Essential Fish Habitat Assessment
Supplement
National Marine Fisheries Service

PSEG Site
Early Site Permit Application

Department of the Army Permit Application

U.S. Nuclear Regulatory Commission Early Site Permit Application
Docket Number 52-043

Salem County, New Jersey

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U.S. Nuclear Regulatory Commission
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U.S. Army Corps of Engineers
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ABBREVIATIONS/ACRONYMS

°C	degrees Celsius
ac	acre(s)
BMPs	best management practices
CDF	confined disposal facility
CFR	*Code of Federal Regulations*
COL	combined construction permit and operating license
CP	construction permit
DRBC	Delaware River Basin Commission
EEP	Estuary Enhancement Program
EFH	essential fish habitat
EIS	environmental impact statement
ESP	early site permit
ft	foot (feet)
HCGS	Hope Creek Generating Station
km	kilometer(s)
m	meter(s)
mi	mile(s)
MSA	Magnuson-Stevens Fishery and Conservation Management Act
MSL	mean sea level
NJDEP	New Jersey Department of Environmental Protection
NJPDES	New Jersey Pollutant Discharge Elimination System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRC	U.S. Nuclear Regulatory Commission
OL	operating license
PDE	Partnership for the Delaware Estuary
ppt	parts per thousand
PSEG	PSEG Power, LLC, and PSEG Nuclear, LLC
RKM	River Kilometer
RM	River Mile
SGS	Salem Generating Station, Units 1 and 2
SWPPP	stormwater pollution prevention plan
USACE	U.S. Army Corps of Engineers
WMA	Wildlife Management Area
yd^3	cubic yard(s)

1.0 INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) review team is reviewing an application submitted by PSEG Power, LLC, and PSEG Nuclear, LLC (PSEG) for an early site permit (ESP) for a site located adjacent to the existing Hope Creek Generating Station (HCGS) and Salem Generating Station (SGS), Units 1 and 2, on the eastern shore of the Delaware River Estuary in Lower Alloways Creek Township, Salem County, New Jersey. As part of its review of the ESP application, the NRC is preparing an environmental impact statement (EIS) as required by Title 10 of the *Code of Federal Regulations* (CFR) Part 51, the NRC regulations that implement the National Environmental Policy Act of 1969, as amended. The EIS includes an analysis of pertinent environmental issues, including endangered and threatened species and impacts to fish and wildlife. The U.S. Army Corps of Engineers (USACE) is participating in the preparation of this EIS as a cooperating agency and as a member of the review team, which consists of the NRC staff, its contractor staff, and the USACE staff. The discussion that follows describes the ESP application and Department of the Army permit application reviews, the proposed actions by the NRC and USACE, and the activities over which the USACE has jurisdiction.

An ESP is an NRC approval of a site for one or more nuclear power facilities that resolves safety and environmental issues related to site suitability. Issuance of an ESP is a process that is separate from the issuance of a construction permit (CP) and operating license (OL) or a combined license (COL) for such a facility, which would be needed to construct and operate a nuclear power plant on a site approved by an ESP. The ESP application and review process makes it possible to evaluate and resolve safety and environmental issues related to siting before the applicant makes a large commitment of resources. If the ESP is approved, the applicant can "bank" the site for up to 20 years for future reactor siting, but may not conduct activities defined as "construction" in 10 CFR 50.10(a)(1) without applying for and receiving further authorization. To construct and operate a nuclear power plant, an ESP holder must obtain a CP and an OL, or a COL, which are separate major Federal actions that require their own environmental reviews in accordance with 10 CFR 51 (10 CFR 51-TN250). An applicant for a CP or COL for a new nuclear plant to be located at a site for which an ESP has been issued may reference the ESP, and matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent the identification of new and significant information. For a COL application that references an ESP, the NRC staff, pursuant to 10 CFR 51.75(c)(1), would prepare a supplement to the ESP EIS in accordance with 10 CFR 51.92(e) and would engage in new consultation in accordance with Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (16 USC 1801-TN1061).

The proposed actions related to the PSEG ESP application are (1) NRC issuance of an ESP for the PSEG Site (10 CFR 52-TN251) and (2) USACE permit action on a Department of the Army permit application pursuant to Section 404 of the Federal Water Pollution Control Act (Clean Water Act; 33 USC 1251-TN662) and Section 10 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403-TN660). The U.S. Environmental Protection Agency (EPA) has the authority to review and veto USACE decisions on Section 404 permits.

As mentioned previously, the USACE is participating as a cooperating agency with the NRC in preparing the EIS and participates collaboratively on the review team. Upon issuance of the

draft EIS, PSEG submitted a Section 10/404 permit application to the USACE on August 8, 2014 (PSEG 2014-TN4235); the Department of the Army permit application number is CENAP–OP–R–2009–0157–45. The NRC and USACE prepared this essential fish habitat (EFH) assessment to support their joint consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 305(b)(2) of the MSA, as amended (16 USC 1801-TN1061). The USACE permit decision will be made following issuance of the final EIS and would authorize preparation of a haul road along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, and installation of the cooling water system intake and discharge structures. Therefore, only these activities, which are identified in the Department of the Army permit application, are described in this assessment.

In a final rule dated October 9, 2007 (72 FR 57416, 72 FR 57432), the NRC limited the definition of "construction" to the activities that fall within its regulatory authority, as provided in 10 CFR 50.10(a)(1) and 10 CFR 51.4. Many of the site-preparation activities associated with building a nuclear power plant are not part of the NRC action to license the plant. These activities, which are not regulated by the NRC and therefore not within the purview of the NRC action, are grouped under the term "preconstruction." Preconstruction activities include clearing and grading, excavating, erecting support buildings and transmission lines, and other associated activities. These preconstruction activities may take place before the application for an ESP, CP/OL, or COL is submitted, during its review, or after it has been granted. Although preconstruction activities are outside the NRC's regulatory authority, many of them are within the regulatory authority of local, State, or other Federal agencies, including the USACE.

While an NRC ESP does not authorize site-preparation activities denoted as "preconstruction" under NRC regulations, USACE permits would authorize some of those site-preparation activities. Because this is a joint supplemental EFH for both the NRC and USACE, the distinction between construction and preconstruction is not carried forward in this EFH; both are jointly discussed using the term "site-preparation activities" when discussing effects to species that would take place under the proposed actions.

Pursuant to the MSA, the review team requested via letter dated October 26, 2010, that the NMFS provide information on EFH in the vicinity of the PSEG Site (NRC 2010-TN2203). In their response to the NRC dated December 9, 2010, NMFS indicated that the estuarine portions of the Delaware River and its tributaries contain designated EFH for a number of species and directed the NRC to prepare an EFH assessment as part of the EFH consultation process (NMFS 2010-TN2171). Another request was sent to NMFS dated July 31, 2013, to confirm designated EFH for the species provided in the December 9, 2010, NMFS letter, or to provide an updated EFH species list (NRC 2013-TN2805). A slightly revised list of species with designated EFH was received from NMFS (PNNL 2013-TN2687; NMFS 2013-TN2804). NMFS received the draft EIS and EFH assessment and provided comments on November 12, 2014 (NMFS 2014-TN4203), and additional clarification on comments December 15, 2014 (NRC 2014-TN4208).

Accordingly, this EFH assessment supplement addresses only the comments received on the EFH assessment related to the following:

- discussion on Bluefish EFH and reasons for exclusion from the EFH assessment

- clarification of wetland impacts and resulting effects on EFH and prey species for managed species from installation activities
- discussion of mitigation for wetlands impacts.

2.0 DESCRIPTION OF THE PROPOSED ACTION

PSEG is seeking an ESP from the NRC for a site approval for a potential new nuclear power plant at a site (the PSEG Site) located adjacent to the existing HCGS and SGS. PSEG is also seeking a Department of the Army permit from the USACE for certain site-preparation activities described below. Site-preparation activities authorized by USACE and the New Jersey Department of Environmental Protection (NJDEP) (but not an NRC ESP) that could directly affect onsite and offsite aquatic ecosystems include preparation of a haul road bulkhead along the shoreline, building the barge storage area and unloading facility (also referred to as the barge unloading and mooring facility in the USACE public notice [USACE 2014-TN4235]), building the proposed 5-mi causeway, installation of the cooling water system intake and discharge structures, dredging, installation of piles, and transport of building materials by barge to the PSEG Site. As these actions require a Department of the Army permit and are permissible, but not authorized, under an NRC ESP, they are assessed in detail below.

2.1 Site Location and Description

The PSEG Site lies on Artificial Island, directly north of the existing SGS and HCGS located on the east bank of the Delaware River in Lower Alloways Creek Township, Salem County, New Jersey, at which point the river is approximately 2.5 mi (4 km) wide. Artificial Island is a human-made island approximately 1,500 ac (600 ha) in size that consists of tidal marsh and grassland. The USACE created the island in the twentieth century by the deposition of hydraulically dredged material atop a natural sand bar that projected into the river. The average elevation of the island is about 9 feet (ft, 2.7 meters [m]) above mean sea level (MSL) with a maximum elevation of approximately 18 ft (5.5 m) above MSL (PSEG 2014-TN3452). The site is located approximately 17 mi (27 km) south of the Delaware Memorial Bridge; 35 mi (56 km) southwest of Philadelphia, Pennsylvania; and 8 mi (13 km) southwest of the City of Salem, New Jersey (PSEG 2014-TN3452). Figure 1 shows the location of the PSEG Site and the areas within a 6-mi (10-km) radius and 50-mi (80-km) radius of the facility.

PSEG owns 734 ac (297 ha) at the southern end of the Artificial Island, of which SGS occupies 220 ac (89 ha) and HCGS occupies 53 ac (62 ha). PSEG is developing an agreement in principle with the USACE to acquire an additional 85 ac (34 ha) of the USACE's Confined Disposal Facility (CDF) land immediately north of HCGS. Figure 2 and Figure 3 provide a context for the site in relation to nearby water bodies and a plan view of the proposed site layout for PSEG, respectively.

The region within 15 mi (24 km) of the site is primarily used for agriculture. The area also includes numerous parks, wildlife refuges, and preserves (e.g., Mad Horse Creek Wildlife Management Area [WMA] to the east; Cedar Swamp State WMA to the south in Delaware; Appoquinimink, Silver Run, and Augustine State WMAs to the west in Delaware; and Supawna Meadows National Wildlife Refuge to the north) (PSEG 2014-TN3452).

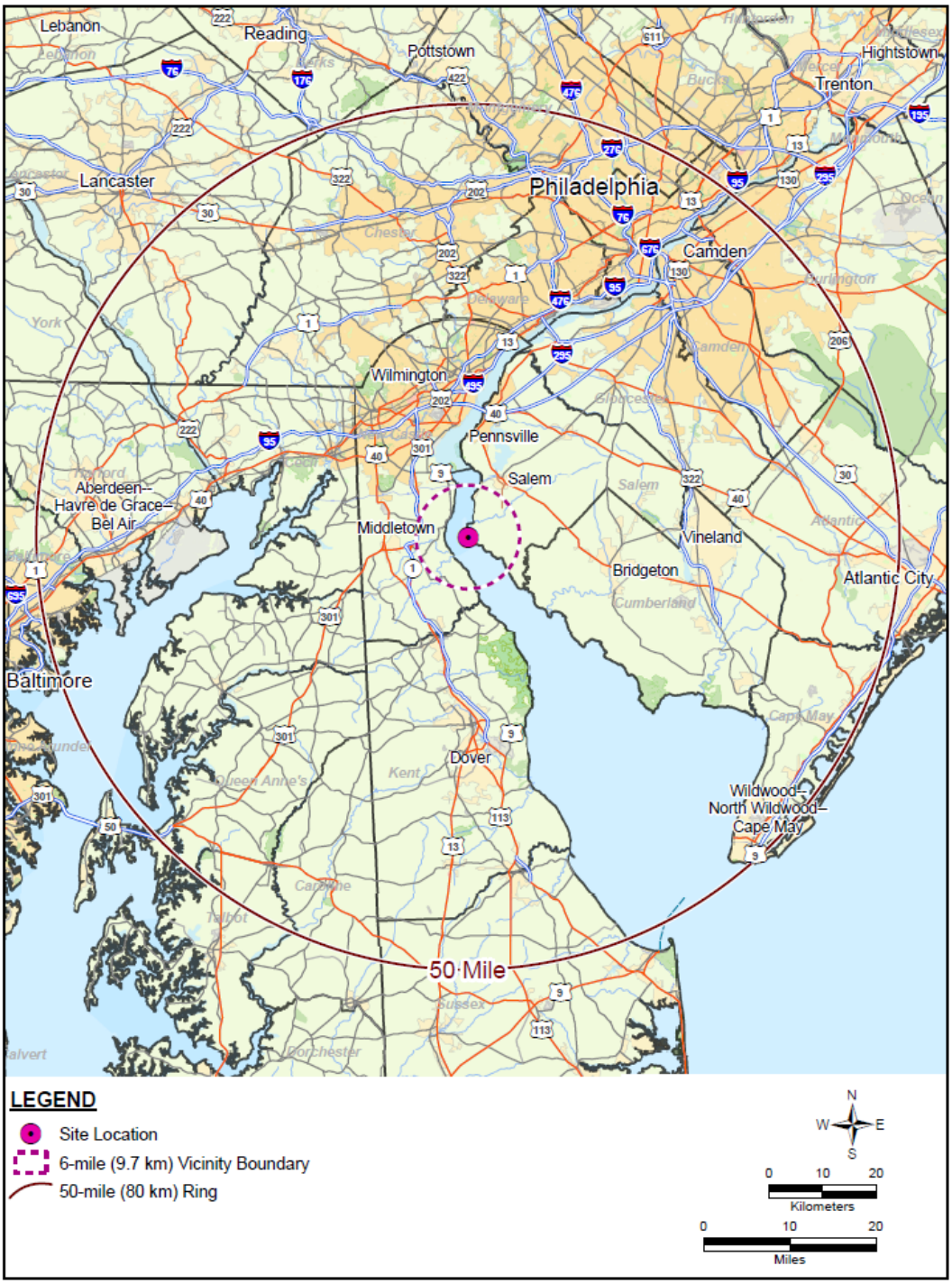

Figure 1. Location of the PSEG Site Within 6-Mile and 50-Mile Radius (Source: Modified from PSEG 2014-TN3452).

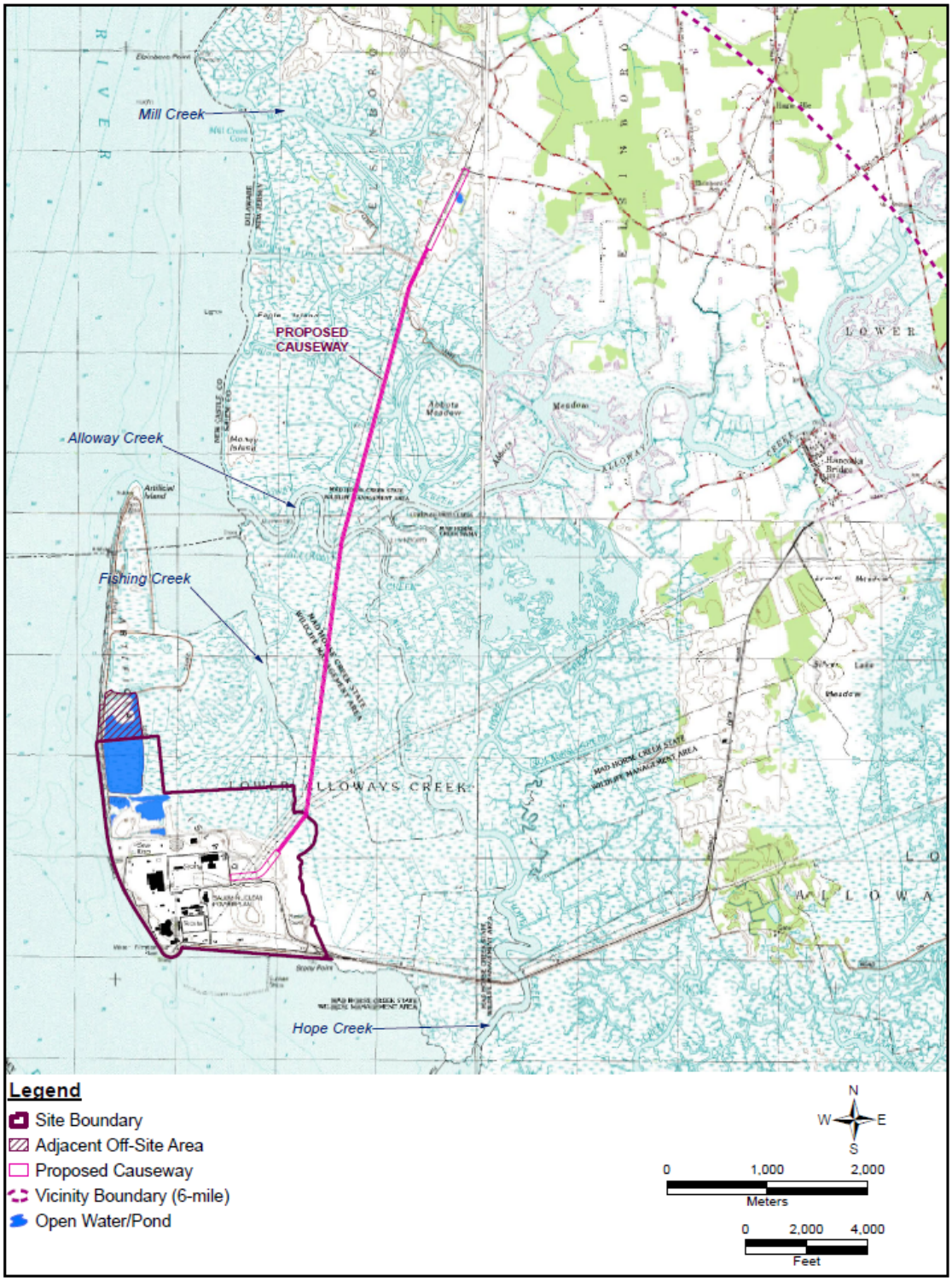

Figure 2. PSEG Site with Nearby Water Bodies and Proposed Causeway (Source: Modified from PSEG 2014-TN3452).

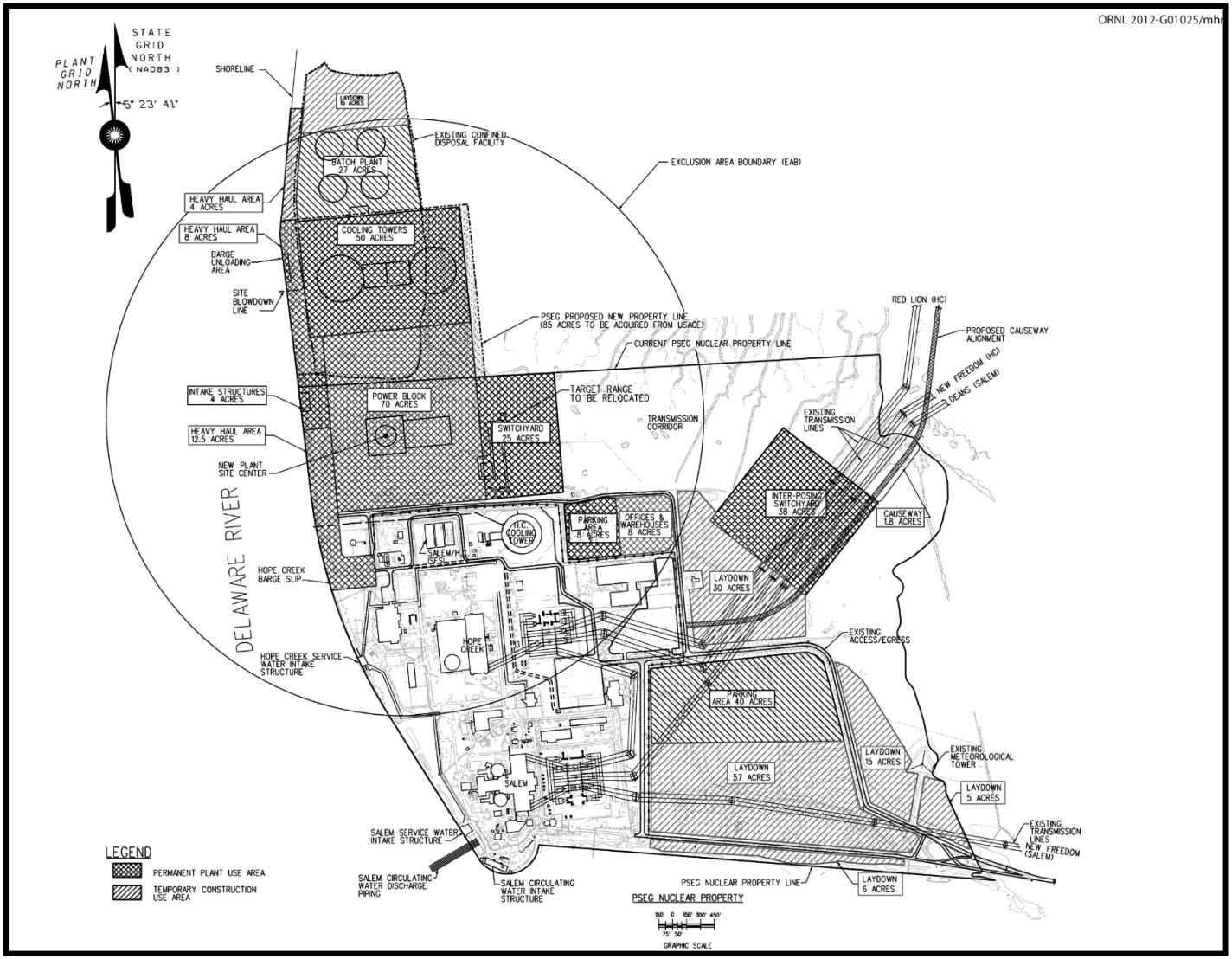

Figure 3. PSEG Site Utilization Plan (Source: PSEG 2012-TN1489).

2.1.1 Delaware River Estuary

The Delaware River and Delaware Bay are a part of the larger Delaware Estuary and River Basin that extends from headwaters in New York State to the coastal plains near Cape Henlopen in Delaware (PDE 2012-TN2191). The Delaware Bay extends from the confluence of the Delaware River with the Atlantic Ocean from Delaware River Mile (RM) 0 to RM 54 (River Kilometer [RKM] 0 to RKM 87). The Delaware River Estuary includes the Delaware Bay and extends up the tidal Delaware River, which is characterized by brackish water between Delaware RM 54 and RM 80 (RKM 87 and RKM 129) and becomes freshwater at Delaware RM 80 (RKM 129) (BBL and Integral 2007-TN2126). The PSEG Site near the mouth of Alloway Creek is at Delaware RM 52 (RKM 84) (DRBC 2011-TN2412) and is considered to be in the lower estuary watershed unit of the Delaware River Estuary (PDE 2012-TN2191).

The boundary of salinity intrusion in the Delaware River Estuary, also known as the salt line, fluctuates with flow changes. The salt line moves in response to the tides and variations in Delaware River Estuary freshwater discharge. During most of the year, the salt line is located between the Commodore Barry Bridge at Delaware RM 82 (RKM 132) and Reedy Island at Delaware RM 54 (RKM 87) (DRBC 2008-TN2277). During the drought of record in the 1960s, the salt line moved to its most upstream historically observed location at Delaware RM 102 (RKM 164) (DRBC 2008-TN2277). Salinity is an important determinant of biotic distribution in estuaries, and salinity near the PSEG Site varies with river flow. Between 2003 and 2010, surface-water salinity measurements near the PSEG Site ranged from 1.8 to 13.3 parts per thousand (ppt) and surface-water temperatures ranged from 0.4 to 28.6°C (PSEG 2004-TN2565; PSEG 2005-TN2566; PSEG 2006-TN2567; PSEG 2007-TN2568; PSEG 2008-TN2569; PSEG 2009-TN2513; PSEG 2010-TN2570; PSEG 2011-TN2571). Salinity measurements taken over a greater number of years between RM 51 and RM 49 (RKM 82 and RKM 79) report a minimum salinity of 0.1 ppt and a maximum of 17.9 ppt (PSEG 2014-TN3452). For the purposes of EFH habitat assessment, the salinity range will conservatively be estimated between 0 and 18 ppt.

At the PSEG Site on Artificial Island, the estuary is tidal with a net flow to the south. The USACE maintains a dredged navigation channel near the center of the estuary about 6,600 ft (2,000 m) west of the shoreline of the PSEG Site. The navigation channel is about 40 ft (12 m) deep and 1,300 ft (400 m) wide; however, starting in 2010, the USACE began implementing the Delaware River Main Channel Deepening Project to deepen the existing navigation channel from 40 to 45 ft (USACE 2011-TN2262). On the New Jersey side of the channel, water depths in the open estuary at mean low water are fairly uniform at about 20 ft (6 m). Predominant tides in the area are semi-diurnal, with a period of approximately 12 hours and a mean tidal range of 5.3 ft (1.6 m) at RM 52 (RKM 84) (PSEG 2014-TN3452).

2.1.2 Wetlands

Most of the PSEG Site is surrounded by tidal marsh dominated by near monocultures of the invasive common reed (*Phragmites australis*). This is also the case for most of the tidal marsh surrounding Hope Creek, Alloway Creek, and associated smaller marsh creeks. Most of the coastal wetlands occur within the northern portion of the PSEG Site and connect to the contiguous Alloway Creek and Hope Creek coastal wetland systems (marshes) (PSEG 2014-

TN3452). The eastern portion of the PSEG Site contains primarily freshwater wetlands dominated by monocultures of common reed. They are predominantly tidal wetland systems that are contiguous with coastal wetlands mapped by the New Jersey Wetlands Act of 1970. Functionally, these wetlands are similar to the coastal wetlands and are tidally influenced systems. Some areas on Artificial Island, such as the CDF and the PSEG Site desilt basins, have been diked and are no longer tidally influenced (PSEG 2014-TN3452). These diked areas and onsite linear drainage features for stormwater conveyance are not considered EFH (PSEG 2015-TN4234).

The proposed causeway would cross NJDEP's Mad Horse Creek WMA, NJDEP's Abbotts Meadow WMA, and lands that are part of PSEG's Alloway Creek Watershed Wetland Restoration (ACW) Site, which is part of PSEG's Estuary Enhancement Program (EEP) (PSEG 2012-TN2282).

2.2 Wetlands Alterations

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

As described in Table 1, building a new nuclear power plant would permanently disturb 108 ac of wetlands onsite, including 71.75 ac within the USACE and PSEG confined disposal facilities areas. A total of 31.8 ac of wetlands would be temporarily disturbed (PSEG 2014-TN3452).

Offsite impacts to wetlands from building activities in the offsite adjacent areas and the proposed causeway would total 72.8 ac, of which 49.8 ac would be temporary impacts. A permanent loss of 23 ac would occur in the wetlands associated with the proposed causeway, (Table 2).

Permanent impacts to wetland plant communities along the causeway would be limited to placement of piers and direct shading. Shading could potentially result in some alteration of plant community makeup under the causeway and a reduction in primary productivity. The building method for the proposed causeway has not yet been determined, but construction work mats are expected to be used within an easement (PSEG 2014-TN3452). Original estimates for the causeway impacts were calculated for a 50-ft-wide easement. However, PSEG further refined the engineering plan for the causeway and reduced the proposed width to 39 ft and approximately 10 ft above the marsh plain, which should further reduce any shading effects (PSEG 2014-TN4235). Reductions in primary productivity due to causeway development should be minimal overall, considering the large area of adjacent coastal wetlands within the project vicinity. An estimated 2,123 linear ft of marsh creek channels would be crossed by the proposed causeway (PSEG 2014-TN3452). PSEG plans to avoid placement of support pilings in stream channels (PSEG 2014-TN3452). Runoff from disturbed areas would be temporary and controlled through the use of best management practices (BMPs) required for water quality in compliance with Federal and New Jersey permitting, and runoff is not expected to adversely affect Delaware River Estuary surface waters (PSEG 2014-TN3452).

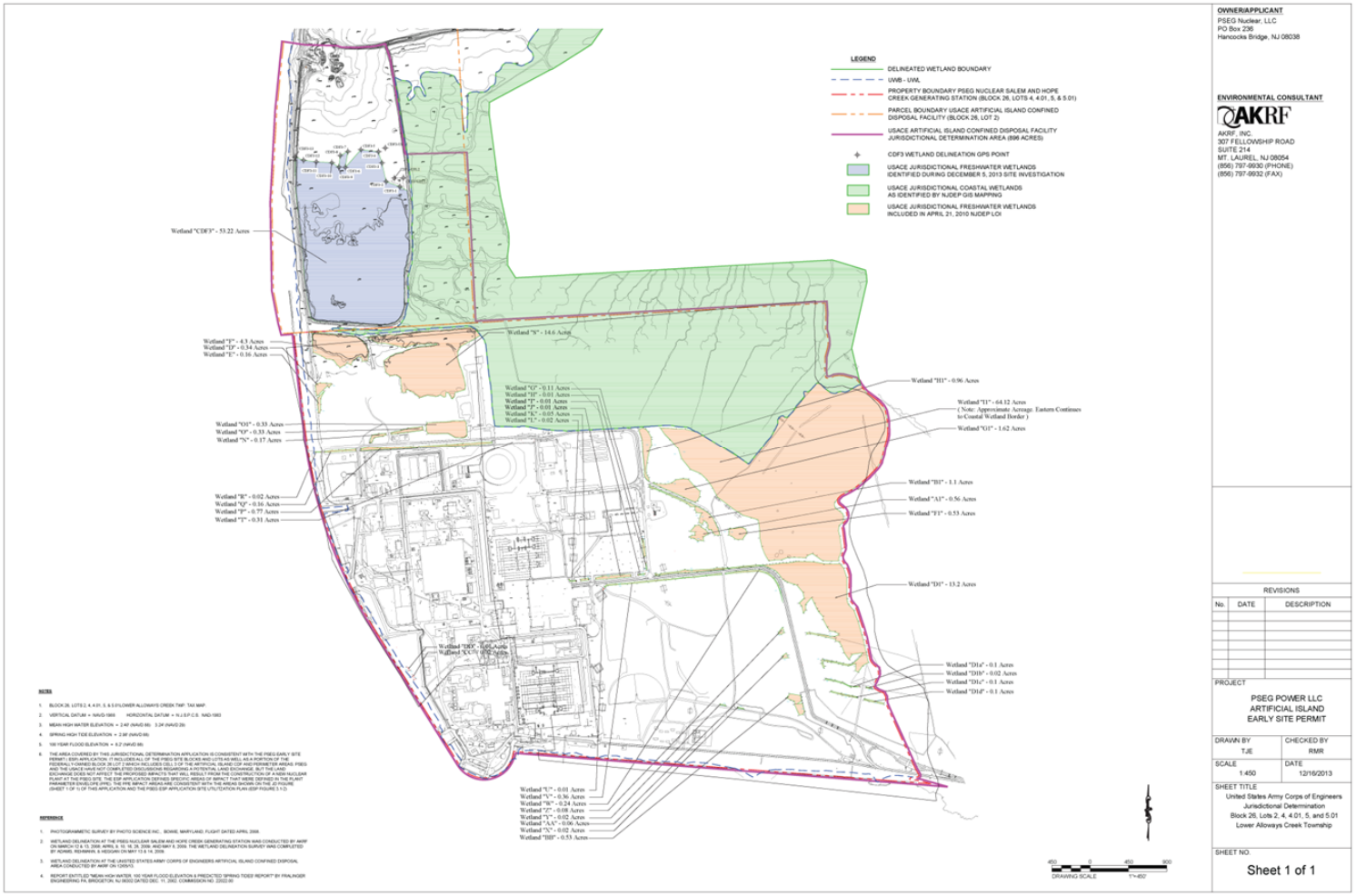

Figure 4. USACE Jurisdictional Determination Block 26, Lots 2, 4, 4.01, 5, and 5.01, Lower Alloways Creek Township (Source: USACE 2013-TN3283).

Table 1. Onsite Wetland Disturbance by Proposed PSEG Site-Preparation Activities (Modified from PSEG 2014-TN3452).

Wetland Types	PSEG Site Area Total (ac)	Permanently Disturbed (ac)	Temporarily Disturbed (ac)
Saline Marsh	0.2	0.1	
Phragmites-Dominated Coastal Wetlands	155.6	58.3	5.1
Deciduous Scrub/Shrub Wetlands	4.6	4.6	
Herbaceous Wetlands	5.8	0.9	2.5
Phragmites-Dominated Interior Wetlands	118.7	44.1	24.2
Total	284.9	108	31.8

Table 2. Offsite Wetland Disturbance by Causeway Installation and Temporary Offsite Activities (Modified from PSEG 2014-TN3452).

Wetland Types	Permanently Disturbed (ac)	Temporarily Disturbed (ac)
Saline Marsh	--	0.8
Freshwater Tidal Marsh	6.1	6.6
Phragmites-Dominated Coastal Wetlands	11.2	13.2
Deciduous Scrub/Shrub Wetlands	0.1	--
Herbaceous Wetlands	1.2	--
Phragmites-Dominated Interior Wetlands	4.4	29.2
Total	23	49.8

The biological communities of the Delaware River Estuary in the area of the PSEG Site are typical of those that exist all along the main reaches of the Delaware Bay system. To mitigate egg and larval fish loss through the cooling system for SGS, PSEG proposed and established an EEP to restore salt marshes and provide monitoring and other structural enhancements to mitigate losses of aquatic species through impingement and entrainment at SGS (Balletto and Teal 2011-TN2612). The PSEG EEP was established in 1995 as part of New Jersey Pollutant Discharge Elimination System (NJPDES) requirements for SGS and includes an ongoing biological monitoring program in addition to habitat restoration to track the success of the mitigation actions. Because of the biological monitoring surveys that have been conducted in this area of the Delaware River Estuary since the mid-1980s in support of environmental requirements for the construction and operation of SGS and HCGS, an extensive long-term data set exists on the fishery and benthic macroinvertebrate communities of this area, which includes prey species for managed fishery species discussed further in Section 3.2.

2.3 Dredging Activities

Before initiating any site-preparation or development activities, PSEG would be required to obtain, from the USACE, the appropriate authorizations regulating alterations to waters of the United States, including ponds and creeks. Site-preparation activities that could directly affect onsite and offsite aquatic ecosystems include installing the haul road bulkhead, building the

barge storage area and unloading facility, installing the cooling water system intake and discharge structures, and building the proposed causeway (Figure 2 and Figure 3). Aquatic habitats potentially affected include habitats associated with the Delaware River Estuary and the interconnected system of tidal wetlands and marsh creeks primarily north of the PSEG Site. Potential direct impacts on aquatic resources as a result of site-preparation activities would involve physical alteration of habitat (e.g., infilling, dredging) including temporary or permanent removal of associated benthic organisms, sedimentation, changes in hydrological regimes, and changes in water quality. Potential indirect impacts would include increased runoff from impervious surfaces and subsequent erosion, as well as sedimentation (PSEG 2014-TN3452). Benthic habitats in the areas for proposed dredging consist of fine-grained sediments composed of clay, silt, and sand. Shoreline depths drop quickly to 10 to 12 ft (3.0 to 3.7 m) and then gradually increase in depth to between 15 to 25 ft (4.6 to 7.6 m) nearshore (PSEG 2014-TN3452). The depth of the areas identified for dredging is a minimum of 10 ft (3.0 m) relative to mean low water with the exception of the western boundary of Artificial Island, which is shallower than 10 ft (3.0 m) and consists of artificially placed rock. Mitigation is not warranted as there is no shallow water habitat conversion to deep water habitat (PSEG 2015-TN4234), and compensatory mitigation is generally not required where a habitat change does not occur. The nearshore benthic macroinvertebrate community and fish diversity is described in Section 2.4.2.1 of the EIS.

Shoreline installation and site-preparation activities would require a stormwater pollution prevention plan, developed as part of the NJPDES stormwater permit, which would describe BMPs to control sedimentation and erosion and provide stormwater management. Shoreline structures would be hardened to protect from shoreline erosion using placement of concrete or riprap (PSEG 2014-TN3452). Approximately 1 ac of open water would be filled (average width of fill would be 10 ft) due to placement of the bulkhead cap and sheeting along the bulkhead shoreline (PSEG 2014-TN4235).

The new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 61 ac (PSEG 2014-TN3452). An additional 0.05 ac of river bottom habitat would be removed for installation of seven 20-ft-diameter barge mooring caissons. Installation of a new intake structure would require dredging of about 225,000 yd^3 of sediment to lower the river bottom by 4.5 ft over 31 ac (PSEG 2014-TN3452).

Dredging, grading, and backfilling activities would be required for installation of a new discharge structure; approximately 0.2 ac of tidal waters would be affected (PSEG 2014-TN4235). As dredging will be done by one hydraulic suction dredge, dredged material disposal would be by direct pipeline to Artificial Island (PSEG 2015-TN4234). No maintenance dredging is planned under the Department of the Army permit application. In total, approximately 92 ac of open water habitat would be permanently affected by dredging, which will occur over a 2-month period (USACE 2015-TN4277).

The installation of the barge storage and unloading facilities as well as the intake and discharge structures would result in temporary disturbances to the aquatic habitat in those portions of the Delaware River Estuary. An increase in suspended sediments could occur during dredging activities; however, PSEG determined that due to the natural high turbidity of the Delaware Estuary at the project location, any increase in sedimentation would not be noticeable (PSEG

2015-TN4234). PSEG would comply with NJDEP and USACE permitting regulations regarding timing and duration of dredging to avoid sensitive aquatic life stage development or spawning (e.g., the current USACE work window to avoid dredge activities occurs between March 1 and June 30). The review team reviewed a recent report on sediment analysis for the Delaware River Basin that describes sediment samples near the PSEG Site as potentially suitable for aquatic habitat restoration projects (DERSMPW 2013-TN4204). Therefore, dredging in this area near the PSEG Site is unlikely to introduce adverse exposure from sediment contaminants to nearby aquatic biota. PSEG proposes to use a hydraulic suction dredge to further minimize increases in turbidity and sedimentation, to limit the duration of dredging, and to avoid the need to handle dredged material twice (PSEG 2015-TN4234). PSEG also would use appropriate BMPs to minimize sedimentation effects as required for Federal and State permitting. Motile invertebrates, fish, and sea turtles might swim into this portion of the Delaware River Estuary, but they would be able to swim away or likely would avoid the area due to dredging activity and noise from pile-driving that may occur simultaneously.

Mobile macroinvertebrates in this area might be able to occupy adjacent habitat in the Delaware River Estuary as the species composition and abundance of the macroinvertebrate community in the Delaware River Estuary near the site are similar to those of benthic communities in adjacent benthic areas of the estuary. Although permanent alteration of at least 92 ac of river bottom habitat would occur, the impacts to aquatic communities in the vicinity are expected to be minimal as benthic organisms would begin to re-colonize the area following the completion of dredging activities (Wilber and Clarke 2007-TN4271).

2.4 Barge Traffic

Vessel use during dredging or installation of the in-water structures and transportation of building materials and large system components to the PSEG Site may affect the aquatic resources of the Delaware River Estuary, particularly the benthos or benthic dwelling organisms (PSEG 2014-TN3452). The main impacts of using vessels would include turbulence from propellers (prop wash), collisions with aquatic species, and accidental spills of materials overboard. PSEG estimated the annual number of vessel trips for the installation activities correlated to the activities described for the Department of the Army permit to be between 247 and 357. This is an incremental increase to the reported annual average of 4,485 commercial vessel trips in the Delaware River and Estuary between 2007 and 2014 (PSEG 2015-TN4234). PSEG estimated that general construction materials shipped by barge over a 3- to 7-year period, would originate at the Ports of Camden, Philadelphia, and Salem, and use shipping routes in the Delaware Bay and River (USACE 2015-TN4281).

The NRC review team determined that vessel traffic during site-preparation activities would result in minimal disturbance to benthic habitats associated with the PSEG Site as it would occur in deeper waters associated with the installation of piles or dredging activities and should not affect the general resources in the region along this coast of the Delaware River Estuary.

2.5 Pile-Installation Activities

PSEG estimated acoustical effects from representative pile-driving studies to determine pile-installation effects on aquatic biota. In-water activities included day-time installation of 24-in.-

wide steel sheeting in the Delaware Estuary for the intake structure (650 sheet piles), the haul road bulkhead (2,400 sheet piles) and the barge unloading facility 20-ft-diameter caissons (1,200 sheet piles) with a vibratory hammer (Table 3). Causeway installation would also occur during the daytime, and analysis was conducted for approximately 1000 30-in.-square concrete piles using an impact hammer with additional cushioning to reduce pile head damage (PSEG 2015-TN4234). PSEG used the NMFS Pile Driving Calculations spreadsheet model (CALTRANS 2013-TN4236) to calculate isopleths for the peak sound pressure level (SPL_{peak}), cumulative sound exposure level (SEL_{cum}), and behavioral root mean square sound pressure level (SPL_{rms}) using specific information on piles such as installation method, number of piles, and type of pile. For SPL_{peak} and SPL_{rms} noise isopleth estimates, the NMFS model can apply a default transmission loss of 15 m as a conservative assumption under a practical spreading loss model that considers the noise attenuation (transmission loss) when site-specific attenuation is not known (PSEG 2015-TN4234). The modeled isopleths for SEL_{cum} account for the number of pile-driving strikes per day, and the number of piles per day is provided in Table 3.

Table 3. Pile Material and Installation Information (PSEG 2015-TN4234).

	Structure			
Pile Information	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Type of pile	Sheeting	Sheeting	Sheeting	Concrete
Length/number of piles	1,200 linear ft	4,500 linear ft	2,200 linear ft	1,000
Piles installed/day	120 linear ft	240 linear ft	120 linear ft	20
Duration of pile driving (days)	10	20	20	50

The criteria for fish are as follows: 206 dB re: 1µPa SPL_{peak}, 187 dB re: 1µPa^2·s SEL_{cum} for fish > 2 cm, 183 dB re: 1µPa^2·s SEL_{cum} for fish < 2 cm, and 150 dB re: 1µPa SPL_{rms}. The determination for potential onset of physical injury is determined by exceedance of both the peak pressure (SPL_{peak}) and cumulative sound exposure level (SEL_{cum}). A determination for potential behavioral effects is made using exceedance of the root mean square pressure level (SPL_{rms}) (CALTRANS 2013-TN4236). Distances from the pile-driving activity that exceed these criteria are presented in Table 4.

Table 4. Estimated Acoustic Area of Effect for Fish from Pile-Driving Activities (PSEG 2015-TN4234)

	Exceedance Distance in m (ft)			
Acoustic Criteria	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Peak pressure (206 dB)	0	0	0	1 (3)
Cumulative sound exposure level (187 dB/183 dB)	40/74 (131/243)	40/74 (131/243)	40/74 (131/243)	216/398 (709/1,306)
Adverse behavioral effects (150 dB)	74 (243)	74 (243)	74 (243)	1,166 (3,825)

Based on the NMFS model, the 206 dB SPL_{peak} is only exceeded immediately adjacent to pile-driving activity and does not extend 1 m out except for causeway installation. The 187/183 dB SEL_{cum} exceedance distance for the proposed causeway is 216/398 m (709/1,306 ft); however, this distance extends over mostly vegetated marsh plain and shallow marsh creeks, not open water (Figure 5).

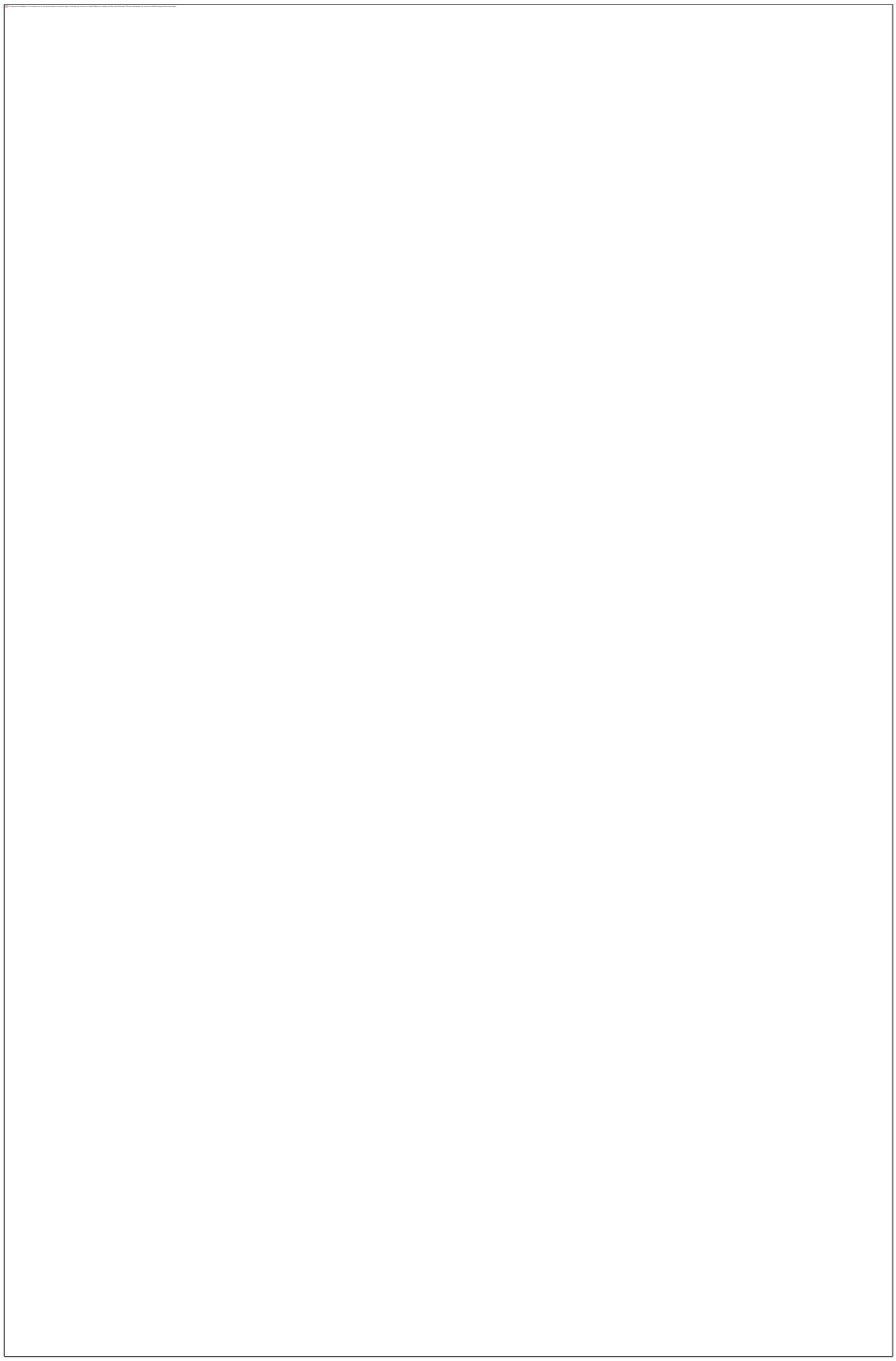

Figure 5. Acoustic Criteria Isopleths for In-Water and Nearshore Pile-Driving Activities (PSEG 2015-TN4275).

The behavioral effects criteria of 150 dB SPL_{rms} is exceeded for the causeway pile installation up to 1,166 m (3,825 ft) from the source, which is mostly vegetated marsh plain and shallow marsh creeks (PSEG 2015-TN4234). For vibratory shoreline steel sheet pile installation at Artificial Island, caisson installation, and intake installation, the behavioral effects criteria exceedance extends out to 74 m (243 ft) from the source into the Delaware River (Figure 5).

3.0 CONSIDERATION OF EFH NEAR THE SITE

3.1 EFH Species Identified for Preliminary Analysis

The 1996 amendments to the MSA (16 USC 1801-TN1061) identified the importance of habitat protection to healthy fisheries. The amendments, known as the Sustainable Fisheries Act of 1996, strengthened the authority of governing agencies to protect and conserve the habitat of marine, estuarine, and anadromous animals. EFH is defined as the waters and substrate necessary for spawning, breeding, feeding, or growth to maturity for managed fishery species. Identifying EFH is an essential component in the development of fishery management plans to evaluate the effects of habitat loss or degradation on fishery stocks and to take actions to mitigate such damage. NMFS considers the estuarine portion of the Delaware River and tidal waters near the PSEG Site to be EFH for 15 species (PNNL 2013-TN2687; NMFS 2013-TN2804), which are listed in Table 5.

Table 5. Species with Designated EFH in the Delaware Bay

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Atlantic Butterfish	*Peprilus triacanthus*	-	-	X	
Atlantic Sea Herring	*Clupea harengus*	-	-	X	X
Black Sea Bass	*Centropristis striata*	-	-	X	
Bluefish	*Pomatomus saltatrix*	-	-	X	X
Clearnose Skate	*Leucoraja eglantaria*	-	-	X	X
Cobia	*Rachycentron canadum*	X	X	X	X
King Mackerel	*Scomberomorus cavalla*	X	X	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Red Hake	*Urophycis chuss*	-	-	-	X
Scup	*Stenotomus chrysops*	-	-	X	
Spanish Mackerel	*Scomberomorus maculatus*	X	X	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

Sources: NOAA 2013a; 2013b
X = designated EFH present for species and life stage
- = no designated EFH present for species and life stage

The review team compared salinity, water temperatures, and depth in the vicinity of the PSEG Site with EFH requirements for each of the species and life stages that appear in Table 5 to further refine the EFH species with the potential to be adversely affected by the proposed action. The EFH requirements of several of the fish species and life stages are conditions that have been reported in the vicinity of the PSEG Site (Table 6).

Table 6. Habitat Requirements of Identified EFH Species

Species, Life Stage	EFH Requirement			Site Matches EFH Requirements?
	Salinity (ppt)	Temperature (°C)	Depth (m)	
PSEG Site	**0 – 18**	**0.4 – 28.6**	**4.4 – 7.6**	
Atlantic Butterfish				
juveniles	3-37	3-28	10-365	No
Atlantic Sea Herring				
juveniles	26-32	<10	15-135	No
adults	>28	<10	20-130	No
Black Sea Bass				
juveniles	>18	>6	1-38	Yes
Bluefish				
juveniles	23-36	19-24	unspecified	No
adults	>25ppt	14-16	unspecified	No
Clearnose Skate[(a)]				
juveniles and adults	12-30	6-20	5-23	Yes
Cobia				
all life stages	>25	>20	unspecified	No
King Mackerel				
all life stages	>30	>20	unspecified	No
Little Skate[(b)]				
juveniles and adults	15-32	3-22	4-21	Yes
Red Hake				
Adults	33-34	<12	10-130	No
Scup				
juveniles	>15	>7	0-38	Yes
adults	>15	>7	2-185	Yes
Spanish Mackerel				
all life stages	>30	>20	unspecified	No
Summer Flounder				
juveniles	10-30	>11	0.5-5	Yes
adults	unspecified	unspecified	0-25	Yes
Windowpane Flounder				
eggs and larvae	unspecified	<20	<70	Yes
juveniles and adults	5.5-36	<25-26.8	1-100	Yes
Winter Flounder				
eggs	10-30	<10	<5	Yes
larvae	4-30	<15	<6	Yes
juveniles	10-30	<25	1-50	Yes
adults	15-33	<25	1-100	Yes
Winter Skate[(c)]				
juveniles and adults	15-35	3-17	7-18	Yes

Source: NMFS 2013, except where noted
(a) Packer et al. 2003a-TN2822
(b) Packer et al. 2003b-TN2823
(c) Packer et al. 2003c-TN2824

3.2 EFH Species Identified for Specific Analysis

For those species whose EFH requirements do not match the local conditions as described in Table 6, the review team did not consider these species or life stages further in this EFH assessment. The Atlantic Butterfish was excluded based on depth requirements not being met for habitat near the PSEG Site. Atlantic Sea Herring juveniles and adults were excluded based on salinity and depth requirements not being met for habitat near the PSEG Site. Bluefish juveniles and adults, Cobia, King Mackerel, Red Hake, and Spanish Mackerel were all excluded as their salinity requirements exceed the available salinity range near the PSEG Site. The remaining species and life stages with EFH requirements matching local conditions appear in Table 7.

Table 7. Species Retained for In-Depth EFH Analysis

Common Name	Scientific Name	Eggs	Larvae	Juveniles	Adults
Black Sea Bass	*Centropristis striata*	-	-	X	-
Clearnose Skate	*Raja eglanteria*	-	-	X	X
Little Skate	*Leucoraja erinacea*	-	-	X	X
Scup	*Stenotomus chrysops*	-	-	X	X
Summer Flounder	*Paralichthys dentatus*	-	-	X	X
Windowpane Flounder	*Scophthalmus aquosus*	X	X	X	X
Winter Flounder	*Pseudopleuronectes americanus*	X	X	X	X
Winter Skate	*Leucoraja ocellata*	-	-	X	X

X = retained for in-depth analysis
- = not retained for in-depth analysis

3.3 Prey for EFH Species

As described in the draft EIS (NRC and USACE 2014-TN4279), a diversity of aquatic species exist in the nearshore waters and coastal wetlands near the PSEG Site, with many of these species representative of prey species for other aquatic organisms. Juvenile and adult Black Sea Bass (*Centropristis striata*) and adult Scup (*Stenotomus chrysops*) prey on benthic invertebrates such as crustaceans and squid (MDMF 2006-TN2159; MDMF 2006-TN2161), whereas Clearnose (*Raja eglanteria*), Little (*Leucoraja erinacea*), and Winter (*L. ocellata*) skates prey on polychaete worms, small crustaceans, squid, and amphipods (Packer et al. 2003-TN2822, 2003-TN2823, 2003-TN2824).

Adult Summer Flounder (*Paralichtys dentatus*) feed on smaller fish, squids, crustaceans, mollusks, marine worms, and sand dollars (Grimes et al. 1989-TN2150), and adult Winter Flounder (*Pseudopleuronectes americanus*) prefer similar prey items such as small crustaceans, annelid worms, small mollusks, and fish (Hendrickson 2006-TN2154). Juvenile and adult Windowpane Flounder (*Scophthalmus aquosus*) have similar food sources, including small crustaceans and fish larvae of hakes and Tomcod (*Microgadus tomcod*) (Chang et al. 1999-TN2133).

4.0 POTENTIAL ADVERSE EFFECTS TO EFH

The provisions of the MSA define an "adverse effect" to EFH as the following (50 CFR 600-TN1342):

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

The review team has identified the following potential PSEG site-preparation activities that may cause adverse effects to EFH:

- wetlands Impacts
- dredging activities
- pile-installation activities.

In the following section, each of these issues is addressed for the EFH species and their prey identified for in-depth analysis in Table 7.

4.1 Wetlands Effects

The NMFS has designated EFH for the species identified in Table 7 within the vicinity of the PSEG Site due to the depth, temperature, and salinity characteristics present to support specific life stages. Managed species with EFH that may be affected by impacts to wetlands include Black Sea Bass juveniles, Scup juveniles and adults, Summer Flounder juveniles and adults, Windowpane juveniles and adults, and Winter Flounder juveniles, and adults. In addition, these managed species all rely on prey species that use wetland habitats in the vicinity of the PSEG Site. Wetland habitats are not considered EFH for skates such as the Little Skate or Winter Skate which have not been collected or reported in the vicinity of the PSEG Site. However, these skate species prey on small crustaceans, and the Clearnose Skate, which may occur near the PSEG Site, preys on small fishes that are abundant in wetland habitats.

Site-preparation activities within the diked CDFs would encompass 71.75 ac (66%) of the total affected wetland habitats identified as being permanently affected on the PSEG Site. These wetland habitats, not connected to the coastal, tidally influenced surrounding wetland habitats, are dominated by the invasive common reed (i.e., *Phragmites)*, and have been routinely disturbed by authorized dredged material disposal activities. The remaining 36.25 ac of permanent wetland habitat loss are a mix of different wetland types, with the majority also being *Phragmites*-dominated wetland as described in Section 2.2.

Permanent loss of 23 ac of wetlands along the elevated causeway would be limited to areas of pier placement. PSEG proposes to build the elevated causeway from the northeast corner of the PSEG property along or adjacent to the existing Hope Creek-Red Lion transmission corridor to minimize land impacts. Shading could potentially result in some alteration of plant community makeup under the causeway and a reduction in primary productivity. PSEG proposes to use construction work mats within a 50-ft-wide easement, although final installation plans would likely identify a smaller installation area footprint (PSEG 2014-TN3452). Loss of wetland habitat and reductions in primary productivity due to causeway development should be minimal overall, considering the large area of adjacent coastal wetlands within the project vicinity.

Although the affected wetlands are a minimal portion of the overall abundance of wetland land-cover types within the vicinity (25,534 ac), the potential impacts to wetland habitats are expected to be noticeable and will warrant some form of compensatory mitigation. The quality of the impacted resource reflects a dominance of the invasive common reed, and a large amount of onsite wetland acreage is within the diked CDFs, which are not connected to nearshore EFH. The wetlands are regulated under the authority and jurisdiction of the USACE and the NJDEP.

The USACE approach is that mitigation may only be used after all appropriate and practical steps to avoid and minimize adverse impacts to aquatic resources, including nontidal wetlands and streams, have been taken. Further, the USACE requires all remaining unavoidable impacts to be compensated to the extent appropriate and practicable. The USACE could monitor or require monitoring for compliance with the USACE-issued permits. The Department of the Army permit could include special conditions that could require PSEG to ensure that the created and enhanced wetlands meet the Federal wetland criteria outlined in the report entitled *Corps of Engineers Wetlands Delineation Manual* (USACE 1987-TN2066). If the USACE did not find the wetlands and stream mitigation satisfactory, it could determine whether adverse impacts to the waterway and wetlands were more than minimal and any project modifications could be warranted. In addition, the USACE would require PSEG to assume all liability for accomplishing the corrective work in accordance with 73 FR 19594, “Compensatory Mitigation for Losses of Aquatic Resources” (73 FR 19594-TN1789; 33 CFR 320-TN424; 33 CFR 325-TN425).

PSEG has taken measures to avoid or minimize impacts to jurisdictional wetlands to the maximum extent possible. Mitigation measures to minimize adverse impacts to waters of the United States include the following: minimizing encroachment into coastal wetlands; minimizing encroachment into NJDEP-regulated freshwater wetlands; use of already existing sediment-disposal basins for plant development (i.e., the PSEG permitted disposal facility and the USACE CDF); refinement of the PSEG Site Utilization Plan (Figure 3) to avoid various wetland areas throughout the PSEG Site; and a causeway built on elevated piers or bridges, instead of on fill, to minimize direct impacts to tidal wetlands and to avoid impacts to tidal creeks (PSEG 2014-TN3452). PSEG plans to develop additional wetland impact minimization measures after a reactor technology has been selected and final site layout design is developed (PSEG 2014-TN4235).

Following the implementation of reasonable measures to avoid or minimize impacts to wetlands, compensation for unavoidable adverse impacts could be undertaken with the execution of an approved wetland restoration and/or rehabilitation program. In selecting a site for wetland mitigation, the following factors are typically considered: existing land use (historic and current), property ownership or potential for acquisition, hydrologic potential, proximity to other wetland sites, site topography, connectivity to adjacent natural habitats, site accessibility, and the presence of or potential to develop hydric soils (PSEG 2014-TN3452). Opportunities for wetland mitigation exist at various locations throughout the PSEG Site and vicinity. Factors that may influence site selection for wetland creation include topography, soil types, watershed size, and the presence of adjacent streams as a source of additional water (PSEG 2014-TN3452). Once a candidate mitigation site has been selected, wetland mitigation could be achieved through a series of rehabilitation and/or restoration methods. These methods could be site-specific and might include the control of common reed, restoration of the hydrologic state (i.e., levee removal, channel design, and reestablishing a connection of upland areas to tidal influences), and wetland enhancement that included the restoration of desirable and native vegetation (PSEG 2014-TN3452).

Wetland mitigation plan details would primarily be guided by conditions established under Clean Water Act Section 404 permits issued by the USACE or the NJDEP Land Use Regulation Program and Section 401 water-quality certifications issued by NJDEP. Therefore, specific wetland mitigation efforts could be determined as part of such authorizations (PSEG 2014-TN3452). Several candidate mitigation areas that have the potential to meet some or all of PSEG wetland mitigation needs were identified during the ESP application process. These candidate mitigation areas include portions of the existing PSEG Site, Mannington Meadow, Mason's Point, and additional areas of the PSEG ACW site (PSEG 2014-TN3452).

Wetland mitigation concepts for each area include the enhancement and/or development of coastal and freshwater wetland systems. A network of marsh creeks is integral to the restoration of coastal marsh and would address the loss of creeks within the existing marsh. While the loss of wetlands for site preparation and causeway installation may be noticeable, the review team determined that the habitat loss would not destabilize wetland resources in the vicinity or the ecological function of nearby, unaffected habitat to support prey species important to sustain populations of managed species. Therefore, effects to EFH for managed species and their prey from wetland habitat loss would be minor.

4.2 Dredging Effects

Managed species with EFH that may be affected by dredging impacts include all species and life stages listed in Table 7. In addition, juvenile and adult managed species rely on prey species found in the vicinity of the dredge areas. PSEG proposes to use one hydraulic dredge over a 2-month period, which would serve to reduce turbidity and sedimentation associated with dredging and would limit the extent of impacts on aquatic resources by minimizing the duration of in-water activity (PSEG 2015-TN4234). Although use of an environmental hopper dredge may be less likely to be directly

injurious to fish species, this method requires a longer work window, increases turbidity, and requires additional handling of material for disposal.

Since hydraulic dredging could potentially entrain or impinge juvenile fish, fish larvae, and eggs, PSEG would adhere to the seasonal in-water timing restrictions imposed by the USACE (currently March 1 through June 30) and NJDEP for dredging and other in-water work to avoid sensitive spawning or recruitment windows to minimize these effects (PSEG 2015-TN4234). Some dredging would likely coincide with pile-driving activities previously described, and thus discourage fish species from foraging in the immediate area. Disruption of habitat for foraging in these areas of the Delaware River or wetland areas associated with the causeway is expected to be minor, temporary, and largely mitigable with the use of BMPs, hydraulic dredge technology, and compliance with USACE and NJDEP work window requirements. Juvenile and adult managed species and their prey species that may be present should be able to use adjacent unaffected habitats during dredge activities. Therefore, effects to EFH for managed species and their prey from dredging operations would be minor.

4.3 Pile-Installation Effects

Managed species with EFH that may be affected by noise from installation of piles include all juvenile and adult species listed in Table 7. In addition, juvenile and adult managed species rely on fish prey species that may also be affected by pile-installation noise. PSEG provided an analysis using criteria accepted by NMFS for estimating exceedance distances to determine cumulative sound exposure effect and behavioral adverse effects from pile-driving activities. Figure 5 shows the areas for noise effects which will occur over a period of approximately 50 days for causeway piling installation, 10 days for intake structure sheet piles, and 20 days each for shoreline and caisson sheet pile installation (PSEG 2015-TN4234). Given the short duration of activity, and the abundance of nearby, adjacent unaffected habitat, it is likely that managed species and their mobile prey would avoid the zone of adverse behavioral affect. Therefore, effects to EFH for managed species and their prey from pile-driving activities would be minor.

5.0 CONCLUSIONS

Conclusions regarding PSEG adverse effects on EFH are addressed in Table 8. All conclusions are made for the PSEG site-preparation activities as defined in the Department of the Army permit application (PSEG 2014-4235).

Table 8. Impacts on EFH from Site-Preparation Activities for a New Nuclear Power Plant at the PSEG Site

Common Name	Life Stage	EFH Description[a]			Expected Impact
		Salinity (ppt)	Temperature (°C)	Depth (m)	
Black Sea Bass	Juveniles	>18	>6	1–38	Minimal adverse effect. Pile-installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Clearnose Skate	Juveniles and Adults	12–30	6–20	5–23	Minimal adverse effect. Prey species would be affected by pile-driving and dredging activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Little Skate	Juveniles and Adults	15–32	3–22	4–21	No adverse effect as this species has not been collected or reported in the vicinity of the PSEG Site.
Scup	Juveniles	>15	>7	0–38	Minimal adverse effect. Pile-installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
	Adults	>15	>7	2–185	
Summer Flounder	Juveniles	10–30	>11	0.5–5	Minimal adverse effect. Pile-installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
	Adults	unspecified	unspecified	0–25	
Windowpane Flounder	Eggs	unspecified	<20	<70	No adverse effect.
	Larvae	unspecified	<20	<70	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat.
	Juveniles and Adults	5.5–36	<25–26.8	1–100	Minimal adverse effect. Pile-installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
Winter Flounder	Eggs	10–30	<10	<5	No adverse effect.
	Larvae	4–30	<15	<6	Minimal adverse effect. Installation activities and dredging in the Delaware River Estuary may temporarily disrupt habitat.
	Juveniles	10–30	<25	1–50	Minimal adverse effect. Pile-installation activities and dredging in the Delaware River Estuary may temporarily disrupt foraging activities. Prey species would be similarly affected by these activities in the Delaware River Estuary and the wetland habitat areas associated with the causeway development.
	Adults	15–33	<25	1–100	
Winter Skate	Juveniles and Adults	15–35	3–17	7–18	No adverse effect as this species has not been collected or reported in the vicinity of the PSEG Site.

(a) NOAA 2006-TN2820; Packer et al. 2003-TN2822; Packer et al. 2003-TN2823; Packer et al. 2003-TN2824.

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