (including Salem City), where existing infrastructure and major roadways exist to support development. Residential growth is encouraged in existing communities and an Open Space and Farmland Preservation Plan focuses on controlling growth in the eastern and central portions of the county to protect the traditional agrarian economy of the area.

Salem County is still predominantly rural, and future land uses will likely continue to be agricultural, open space recreation, and wetlands. Commercial and residential development has experienced minimal change over the 33 years of existing plant operations. Salem County has several planning initiatives in place that are designed to maintain existing patterns and to focus new residential developments within existing communities. The population and land use patterns in Salem County have remained relatively stable since construction of the SGS and HCGS, indicating that the tax revenues are not resulting in induced secondary development. Tax revenues from the new plant will provide additional funding support to schools, emergency management systems, road maintenance, and county facilities. After the new plant comes on-line, property tax payments will remain within the NRC criteria for small effect or impact.

Extensive areas surrounding the PSEG Site consist of open water (Delaware River) and undeveloped coastal marsh. These lands are either owned by the federal government or NJ and portions are designated as state-owned wildlife management areas or licensed dredge material disposal areas. Secondary development in these areas is not likely due to environmental constraints.

Accordingly, the proposed plant, causeway and potential transmission line will be consistent with **N.J.A.C. 7:7E-6.3** because the overall impact of associated secondary development and land use alteration in the vicinity is positive.

F. Use Rules

7. 7:7E-7.2 Housing Use Rules

"Housing" includes single family detached houses, multi-family units with apartments or town houses, high-rise buildings and mixed use developments.

These rules set forth detailed standards for housing development within the Coastal Zone.

The proposed project does not involve housing development. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.2** because issuance will not involve housing development.

8. 7:7E-7.3 Resort/Recreational Use

Resort/recreation uses include the wide range of small and large developments attracted to and often dependent upon locations along the coast. These uses include hotels, motels, marinas, boating facilities, campgrounds, amusement piers, parks and recreational structures such as bathhouses, natural areas, open space for active and passive recreation, and linear paths for bicycling and jogging (see N.J.A.C. 7:7E-7.10 and N.J.A.C. 7:7E-5.5(d)).

These rules provide the requirements for development projects involving resorts and/or recreations uses (e.g,. amusement parks) within the Coastal Zone.

No resort or recreational uses are proposed as part of the new plant. Accordingly, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.3** because issuance will not involve any resort or recreational development.

9. 7:7E-7.3A Marina Development

Marinas are any docks, piers, bulkheads, moorings, or similar structure or a collection of adjacent structures under singular or related ownership providing permanent or semi-permanent dockage to five or more vessels.

This rule provides the requirements for the development of a marina within the Coastal Zone.

No marina development is proposed as part of the new plants. Accordingly, NRC issuance by of the ESP will be consistent with **N.J.A.C. 7:7E-7.3A** because issuance will not involve any marina development.

10. 7:7E-7.4 Energy facility use rule

Energy facilities include facilities, plants or operations for the production, conversion, exploration, development, distribution, extraction, processing, or storage of energy or fossil fuels. Energy facilities also include onshore support bases and marine terminals. Energy facilities do not include operations conducted by a retail dealer, such as a gas station, which is considered a commercial development.

Standards relevant to siting of new energy facilities, including all associated development activities, are as follows:

1. Energy facilities shall not be sited in Special Areas as defined at N.J.A.C. 7:7E-3.1 through 3.42, 3.44, 3.46, and marine fish and fisheries areas defined at N.J.A.C. 7:7E-8.2, unless site-specific information demonstrates that such facilities will not result in adverse impacts to these areas;

2. Except for water dependent energy facilities, energy facilities shall be sited at least 500 feet inland of the mean high water line of tidal waters in the following areas:

i. The CAFRA area; and

ii. The Western Ocean, Southern, Mullica-Southern Ocean, Great Egg Harbor River and Delaware Estuary regions, as defined at N.J.A.C. 7:7E-5A.2(d);

3. Public access shall be provided in accordance with the lands and waters subject to public trust rights rule, N.J.A.C. 7:7E-3.50, and the public trust rights rule, N.J.A.C. 7:7E-8.; and

4. The scenic and visual qualities of coastal areas shall be maintained as important public resources in the siting of energy facilities, pursuant to N.J.A.C. 7:7E-8.12.

The subject property is located within the CAFRA area as defined in the jurisdictional mapping provided by CAFRA, N.J.S.A. 13:19-1 et seq. (as amended to July 19, 1993). On July 24, 2002, the New Jersey State Planning Commission adopted Resolution 2002-11 approving an amendment of the State Plan Policy Map to delineate a "Heavy Industry-Transportation-Utility Node" within the Environmentally Sensitive Planning Area 5. Further, the State Planning Commission adopted the NJDEP's recommendation that the boundary of the Node include 501 acres of the 734 acre PSEG owned property that contains both HCGS and the SGS and areas north. On December 2, 2002, NJDEP amended the CAFRA Planning Map to include the PSE&G Energy Facility Node corresponding to the Heavy Industry-Transportation-Utility Node as adopted by the State Planning Commission. As conceptually designed

and submitted as part of the ESP application, portions of the new plant and ancillary support structures will be located outside of the existing PSEG Heavy Industry-Transportation-Utility Node. Specifically, the new power block will be located on lands that are presently used by the USACE as CDF. These lands are highly disturbed lands that are subject to periodic disturbance through the distribution of dredge spoil materials. A second area of improvement outside of the existing CAFRA Node includes new switchyards which will be located in an area of unmapped coastal wetlands.

PSEG will be seeking to include these lands into the existing CAFRA Node boundaries through the NJDEP State Planning Commission. This process will be initiated well before any formal permits are submitted to NJDEP for construction of the new plant. PSEG believes that a change to the CAFRA Node is warranted based on the following:

- The CDF presently operated by the USACE represents a historically disturbed area. The PSEG Site is uniquely suited for development of a nuclear power plant, given the presence of existing security and infrastructure. Expanding the CAFRA Node to encompass the USACE CDF site will development of a needed, new power source for NJ within and area of limited environmental sensitivity.
- PSEG will provide the needed mitigation to offset the impacts of wetlands lost as part of the expansion of the CAFRA Node
- Expansion of the CAFRA Node to include the USACE CDF facilities will enable the project to minimize wetland impacts.
- As discussed above, wetlands impacted on Artificial Island are generally low value, *Phragmites*-dominated wetlands associated with authorized use of the CDFs.

The proposed plant is considered a water dependent energy facility and therefore is not subject to the 500 foot setback.

* * *

Coastal energy facilities construction and operation shall not directly or indirectly result in net loss of employment in the State for any single year.

1. Coastal energy facility construction and operation which results in loss of 200 or more person-years of employment in jobs in New Jersey directly or indirectly related to the State's coastal tourism industry in any single year is prohibited.

The adjacent SGS and HCGS complex is one of the largest employers in the four-county area. The plants directly employ 1,574 people. The construction and operation of a new plant will increase employment with up to 4,100 construction jobs and 600 permanent jobs. The construction of the plant will not result in loss of employment of 200 or more person/year related to the state's coastal tourism industry as the area is not a high tourism area.

Approximately 82.6 percent (496) of the new employees are expected to reside in the four-county socioeconomic Region of Influence (New Castle, Salem, Cumberland, and Gloucester counties). Most of the new employees from the three NJ counties are likely to come from the higher population communities such as Bridgeton, Glassboro, Millville, Pennsville Township, Penns Grove, Pitman, Quinton, Salem, and Vineland. New employees from New Castle County, DE are most likely to come from Bear, Brookside, Clayton, Edgemoor, Hockessin, New Castle, Newark, Pike Creek, and Wilmington.

* * *

Standards relevant to electric generating stations are as follows:

1. New or expanded electric Generating facilities (for base load, cycling, or peaking purposes) and related facilities are conditionally acceptable provided:

iii. Nuclear generating stations shall be located in generally remote, rural, and low density areas, consistent with the criteria of 10 CFR 100 (United States Nuclear Regulatory Commission rules on siting nuclear generating stations) and/or any other related Federal regulations. In addition, the nuclear generating facility shall be located in an area where the appropriate low population zone and population center distance are likely to be maintained around the nuclear generating facility, through techniques such as land use controls or buffer zones.

The subject site is located in Lower Alloways Creek Township (LACT). LACT is generally considered a rural community comprised of a series of small population centers and agricultural interests. The 2000 U.S. Census data indicate a population density in LACT of 39.6 individuals/square mile; one of the least densely populated areas in NJ (USCB 2000).

The nearest residence is approximately 2.8 miles west of the subject site in Bay View Beach, DE. Other nearby residences are located 3.5 miles east-northeast and 3.5 miles northwest of the subject site. The population center distance (defined in 10 CFR 100 ["Reactor Site Criteria"] as the distance from the reactor to the nearest boundary of a densely populated center with 25,000 residents or more) is 15.5 miles. The area within 15 miles of the site is primarily utilized for agriculture. Heavy industry exists more than 15 miles north of the site (PSEG 2007c). The area immediately surrounding the site is comprised of the Delaware River to the west and extensive wetland complexes to the east north and south.

* * *

iv. The construction and operation of a nuclear generating station shall not be approved unless the proposed method for disposal of the spent fuel to be produced by the facility will be safe, conforms to standards established by the United States Nuclear Regulatory Commission, and will effectively remove danger to life and the environment from the radioactive waste material. This finding is required under present State law (N.J.S.A. 13:19-11) and will be made consistent with judicial decisions (see Public Interest Research Group v. State of New Jersey, 152 N.J. Super. 191 (App. Div.,certif. Den., 75 N.J. 538 (1977)) and Federal law.

The proposed plant will conform to the standards of spent fuel storage and disposal established by the NRC:

a. Transportation of Unirradiated fuel

Transportation of new fuel assemblies to the PSEG Site from a fuel fabrication facility will be in accordance with Department of Transportation (DOT) (49 CFR Parts 173, 178, and 397) and NRC regulations (10 CFR 71). The fuel assemblies will be fabricated at a fuel fabrication plant and shipped by truck to the PSEG Site shortly before they are required. The details of the container designs, shipping procedures, and transportation routing will be in accordance with DOT and NRC regulations and will depend on the requirements of the suppliers providing the fuel fabrication services. The truck shipments will not exceed 73,000 pounds as governed by federal or state gross vehicle weight restrictions.

b. Transportation of Irradiated Fuel

Spent fuel assemblies will be discharged and remain in the new plant's spent fuel pool at least five years while short half-life isotopes decay. The new plant will have sufficient spent fuel capacity to ensure that irradiated fuel can be stored for at least five years before being removed. After a sufficient decay period, the fuel will be removed from the spent fuel pool and packaged in spent fuel shipping/storage casks, licensed in accordance with 10 CFR 72, and transferred either to an independent spent fuel storage installation facility onsite or an offsite disposal facility. Packaging of the fuel for offsite shipment will comply with applicable DOT (49 CFR Parts 173, 178, and 397) and NRC regulations (10 CFR 71) for transportation of radioactive material. By

law, the Department of Energy (DOE) is responsible for spent fuel transportation from reactor sites to a repository (Nuclear Waste Policy Act of 1982, as amended). DOE will determine the mode of transport.

c. Transportation of Radioactive Waste

Low-level radioactive waste will be packaged to meet transportation and disposal site acceptance requirements. Packaging of waste for offsite shipment will comply with applicable DOT (49 CFR Parts 173 and 178) and NRC regulations (10 CFR 71) for transportation of radioactive material. The packaged waste will be stored onsite on an interim basis before being shipped offsite to a licensed processing, storage, or disposal facility. Radioactive waste will be shipped offsite by truck. Radioactive solid waste generated from the project will be shipped to the PSEG Site repository in Barnwell, South Carolina. New Jersey is a member of the Atlantic Interstate Low Level Radioactive Waste Management Compact.

* * *

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.4** because construction of a new energy facility will provide clean energy (non-greenhouse gas emission), beneficial secondary impacts to the region, and continued employment opportunities.

11. 7:7E-7.5 Transportation Use Rule

New road construction must be consistent with the rule on location of linear development at N.J.A.C. 7:7E-6.1, and shall be limited to situations where:

i. A clear need exists, taking into account the alternatives of upgrading existing roads and of using public transportation to meet the need;

ii. Provision is made to include construction of bicycle and foot paths, except where these would not be feasible;

iii. Provision is made to include, where appropriate, catwalks and parking access to nearby water bodies.

iv. Provision is made for coordinated construction of public transportation rights-of-way and facilities, such as bus lanes, rail lines, and related transit stop or station facilities and parking, except where such construction would not be feasible;

v. Visual and physical access to the coastal waters is maintained, to the maximum extent practicable; and

vi. Induced development in conflict with coastal rules would not be expected to result.

The only existing vehicular access to the PSEG Site is the existing plant access road. This road extends through coastal wetlands from the PSEG Site in an easterly and east-northeasterly direction for about 3.6 miles, where it connects to Alloway Creek Neck Road (an existing secondary road). Alloway Creek Neck Road continues through uplands to the town of Hancock's Bridge. The existing right-of-way for the access road is variable, ranging from 350 feet to about 450 feet in width through state owned lands.

Additional access road capacity is needed to address the current and future transportation needs for the PSEG Site and to eliminate congestion due to operational/outage traffic and new plant construction traffic at rural intersections near Hancock's Bridge. The proposed causeway will also provide means of evacuation and emergency access to and from the PSEG Site. This proposed causeway is conceptually designed as a three-lane causeway to be constructed on elevated structures for its entire length through the coastal wetlands. The proposed causeway extends northeast from the PSEG Site along or adjacent to the existing transmission corridor right-of-way to the intersection of Money Island Road and Mason Point Road (Figure 10). The alignment runs roughly 200 feet east of, and parallel to, the

existing Red Lion transmission line for most of its length. Through the coastal wetlands, the causeway would be constructed on elevated structures, thereby reducing environmental impacts.

The proposed causeway will be designed and constructed with a sufficient lifespan that is consistent with that of the operating life of the new plant. Periodic maintenance activities will be required for the proposed causeway to ensure that it is in a safe operational condition including storm drainage features. Such activities are expected to include repair and maintenance of the roadway surface and catch basins/drainage, lane striping, and periodic management, mowing and cutting of adjacent vegetation.

The proposed causeway alignment traverses through areas owned by NJ and PSEG. These lands are mostly wetlands and deed restricted for conservation, so secondary development caused by the causeway is not likely. Wetlands impacts are discussed under **N.J.A.C. 7:7E-3.27**. The proposed causeway is consistent with the rule on location of linear development at **N.J.A.C. 7:7E-6.1**. For the above reasons, the proposed causeway will be consistent with **N.J.A.C. 7:7E-7.5**.

12. 7:7E-7.6 Public Facility Use Rule

Public facilities include a broad range of public works for production, transfer, transmission, and recovery of water, sewerage and other utilities. The presence of an adequate infrastructure makes possible future development and responds to the needs created by present development.

No new or expanded public facilities, including water production, wastewater treatment, sewage treatment, and solid waste management facilities, are required for the new plant. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.6** because issuance will not involve any new public facilities.

13. 7:7E-7.7 Industry Use Rule

Industry uses are uses that involve industrial processing, manufacturing, storage or distribution activities. These uses include, but are not limited to, electric power production, food and food by-product processing, paper production, agri-chemical production, chemical processes, storage facilities, metallurgical processes, mining and excavation processes, and processes using mineral products. Industrial uses do not include petroleum refining which is considered an energy use and, therefore subject to the standards of N.J.A.C. 7:7E-7.4

New industrial development is encouraged to locate at or adjacent to existing industrial sites, to the maximum extent practicable. Industry that is easily accessible to its labor force by foot or public transportation is encouraged. Marine resource-dependent industry, such as commercial fishing, is encouraged and shall have priority over other waterfront uses, except for recreation. The cogeneration of electricity with process steam is encouraged.

The new plant is subject to the **N.J.A.C. 7:7E-7.4 Energy Facility Use Rule** and has been addressed accordingly. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.7** because issuance will not involve any new industry uses.

14. 7:7E-7.8 Mining Use Rule

New or expanded mining operations on land, and directly related development, for the extraction and/or processing of construction sand, gravel, ilmenite, glauconite, and other minerals are conditionally acceptable, provided that the following conditions are met (mining is otherwise exempted from the General Land Areas rule, but shall comply with the Special Areas, and General Water Area rules).

No activities that will constitute mining operations are proposed as part of the new plants. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.8** because issuance will not authorize any new or expanded mining operations.

15. 7:7E-7.9 Port Use Rule

Port uses are concentrations of shoreside marine terminals and transfer facilities for the movement of waterborne cargo (including fluids), and including facilities for loading, unloading and temporary storage.

Port-related development and marine commerce is encouraged in and adjacent to established port areas. Water-dependent development shall not be preempted by non-water dependent development in these areas. New port uses outside of existing ports as defined at N.J.A.C. 7:7E-3.11(a) are acceptable only when there is a clear demonstration of need, and when suitable land and water area is not available in or adjacent to an existing port. New or expanded ports must be compatible with surrounding land uses and provide for maximum open space and physical and visual access to the waterfront, provided that this access does not interfere with port operations or endanger public health and safety. New or expanded ports must also not interfere with national, State, county or municipal parks, recreational areas, or wildlife refuges. New, expanded or redeveloped port facilities must have direct access to navigation channels of sufficient depth for anticipated vessel access, with minimal dredge and fill requirements, adequate access to road, rail transportation, and adjacent land with sufficient load bearing capacity for structures.

As discussed above, PSEG may make use of the Port of Salem as a nearby staging area for new plant construction; however, the decision to use this facility will depend upon the reactor technology selected for the new plant. Nevertheless, PSEG does not anticipate expansion of the Port of Salem. As such, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.9** because issuance will not authorize any new or expanded port uses.

16. 7:7E-7.10 Commercial Facility Use Rule

Commercial uses include hotels and motels, retail trade and services, and convention centers.

New, expanded or improved hotels and motels are conditionally acceptable provided that the development complies with all Location and Resource rules and with the rule for high-rise structures and is compatible in scale, site design, and architecture with surrounding development. Hotels, motels or restaurants may be water oriented if they take full advantage of a waterfront location.

No activities that constitute commercial facility uses are proposed as part of the new plant. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.10** because issuance will not authorize any new or expanded commercial uses.

17. 7:7E-7.11 Coastal Engineering

(a) Coastal engineering includes a variety of structural and non-structural measures to manage water areas and the shoreline for natural effects of erosion, storms, and sediment and sand movement. Beach nourishment, sand fences, pedestrian control on dunes, stabilization of dunes, dune restoration projects, dredged material disposal and the construction of retaining structures such as bulkheads, gabions, revetments and seawalls are all examples of coastal engineering.

* * *

(e) Standards relevant to structural shore protection are as follows:

1. The construction of new shore protection structures or expansion or fortification of existing shore protection structures, including, but not limited to, jetties, groins, seawalls, bulkheads, gabions and other retaining structures to retard longshore transport and/or to prevent tidal waters from reaching erodible material is acceptable only if it meets all of the following five conditions:

i. The structure is essential to protect water dependent uses or heavily used public recreation beach areas in danger from tidal waters or erosion, or the structure is essential to protect existing structures and infrastructure in developed shorefront areas in danger from erosion, or the structure is

essential to mitigate, through, for example, the construction of a retained earthen berm, the projected erosion in an erosion hazard area along a headland and provide erosion protection for a development that is otherwise acceptable under the Coastal Zone Management rules;

ii. The structure will not cause significant adverse impacts on local shoreline sand supply;

iii. The structure will not create net adverse shoreline sand movement downdrift, including erosion or shoaling;

iv. The structure will cause minimum feasible adverse impact to living marine and estuarine resources;

v. The structure is consistent with the State's Shore Protection Master Plan;

vi. If the proposed project requires filling of a water area it must be consistent with the General Water Area rule for Filling (N.J.A.C. 7:7E-4.10) and all other relevant coastal rules.

Maintenance or construction of an existing bulkhead is also conditionally acceptable provided that it meets the criteria specified in the rule.

No activities that constitute coastal engineering are proposed as part of the new plants. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.11** because issuance will not authorize any coastal engineering.

18. 7:7E-7.12 Dredged Material Placement on Land

Dredged material placement is the disposal or beneficial use of sediments removed during dredging operations. Beneficial uses of dredged material include, but are not limited to, fill, topsoil, bricks and lightweight aggregate. This rule applies to the placement of dredged material landward of the spring high water line. The standards for dredged material disposal in Water Areas are found at ***N.J.A.C. 7:7E- 4.8.***

Dredged material placement on land is conditionally acceptable provided that the use is protective of human health, groundwater quality, and surface water quality, and manages ecological risks. Testing of the dredged material may be required as needed to determine the acceptability of the placement of the material on a particular site. Dredged material disposal is prohibited on wetlands unless the disposal satisfies the criteria found at ***N.J.A.C. 7:7E-3.27****. The use of dredged material of appropriate quality and particle size for purposes such as restoring landscape, enhancing farming areas, capping and remediating landfills and brownfields, beach protection, creating marshes, capping contaminated dredged material disposal areas, and making new wildlife habitats is encouraged. Effects associated with the transfer of the dredged materials from the dredging site to the disposal site shall be minimized to the maximum extent feasible.*

Dredged material disposal in wet and dry borrow pits is conditionally acceptable If pre-dredging sediment analysis indicates contamination, then special precautions shall be imposed including but not necessarily limited to increasing retention time of water in the disposal site or rehandling basin through weir and dike design modifications, use of coagulants, ground water monitoring, or measures to prevent biological uptake by colonizing plants. All potential releases of water from confined (diked) disposal sites and rehandling basins shall meet existing State Surface Water Quality Standards (N.J.A.C. 7:9B) and State Groundwater Quality Standards (N.J.A.C. 7:9).

New and maintenance dredging is required as discussed under **7:7E-4.7 New Dredging** and **7:7E-4.6 Maintenance Dredging**. As part of the development of the USACE CDF site, PSEG will develop an alternative dredged disposal site to compensate for the loss of capacity at the existing site. At the present time, an alternative site has not been defined. Any CDF developed by PSEG within the coastal zone will be completed in accordance with the rules for Coastal Zone Management (**N.J.A.C. 7:7E**) and will be constructed only after all local state and federal permits for the facility have been issued.

19. 7:7E-7.13 National Defense Facilities Use Rule

A national defense facility is any building, group of buildings, marine terminal, or land area owned or operated by a defense agency (Army, Navy, Air Force, Marines, Coast Guard) and used for training, research, material support, or any other defense related use.

National defense facilities are conditionally acceptable provided the development is consistent with all relevant Coastal Zone Management rules or the proposed facility is coastally dependent, will be constructed and operated with maximum possible consistency with Coastal Zone Management rules, and will result in minimal feasible degradation of the natural environment. The construction of new facilities or expansion of existing facilities on land not owned by a defense agency is discouraged, unless it can be shown that the facility cannot feasibly be accommodated on an existing base.

Although the PSEG Site is not a national defense facility, PSEG is entering into an agreement in principle with the USACE to acquire land immediately to the north of the PSEG Site. Therefore, there is reasonable assurance that PSEG will have exclusive control over the area within the exclusion area boundary by the time the COL is issued.

The existing 734 acre PSEG property is located on the southern part of Artificial Island on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, NJ. PSEG is developing an agreement in principle with the USACE to acquire an additional 85 acres adjacent to the current SGS. With the additional land obtained from the USACE, the total land area owned by PSEG will be 819 acres. The land acquisition has not been completed but a formal agreement has been reached between the USACE and PSEEG. The agreement in principle with the USACE will serve to establish the basis for eventual land acquisition and EAB control, necessary to support the issuance of a future Combined Operating License.

Subsequent to the agreement in principle with the USACE, PSEG will develop a lease agreement for the USACE CDF land to the north of the PSEG Site, depicted on the Site Utilization Plan for the concrete batch plant and temporary construction/laydown use. At the completion of construction, the leased land will be returned to the USACE, subject to any required long-term EAB control conditions.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.13** because issuance will not authorize any new or expanded national defense facilities use at the PSEG Site.

20. 7:7E-7.14 High Rise Structures

High-rise structures are structures which are more than six stories or more than 60 feet in height as measured from existing preconstruction ground level.

High-rise structures are encouraged to locate in an urban area of existing high density, high-rise and/or intense settlements. High-rise structures within the view of coastal waters shall be separated from coastal waters by at least one public road or an equivalent area (at least 50 feet) physically and visually open to the public except as provided by N.J.A.C. 7:7E-3.48. The longest lateral dimension of any high-rise structure must be oriented perpendicular to the beach or coastal waters, except for a high-rise structure that is located in the Redevelopment Zone of the City of Long Branch and authorized pursuant to the Long Branch Redevelopment Zone Permit at N.J.A.C. 7:7-7.4. The proposed structure must not block the view of dunes, beaches, horizons, skylines, rivers, inlets, bays, or oceans that are currently enjoyed from existing residential structures, public roads or pathways, to the maximum extent practicable. High-rise structures outside of the Hudson River waterfront special area as defined by N.J.A.C. 7:7E-3.48 shall not overshadow the dry sand beach between 10:00 A.M. and 4:00 P.M. between June 1 and September 20, and shall not overshadow waterfront parks year round. The proposed structure must be in character with the surrounding transitional heights and residential densities, or be in character with a municipal comprehensive development scheme requiring an increase in height and density which is consistent with all applicable Coastal Zone Management rules. The proposed structure

must not have an adverse impact on air quality, traffic, and existing infrastructure. The proposed structure must be architecturally designed so as to not cause deflation of the beach and dune system or other coastal environmental waterward of the structure. The high-rise structures rule shall not apply to utility structures that have a demonstrated need.

Certain components of the new plant will exceed 60 feet in height and be classified as high rise structures. However, **N.J.A.C. 7:7E-7.14(c)2** exempts "Utility structures that have a demonstrated need" from the standards applicable to high-rise structures. Accordingly, the cooling towers, containment buildings, and other structures at the new plant, which will exceed 60 feet in height but are integral and necessary to operation of a nuclear power plant, qualify for this exemption. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-7.14** because issuance will not authorize any new or expanded high rise structures.

G. Resource Rules

21. 7:7E-8.2 Marine Fish and Fisheries

Marine fish are marine and estuarine animals other than marine mammals and birds. Marine fisheries means:

1. One or more stocks of marine fish which can be treated as a unit for the purposes of conservation and management and which are identified on the basis of geographical, scientific, technical, recreational and economic characteristics; and

2. The catching, taking or harvesting of marine fish.

Any activity that would adversely impact on the natural functioning of marine fish, including the reproductive, spawning and migratory patterns or species abundance or diversity of marine fish, is discouraged. In addition, any activity that would adversely impact any New Jersey based marine fisheries or access thereto is discouraged.

As discussed in response to **7:7E-3.5 Finfish Migratory Pathways**, the closed cycle cooling for the new plant is BTA for minimizing adverse environmental impact from impingement and entrainment effects.

PSEG collects and maintains an extensive, long-term dataset on the distribution and occurrence of finfish species of concern in the portion of the Estuary near the PSEG Site. Data collection has continued annually since 1968. Expanded reports summarizing the results of these monitoring activities have been submitted to the NJDEP annually since 1995 in accordance with the SGS's NJPDES Permit No. NJ005622 (for example, PSEG 2009).

The new plant will have a shoreline intake structure that withdraws water for use in the SWS. The water is utilized as makeup water for the CWS, which is a closed-cycle condenser cooling system consisting a cooling tower or towers with make-up, blowdown, basin bypass systems, circulating water pumps; one or more condensers; and a closed loop circulating water piping arrangement.

The new plant's intake structure will be located parallel to, and nearly flush with, the Delaware River shoreline. This location increases tidal flushing of the forebay and eliminates long intake canals and blind pockets, thus reducing finfish entrapment potential. In addition to the low approach velocities and the intake structure's traveling screens, the intake structure will be equipped with a fish return system that includes screen panel buckets, a low pressure fish removal system, a high pressure debris removal system, and a trough to return debris and fish to the river.

The intake flow velocities through the traveling screens are less than 0.5 fps. This velocity reduces the swim speed necessary for a fish to escape the intake's flow and allows many organisms to escape impingement, especially the larger finfish and blue crabs (i.e. greater than 20 mm, depending upon species). The 0.5 fps intake velocity and closed-cycle cooling has also been specified by the USEPA's

Section 316(b) Phase I rulemaking for new power plants as being BTA for the protection of aquatic life from the effects of impingement and entrainment.

The new plant will withdraw approximately 112 mgd of water from the Delaware River during normal operations. Water usage at the new plant during normal operations will account for less than about 0.02 percent of the typical tidal flow of the Delaware River.

Under Section 316(b) of the Clean Water Act [33 U.S.C 1326(b)], the NJDEP must determine whether the location, design, construction, and capacity of a power plant's intake structure reflects BTA for minimizing adverse environmental impact (40 CFR 125). In 2003, the NJDEP (NJDEP 2003) determined that the adjacent HCGS closed-cycle condenser cooling system reflects BTA. The new plant's closed cycle cooling system is substantially similar to that of the HCGS, and will be equally protective of finfish.

The proposed causeway will cross Alloway Creek and several associated smaller creeks, which are a tidal tributary system of the Delaware Estuary. Alloway Creek is a known finfish migratory pathway for anadromous river herring, and a fish ladder has been installed at the dam of Alloway Lake at the head of tide to facilitate fish migration to non-tidal reaches. The proposed causeway will cross the creek near its mouth on the Delaware Estuary, and is designed to minimize the disturbance footprint to wetlands and tidal waters by being situated on overhead spans. Several other existing bridges are present along the course of the tidal portion of Alloway Creek, and do not comprise a barrier or disturbance to anadromous fish migration or marine species potentially transiting this waterway. The proposed causeway is not expected to affect reproductive, spawning and migratory patters, species abundance, or diversity of marine fish stocks.

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.2** because issuance will not adversely affect marine fishery resources.

22. 7:7E-8.4 Water Quality

As required by Section 307(f) of the Federal Coastal Zone Management Act (P.L. 92-583), Federal, State and local water quality requirements established under the Clean Water Act (33 U.S.C., 1251) shall be the water resource standards of the coastal management program. These requirements include not only the minimum requirements imposed under the Clean Water Act but also the additional requirements adopted by states, localities, and interstate agencies pursuant to Section 510 of the Clean Water Act and such statutes as the New Jersey Water Pollution Control Act. In the Delaware River Basin, the requirements include the prevailing "Basin Regulations-Water Quality" adopted by the Delaware River Basin Commission as part of its Comprehensive Plan. In the waters under the jurisdiction of the Interstate Sanitation Commission in the New Jersey-New York metropolitan area, the requirements include the Interstate Sanitation Commission's Water Quality Regulations. Department rules related to water pollution control and applicable throughout the entire coastal zone include, for example, the Surface Water Quality Standards (N.J.A.C. 7:9-4), the rules concerning Wastewater Discharge Requirements (N.J.A.C. 7:9-5), the Ground-Water Quality Standards (N.J.A.C. 7:9-6), and the Regulations Concerning the New Jersey Pollutant Discharge Elimination System (N.J.A.C. 7:14A).

*Coastal development which would violate the Federal Clean Water Act, or State laws, rules and regulations enacted or promulgated pursuant thereto, is prohibited. In accordance with N.J.A.C. 7:15 concerning the Water Quality Management Planning and Implementation process, coastal development that is inconsistent with an approved Water Q*uality Management *(208) Plan under the New Jersey Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq., is prohibited.*

As discussed above, the new plant will operate in compliance with applicable state and federal effluent limitations (including thermal limitations). Water quality standards for discharges of wastewater will be assured throughout the operating period by NJDEP oversight under NJPDES Permit. NRC

issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.4** because issuance will authorize no coastal development that will violate applicable federal or state water quality standards.

23. 7:7E-8.5 Surface Water Use

Surface water is water in lakes, ponds, streams, rivers, bogs, wetlands, bays, and ocean that is visible on land.

Coastal development shall demonstrate that the anticipated surface water demand of the facility will not exceed the capacity, including phased planned increases, of the local potable water supply system or reserve capacity, and that construction of the facility will not cause unacceptable surface water disturbances, such as drawdown, bottom scour, or alteration of flow patterns.

The total intake for the new plant from the Delaware River is 78,196 gpm (average) and 80,600 gpm (maximum), or 112 mgd and 116 mgd, respectively. The combined plant blowdown consists of CWS blowdown, SWS blowdown, PSWS blowdown, DWDS blowdown, miscellaneous drains blowdown, liquid radwaste blowdown, and SWS makeup filter backwash. The combined plant blowdown flows discharge into the Delaware River at a flowrate of 51,946 gpm (average) and 53,222 gpm (maximum), or 74 mgd and 76 mgd, respectively. An average of 38 mgd is lost to evaporative cooling, and accounts for less than 0.02% of the average 259,000 mgd tidal flow past the station. This withdrawal will require a new NJPDES Permit, Surface Water Diversion Permit, and a DRBC Docket for authorization. Based on the volume of water lost to evaporation compared to the volume of tidal flow past the new plant, construction of the facility will not cause unacceptable surface water disturbances, such as drawdown, bottom scour, or alteration of flow patterns. The brackish Delaware River is not used as potable water.

DRBC and NJDEP required monitoring conducted during SGS and HCGS operation has indicated that no degradation in the quality or available quantity of water in the Delaware River. Furthermore, no evidence of surface water disturbances, such as drawdown, bottom scour, or alteration of flow patterns, has been observed (PSE&G 1999, PSEG 2006).

NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.5** because issuance will neither authorize surface water use that violates existing NJDEP or DRBC requirements nor create unacceptable surface water disturbances, such as drawdown, bottom scour, or alteration of flow pattern.

24. 7:7E-8.6 Groundwater Use

Groundwater is all water within the soil and subsurface strata that is not at the surface of the land. It includes water that is within the earth that supplies wells and springs.

Coastal development shall demonstrate, to the maximum extent practicable, that the anticipated groundwater withdrawal demand of the development, alone and in conjunction with other groundwater diversions proposed or existing in the region, will not cause salinity intrusions into the groundwaters of the zone, will not degrade groundwater quality, will not significantly lower the water table or piezometric surface, or significantly decrease the base flow of adjacent water sources. Groundwater withdrawals shall not exceed the aquifer's safe yield. Coastal development shall also conform with all applicable Department and, in the Delaware River Basin, Delaware River Basin Commission requirements for groundwater withdrawal and water diversion rights.

PSEG has a permit from the NJDEP Bureau of Water Allocation (NJDEP 2004) for combined diversion at HCGS and SGS of up to 43.2 mgm. The NJDEP issued a single permit for both plants. The permit contains individual pumping limits for each plant's well, and also sets diversion limits for all wells combined. The maximum total diversion rate for SGS and HCGS is 2,900 gpm, and actual water diverted is limited to 43.2 mgm and 300 mgy. The Delaware River Basin Commission has also issued Docket No. D-90-71 (DRBC 2000) authorizing ground-water withdrawal for HCGS and SGS combined

that is equivalent to that authorized by NJDEP. Groundwater is the only source of freshwater used by SGS and HCGS.

The pumping rate for each of the two HCGS wells is limited to 750 gpm. These production wells (HC-1 and HC-2) are installed to a depth of 816 feet within the PRM Aquifer. The wells supply two 350,000-gal. storage tanks. Of the total volume, 656,000 gal. of water are reserved for fire protection; the remainder is for potable, sanitary, and industrial purposes including demineralized makeup water (PSEG 2000).

The SGS primarily uses two production wells, PW-5 and PW-6, with pumping rates that are limited by NJDEP to 800 gpm and 600 gpm, respectively. PW-5 and PW-6 are installed to depths respectively of 840 feet in the Upper Raritan Formation of the PRM Aquifer and 1,135 feet in the Middle Raritan Formation of the PRM Aquifer. SGS also has the capability of using two shallower wells, PW-2 and PW-3, currently classified as stand-by wells by NJDEP (NJDEP 2004). These wells are installed to depths of 281 feet and 293 feet respectively, within the Mount Laurel-Wenonah Aquifer. The wells collectively supply two 350,000 gallon storage tanks. Of the total volume, 600,000 gallons of water are reserved for fire protection; the remaining 100,000 gallons are for potable, sanitary, and industrial purposes, including demineralized makeup water. (PSEG 2000)

Between 2002 and 2009, the SGS wells pumped an average of 219 gpm with a production low of 169 gpm during 2002 and a high of 267 gpm during 2008. During the same period, the HCGS wells pumped an average of 160 gpm with a production low of 137 gpm during 2002 and a high of 197 gpm during 2004.

New plant systems will require freshwater. The PSWS supplies water needed for plant operation including potable water, sanitary water, and miscellaneous systems. The DWDS supplies water of reactor coolant quality for makeup and treated water for other station operating. The FPS supplies water to the wet system type fire suppression systems.

The current SGS and HCGS groundwater withdrawal permits allow for a maximum withdrawal rate of 2900 gpm, and total diversion limits of 43.2 mgm and 300 Mgy. The additional average groundwater withdrawal for new plant construction (119 gpm) is within the currently permitted amounts. The groundwater withdrawal for the new plant operation is 210 gpm, which equals 110.4 Mgy. The cumulative maximum withdrawal for plant operations (new plant plus SGS and HCGS average historic withdrawals) is 309 Mgy, which is 3 percent above the current SGS and HCGS site permitted annual water withdrawal. The highest SGS and HCGS historic groundwater withdrawal is 232.5 Mgy (1995). PSEG will continue to manage water use to further reduce the impact of the new plant on groundwater resources.

When the reactor technology is selected and a final site water balance is developed, PSEG will reevaluate total site (SGS, HCGS, and new plant) water use against the site water allocation permit limits. The current permits and authorizations will be modified as necessary to include the new plant, or new permit(s) for water withdrawal will be obtained.

Supply wells would be installed in accordance with the requirements and permit limits set forth by NJDEP and DRBC. Thus, NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.6** because issuance will not authorize groundwater use that will violate NJDEP or DRBC requirements.

25. 7:7E-8.7 Stormwater Management

If a project or activity meets the definition of "major development" at N.J.A.C. 7:8-1.2, then the project or activity shall comply with the Stormwater Management rules at N.J.A.C. 7:8.

"Major development" means any "development" that provides for ultimately disturbing one or more acres of land or increasing impervious surface by one-quarter acre or more. Disturbance for the

purpose of this rule is the placement of impervious surface or exposure and/or movement of soil or bedrock or clearing, cutting, or removing of vegetation.

The new plant will increase the impervious cover at the PSEG Site. Most of the soils on which the new plant and proposed causeway are constructed generally do not meet the criteria for recharge (for example, Artificial Island is "made land" and the coastal marshes traversed by the causeway are saturated wetland soils, both of which have recharge coefficients of zero in accordance with the NJDEP's Groundwater Recharge Spreadsheet).

Nevertheless, PSEG will comply with the stormwater rule through the use of approved BMPs for stormwater quality runoff at the site. These BMPs could include detention basins, swales, and interception/treatment via yard drains. The exact nature of the stormwater treatment facilities will depend on site layout, reactor technology selected, and other site factors that will govern the location and size of stormwater treatment facilities. Treatment of stormwater for quantity is not applicable because the receiving waters are tidal.

There are Category One Waters adjacent to the project site and within the proposed causeway alignment, and the project will be considered a "major development" under the Stormwater rules (N.J.A.C. 7:8). The rules at N.J.A.C. 7:8-5.5(h) require a Special Water Resource Protection Area (SWRPA) adjacent to all Category One waters and their upstream tributaries located within the same HUC 14. The rules at N.J.A.C. 7:8-5.5(h) define a SWRPA as a 300 foot area on each side of the waterway to consist of existing vegetation or vegetation allowed to follow natural succession so as to maintain and/or create an unbroken, undisturbed vegetated buffer along Category One waters and upstream tributaries.

The rules at N.J.A.C. 7:8-5.5(h) only allow encroachment within the designated SWRPA when necessary to meet the Standard for Offsite Stability in the Standards for Soil Erosion and Sediment Control in New Jersey (N.J.A.C. 2:90-1.3) or where previous development or disturbance has occurred and where an applicant can demonstrate that the functional value and overall condition of the SWRPA will be maintained to the maximum extent practicable.

No encroachment is permitted into a Special Water Resource Protection Area unless the applicant demonstrates that the functional value and overall condition of the Special Water Resource Protection Area will be maintained to the maximum extent practicable. To demonstrate that the functional value and overall condition of the Special Water Resource Protection Area will be maintained requires the applicant to perform a Functional Value Analysis in accordance with the Stormwater Management Rules (N.J.A.C. 7:8). A Functional Value Analysis will be completed when the detailed design of the proposed causeway and new facility are completed.

Thus, NRC issuance of the ESP would be consistent with **N.J.A.C. 7:7E-8.7** because stormwater treatment facilities and a Functional Value Analysis will be developed in accordance with the provisions of the rule.

26. 7:7E-8.8 Vegetation

Vegetation is the plant life or total plant cover that is found on a specific area, whether indigenous or introduced by humans.

Coastal development shall preserve, to the maximum extent practicable, existing vegetation within a development site. Coastal development shall plant new vegetation, particularly appropriate coastal species native to New Jersey to the maximum extent practicable.

In addition to the wetland and riparian zone salt marsh vegetation associated with the proposed causeway (discussed under **N.J.A.C. 7:7E-3.26** and **3.27**, respectively), the footprint of the new plant also impacts upland vegetation on the PSEG Site. A number of NJDEP LULC cover types may be collectively grouped as forest/old field habitat. The communities consist of an assemblage of habitats dominated by

trees and other occasional woody vegetation on previously disturbed uplands that have become naturalized by plant communities in varying stages of succession. This land cover category includes the following land cover types:

- Deciduous brush/shrubland
- Deciduous Forest (10–50 percent crown closure)
- Old field (less than 25 percent brush covered)
- *Phragmites*-dominated old field

Forest/old field habitat occupies approximately 107 acres within the PSEG Site. This land cover type is mainly represented in the southeast portion of the PSEG Site and corresponds to lands used in support of the construction of SGS and HCGS. 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. Almost 32 acres of this LULC category is represented by *Phragmites*-dominated old field. A small section of old field habitat is present at the northern end of the proposed causeway.

Approximately 8.7 acres of this habitat type are permanently impacted by onsite construction activities, and about 80.3 acres will be temporarily impacted. Approximately 3.5 acres of this habitat is likely to be permanently impacted by construction of the proposed causeway bridge and site access areas. A temporary impact of about 0.1 acres of forest/old field habitat is also likely within the causeway construction area. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.8** because impacts to vegetation will be mitigated in accordance with the provisions of **N.J.A.C. 7:7E-3.26 Riparian Zone**, **N.J.A.C. 7:7E-3.27 Wetlands**, and **N.J.A.C. 7:7E-3.28 Wetland Buffers** at appropriate ratios.

27. 7:7E-8.10 Air Quality

The protection of air resources refers to the protection from air contaminants that injure human health, welfare or property, and the attainment and maintenance of State and Federal air quality goals and the prevention of degradation of current levels of air quality.

Coastal development shall conform to all applicable State and Federal regulations, standards and guidelines and be consistent with the strategies of New Jersey's State Implementation Plan (SIP). See N.J.A.C. 7:27 and New Jersey SIP for ozone, particulate matter, sulfur dioxide, nitrogen dioxide, carbon monoxide, lead, and visibility. Coastal development shall be located and designed to take full advantage of existing or planned mass transportation infrastructures and shall be managed to promote mass transportation services, in accordance with the Traffic rule, N.J.A.C. 7:7E-8.14.

The principal air emission sources associated with new plant operation are cooling towers, auxiliary boilers for plant heating and start-up, engine driven emergency equipment, and the emergency power supply system diesel generators, and/or combustion turbines. Based on the bounding assumptions for the plant parameter envelope, the PSEG Site has six backup generators (four emergency and two normal) as part of the emergency power supply system. Estimates of the anticipated annual auxiliary boiler and diesel generator air emissions, which include nitrogen oxides (NO_x), sulfur oxides (SO_X), carbon monoxide (CO), hydrocarbons in the form of volatile organic compounds (VOC), and particulates are provided on Table 10. Modifications to the SGS/HCGS Title V Operating Permit under the Clean Air Act will be required for the new plant, addressing emissions and compliance with state and federal regulations.

The PSEG Site is located in Salem County, NJ, which is part of the Metropolitan Philadelphia Air Quality Control Region (40 CFR 81.15). The Clean Air Act and its amendments establish National Ambient Air Quality Standards (NAAQS) for ambient pollutant concentrations that are considered harmful to public health and the environment. NJ has established similar State Ambient Air Quality Standards (NJAAQS). Primary standards set limits to protect public health and secondary standards set limits to protect public welfare such as decreased visibility, and damage to animals, crops, vegetation, and

buildings. The principal pollutants for which NAAQS have been set are CO, nitrogen dioxide (NO_2), lead, sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and ozone (O_3). There is one or more averaging times associated with each pollutant for which the standard must be attained.

Areas having air quality as good as or better than the NAAQS are designated as attainment areas. Areas having air quality that is worse than the NAAQS are designated as non-attainment areas. Salem County is next to (but not included in) the Philadelphia-Wilmington $PM_{2.5}$ non-attainment area and is located in the Philadelphia-Wilmington-Atlantic City 8-hour ozone non-attainment area.

The AERMOD modeling system was used to assess the impacts of pollutants generated by the new plant, which include the cooling towers and the auxiliary boilers. Standby emergency electric power generators are operated for limited periods of time for testing and therefore were not modeled. The auxiliary boilers were modeled assuming approximately 4 months of continuous operation from mid-November to mid-March when they are likely to be operational to provide heat for the new facility. The auxiliary boilers are expected to operate for shorter periods of time during unit start-up to provide process and sealing steam.

Three years of site-specific meteorology supplemented with National Weather Service observations of cloud cover from Wilmington, DE and upper air data from Sterling, Virginia were processed to generate the required meteorological parameters for AERMOD. A nested grid of receptors (locations around the facility at which impacts are modeled) extended out 6.8 miles from the facility boundary. Modeled ambient concentrations at the DE/NJ boundary from the new plant are below the NAAQS for each pollutant.

The resulting concentrations, based on the AERMOD modeling runs, are shown in Table 11 with the appropriate NAAQS averaging times, background concentration, total concentration, the NAAQS standard, and the Prevention of Significant Deterioration (PSD) for each pollutant. The concentrations shown are the high-first-high impacts (H1H) for annual averages and high-second-high (H2H) for short term averages from all sources over the 3 years modeled. Table 12 compares the H1H impacts to the Significant Impact Levels (SILs) for annual and short-term averages from all sources. The SILs establish the concentration below which the impact is presumed not to cause or contribute to a violation of a NAAQS or NJAAQS.

The computed impacts for each pollutant and averaging time were compared to the SILs. The H1H impacts for PM_{10} and $PM_{2.5}$[3] exceed the respective 24 hr. SILs for the scenarios involving both the mechanical and the natural draft towers with concurrent operation of the auxiliary boilers. In addition, the 24-hour and 3-hour impacts of SO_2 exceed the corresponding SIL, due to the auxiliary boilers.

The annual $PM_{2.5}$ impact exceeds the annual SILs only for the scenario involving the mechanical draft cooling towers. The annual $PM_{2.5}$ impacts for the scenario involving the natural draft cooling towers are below the SIL. Annual SO_2 impacts, annual NO_x impacts, and H1H 1-hr. and 8-hr. CO impacts, are below the respective SILs. Thus, emissions of NO_x and CO from the new plant will not cause or contribute to a violation of an NAAQS / NJAAQS. As one or more of the SILs for the SO_2, PM_{10}, and $PM_{2.5}$ are exceeded, determining compliance with the NAAQS / NJAAQS requires detailed design and

[3] The 24-hr. SIL for $PM_{2.5}$ previously in use by NJDEP was 2.0 $\mu g/m^3$. However, subsequent to USEPA's promulgation of a lower 24-hr. $PM_{2.5}$ NAAQS, NJDEP has adopted a lower SIL of 1.2 $\mu g/m^3$. A memorandum entitled "Revised Interim Permitting and Modeling Procedures for Sources Emitting between 10-100 tons per year of $PM_{2.5}$" (Reference) indicates that NJ will apply the lower SIL in evaluation of both attainment and non-attainment sources.

equipment specification to be completed, consideration of background concentrations and other nearby sources of these pollutants.

The 24 hour H2H impact of $PM_{10}/PM_{2.5}$, for the combined operation of the mechanical draft cooling towers and auxiliary boilers, is 9.9 $\mu g/m^3$ (in 2006). This impact is on the fence line at the northern property boundary of the PSEG Site. The 24 hour H2H impact for $PM_{10}/PM_{2.5}$ for the combined operation of the natural draft cooling towers and auxiliary boilers is 5.6 $\mu g/m^3$ (in 2007). Because these impacts exceed the SIL, a cumulative modeling analysis must be conducted that includes background concentration and other sources to demonstrate compliance with the NAAQS and PSD increments.

The NJ/DE state line is approximately 6,900 feet north and 5,900 feet west of the proposed cooling towers. At the state line northwest of the facility, the maximum 24 hour H2H impact (without background) for $PM_{10}/PM_{2.5}$ from the mechanical draft cooling towers plus auxiliary boilers is approximately 2.6 $\mu g/m^3$. For the natural draft towers plus auxiliary boilers, the maximum 24 hour H2H impact for PM_{10} approximately 1.7 $\mu g/m^3$.

The annual average NO_x impacts, SO_2 and PM_{10} impacts for Class II areas are below the PSD increments. The H1H annual average impact and corresponding PSD increment for NO_x are 0.13 $\mu g/m^3$ and 25 $\mu g/m^3$, respectively. For SO_2 the H2H 3 hour average impact and PSD increment are 68.1 $\mu g/m^3$ and 512 $\mu g/m^3$, respectively; the H2H for 24 hour average impact and PSD increment are 18.6 $\mu g/m^3$ and 91 $\mu g/m^3$, respectively; and the H1H annual average and PSD increment are 0.8 $\mu g/m^3$ and 20 $\mu g/m^3$ respectively. PSD increments for $PM_{2.5}$ have not been finalized by EPA, but 9 $\mu g/m^3$ and either 4 or 5 $\mu g/m^3$ have been proposed for the 24 hour and annual, respectively.

In summary, initial AERMOD analyses suggest that the emissions from the cooling towers and auxiliary boilers at the new plant result in a modeled exceedance of the USEPA SIL level for $PM_{2.5}$ in New Castle County, DE, which is in a non-attainment area for 24 hour $PM_{2.5}$. In addition, when combined with available background $PM_{2.5}$ concentration data for the site area in NJ, the modeled 24 hour H2H $PM_{2.5}$ impact shows a slight exceedance of the NAAQS.

After a reactor technology is selected and detailed design is completed for the cooling towers and combustion sources (including auxiliary boiler equipment), PSEG will consult with NJDEP and perform more detailed modeling. Applicable emissions rates in effect at the time will be used in detail design and specification of equipment, along with identification of the appropriate engineering and operational controls. The final modeling will demonstrate that the new plant complies with the NAAQS, NJAAQS and PSD increments, and ensure that the impacts to air quality are small.

For PM_{10} and $PM_{2.5}$, the PSD increments will be addressed during Title V permitting after a reactor technology is selected and other combustion equipment, such as the auxiliary boilers, are specified.

The additional operations-related traffic also results in vehicular air emissions. NO_2 is of particular concern as it contributes to ozone formation and Salem County is an 8-hour ozone non-attainment area. Some localized nominal increases in emissions can be expected due to the increased numbers of cars, trucks, and delivery vehicles that will travel to and from the PSEG Site. Most of the increased traffic is associated with employees driving to and from work. Once the workers are at the site, the volume of traffic and its associated emissions is expected to decrease. It is likely that most of the workforce spends less than 2 hours of driving time during the work day. The workforce may also be staggered in shifts, which further reduces the amount of traffic during peak traffic times. Therefore, impacts to local and regional air quality from operations-related traffic impacts are small.

Air emissions also include salt deposition from water droplets leaving the top of the cooling towers of the circulating water supply system. As the droplets evaporate, solids will fall to the ground. As discussed above under **N.J.A.C. 7:7E-3.36**, the salt deposition is not expected to have an impact on the adjacent salt marsh communities. Plant communities most likely to experience this salt deposition are currently adapted to fluctuations in salt levels due to the euryhaline nature of the coastal marsh and Delaware River. Although salt deposition does occur outside the site boundary, the impact to the surrounding areas is small due to the nature of the vegetation subject to salt deposition.

Air emissions sources are also controlled to comply with Occupational Safety and Health Administration (OSHA) standards. 29 CFR 1910.1000 places limits on certain vapors, dusts, and other air contaminants. Dust suppression methods such as watering exposed areas minimize dust emissions. Reseeding or otherwise stabilizing disturbed areas after construction promotes the development of ground cover that further minimizes fugitive dust emissions in the operational phase. Thus, the impact from air emissions from operation of the new plant to nearby residences and recreational areas is small.

28. 7:7E-8.11 Public Trust Rights

Public trust rights to tidal waterways and their shores (public trust rights) established by the Public Trust Doctrine include public access which is the ability of the public to pass physically and visually to, from and along lands and waters subject to public trust rights as defined at N.J.A.C. 7:7E-3.50, and to use these lands and waters for activities such as swimming, sunbathing, fishing, surfing, sport diving, bird watching, walking and boating. Public trust rights also include the right to perpendicular and linear access. Public accessways and public access areas provide a means for the public to pass along and use lands and waters subject to public trust rights.

Except as otherwise provided, development on or adjacent to all tidal waterways and their shores shall provide onsite, permanent, unobstructed public access to the tidal waterway and its shores at all times, including both visual and physical access. Specific requirements for sites located along the Arthur Kill, Kill Van Kull west of Bayonne Bridge, Newark Bay, Delaware River from the Trenton Makes Bridge to the CAFRA boundary, Elizabeth River, Hackensack River, Passaic River, Rahway River, Raritan River, Cohansey River in Bridgeton City, and Maurice River in Millville City are found at (e) below.

The permanent onsite public access required may be modified where development of a new or at an existing energy facility, industrial use, port use, airport, railroad, or military facility is proposed and the Department determines that perpendicular access and/or a linear area along the entire shore of the tidal waterway is not practicable based on the risk of injury from existing or proposed hazardous operations, or substantial existing and permanent obstructions, and no measures can be taken to avert these risks. If public access on site is not practicable, alternate public access of comparable use to the public shall be provided at a nearby off site location.

Security requirements imposed by the NRC preclude PSEG from providing public access to the Delaware River at the PSEG Site. PSEG has provided alternate public access throughout the Delaware Estuary as part of its EEP. The EEP, a program sponsored by PSEG, was implemented as part of the special conditions of the NJPDES permit for the SGS. The EEP provides broad-based, long term benefits for the environment, natural resources and people located in the Delaware Estuary vicinity.

The primary feature of the EEP is a large scale wetlands restoration program. PSEG has restored, enhanced or preserved more than 20,000 acres of degraded salt marsh and adjacent uplands along the Delaware Estuary in NJ and DE. More than 11,000 of the enhanced or preserved acres are located in NJ where Deed of Conservation Restrictions have been filed for the properties and permanent public access is provided. PSEG has enhanced the restoration sites through construction of more than $1 million of new public use facilities, and funding many environmental education and research opportunities including:

- Wildlife observation areas with observation platforms, towers, boardwalks, floating platforms, viewing blinds, parking areas and boat launches;
- Several miles of nature trails;
- Osprey nesting platforms;
- Education signs, literature and hands-on classroom wetland discovery kits and activities for use by educators in NJ;
- Access to thousands of deed protected acres of vast, natural areas for a broad range of diverse public uses such as environmental education, nature study, hunting, fishing, trapping and other recreational opportunities.

Figure 16 provides a map illustrating the locations of the public access facilities. Table 6 lists EEP sites in NJ that provide public access to the tidal waters of the state. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.11** because PSEG has established and maintains an extensive array of public access to tidal waters and their shorelines in the immediate vicinity of the PSEG Site as well locations throughout the Delaware Estuary.

29. 7:7E-8.12 Scenic Resources and Design

Scenic resources include the views of the natural and/or built landscape.

New coastal development that is visually compatible with its surroundings in terms of building and site design, and enhances scenic resources is encouraged. New coastal development that is not visually compatible with existing scenic resources in terms of large-scale elements of building and site design is discouraged.

The new plant will be visible at ground level from limited points to the east of the site, due to the elevated terrain and upland woods. However, the plant site and associated buildings and structures are visible from the west and from the Delaware River. The new plant is located at a low elevation on the eastern shore of the Delaware River. The predominant features will be the cooling towers. The HCGS and SGS generally block the view of other plant features from the south. Recreational users of the Delaware River have a clear view of the plant site. Similarly, residents in DE have an unobstructed view of the plant site across the Delaware River, albeit at a greater distance. Because of this distance, visible features are primarily limited to the cooling towers and containment buildings. Upper portions of the cooling tower are visible to residents north and east of the plant site and from travelers crossing the Delaware Memorial Bridge, about 15 miles to the north of the PSEG Site. The cooling towers have warning lights, as required by the Federal Aviation Administration, and these lights are visible from several miles distant at night. Because the site is in a remote location, and is co-located with two existing plants that include a natural draft cooling tower, three reactor containment buildings, and other structures, the new plant is not expected to significantly change the existing viewscape. Therefore, visual impacts to the public, local communities and recreational users are expected to increase incrementally over the existing PSEG Site.

The water vapor plume from the cooling towers will be noticeable, given the height and extent of the plumes, especially during the winter months. The frequency of the plume direction, its height, and its extent will vary, depending on the season, wind speed, and wind direction. As a result, potential visual effects from the plume vary according to the viewpoint location, but are temporary as weather conditions and wind direction change frequently at the PSEG Site. With the exception of the onsite workforce and recreational and commercial users of the Delaware River, most observers see these plumes from several miles away. Given that the plumes fluctuate in height and extent as weather conditions change, the plume is similar to that from the existing HCGS cooling tower, and offsite observation of the plumes is from several miles away, visual impacts are small.

Because the subject site is an existing extensively developed site located in the PSEG Energy Facility Node specifically designated for maintenance and upgrade of existing electric power generation

facilities and contains the SGS and HCGS, the visual effects of the new plant will be incremental over that of the existing conditions. Accordingly, the construction of a new plant will be consistent with **N.J.A.C. 7:7E-8.12** because it is compatible with adjacent uses.

30. 7:7E-8.13 Buffers and Compatibility of Uses

Buffers are natural or man-made areas, structures, or objects that serve to separate distinct uses or areas. Compatibility of uses is the ability for uses to exist together without aesthetic or functional conflicts.

Development shall be compatible with adjacent land uses to the maximum extent practicable.

On July 24, 2002, the New Jersey State Planning Commission adopted Resolution 2002-11 approving an amendment of the State Plan Policy Map to delineate a "Heavy Industry-Transportation-Utility Node" within the Environmentally Sensitive Planning Area 5. Further, the State Planning Commission adopted the NJDEP's recommendation that the boundary of the Node include 501 acres of the approximately 740 acre PSEG owned property that contains both HCGS and the SGS. On December 2, 2002, NJDEP amended the CAFRA Planning Map to include the PSEG Energy Facility Node, recognizing among other things that this designation will enable the PSEG nuclear facilities to be maintained and upgraded. The Node designation allows for increased impervious cover and intensity use as provided in N.J.A.C. 7:7E-5.3. PSEG will seek to modify the existing CAFRA Node boundaries through the NJDEP State Planning Commission and DCA Office of Smart Growth. This process will be initiated well before any formal permits are submitted to NJDEP for construction of the new plant.

Geographically, the subject site is isolated from other land uses. The new plant will be within the PSEG's nuclear complex in the Industrial Zone of Lower Alloways Creek Township. The site is surrounded by coastal wetlands and the Delaware River. Adjacent landowners are the State of NJ and the federal government. The site is approximately 3 miles from the nearest farmland and residential development. Its isolated location provides for minimal functional conflicts with adjoining landowners.

The construction of the new plant will be consistent with **N.J.A.C. 7:7E-8.13** because the site is isolated and provides minimal functional conflicts with adjoining land owners, is consistent with both state and local land use planning designations, and no substantial changes to existing land use at the PSEG Site are necessary.

31. 7:7E-8.14 Traffic

Traffic is the movement of vehicles, pedestrians or ships along a route.

Coastal development shall be designed, located and operated in a manner to cause the least possible disturbance to traffic system.

Construction traffic on local roads is expected to have adverse impacts to the level of service (LOS) at several intersections in and around Salem City (Table 13). Based on the Traffic Impact Analysis conducted in 2009, a number of recommendations were made for mitigating impacts to LOS as a result of increased traffic volume during construction (KLD 2009). The Traffic Impact Analysis shows that installation of signal lights and additional turn lanes at some of the impacted intersections improves the LOS to projected pre-construction levels (Table 13). The impacts from construction traffic are higher because the peak traffic volume is around 2,200 cars going to and from the plant site as compared to about 1,200 cars during operation and refueling outage (based on an operational workforce of 360 in the first shift and a refueling outage workforce of 1000). Given the resultant improvements in LOS shown for the recommended mitigation measures, including the proposed causeway, the reduced levels of operations-related traffic should not have any additional adverse impacts on LOS. It is anticipated that LOS at these intersections may actually improve, because the intersections are upgraded to handle the higher construction traffic volumes and the proposed causeway will supply an alternative means of access for many plant workers.

The construction of the new plant and proposed causeway will be consistent with **N.J.A.C. 7:7E-8.14** because necessary improvements will be made to local roads to ensure that the traffic system in and around the site will have the least possible disturbance.

32. 7:7E-8.21 Subsurface Sewage Disposal Systems

Subsurface sewage disposal system means a system for disposal of sanitary sewage into the ground which is designed and constructed to treat sanitary sewage in a manner that will retain most of the settleable solids in a septic tank and to discharge the liquid effluent to a disposal field.

Construction of the subsurface sewage disposal system is acceptable provided it meets all the provisions of the standards for Individual Subsurface Sewage Disposal Systems (N.J.A.C. 7:9A) and receives approval from the appropriate administrative authority; For areas subject to tidal flooding, the bottom elevation of the disposal bed must be at or above the 10 year flood elevation as determined by the Federal Emergency Management Agency Flood Insurance Study Reports, and construction of subsurface sewage disposal systems must comply with flood hazard areas rule at N.J.A.C. 7:7E-3.25.

There are no Subsurface Sewage Disposal Systems as part of the new plant. NRC issuance of the ESP will be consistent with **N.J.A.C. 7:7E-8.21** because issuance will not necessitate construction or continued operation of any subsurface sewage disposal system.

33. 7:7E-8.22 Solid and Hazardous Waste

Solid waste means any garbage, refuse, sludge or other waste material, including solid, liquid, semi-solid or contained gaseous material. A material is a solid waste if it is "disposed of" by being discharged, deposited, injected, dumped, spilled, leaked or placed into or on any land or water so that such material or any constituent thereof may enter the environment or be emitted into the air or discharged into ground or surface waters. Solid waste becomes a hazardous waste when it exhibits any of the characteristics which are specified in the Federal Regulations on Identification and Listing of Hazardous Waste (40 C.F.R. 261). The general characteristics of hazardous waste include, but are not limited to, characteristics of ignitibility, characteristics of corrosivity, characteristics of reactivity and characteristics of toxicity.

Coastal development shall conform with all applicable State and Federal regulations, standards and guidelines for the handling and disposal of solid and hazardous wastes, including the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., the Solid Waste Management rules, N.J.A.C. 7:26, the Recycling rules, N.J.A.C. 7:26A, and the Hazardous Waste rules, N.J.A.C. 7:26G.

Operating activities at the new plant will produce solid wastes. The primary types of solid wastes generated include:

- normal refuse
- recyclable materials
- hazardous wastes
- universal wastes
- treatment system residuals
- radioactive wastes

Normal refuse consists primarily of trash, but does not include non-refuse solid waste materials identified above. PSEG will collect normal refuse at the site in large containers and transport it offsite for disposal (currently at the Salem County Sanitary Landfill). This is in accordance with the New Jersey Solid Waste Management Act and implementing regulations at N.J.A.C. 7:26.

Recyclable materials include such materials as:

- metals

- glass
- paper
- plastics
- cardboard
- construction and demolition debris
- vegetative wastes
- used oils

Recyclable materials will be managed in accordance with the New Jersey Solid Waste Management Act, its implementing regulations at N.J.A.C. 7:26A, and the State Wide Solid Waste Management Plan (NJDEP 2006). The State Wide Solid Waste Management Plan sets a recycling goal for solid waste of greater than 50 percent. PSEG will work with the municipality, Lower Alloways Creek Township, to support that goal and provides routine reports to the municipality of the types, volumes, and percentages of materials recycled.

Hazardous wastes include those identified at 40 CFR 261 and N.J.A.C. 7:26G. Pursuant to the requirements of Resource Conservation and Recovery Act (RCRA) and the New Jersey Solid Waste Management Act (N.J.S.A. 13:1E-1 et seq.), PSEG has obtained Generator Identification Number NJD077070811 for its hazardous waste operations, including those at HCGS and SGS. PSEG currently is a conditionally exempt small-quantity hazardous waste generator, generating less than 220 pounds/month. Because of episodic generation of hazardous wastes, during outages for example, PSEG maintains the program required of a small-quantity generator and monitors the amount of hazardous waste generated at the PSEG Site each month to determine the correct status.

Universal waste, such as paint waste, lead-acid batteries, used lamps, and mercury-containing switches, will be segregated and disposed of through a licensed broker. Because PSEG (including HCGS and SGS) accumulates less than 11,000 pounds of universal waste at any given time, it is registered as a small quantity universal waste handler (NJD077070811) and manages its universal wastes in accordance with the management requirements found at N.J.A.C. 7:26A-7.4.

The PSEG Site currently has a solid radwaste system in place for HCGS and SGS. The low-level solid waste storage from the new plant will be coordinated with that from the existing plants. The solid radwaste system will be designed to handle the following waste types: dry active waste, spent filter elements, spent resin, spent activated carbon, oil and sludge. The system will be designed to store and process the waste to maintain ALARA radiation exposure. Radiation monitors will be used to monitor the area and the waste to ensure that applicable requirements are met.

The system design will ensure that the solid radioactive wastes are collected, monitored, segregated, stored, and packaged for shipment in a manner that minimizes exposure to plant personnel and the public in accordance with 10 CFR 20 and 10 CFR 50, Appendix I.

The PSEG Site currently does not have processes that result in the generation of mixed waste (i.e., waste having both a hazardous waste component that is subject to the requirements of RCRA, and a radioactive component that is subject to the requirements of the Atomic Energy Act). In the past, most mixed waste generated at the PSEG Site resulted from the contamination of oils (hydraulic and lubricating) used in plant systems. All oils currently used in plant systems are non-hazardous and will not result in mixed waste if they became radiologically contaminated. There are currently no mixed wastes stored at the PSEG Site, and mixed wastes are not expected to be stored at the new plant.

An incremental increase in the amounts of non-hazardous or hazardous solid wastes generated by activities at the new plant is expected to support plant activities. The handling of these wastes will be substantially similar to that of the wastes at the existing facilities, and will be integrated into PSEG Site waste handling and disposal plans. As such, NRC issuance of the ESP will be consistent with **N.J.A.C.**

7:7E-8.22 because it will not authorize activities that will contravene applicable federal and state requirements for handling and disposal of solid and hazardous wastes.

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Table 1
Plant Water Use

System	Average Flow (gpm)	Maximum Flow[a] (gpm)
Circulating Water System		
Evaporation	25,264	25,264
Drift[b]	12	12
Makeup	75,792	75,792
Blowdown	50,516	50,516
Service Water/UHS System		
Evaporation	1142	2284
Drift	2	4
Makeup (before filter)	2404	4808
Makeup (after filter)	2284	4568
Blowdown	1140	2280
Makeup Filter Backwash	120	240
UHS Makeup (emergency only)	4568	4568
Plant Makeup		
PSWS Makeup	93	216
DWDS Makeup	107	107
FPS Makeup	5	625
Floor Wash Drain Makeup	5	5
Plant Blowdown		
PSWS Blowdown	93	93
DWDS Blowdown	27	27
Misc. Drains Blowdown	39	55
Liquid Radwaste Flow	11	11
Combined Plant Blowdown (includes CWS Blowdown, SWS/UHS Blowdown, SWS/UHS Makeup Filter Backwash, and Plant Blowdown)	51,946	53,222

a) These flows are not necessarily concurrent.
b) The cooling tower drifts are 0.001% of the tower circulating water flow.
c) The cooling tower drifts are <0.005% of the tower circulating water flow.

Table 2
Circulating Water System Cooling Tower Design Specifications

Design Conditions	Cooling Tower
Number of Towers	2[(a)]
Heat Load	1.508E10 Btu/hr
Circulating Water	1,200,000 gpm
Approximate Dimensions	
Mechanical Draft:	100 ft. by 820 ft.
	46 ft. (Height)
Natural Draft:	410 ft. (Diameter)
	590 ft. (Height)
Fan-Assisted:	400 ft. (Diameter)
	224 ft. (Height)
Design Wet Bulb Temperature	76.6°F
Design Temperature Range	25.2°F
Approximate Exit Air Velocity	
Mechanical Draft:	1730 fpm
Natural Draft:	995 fpm
Fan-Assisted:	902 fpm
Drift Rate	0.001%
Noise Level	60 dBA at 1000 ft. from tower

a) The bounding CWS design is based on a dual unit plant. A single unit plant may also require two cooling towers.

Table 3
SWS/UHS Cooling Tower Design Specifications

Design Conditions	Cooling Tower
Heat Load	
Normal:	**2.06E8 Btu/hr**
Peak:	**4.72E8 Btu/hr**
Accident:	**3.95E8 Btu/hr**
Approximate Dimensions	
Cooling Tower Deck Height:	**63 ft.**
Exhaust Stack Height:	**35 ft.**
Drift	**2 gpm**
Noise Level	**57 dBA at 200 ft. from tower**

Table 4
Comparison of Environmental Impacts of Construction and Operation

Impact Category	Proposed New Plant at PSEG Site	Coal-Fired Generation	Gas-Fired Generation	Combination (wind, biomass and solar PV with natural gas)
Land Use and Visual Resources	SMALL	SMALL TO MODERATE	SMALL	SMALL TO LARGE
Air Quality & Noise	SMALL	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL
Ecology	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Historic and Cultural Resources	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL	SMALL	SMALL
Human Health	SMALL	SMALL TO MODERATE	SMALL TO MODERATE	SMALL TO MODERATE
Environmental Justice	SMALL	SMALL	SMALL	SMALL
Waste Management and Pollution Prevention	SMALL	SMALL TO MODERATE	SMALL	SMALL

Table 5 (Sheet 1 of 2)
Taxonomic Composition and Abundance in Macroinvertebrate Surveys Collected by Ponar Dredge in Marsh Creeks on or near the PSEG Site, 2009

Scientific Name	Spring 2009							Fall 2009						
	Large Marsh Creeks				Small Marsh Creeks			Large Marsh Creeks				Small Marsh Creeks		
	AS-01	AS-02	AS-03	AS-11	AS-05	AS-06	AS-10	AS-01	AS-02	AS-03	AS-11	AS-05	AS-06	AS-10
PHYLUM NEMERTEA														
Unidentified *Nemertea*								1						
PHYLUM ANNELIDA														
Unidentified *Annelida*								1						
Class Oligochaeta														
Limnodrilus sp.					15	52	19						1	
Unidentified *Naididae*				1										
Unidentified *Tubificidae*					29	68	11							
Unidentified *Oligochaeta*			1	1	3									
Class Polychaeta														
Ampharetidae					4	6						1		
Marenzellaria viridis								1			1			
Nereis (=Neanthes) succinea		1	21							1				
Nereis virens						8								
Unidentified *Polychaeta*	1	2	1	4	4									
PHYLUM MOLLUSCA														
Class Pelecypoda														
Mya arenaria											1			
Rangea cuneata			1											
Unidentified *Pelecypoda*				2										
PHYLUM ARTHROPODA														

Subphylum Crustacea									
Order Amphipoda									
Corophium sp.		705	163	1	1				
Gammarus sp.						68	1		
Gammarus daiberi		33	37		11	75			
Leptocheirus plumulosis				12	8	116			
Photis sp.	4								
Unidentified *Amphipoda*	4	2	3	1	2	7			

Table 5 (Sheet 2 of 2)

Taxonomic Composition and Abundance in Macroinvertebrate Surveys Collected by Ponar Dredge in Marsh Creeks on or near the PSEG Site, 2009

Scientific Name	Spring 2009							Fall 2009						
	Large Marsh Creeks				Small Marsh Creeks			Large Marsh Creeks				Small Marsh Creeks		
	AS-01	AS-02	AS-03	AS-11	AS-05	AS-06	AS-10	AS-01	AS-02	AS-03	AS-11	AS-05	AS-06	AS-10
Order Decapoda														
Callinectes sapidus									1					
Hemigrapsus sanguineus		1												
Order Isopoda														
Chiridotea almyra				3										
Cyathura polita		9		1	2									
Edotea triloba			1											
Order Mysidacea														
Neomysis sp.	3													
Neomysis americana		3												
Subphylum Mandibulata														
Class Insecta														
Order Diptera														
Chironomus sp.					5	1	13							1
Serromyia sp.							4							
Total Number of Individuals	12	756	228	26	84	401	48	3	1	1	2	1	1	1
Total Number of Taxa	4	8	8	9	11	9	5	3	1	1	2	1	1	1

Table 6 - PSEG SPONSORED PUBLIC ACCESS TO THE WATERFRONT, NEW JERSEY

Site Name, Town(s), County, State	Acreage Available to the Public	Observation Areas Boardwalks/Platforms/Natural Trails (All NJ sites feature osprey platforms, viewing areas and educational signs.)	Fishing, Crabbing Hunting, Trapping
Alloway Creek Watershed *Elsinboro & Hancocks Bridge* *Salem County, NJ*	3,096	NJ Coastal Heritage Trail Route Site Observation Platform & Tower Viewing Area Boardwalk to Beach Eagle Island Trail (1.35 mi) Money Island Trail (<.5 mi) Parking Areas (4) Boat Ramp (offsite; Sinnickson-Landing Rd)	Yes
Bayside Tract *Greenwich* *Cumberland County, NJ*	4,407	Observation Area (Caviar Point) Parking Area (8)	Yes
Cohansey River Watershed *Hopewell & Fairton* *Cumberland County, NJ*	1,055	NJ Coastal Heritage Trail Route Site Outdoor Classroom Viewing Areas Nature Trail (<.5 mi) Parking Area (1) Boardwalk Boat Ramp	Yes
Commercial Township *Port Norris & Bivalve* *Cumberland County, NJ*	4,171	NJ Coastal Heritage Trail Route Site Observation Platforms (3) Nature Trail (1.68 mi) Parking Area (3) Car-Top Boat Launch	Yes
Cooper River Fish Ladder *Camden* *Camden County, NJ*		Education Signs	Limited bank fishing
Dennis Township *Eldora* *Cape May County, NJ*	578	NJ Coastal Heritage Trail Route Site Observation Areas (2) Floating Dock Platform Nature Tail (.18 mi) Parking Areas (2) Car-Top Boat Launch	Yes
Maurice River Township *Heislerville* *Cape May County, NJ*	1,396	NJ Coastal Heritage Trail Route Site Observation Platform Parking Areas (2) Boat Launches (2)	Yes
Newton Lake Fish Ladder *Oaklyn* *Camden County, NJ*		Education Signs	Limited bank fishing
Stewart Lake Fish Ladder *Woodbury* *Gloucester County, NJ*		Education Signs	Limited bank fishing
Sunset Lake Fish Ladder *Cohansey River* *Bridgeton, Cumberland County, NJ*	94	Nature Tail and Education Signs Parking nearby	Limited bank fishing

Table 7 - Summary of Wetland Impacts

Impact Area	Wetland Impacts (ac.)[a, b]				Total Wetland Impacts (ac.)
	Coastal	Unmapped Coastal-CDF/Disposal Basin	Unmapped Coastal-Other	Freshwater	
Batch Plant[c]	0	19.1	0		19.1
Construction Parking[d]	0	0	0.1		0.1
Cooling Tower	11.7	36.3	0		48.0
Heavy Haul Road[e]	8.6	0.9	0.1		10.0
Intake Structure	0.9	0.6	0		1.5
Power Block	8.9	30.5	0		39.4
Switchyard	29.9	0	23.8		53.7
Temporary Laydown	0	2.6	6.5		9.1
Transmission Towers[d]	5	0	0		5.0
Causeway (Site)[e]	0.2	0	1.6		1.8
Subtotal Site	**65.2**	**90**	**32.5**		**187.7**
Causeway (Off-Site)[e]	39.6	0		1.4	41.0
Total Impacts	**104.8**	**90**	**32.5**	**1.4**	**228.7**

Impact Summary	**ac.**
Permanent Use Area	
Onsite	151.2
Offsite (causeway)	20.9
Subtotal	**172.1**
Temporary Use Area	
Onsite[d]	17.4
Adjacent Off-Site[c]	19.1
Offsite (causeway)	20.1
Subtotal	**56.6**
Total	**228.7**

a) Wetland impacts may be reduced by 90 ac. if the wetland areas in the CDF/Disposal Basins are deemed non-jurisdictional via the JD/LOI process
b) Wetlands as defined by NJDEP and PSEG field delineations
c) Includes adjacent offsite areas (batch plant)
d) Temporary impact area
e) Includes the following temporary impact: haul road (onsite) – 2.3 ac.; causeway (onsite) – 0.9 ac.; causeway offsite – 20.1 ac.

Table 8 - Recorded Endangered and Threatened Species Potentially Occurring in the Vicinity of the PSEG Site[a]

Scientific Name	Common Name	Federal Status	NJ Status	DE Status
Birds				
Accipiter cooperii	Cooper's hawk		T	
Buteo lineatus	Red-shouldered hawk		E/T[b]	
Circus cyaneus	Northern harrier		E	E
Haliaeetus leucocephalus	Bald eagle[d]		E	E
Melanerpes erythrocephalus	Red-headed woodpecker		T/T[b]	
Pandion haliaetus	Osprey		T/T[b]	
Fish				
Acipenser brevirostrum	Shortnose sturgeon	E	E	
Acipenser oxyrhynchus	Atlantic sturgeon	C	E	E
Reptiles				
Chelonia mydas	Atlantic green turtle	T	T	E
Caretta caretta	Atlantic loggerhead turtle	T	E	E
Dermochelys coriacea	Leatherback turtle	E	E	
Lepidochelys kempii	Kemp's ridley turtle	E	E	E
Glyptemys muhlenbergii	Bog turtle[c]	T		E

E = Endangered; T = Threatened; C = Candidate

a) Potential for occurrence based on habitat types found within the site and 6-mi. vicinity and along proposed causeway

b) Breeding/Non-breeding

c) Not recorded during the 2009 field studies or in any other historical records.

d) Also protected under the Bald and Golden Eagle protection Act.

Table 9 - Current list of threatened and endangered species potentially occurring near the PSEG Site (Sources: NJDEP 2010, USFWS 2010)

Common Name	Scientific Name	State Status	Federal Status
Birds			
Bald eagle	*Haliaeetus leucocephalus*	E	-
Peregrine falcon	*Falco peregrinus*	E	-
Osprey	*Pandion haliaetus*	T/T	-
Northern harrier	*Circus cyaneus*	E/U	-
Grasshopper sparrow	*Ammodramus savannarum*	T/S	-
Savannah sparrow	*Passerculus sandwichenis*	T/T	-
Vesper sparrow	*Pooectes gramineus*	E	-
Sedge wren	*Cistothorus platenis*	E	-
Pied-billed grebe	*Podilymbus podiceps*	E/S	-
Upland sandpiper	*Bartramia longicauda*	E	-
Bobolink	*Dolichonyx oryzivorus*	T/T	-
Cooper's hawk	*Accipiter cooperii*	T/T	-
Red-headed woodpecker	*Melanerpes erythrocephalus*	T/T	-
Mammals			
Bobcat	*Lynx rufus*	E	-
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	E
Atlantic sturgeon	*A. oxyrinchus oxyrinchus*	E	C
Reptiles and Amphibians			
Atlantic loggerhead turtle	*Caretta caretta*	E	T
Atlantic green turtle	*Chelonia mydas*	T	T
Atlantic hawksbill turtle	*Eretmochelys imbricata*	E	E
Leatherback turtle	*Dermochelys coriacea*	E	E
Kemp's ridley turtle	*Lepidochelys kempi*	E	E
Plants			
Sensitive Joint Vetch	*Aeschynomene virginica*	E	T
Low rough aster	*Eurybia radula (Aster radula)*	E	-
Erect bindweed	*Calystegia spithamaea*	E	-
Coast flat sedge	*Cyperus polystachyos*	E	-
Black-fruit spike-rush	*Eleocharis melanocarpa*	E	-
Sandplain flax	*Linum intercursum*	E	-
American lotus	*Nelumbo lutea*	E	-
Wooly three-awn grass	*Aristida lanos*	E	-
Marsh flat sedge	*Cyperus pseudovegetus*	E	-
Carolina elephant-foot	*Elephantopus carolinianus*	E	-

Common Name	Scientific Name	State Status	Federal Status
Darlington's glade spurge	*Euphorbia purpurea*	E	-
Featherfoil	*Hottonia inflata*	E	-
Floating marsh-pennywort	*Hydrocotyle ranunculoides*	E	-
Barton's St. John's-wort	*Hypericum adpressum*	E	-
Minute duckweed	*Lemna perpusilla*	E	-
Hairy wood-rush	*Luzula acuminate*	E	-
Virginia bunchflower	*Melanthium virginicum*	E	-
Cut-leaf water-milfoil	*Myriophyllum pinnatum*	E	-
Virginia false-gromwell	*Onosmodium virginianum*	E	-
Southern adder's tongue	*Ophioglossum vulgatum pycnostichum*	E	-
Greek-valerian	*Polemonium reptans*	E	-
Chickasaw plum	*Prunus angustifolia*	E	-
Dwarf azalea	*Rhododendron atlanticum*	E	-
Coarse grass-like beaked-rush	*Rhynchospora globularis*	E	-
Small skullcap	*Scutellaria leonardii*	E	-
Two-flower bladderwort	*Utricularia biflora*	E	-
Broad-leaf ironweed	*Vernonia glauca*	E	-
Squirrel-tail six-weeks grass	*Vulpia elliotea*	E	-
Sword bogmat	*Wolffiella floridana*	E	-

[1] State status for birds separated by a slash(/) indicates a dual status. First status refers to the state breeding population, and the second status refers to the migratory or winter population. E = Endangered; T = Threatened; S = Stable; C = Candidate; - = Not listed. (NJDEP 2008g)

[2] E = Endangered; T = Threatened; - = Not listed.

Table 10
Annual Estimated Emissions from Cooling Towers, Auxiliary Boilers and Emergency Power Supply System Diesel Generators at the PSEG Site

Emission Effluent	Cooling Towers (Pounds)[a]	Auxiliary Boilers (Pounds)[b]	Diesel Generators(Pounds)[c]
Nitrogen Oxides	NA	76,088	28,968
Carbon Monoxide	NA	6996	4600
Sulfur Oxides	NA	460,000	5010
Volatile Organic Compounds[d]	NA	400,800	3070
Particulates (PM10 and smaller)	122,000	138,000	1620

a) Based on 8760 hr. of operation at 13.9 lb/hr (14.63 gm/sec)
b) Based on 120 days of operation; PPE values are based on 30 days/year operation – to obtain emissions for 120 days, the value in the PPE is multiplied by 4
c) Based on 4 hr. of operation per month
d) As total hydrocarbon

Table 11 - Highest of the Modeled Concentrations by Pollutant over 3 Years

Pollutant	Averaging Period	Rank	AERMOD ($\mu g/m^3$)	Year	Background Conc. (Monitoring Site, Year)	Total Conc. ($\mu g/m^3$)	NAAQS [a] ($\mu g/m^3$)
Natural Draft Cooling Tower + Aux Boilers							
PM10	24-hr	H2H	5.6	2007	120 $\mu g/m^3$ (Camden RRF, 2004)	125.6	150
PM2.5	24-hr	H2H	5.6 [b]	2007	27.5 $\mu g/m^3$ (Gibbstown) [d]	33.1	35
PM2.5	Annual	H1H	0.25 [c]	2008	11.7 $\mu g/m^3$ (Gibbstown) [d]	12.0	15
Mechanical Draft Cooling Tower + Aux Boilers							
PM10	24-hr	H2H	9.9	2006	120 $\mu g/m^3$ (Camden RRF, 2004)	129.9	150
PM2.5							
PM2.5	24-hr	H2H	9.9 [b]	2006	27.5 $\mu g/m^3$ (Gibbstown) [d]	35.6	35
	Annual	H1H	0.73 [c]	2007	11.7 $\mu g/m^3$ (Gibbstown) [d]	12.4	15
NOx (as NO_2) [g]	Annual	H1H	0.13	2008	0.022 ppm (Camden, 2005) or 41.4 $\mu g/m^3$	41.5	100
	1-hr	H2H	17.7 [h]	2006	0.083 ppm (Camden, 2005) [h] or 156 $\mu g/m^3$	173.7	150-190 [f]
CO	1-hr	H2H	1.6	2006	3.9 ppm (Camden, 2005) or 4145 $\mu g/m^3$	4147	40,000
	8-hr	H2H	0.70	2008	3.0 ppm (Camden, 2005) or 3188 $\mu g/m^3$	3189	10,000
SO_2	3-hr	H2H	68.1	2008	0.128 ppm (Clarksboro, 2005) [e] or 335 $\mu g/m^3$	403	1300
	24-hr	H2H	18.6	2007	0.023 ppm (Clarksboro, 2005) or 60.2 $\mu g/m^3$	79	365
	Annual	H1H	0.81	2008	0.005 ppm (Clarksboro, 2005) or 13.1 $\mu g/m^3$	14	80

a) Primary standards except SO_2 3-hr, which is a secondary standard
b) H2H used as a conservative estimate of 98th percentile value
c) Highest annual average used as a conservative estimate of the 3-yr average value
d) Background concentration from memorandum on "Revised Interim Permitting and Modeling Procedures for Sources Emitting between 10-100 Tons per Year of $PM_{2.5}$" by John Preczewski (NJDEP) dated March 17, 2009
e) 24-hr SO_2 background appears high. Other nearby sites for the years 2004-2006 and for Clarksboro for 2004 and 2006 were approximately 0.03 ppm.
f) Proposed, but could be as low as 120 $\mu g/m^3$ (65 ppb) and as high as 280 $\mu g/m^3$ (150 ppb)
g) NOx modeled; assumed a 100% conversion rate of NOx to NO2
h) H2H used as a conservative estimate of the 99th percentile value; 2nd highest 1-hr average background value used

Table 12
Modeled Concentrations by Pollutant Compared to SIL

Pollutant	Averaging Period	Rank	Predicted Impact ($\mu g/m^3$)	Year	SIL ($\mu g/m^3$)	PSD ($\mu g/m^3$)
NDCT + Aux Boilers						
PM10	24-hr	H1H	**7.94**	2006	5	30
PM2.5	24-hr	H1H	**7.94**	2006	1.2	9[a]
PM2.5	Annual	H1H	0.25	2008	0.3	4 or 5[(a)]
MCDT + Aux Boilers						
PM10	24-hr	H1H	**9.96**	2006	5	30
PM2.5	24-hr	H1H	**9.96**	2006	1.2	9[a]
PM2.5	Annual	H1H	**0.73**	2007	0.3	4 or 5[(a)]
NOx	Annual	H1H	0.13	2008	1	25
CO	1-hr	H1H	2.80	2006	2,000	None
	8-hr	H1H	0.82	2008	500	None
SO_2	3-hr	H1H	**90.6**	2006	25	512
	24-hr	H1H	**26.4**	2006	5	91
	Annual	H1H	0.81	2008	1	20

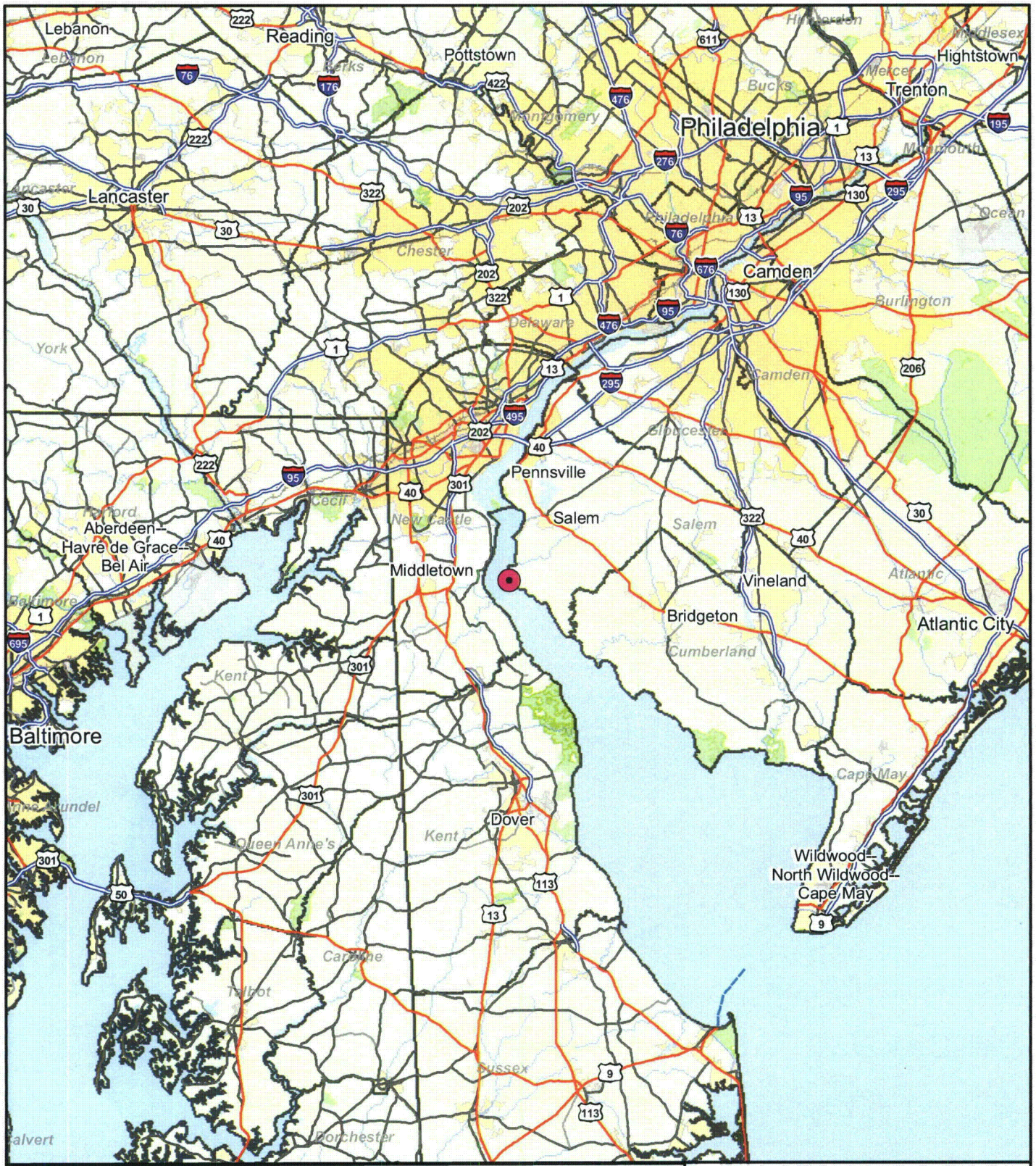
Values in bold text exceed SIL values

Table 13
Level of Service Impacts at Key Intersections with and without Causeway Construction

Intersection	Level of Service (LOS)[1]						Mitigative Measures
	Future Without Causeway		Future With Causeway		With Mitigation		
	AM	PM	AM	PM	AM	PM	
Grieves Parkway and Walnut Street[2]					C	B	Traffic Signal
Northwest Approach	F	F	F	E			
Southeast Approach	F	F	F	C			
Grieves Parkway and Chestnut Street[2]					B	B	Traffic Signal
Northwest Approach	C	C	E	D			
Southeast Approach	C	E	F	C			
Grieves Parkway and Oak Street[2]					A	B	Traffic Signal
Northwest Approach	B	C	B	F			Extra eastbound right turn bay
Southeast Approach	C	B	F	F			Extra northbound left turn bay
Broadway (Route 49) and Front Street	F	C	F	F	D	D	Extra southbound left turn bay

[1] *LOS is a reflection of delays at intersections with A being the optimum with minimum delays, and F being the worst with unacceptable delays*

[2] *Future Without Causeway has two-way stop sign control; Future With Causeway has traffic signal control*



LEGEND

Site Location

N
W E
S

0 10 20
Kilometers

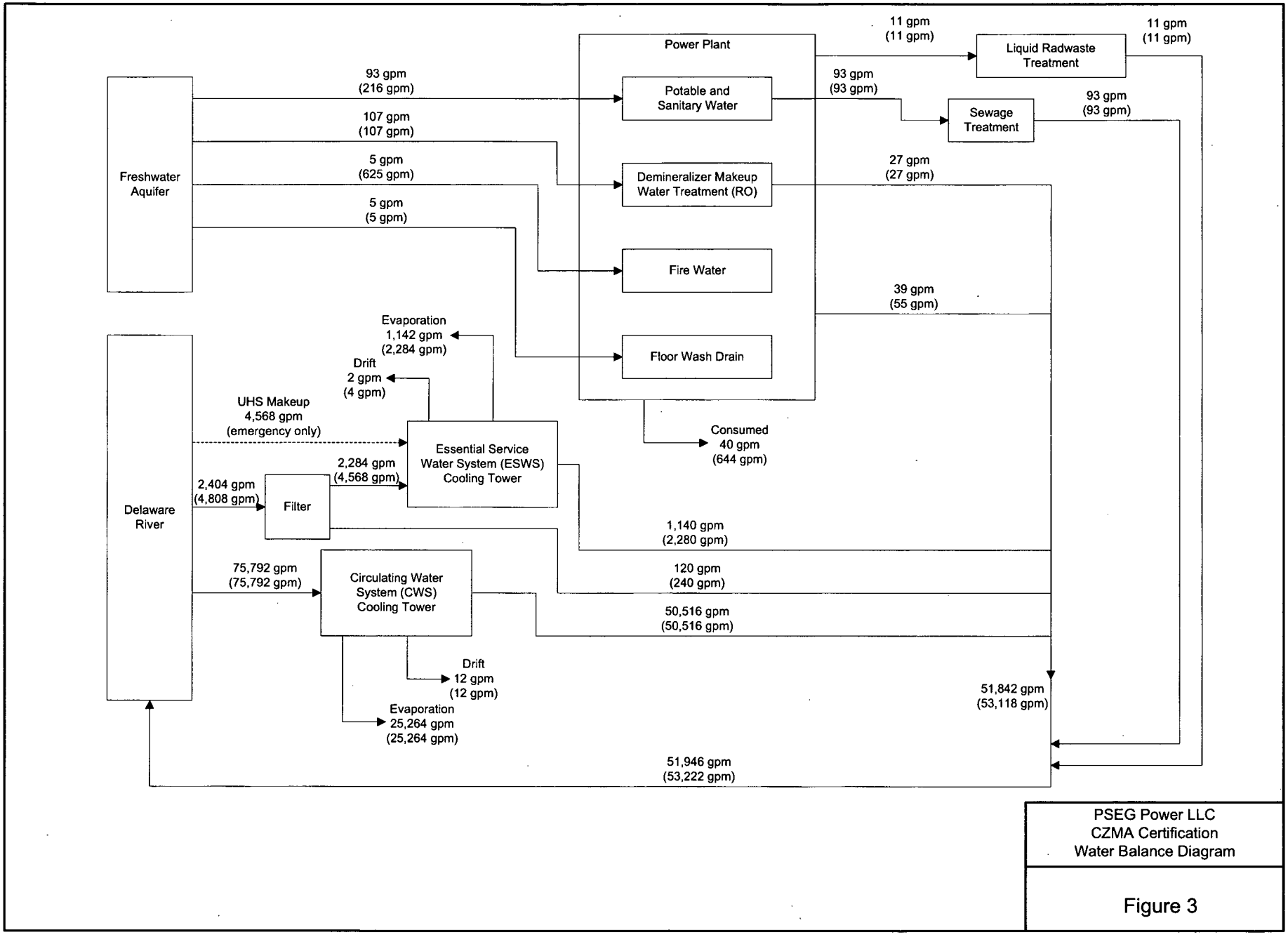
Miles
0 10 20

PSEG Power, LLC
CZMA Certification
Site Location Map

Figure 1

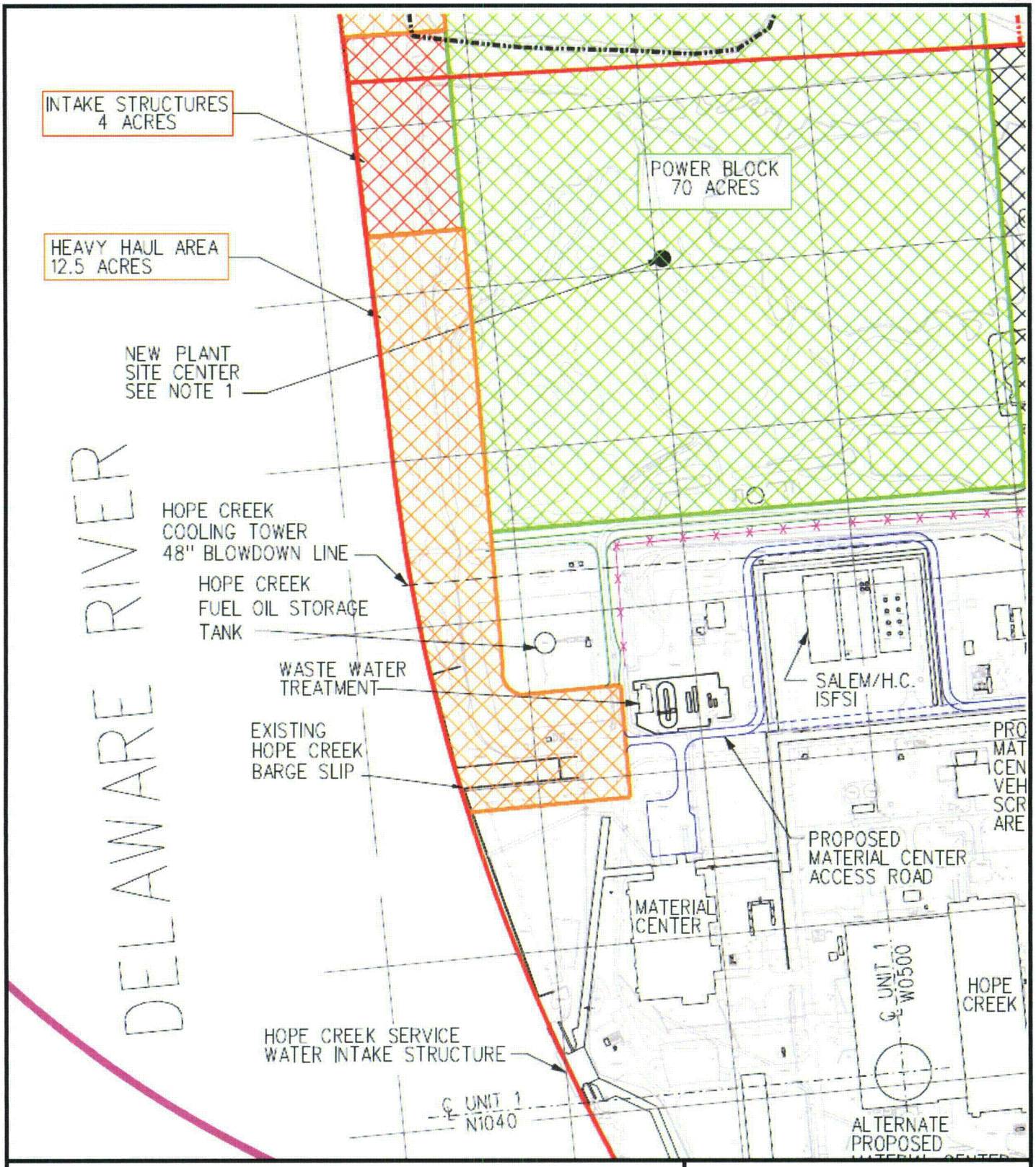
PSEG Power LLC
CZMA Certification
Site Utilization Plan

Figure 2



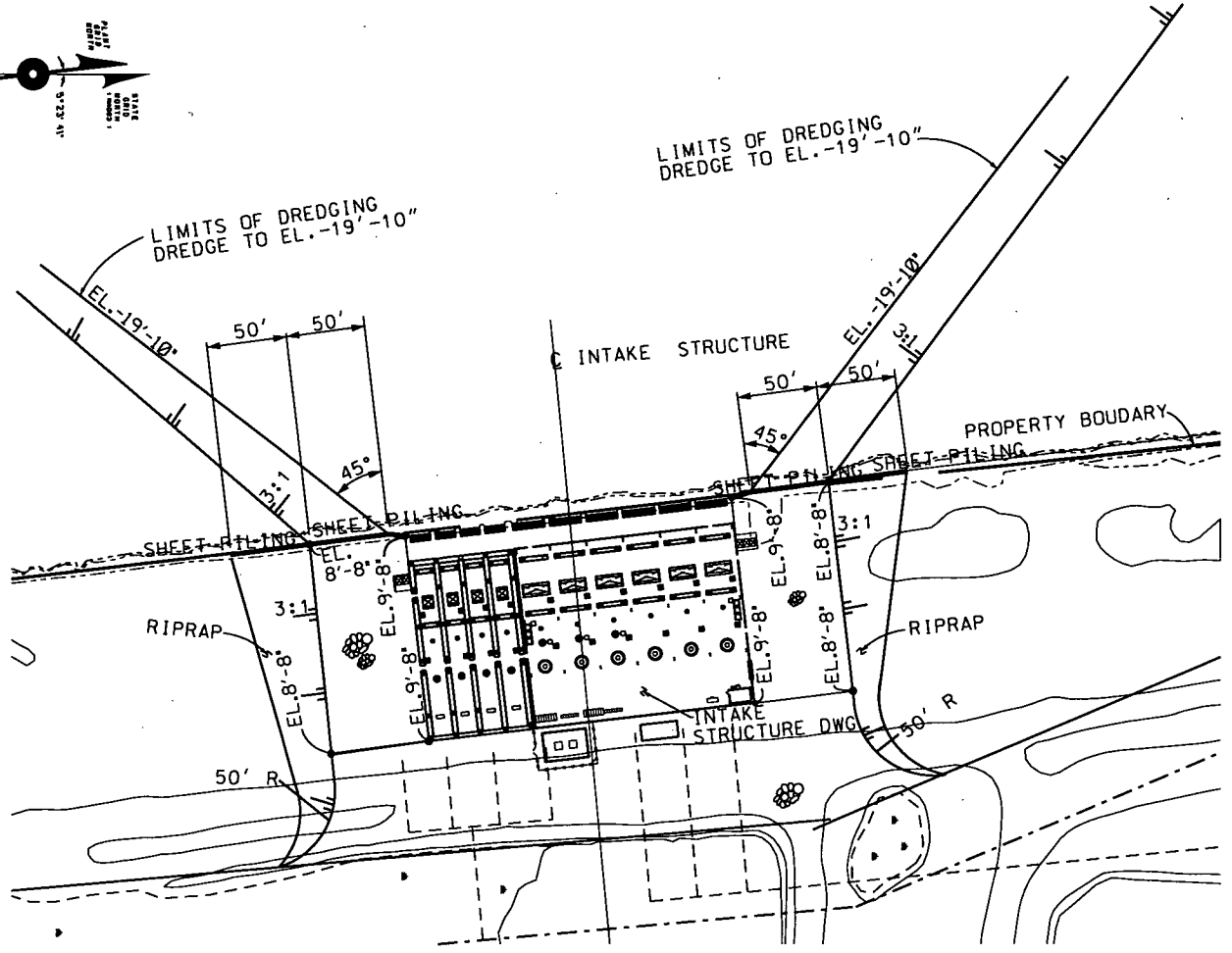
PSEG Power LLC
CZMA Certification
Water Balance Diagram

Figure 3



PSEG Power LLC
CZMA Certification
New Plant and HCGS Intakes

Figure 4



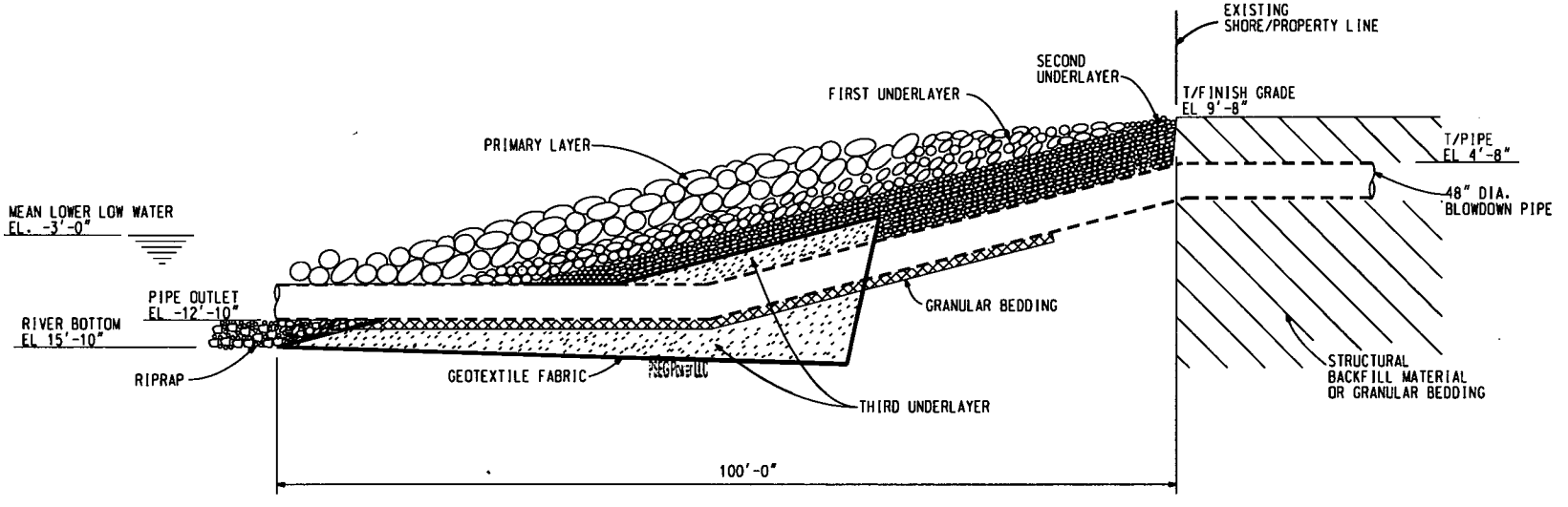
NOTE:

1. THE RIVER BOTTOM CONTOURS SHOWN ARE APPROXIMATE AND INTENDED FOR DESCRIPTION OF SITE IN GENERAL (REFERENCE DRAWING #59272: DELAWARE RIVER PHILADELPHIA TO THE SEA. REEDY ISLAND & BAKER RANGES EXAMINATION STA 255+000 TO 275 + 57.48: U.S. ARMY CORPS OF ENGINEERS. 2001).

2. ELEVATIONS SHOWN ARE NAVD 88 DATUM.

PSEG Power LLC
CZMA Certification
Layout View of Intake

Figure 5

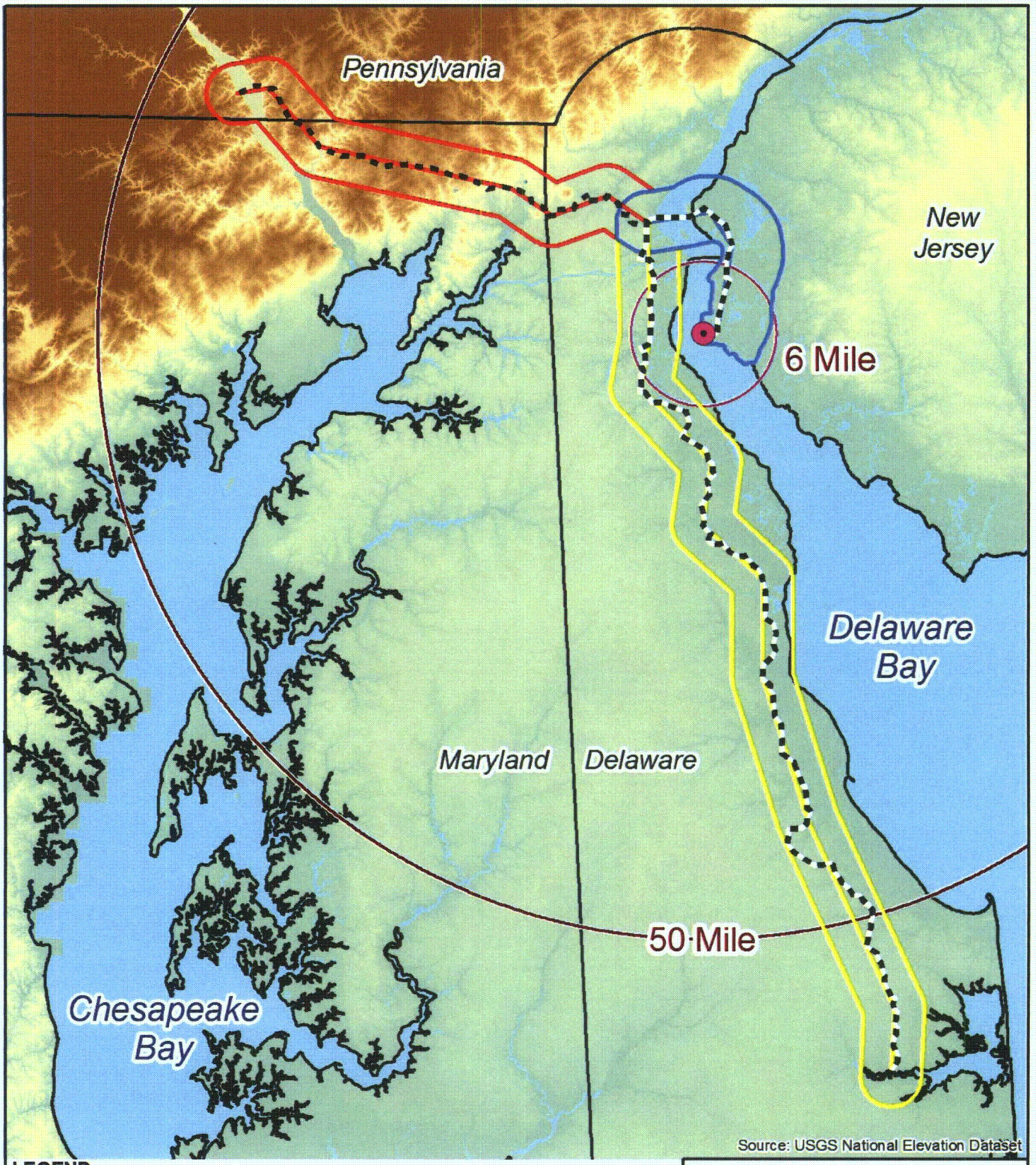


NOTE:

1. ELEVATIONS SHOWN ARE NAVD 88 DATUM.

PSEG Power LLC
CZMA Certification
Discharge System Layout

Figure 6



PSEG Power, LLC
CZMA Certification
Transmission Macro-Corridors

Figure 7

PSEG Power LLC
CZMA Certification
Existing Access Road

Figure 8

LEGEND

- Site Boundary
- Proposed Causeway
- Off-Site Roadway Network
- Highway
- Major Road
- Local Road
- Township Boundary

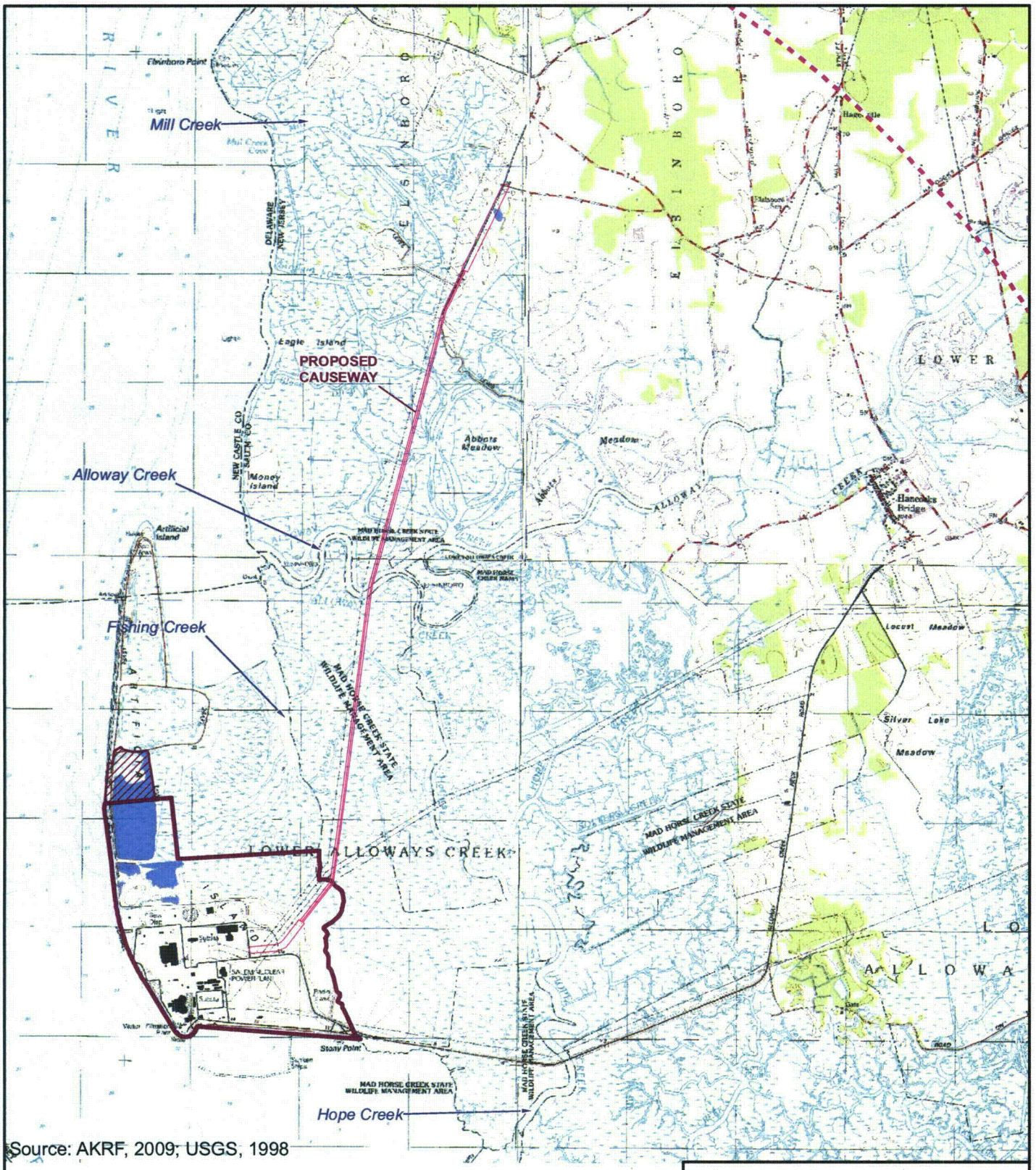
N
W E
S

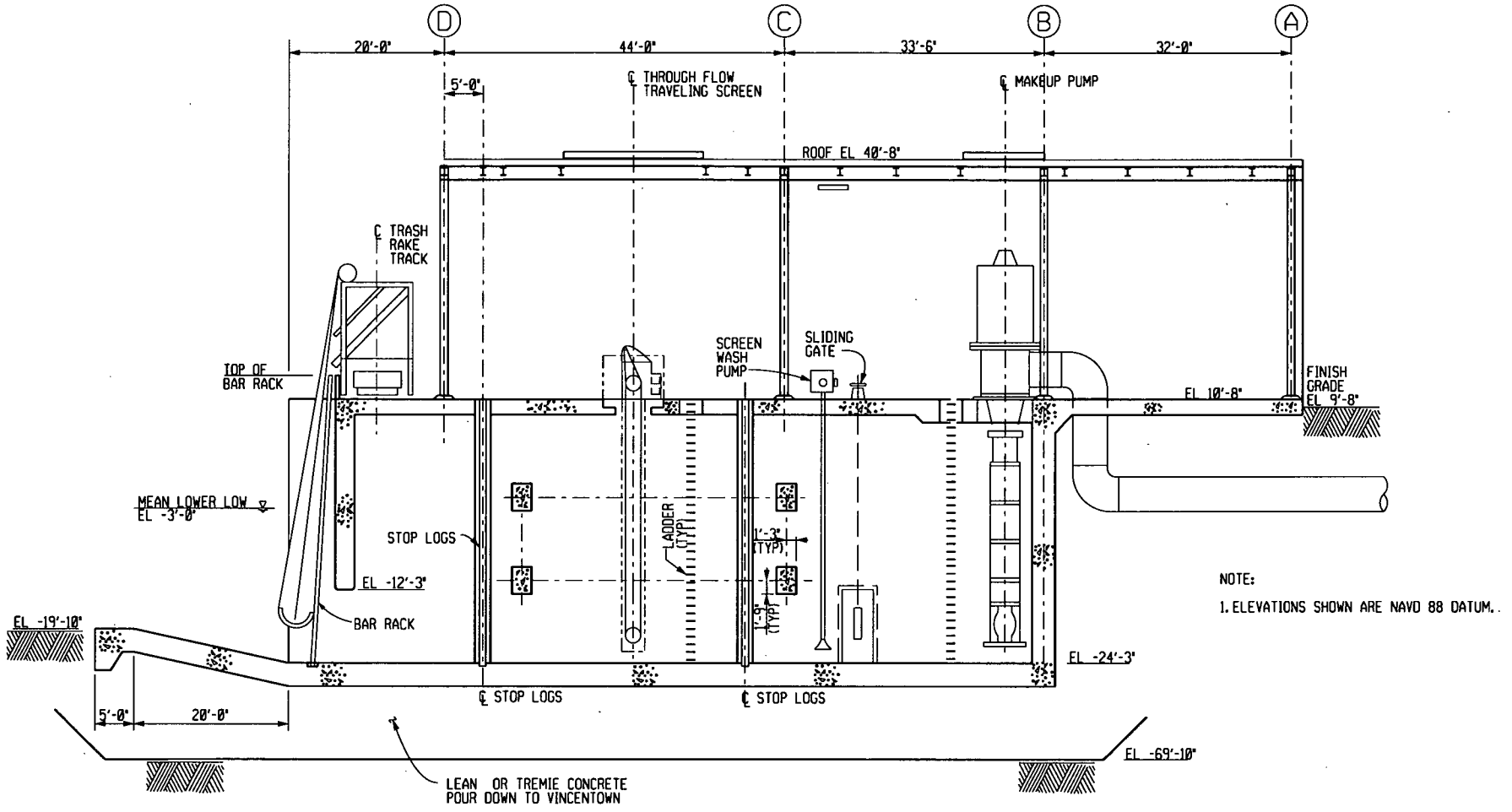
0 1 2
Kilometers

0 0.5 1
Miles

PSEG Power, LLC
CZMA Certification
Proposed Access Road

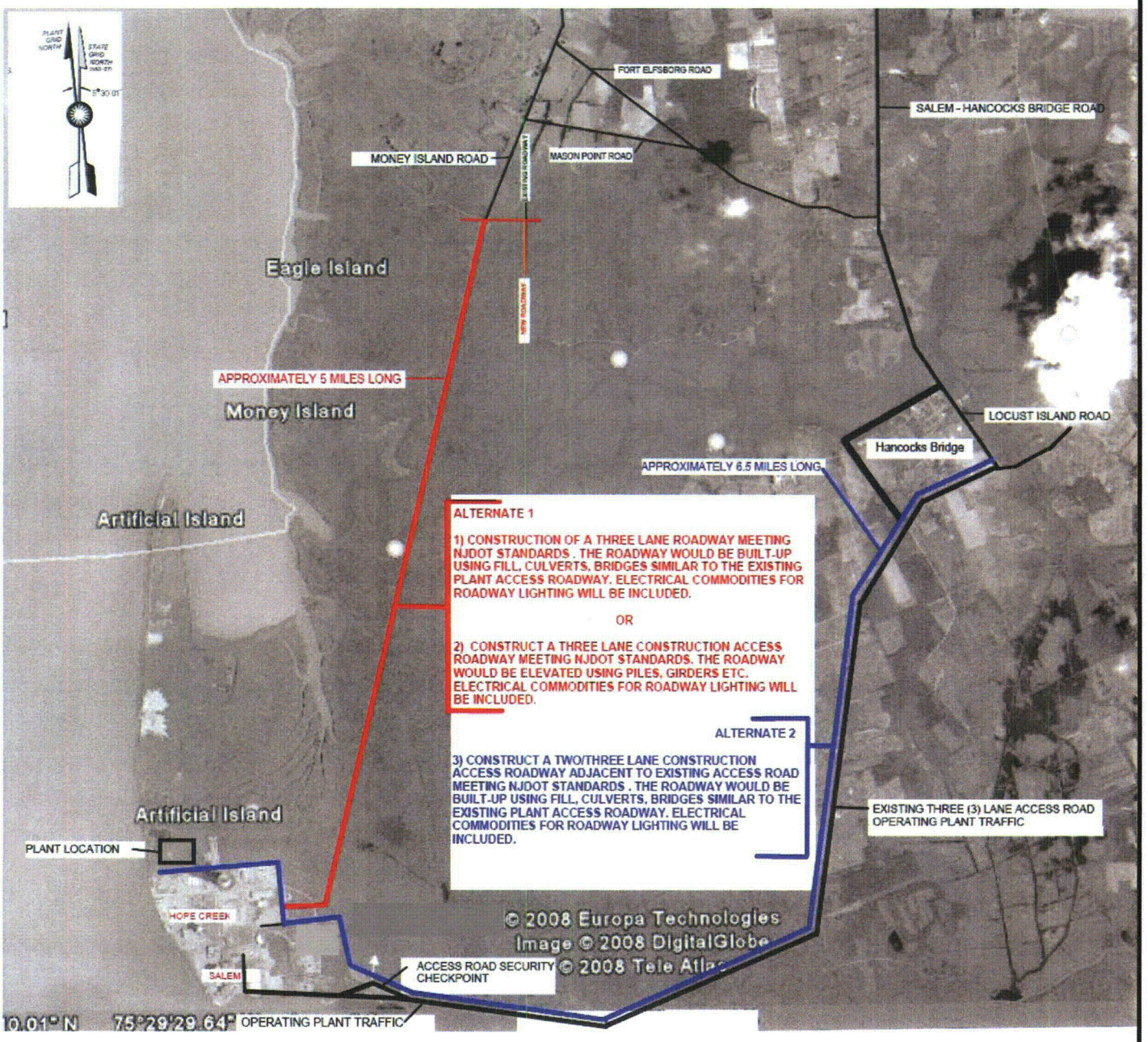
Figure 9


Mill Creek
PROPOSED CAUSEWAY
Alloway Creek
Fishing Creek
Hope Creek
Source: AKRF, 2009; USGS, 1998
Legend
Site Boundary
Adjacent Off-Site Area
Proposed Causeway
Vicinity Boundary (6-mile)
Open Water/Pond
N
W
E
S
0 1,000 2,000
Meters
0 2,000 4,000
Feet
PSEG Power, LLC
CZMA Certification
Proposed Access Road Detail
Figure 10



PSEG Power LLC
CZMA Certification
Intake Structure Elevations

Figure 11



PSEG Power, LLC
CZMA Certification
Access Road Alternatives

Figure 12

Legend

- Site Boundary
- Adjacent Off-Site Area
- Proposed Causeway
- Shellfish - Special Restricted
- Shellfish - Prohibited

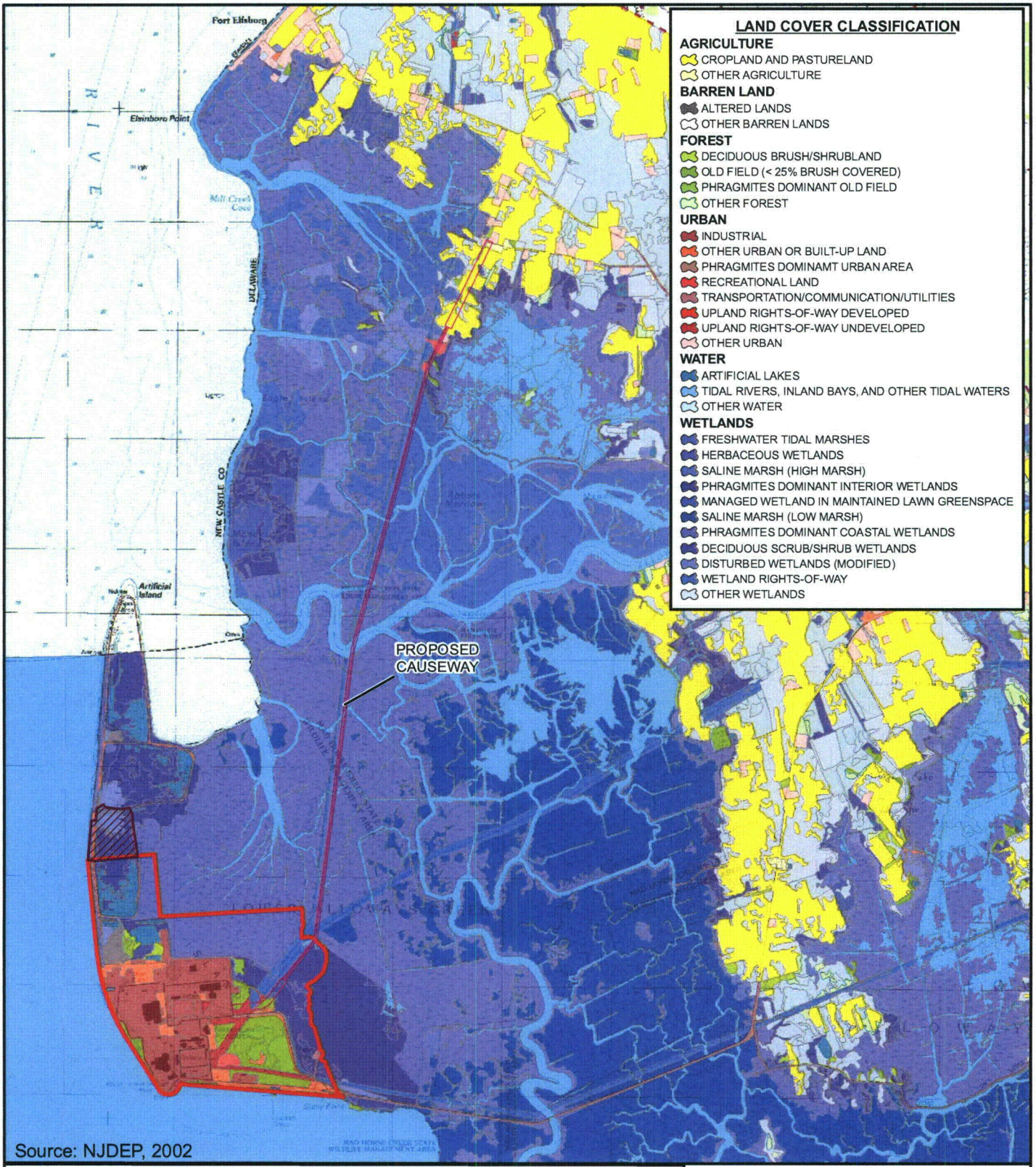
N
W E
S

0 0.5
Kilometers

0 0.5
Miles

PSEG Power LLC
CZMA Certification
NJDEP Shellfish Classification

Figure 13



Legend

- Site Boundary
- Adjacent Off-site Area
- Proposed Causeway
- 6-mile (9.7 km) Vicinity Boundary

N
W E
S

0 0.5
Kilometers

0 0.5
Miles

PSEG Power, LLC
CZMA Certification
NJDEP LULC Cover Types

Figure 14

LEGEND

- Site Location
- Candidate Mitigation Site
- EEP Site

N
W E
S

0 1 2
Kilometers

0 1 2
Miles

PSEG Power, LLC
CZMA Certification
Potential Wetland Mitigation Sites

Figure 15

PSEG_ER_FIG04_03_003_RevA

N
W E
S

PSEG Power, LLC
CZMA Certification
Public Access Improvements

Figure 16