Candidate Site Impact Quantification Report

Prepared for
PSEG Power, LLC

Report SL-010129

PSEG

Project 12380-008
April 2010

Prepared by

Sargent & Lundy LLC

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Prepared by

Douglas J. Dahlberg
Project Civil Engineer

Daniel P. Laubenthal
Environmental Site
Evaluation Specialist

Louis D. Wislocki
Civil Engineer

Eyup S. Motan
Geotechnical Engineer

Reviewed by

Timothy P. Krause
Manager

Approved by

Michael J. Shervin
Project Manager

April 9, 2010
Date

SL-010129
April 2010

Sargent & Lundy LLC

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Candidate Site Impact Quantification Report

CONTENTS

CONTENTS (cont.)

CONTENTS (cont.)

TABLES

FIGURES

Figure — Page

ACRONYMS AND ABBREVIATIONS

Term	Definition or Clarification
7Q10	7-day, 10-year low flow
ac.	acre(s)
ASE	Alternative Site Evaluation
DRBC	Delaware River Basin Commission
EIF	equivalent impact factor
ESPA	Early Site Permit Application
ESRI	Environmental Science Research Institute
FEMA	Federal Emergency Management Agency
ft.	foot (feet)
GIS	Geographic Information System
gpm	gallon(s) per minute
HCGS	Hope Creek Generating Station
mi.	mile(s)
NJDEP	New Jersey Department of Environmental Protection
NLCD	National Land Cover Database
NWI	National Wetlands Inventory
PSEG	PSEG Power, LLC
ROW	right-of-way
SGS	Salem Generating Station
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

1. EXECUTIVE SUMMARY

1.1 SCOPE

In September 2009, PSEG Power, LLC (PSEG) contracted Sargent & Lundy, LLC (Sargent & Lundy) to prepare an Impact Quantification Report for the five Candidate Sites discussed in the Alternative Site Evaluation (ASE) Report, SL-010099. The purpose of the Impact Quantification Report was to summarize and compare the approximate environmental impacts of the Candidate Sites in those areas where potential impacts could be evaluated using Geographic Information System (GIS) data and other publicly available information. Generally, the quantification of impacts was based on the conceptual site boundaries, plant footprints, and off-site corridors (access road, rail spur, and water pipeline routes) presented in the ASE Report. The quantification of transmission corridors included both the transmission lines required to connect to the nearest 500-kV transmission line (as presented in the ASE Report) and additional transmission lines that may be required to address grid stability issues (as identified by PSEG transmission studies).

The following types of impacts were evaluated:

- Quantity of natural habitats (wetlands, floodplains, streams, and forest) and sensitive land uses (developed land, cultivated land, Prime Farmland, and Farmland of Statewide Importance) potentially impacted by the plant footprints and off-site corridors, as determined from GIS databases.
- Numbers of residences and property parcels inside the site boundaries and plant footprints, as determined from aerial photographs and property maps.
- Quantity of dredging required for water intake facilities and barge docking facilities, as determined from topographic maps and navigation charts.
- Quantity of surface water available and percentage that would be withdrawn, as determined from published river flow monitoring data.
- Qualitative discussion of issues associated with groundwater withdrawal, as determined from published groundwater data.
- Qualitative discussion of issues associated with endangered, threatened, and rare species, based on New Jersey Natural Heritage data and other government agency data.

The purpose of these evaluations was to provide an approximation of potential environmental impacts suitable for a conceptual comparison of alternative sites.

1.2 METHODS AND RESULTS

Natural habitat and sensitive land use impacts for Sites 4-1, 7-1, 7-2, and 7-3 generally were quantified using GIS mapping data. Natural habitat and sensitive land use impacts for Site 7-4 generally were quantified using detailed habitat and land use evaluations developed for the ESPA. Based on potential impact areas within the site boundaries and the access road, rail spur, and water pipeline corridors, each of the sites has relatively large impacts in some land cover categories and relatively small impacts in other categories. For example, Site 4-1 impacts the largest total area, the largest quantity of forest, and the second-largest quantity of Prime Farmland and Farmland of Statewide Importance; but Site 4-1 impacts the smallest quantity of streams, the smallest quantity of 100-year floodplains, and the second-smallest quantity of wetlands. Site 7-4 impacts the largest quantity of wetlands and the second-largest quantity of 100-year floodplains; but Site 7-4 impacts the smallest total area and the smallest quantity of forest, cultivated land, Prime Farmland, and Farmland of Statewide Importance. Site 7-4 also impacts the second-smallest quantity of streams. Site 7-1 impacts the largest quantity of streams and Farmland of Statewide Importance; Site 7-2 impacts the largest quantity of cultivated land and Prime Farmland; and Site 7-3 impacts the largest quantity of 100-year floodplains. It should be noted that Site 7-4 impacts the largest quantity of land classified as developed, but virtually all of this impact is to land that was developed for past power plant uses. This situation is distinctly different from that at the other sites, all of which are greenfield sites where developed land typically represents residential land use.

Based on transmission facilities, most of the sites again have relatively large impacts in some land cover categories and relatively small impacts in other categories. The only exception is Site 7-4; in comparison with the other sites, Site 7-4 does not have especially large impacts in any category and has the smallest or second-smallest impact in almost all categories.

Existing residences were identified primarily through interpretation of recent aerial photographs supplemented with field reconnaissance along public roads in the site areas. Property parcels were identified using property maps obtained from the township where each site was located. The results indicate that Site 4-1 has the largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries, and the second-largest number of residences and property parcels inside the site boundaries. Site 7-2 has the largest number of residences and property parcels inside the site boundaries, and the second-largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries. Therefore, these two sites clearly have the greatest potential to impact existing residences and property owners. Site 7-4 has no residences inside the plant footprint,

inside the site boundaries, or within 0.5 mile of the site boundaries, and the Site 7-4 boundaries encompass only one property parcel that is not already owned by PSEG. Therefore, Site 7-4 clearly has the least potential to impact existing residences and property owners.

All of the Candidate Sites would require some dredging in the Delaware River to facilitate the construction and operation of a water intake structure and (at most sites) a barge docking facility. It was assumed that the same intake structure and barge facility design would be used at all of the sites; therefore, the required quantity of dredging was estimated based on the river depth and river bottom configuration in each site area. The results indicate that Site 4-1 has the least potential dredging impact, primarily because a barge docking facility is not feasible at this site. The absence of a barge docking facility is a disadvantage for delivering large equipment and materials to the site, but an advantage in terms of minimizing dredging requirements. Of the sites where barge delivery is feasible, Sites 7-1 and 7-4 have an advantage in that the river in the site areas is sufficiently deep so that a barge inlet channel from the main shipping channel is not required, which reduces the amount of dredging required for the barge facility. Site 7-3 has the greatest potential dredging impact, primarily because of the large amount of dredging required for the barge inlet channel.

The Delaware River would be the primary water source for a new power plant located at any of the Candidate Sites. Potential impacts on the Delaware River were evaluated by comparing the estimated water withdrawal, water consumption, and equivalent fresh water consumption rates with the annual average river flow and the 7-day, 10-year low flow for each site area. The results indicate that the percentage of the river flow diverted due to water withdrawal and the percentage consumed due to total water loss are very similar at all of the sites. None of the sites appears to have a significant advantage or disadvantage regarding these parameters. However, based on the equivalent fresh water consumption, Sites 7-1, 7-2, 7-3, and 7-4 have a significant advantage over Site 4-1.

During plant operation, water for potable use and other uses that require fresh water would be withdrawn from the most appropriate groundwater aquifer available at each site. Potential issues associated with groundwater withdrawal were evaluated by reviewing available information on the major aquifers in New Jersey, the approximate depth and thickness of these aquifers within the counties where the Candidate Sites are located, and data for representative wells in the vicinity of each site, including the location, depth, aquifer within which each well is screened, historical water levels, and approximate yields within each aquifer. The available information indicates that the plant groundwater requirements could be supplied by one or more of the aquifers present at

each site. Although some parts of some of the aquifers may have had groundwater drawdown, it is likely that properly located wells could supply the plant water needs with no problems. None of the sites appear to have a significant advantage or disadvantage regarding groundwater withdrawal.

Information on the endangered, threatened, or rare species that have been recorded within approximately 1 mile of Sites 4-1, 7-1, 7-2, and 7-3 was obtained from the New Jersey Department of Environmental Protection. Information on the endangered, threatened, or rare species that potentially could occur on or near Site 7-4 was obtained from ecological studies conducted for the ESPA. Although several such species could occur at each of the sites, it appears unlikely that any of these species would be significantly affected by project construction or operation. None of the sites appears to have a significant advantage or disadvantage regarding endangered, threatened, or rare species.

2. INTRODUCTION

In September 2009, PSEG Power, LLC (PSEG) contracted Sargent & Lundy, LLC (Sargent & Lundy) to prepare an Impact Quantification Report for the five Candidate Sites discussed in the Alternative Site Evaluation (ASE) Report, SL-010099. The purpose of the Impact Quantification Report was to summarize and compare the approximate environmental impacts of the Candidate Sites in those areas where potential impacts could be evaluated using Geographic Information System (GIS) data and other publicly available information. Generally, the quantification of impacts was based on the conceptual site boundaries, plant footprints, and off-site corridors (access road, rail spur, and water pipeline routes) presented in the ASE Report. The quantification of transmission corridors included both the transmission lines required to connect to the nearest 500-kV transmission line (as presented in the ASE Report) and additional transmission lines that may be required to address grid stability issues (as identified by PSEG transmission studies).

The following types of impacts were evaluated:

- Quantity of natural habitats (wetlands, floodplains, streams, and forest) and sensitive land uses (developed land, cultivated land, Prime Farmland, and Farmland of Statewide Importance) potentially impacted by the plant footprints and off-site corridors, as determined from GIS databases.
- Numbers of residences and property parcels inside the site boundaries and plant footprints, as determined from aerial photographs and property maps.
- Quantity of dredging required for water intake facilities and barge docking facilities, as determined from topographic maps and navigation charts.
- Quantity of surface water available and percentage that would be withdrawn, as determined from published river flow monitoring data.
- Qualitative discussion of issues associated with groundwater withdrawal, as determined from published groundwater data.
- Qualitative discussion of issues associated with endangered, threatened, and rare species, based on New Jersey Natural Heritage data and other government agency data.

The purpose of these evaluations was to provide an approximation of potential environmental impacts suitable for a conceptual comparison of alternative sites.

Based on the conceptual site boundaries, plant footprints, and offsite corridors identified in the ASE Report, the dimensions of the Candidate Sites and associated off-site corridors are summarized below.

Site 4-1 has a total area of approximately 1,128 acres (ac.). The plant footprint (including areas used temporarily during plant construction) occupies approximately 401 ac. The following off-site features would be required:

- Road access to the site would be provided by existing public roads, but portions of those roads would have to be relocated around plant facilities or improved to allow them to carry plant-related traffic. It was assumed that all roads would be constructed on a right-of-way (ROW) 150 feet (ft.) wide. A total of approximately 3.5 miles (mi.) of road construction would be required.
- A new rail spur would allow delivery of materials and equipment to the site. It was assumed that the rail spur would be constructed on a ROW 150 ft. wide. A conceptual route to the nearest active railroad line was identified based on existing terrain and land use features, and this route is approximately 6.8 mi. long.
- A new makeup water pipeline would withdraw water from the Delaware River, and a new blowdown pipeline would discharge wastewater to the Delaware River. It was assumed that the two pipelines would be constructed parallel to one another, on a single ROW 100 ft. wide. A conceptual route to the Delaware River was identified based on existing terrain and land use features, and this route is approximately 6.6 mi. long.
- Three new 500-kV transmission lines would connect the site to the existing 500-kV transmission system. It was assumed that the three transmission lines would be constructed parallel to one another, each on a ROW 200 ft. wide. A conceptual route to the nearest existing 500-kV transmission line was identified based on existing terrain and land use features, and this route is approximately 1.1 mi. long. It was expected that an interposing switchyard would be required at the connection point, and this switchyard was conceptually located on approximately 25 ac. of land. In addition, it was expected that a new 500-kV transmission line from the switchyard to the Limerick Substation in Pennsylvania would be required to address potential grid stability issues. The Limerick Substation is at the Limerick Generating Station, which would be capable of providing synchronizing support to Site 4-1 during grid disturbances, thus maintaining system stability. It was assumed that this transmission line would be constructed on a 200-ft. wide ROW parallel to existing transmission lines, for a total distance of approximately 84 mi.

Site 7-1 has a total area of approximately 987 ac. The plant footprint (including areas used temporarily during plant construction) occupies approximately 432 ac. The following off-site features would be required:

- Road access to the site would be provided by existing public roads, but portions of those roads would have to be relocated around plant facilities or improved to allow them to carry plant-related traffic. It was assumed that all roads would be constructed on a ROW 150 ft. wide. A total of approximately 3.3 mi. of road construction would be required.

- A new rail spur would allow delivery of materials and equipment to the site. It was assumed that the rail spur would be constructed on a ROW 150 ft. wide. A conceptual route to the nearest active railroad line was identified based on existing terrain and land use features, and this route is approximately 6.9 mi. long.
- A new makeup water pipeline would withdraw water from the Delaware River, and a new blowdown pipeline would discharge wastewater to the Delaware River. It was assumed that the two pipelines would be constructed parallel to one another, on a single ROW 100 ft. wide. A conceptual route to the Delaware River was identified based on existing terrain and land use features, and this route is approximately 5.1 mi. long.
- Three new 500-kV transmission lines would connect the site to the existing 500-kV transmission system. It was assumed that the three transmission lines would be constructed parallel to one another, each on a ROW 200 ft. wide. A conceptual route to the nearest existing 500-kV transmission line was identified based on existing terrain and land use features, and this route is approximately 5.4 mi. long. It was expected that an interposing switchyard would be required at the connection point, and this switchyard was conceptually located on approximately 25 ac. of land. In addition, it was expected that a new 500-kV transmission line from the switchyard to the Indian River Substation in Delaware would be required to address potential grid stability issues. The Indian River Substation is a strong, regional 500-kV substation that would be capable of providing synchronizing support to Site 7-1 during grid disturbances, thus maintaining system stability. It was assumed that this transmission line would be constructed on a 200-ft. wide ROW generally following existing transmission lines, for a total distance of approximately 96 mi.

Site 7-2 has a total area of approximately 996 ac. The plant footprint (including areas used temporarily during plant construction) occupies approximately 394 ac. The following off-site features would be required:

- Road access to the site would be provided by existing public roads, but portions of those roads would have to be relocated around plant facilities or improved to allow them to carry plant-related traffic. It was assumed that all roads would be constructed on a ROW 150 ft. wide. A total of approximately 2.2 mi. of road construction would be required.
- A new rail spur would allow delivery of materials and equipment to the site. It was assumed that the rail spur would be constructed on a ROW 150 ft. wide. A conceptual route to the nearest active railroad line was identified based on existing terrain and land use features, and this route is approximately 5.4 mi. long.
- A new makeup water pipeline would withdraw water from the Delaware River, and a new blowdown pipeline would discharge wastewater to the Delaware River. It was assumed that the two pipelines would be constructed parallel to one another, on a single ROW 100 ft. wide. A conceptual route to the Delaware River was identified based on existing terrain and land use features, and this route is approximately 12.9 mi. long.
- An existing 500-kV transmission line crosses the site, and this line would provide a two-circuit connection to the 500-kV transmission system (incoming and outgoing portions of the line). A portion of the existing line would have to be re-routed to avoid plant facilities, for a total

distance of approximately 1.8 mi. A third circuit connection to the transmission system would be provided by a new transmission line from Site 7-2 to a second existing 500-kV corridor, which originates from the Salem Generating Station (SGS) and Hope Creek Generating Station (HCGS) site. It is assumed that this new transmission line would be constructed on a ROW 200 ft. wide. A conceptual route to the existing 500-kV transmission corridor was identified based on existing terrain and land use features, and this route is 4.1 mi. long. It was expected that an interposing switchyard would be required at the connection point, and this switchyard was conceptually located on approximately 25 ac. of land. In addition, it was expected that a new 500-kV transmission line would be required to address potential grid stability issues. A new line between the Indian River Substation in Delaware and the SGS/HCGS site (which, in turn, is electrically tied to the new interposing switchyard) would fulfill this purpose. The Indian River Substation is capable of providing synchronizing support to maintain system stability during grid disturbances. It was assumed that this transmission line would be constructed on a 200-ft. wide ROW generally following existing transmission lines, for a total distance of approximately 107 mi.

Site 7-3 has a total area of approximately 886 ac. The plant footprint (including areas used temporarily during plant construction) occupies approximately 395 ac. The following off-site features would be required:

- Road access to the site would be provided by existing public roads, but portions of those roads would have to be relocated around plant facilities or improved to allow them to carry plant-related traffic. It was assumed that all roads would be constructed on a ROW 150 ft. wide. A total of approximately 4.2 mi. of road construction would be required.

- A new makeup water pipeline would withdraw water from the Delaware River, and a new blowdown pipeline would discharge wastewater to the Delaware River. It was assumed that the two pipelines would be constructed parallel to one another, on a single ROW 100 ft. wide. A conceptual route to the Delaware River was identified based on existing terrain and land use features, and this route is approximately 0.7 mi. long

- Three new 500-kV transmission lines would connect the site to the existing 500-kV transmission system. It was assumed that the three transmission lines would be constructed parallel to one another, each on a ROW 200 ft. wide. A conceptual route to the nearest existing 500-kV transmission line (which originates from the SGS/HCGS site) was identified based on existing terrain and land use features, and this route is approximately 6.8 mi. long. It was expected that an interposing switchyard would be required at the connection point, and this switchyard was conceptually located on approximately 25 ac. of land. In addition, it was expected that a new 500-kV transmission line would be required to address potential grid stability issues. A new line between the Indian River Substation in Delaware and the SGS/HCGS site (which, in turn, is electrically tied to the new interposing switchyard) would fulfill this purpose. The Indian River Substation is capable of providing synchronizing support to maintain system stability during grid disturbances. It was assumed that this transmission line would be constructed on a 200-ft. wide ROW generally following existing transmission lines, for a total distance of approximately 107 mi.

A rail spur would not be required for Site 7-3, because the site is favorably located for barge delivery of materials and equipment.

Site 7-4 is located at an existing nuclear power facility, and most of the land within the overall site boundaries has already been used for various power plant activities. Therefore, the total area within the site boundaries is not a meaningful parameter. However, the footprint for the new plant (including adjacent areas used temporarily during plant construction) occupies approximately 431 ac. The following off-site features would be required:

- Road access would be provided by a new causeway that connects to existing public roads. The causeway would be approximately 4.8 mi. long. The conceptual design specifies a 200-ft. wide ROW in upland areas and a 48-ft. wide elevated structure where the causeway crosses lowland areas. For impact assessment purposes, a 50-ft. wide ROW was assumed to be permanently impacted by the elevated causeway, and an additional 50-ft. wide ROW was assumed to be temporarily impacted during construction.
- No off-site transmission lines would be required for the primary connection to the existing 500-kV transmission system, because Site 7-4 is located adjacent to an existing 500-kV substation. However, it was expected that a new 500-kV transmission line would be required to address potential grid stability issues. A new line between the Indian River Substation in Delaware and Site 7-4 would fulfill this purpose. The Indian River Substation is capable of providing synchronizing support to maintain system stability during grid disturbances. It was assumed that this transmission line would be constructed on a 200-ft. wide ROW generally following existing transmission lines, for a total distance of approximately 107 mi.

A rail spur would not be required for Site 7-4, because the site is favorably located for barge delivery of materials and equipment. Furthermore, makeup water and wastewater blowdown pipelines would not be required for Site 7-4, because the site is located adjacent to the Delaware River.

Maps showing the site layouts and off-site corridors identified for each Candidate Site are included in Appendix A.

This report has been prepared to document the methods and results of the Candidate Site Impact Quantification study. The methods used to evaluate each type of impact and the results of those evaluations are described in the following sections of this report.

3. NATURAL HABITATS AND SENSITIVE LAND USES

Natural habitat and land use impacts for Sites 4-1, 7-1, 7-2, and 7-3 generally were quantified using GIS mapping data as described below. Natural habitat and land use impacts for Site 7-4 generally were quantified using detailed habitat and land use evaluations developed for the Early Site Permit Application (ESPA). Natural habitat and land use impacts associated with the potential transmission line to Indian River Substation for Sites 7-1, 7-2, 7-3, and 7-4 were based on the GIS macro-corridor analysis developed for the ESPA.

3.1 METHODS

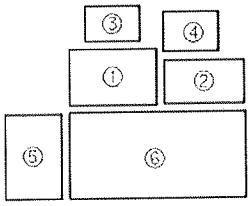
GIS mapping functions and analyses were performed with ArcInfo, Version 9.3.1, software developed by the Environmental Science Research Institute (ESRI). The conceptual site boundaries, plant footprint, and off-site corridor routes (except for the transmission macro-corridor to Indian River Substation) were developed as DWG files and imported into the ArcMap interface in ArcInfo. To facilitate impact calculations, additional plant layout areas and proximity buffers were created in ArcMap.

As illustrated in Figure 3-1, the plant footprints developed by Sargent & Lundy included six blocks representing the conceptual utilization areas for various plant facilities. For quantifying potential impacts, all land inside and in between these plant footprint blocks was assumed to be directly disturbed, at least temporarily, during plant construction. This part of each site was designated the Plant Layout Area. In addition, for all sites except Site 7-4, the land inside the site boundaries but outside the Plant Layout Area was designated the Remaining Site Boundary Area. Non-power-related land uses generally would be prohibited in the Remaining Site Boundary Areas, and these areas would be subject to indirect disturbance due to noise and dust during plant construction and operation. For Sites 4-1, 7-1, 7-2, and 7-3, the Remaining Site Boundary Areas represent previously undisturbed land that would be impacted by site development. For Site 7-4, all land inside the site boundaries but outside the Plant Layout Area has already been disturbed for previous power plant development, so the Remaining Site Boundary Area is not meaningful at Site 7-4.

For all of the sites, Plant Layout Areas were created in ArcMap in order to perform impact analyses for the land inside and in between the plant footprint blocks. The Plant Layout Areas were created by drawing polygons that connected the outermost vertices of the plant footprint blocks, as illustrated in Figure 3-2. For Sites 4-1, 7-1, 7-2, and 7-3, Remaining Site Boundary Areas were created in ArcMap in order to perform impact analyses for

the land inside the site boundaries but outside the Plant Layout Area. The Remaining Site Boundary Areas were created by inputting site boundaries to ArcMap's Erase Analysis Tool and providing the Plant Layout Areas as the erase figure. The remaining polygons were defined as the Remaining Site Boundary Areas, as illustrated in Figure 3-3.

Figure 3-1 — Conceptual Plant Footprint Blocks



① POWER BLOCK AREA (1900' X 1600') = 70 ACRES
② COOLING TOWER AREA (1800' X 1200') = 50 ACRES
③ PLANT SWITCHYARD AREA (1200' X 900') = 25 ACRES
④ CONCRETE BATCH PLANT AREA (1300' X 900') = 27 ACRES
⑤ CONSTRUCTION PARKING AREA (1600' X 1300') = 48 ACRES
⑥ CONSTRUCTION LAYDOWN AND TEMPORARY (3700' X 1600') = 135 ACRES
CONSTRUCTION SUPPORT FACILITIES
(OFFICES & WAREHOUSES)

Figure 3-2 — Creating Plant Layout Area by Tracing Footprint Blocks

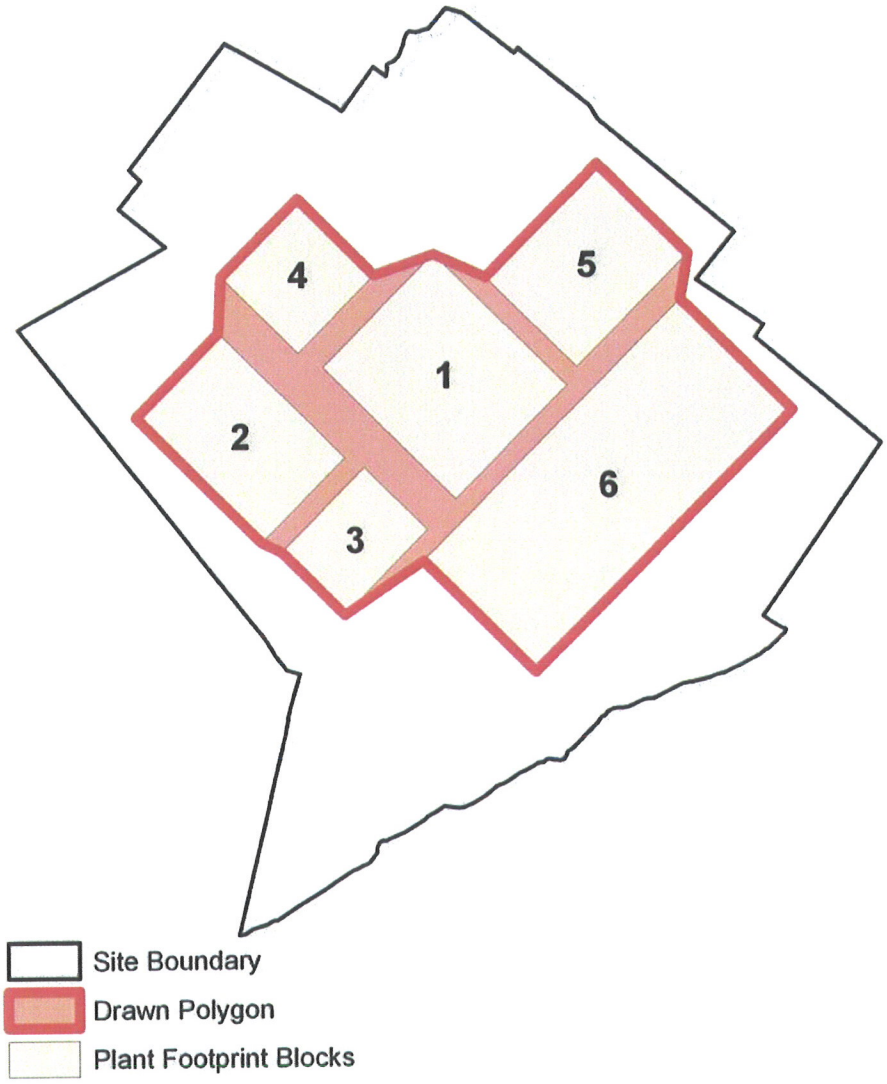
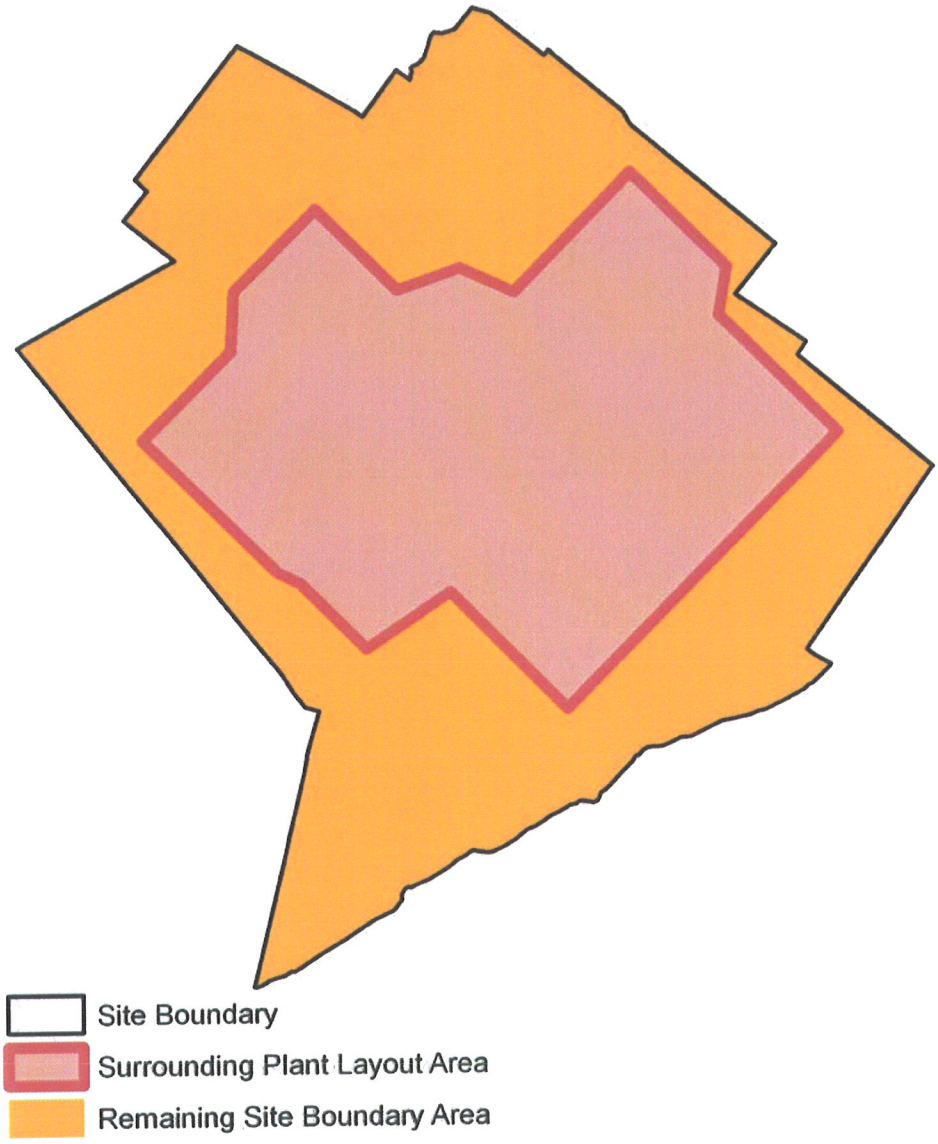


Figure 3-3 — Creating Remaining Site Boundary Area



To calculate the impacts due to the access road, rail spur, water pipeline, and transmission line corridors Proximity, buffer polygons also were created in ArcMap. All corridor buffers were equal to half of the total corridor widths listed in Section 2. In addition, transmission corridor impacts for all of the sites except Site 4-1 included the results of the macro-corridor analysis presented in the ESPA. The transmission corridor impacts for

Site 4-1 included an additional transmission line from the interposing switchyard to the Limerick Power Plant, as listed in Section 2.

Several land cover features were considered when quantifying the impact of the plant layouts and off-site corridors. The features considered, along with the data source for their corresponding ArcGIS feature class, are listed in Table 3-1. To calculate impact quantities, all of these land cover features were separately clipped to each of the polygon geographic features using the ArcGIS Clip Analysis tool. For each of the resulting clipped features, areas and lengths were calculated using the Calculate Geometry function in ArcMap. A detailed breakdown of the resulting impact calculations is provided in Appendix B.

3.2 RESULTS

Table 3-2 summarizes the impacts associated with the Plant Layout Area, Remaining Site Boundary Area, and access road, rail spur, and water pipeline corridors as required for each site. The impact estimates are based on GIS impact calculations for Sites 4-1, 7-1, 7-2, and 7-3, and ESPA impact calculations for Site 7-4. It can be seen that each of the sites has relatively large impacts in some land cover categories and relatively small impacts in other categories. For example, Site 4-1 impacts the largest total area, the largest quantity of forest, and the second-largest quantity of Prime Farmland and Farmland of Statewide Importance; but Site 4-1 impacts the smallest quantity of streams, the smallest quantity of 100-year floodplains, and the second-smallest quantity of wetlands. Site 7-4 impacts the largest quantity of wetlands and the second-largest quantity of 100-year floodplains; but Site 7-4 impacts the smallest total area and the smallest quantity of forest, cultivated land, Prime Farmland, and Farmland of Statewide Importance. Site 7-4 also impacts the second-smallest quantity of streams. Site 7-1 impacts the largest quantity of streams and Farmland of Statewide Importance; Site 7-2 impacts the largest quantity of cultivated land and Prime Farmland; and Site 7-3 impacts the largest quantity of 100-year floodplains. It should be noted that Site 7-4 impacts the largest quantity of land classified as developed, but virtually all of this impact is to land that was developed for past power plant uses. This is distinctly different than the other sites, where developed land typically represents residential land use.

Table 3-1 — Land Features Considered in GIS Mapping

Land Feature Sub-Category (if applicable)	Data Source
Wetlands	U.S. Fish and Wildlife Service, National Wetlands Inventory
Estuarine and Marine Deepwater	
Estuarine and Marine Wetland	
Freshwater Emergent Wetland	
Freshwater Forested/Shrub Wetland	
Other Wetlands *	
Land Cover	
Forest	U.S. Geological Survey, National Land Cover Database (NLCD)–30-meter resolution, categories 40, 41, 42,43
Pasture/Hay	NLCD, category 81
Cultivated Crops	NLCD, category 82
Total Planted/Cultivated Land	NLCD, categories 81, 82
Developed Land	NLCD, categories 20, 21, 22, 23, 24
Open Water	NLCD, category 11
Barren Land	NLCD, category 31
Grasslands/Herbaceous	NLCD, category 71
Prime Farmland **	U.S. Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic
Farmland of Statewide Importance**	
100-Year Floodplain	Federal Emergency Management Agency, 100-Year Q3/DFIRM Flood Zones
Streams	New Jersey Department of Environmental Protection, Surface Water Quality Standards / U.S. Geological Survey, National Hydrography Dataset

* The "Other Wetlands" grouping includes wetlands classified as Freshwater Pond, Lake, Riverine, and Other.

** Geographic farmland data not available for New Castle County, DE.

Table 3-2 — Summary of Candidate Site Impacts Due to Plant Layout Area, Remaining Site Boundary Area, and Non-Transmission Off-Site Corridors

Land Cover Category	Site 4-1	Site 7-1	Site 7-2	Site 7-3	Site 7-4
Total Impact Area (acres)	1,395.9	1,233.2	1,289.2	970.1	499.5
Planted / Cultivated Land (acres)	926.8	971.2	1,102.4	575.1	11.5
Prime Farmland (acres)	843.2	202.5	1,012.3	777.3	15.9
Farmland of Unique or Statewide Importance (acres)	507.4	608.0	144.9	81.2	18.5
Developed Land (acres)	16.7	13.5	10.7	3.0	95.7
Forest (acres)	219.8	116.0	95.1	122.3	0.1
Wetlands (acres)	91.6	113.5	86.9	172.6	228.7
100-year Floodplain (acres)	1.3	81.4	57.5	220.0	152.0
Streams (linear feet)	9,361	22,232	11,630	14,885	9,388

Note: All impacts are based on the Plant Layout Area, Remaining Site Boundary Area, and the access road, rail spur, and water / wastewater pipeline corridors, as necessary at each site.

Table 3-3 summarizes the impacts associated with the transmission corridors and interposing switchyard as required for each site. The impact estimates are based on GIS impact calculations for most transmission corridors and the interposing switchyards, and are based on the ESPA macro-corridor analysis for the potential transmission line to Indian River Substation. Again, it can be seen that most of the sites have relatively large impacts in some land cover categories and relatively small impacts in other categories. The only exception is Site 7-4, which does not have especially large impacts in any category and has the smallest or second-smallest impact in almost all categories.

Finally, it should be noted that the rail spur for Site 4-1 crosses part of the New Jersey Highlands, an area designated by the state legislature for special preservation and planning measures. Although the Highlands does not constitute a specific land use or natural habitat, it is an environmentally sensitive area, and impacts on the Highlands generally would be expected to receive more regulatory scrutiny than impacts in other areas.

Table 3-3 — Summary of Candidate Site Impacts Due to Transmission Facilities

Land Cover Category	Site 4-1	Site 7-1	Site 7-2	Site 7-3	Site 7-4
Total Impact Area (acres)	2,135.6	2,857.1	2,895.6	3,238.4	2,728.0
Planted / Cultivated Land (acres)	1,274.9	1,357.6	1,463.3	1,567.2	1,358.0
Prime Farmland (acres)	595.3	843.1	921.3	1,048.5	837.0
Farmland of Unique or Statewide Importance (acres)	822.4	677.0	657.8	779.0	642.0
Developed Land (acres)	171.2	134.6	148.6	146.3	146.0
Forest (acres)	581.2	428.2	464.4	632.5	408.0
Wetlands (acres)	36.1	963.4	825.1	935.9	814.0
100-year Floodplain (acres)	102.8	1,172.0	1,026.0	1,065.4	1,026.0
Streams (linear feet)	32,704	100,104	79,218	86,596	77,088

Note: The transmission facilities include all off-site transmission corridors and an interposing switchyard at the interconnection point, as necessary at each site.

Last page of Section 3.

4. RESIDENCES AND PROPERTY PARCELS

Existing residences were identified primarily through interpretation of recent aerial photographs supplemented with field reconnaissance along public roads in the site areas. The potential impact on residences would depend on exactly where they are located vs. the site boundary. Residences located inside the Plant Layout Areas would have to be removed before plant construction could proceed. Residences located outside the Plant Layout Areas but inside the site boundaries would not necessarily have to be removed, but plant security and emergency planning measures would prevent them from being occupied during plant operation. Residences outside the site boundaries but within approximately 0.5 mi. of the boundaries could remain in use but might be subject to adverse impacts due to noise and visual intrusion.

4.1 METHODS

Aerial photographs were obtained from the GLOBALMAPPER website under the National Agricultural Imaging Program. The plant footprint and site boundary lines provided in the ASE Report were overlayed on the aerial photographs, and a 0.5 mi. separation line was drawn around the site boundaries. Residences were totaled inside the plant footprint, inside the site boundaries, and outside the site boundaries but within 0.5 mi.

Residences were identified as individual houses or other residential units. Structures that appeared to be garages, barns, or other utility buildings were not counted. Due to the rural setting of all the site areas, many residences have agricultural-related buildings nearby. A house with multiple "out buildings" that appeared to be for agricultural use was counted as a single residence. Locations where two houses were served by a single driveway were counted as two residences although they might be on a single property.

Property parcels were identified using property maps obtained from the township where each site was located. Although individual land owners were not identified, the number of property parcels within the site boundaries is considered an indication of the number of owners potentially affected by land acquisition for the new plant.

4.2 RESULTS

The numbers of residences and property parcels potentially affected at each site are summarized in Table 4-1. It can be seen that Site 4-1 has the largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries, and the second-largest number of residences and property parcels inside the site boundaries.

Site 7-2 has the largest number of residences and property parcels inside the site boundaries, and the second-largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries. Therefore, these two sites clearly have the greatest potential to impact existing residences and property owners. Site 7-4 has no residences inside the plant footprint, inside the site boundaries, or within 0.5 mile of the site boundaries, and the Site 7-4 boundaries encompass only one property parcel that is not already owned by PSEG. Therefore, Site 7-4 clearly has the least potential to impact existing residences and property owners.

Table 4-1 — Summary of Impacts to Residences and Property Parcels

Parameter	Site 4-1	Site 7-1	Site 7-2	Site 7-3	Site 7-4
Number of Residences:					
Inside Plant Footprint	19	7	8	8	0
Inside Site Boundary	26	17	46	9	0
Outside Site Boundary but within 0.5 Mile of Site Boundary	109	39	76	17	0
Number of Property Parcels Not Owned by PSEG Inside Site Boundary	32	29	62	9	1

Last page of Section 4.

5. DREDGING REQUIREMENTS

All of the Candidate Sites would require some dredging in the Delaware River to facilitate the construction and operation of a water intake structure and (at most sites) a barge docking facility. It was assumed that the same intake structure and barge facility design would be used at all of the sites; therefore, the required quantity of dredging would depend on the river depth and river bottom configuration in each site area. The methods used to estimate the quantity of dredging and the results for each site are summarized below.

5.1 METHODS FOR WATER INTAKE

For this comparative analysis it was assumed that each intake location would have a 200-ft. wide channel extending from the intake structure to a point where the river is of sufficient depth. The minimum water depth required for proper operation of the intake is such that at least 6 ft. of water is maintained over the interior bottom of the intake opening. Given that the interior foundation elevation of the intake structure that extends into the river is approximately 6 ft. below the extreme low water level, the minimum required water depth below historical low water level in the intake area is approximately 12 ft. Tidal fluctuations in the area of Sites 7-1, 7-2, 7-3, and 7-4 can significantly affect the water level, so the minimum depth required for these sites is approximately 19 ft. below the mean tide elevation. During final design at any of the intake locations, more site-specific water elevation information would be used to establish required elevations. Tidal fluctuations are not significant in the area of Site 4-1, so the minimum depth required for Site 4-1 is approximately 12 ft. below the historic low water elevation.

Conceptual dredging quantities were estimated based on the water intake (and adjacent barge dock as applicable) areas shown in Figures 5-1 through 5-5. Templates of the configurations shown in Figures 5-1 through 5-5 were placed over the appropriate U.S. Geological Survey (USGS) topographic quadrangle maps showing river bottom elevations (where available). These sketches were then used to estimate dredging quantities based on the area and depth of required dredging. The river bottom area to be disturbed at each site was scaled directly from each sketch.

Water depth measurements for Sites 7-1, 7-2, 7-3, and 7-4 were obtained using the Wilmington South, Taylors Bridge, Canton, and Frenchtown USGS quadrangles, respectively. Navigation charts published by the National Oceanic and Atmospheric Administration were reviewed but found to have the same river depth information as

the USGS quadrangles. Neither the USGS quadrangles nor the navigation charts provide river depth information for the Site 4-1 area, so dredging quantities for this site were based on worst case assumptions as described below.

5.2 METHODS FOR BARGE DOCKING FACILITIES

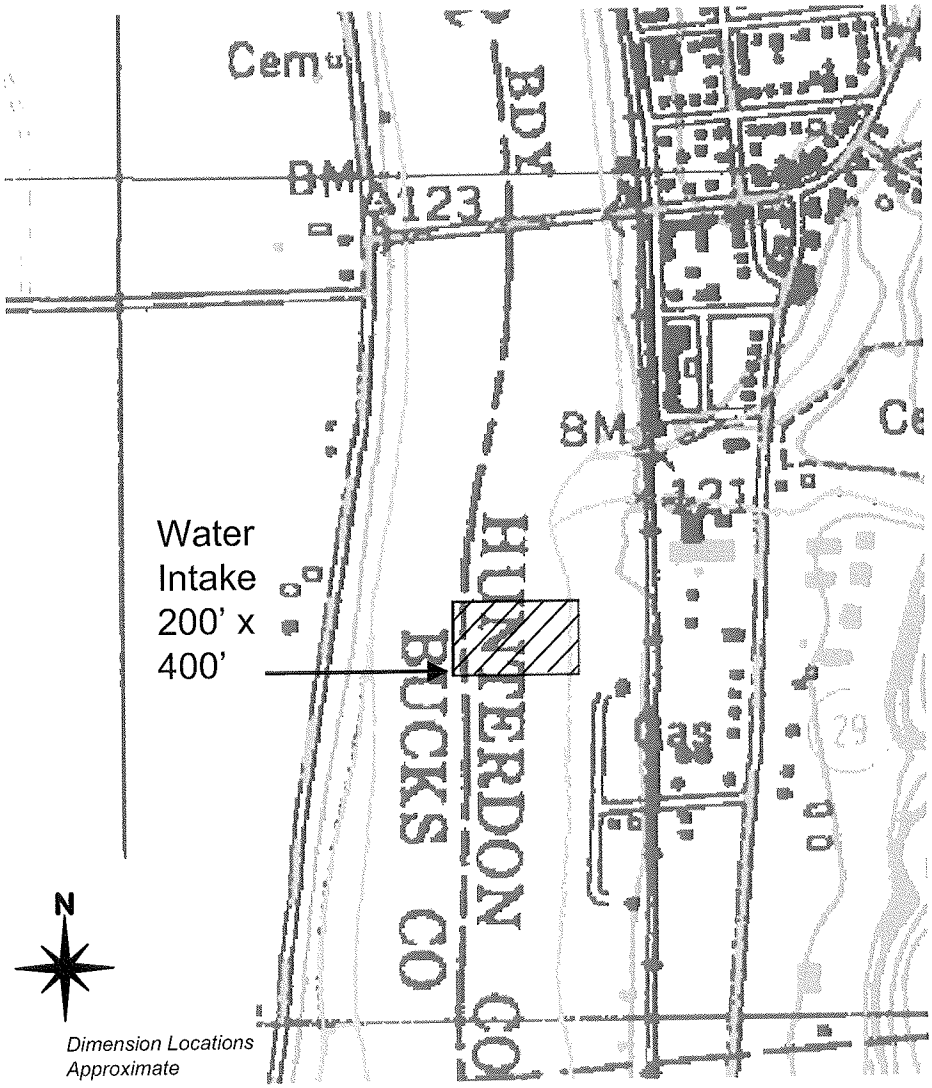
Barge unloading docks require a turning basin in front of the docks consisting of an area approximately 1,400 ft. long by 2,100 ft. wide to allow multiple barge rafts to maneuver before securing to the docks. The approximate minimum depth is 15 ft. below the low water level. If the existing river depth satisfies this requirement at the outer edge of the turning basin (the furthest point from shore), no additional channel is required for barge ingress/egress. If the river is not deep enough at the outer edge of the turning basin, a 450-ft. wide channel must be dredged to the minimum depth of 15 ft. to the point where the river reaches that depth. This channel width would allow two barge rafts, each three barges wide, to pass each other.

5.3 RESULTS FOR SITE 4-1

Water depth data for the Delaware River in the Site 4-1 area was not available. A conservative estimate of dredging requirements for the water intake was developed based on the center of the river being approximately 400 ft. off-shore. It was assumed that the deepest portion of the river is at the center, requiring dredging to that point. Dredging a channel 200-ft. wide and 400-ft. long would produce approximately 2 ac. of bottom disturbance. Conservatively assuming that the entire channel area has virtually no existing depth and must be dredged to a depth of 12 ft. would produce approximately 35,000 cubic yards of dredged material.

A barge docking facility was not evaluated for Site 4-1, as it is north of the fall line in Trenton and barge navigation in the Site 4-1 area is not possible. The conceptual dredging area for the water intake location is shown in Figure 5-1.

Figure 5-1 — Conceptual Dredging Area for Site 4-1



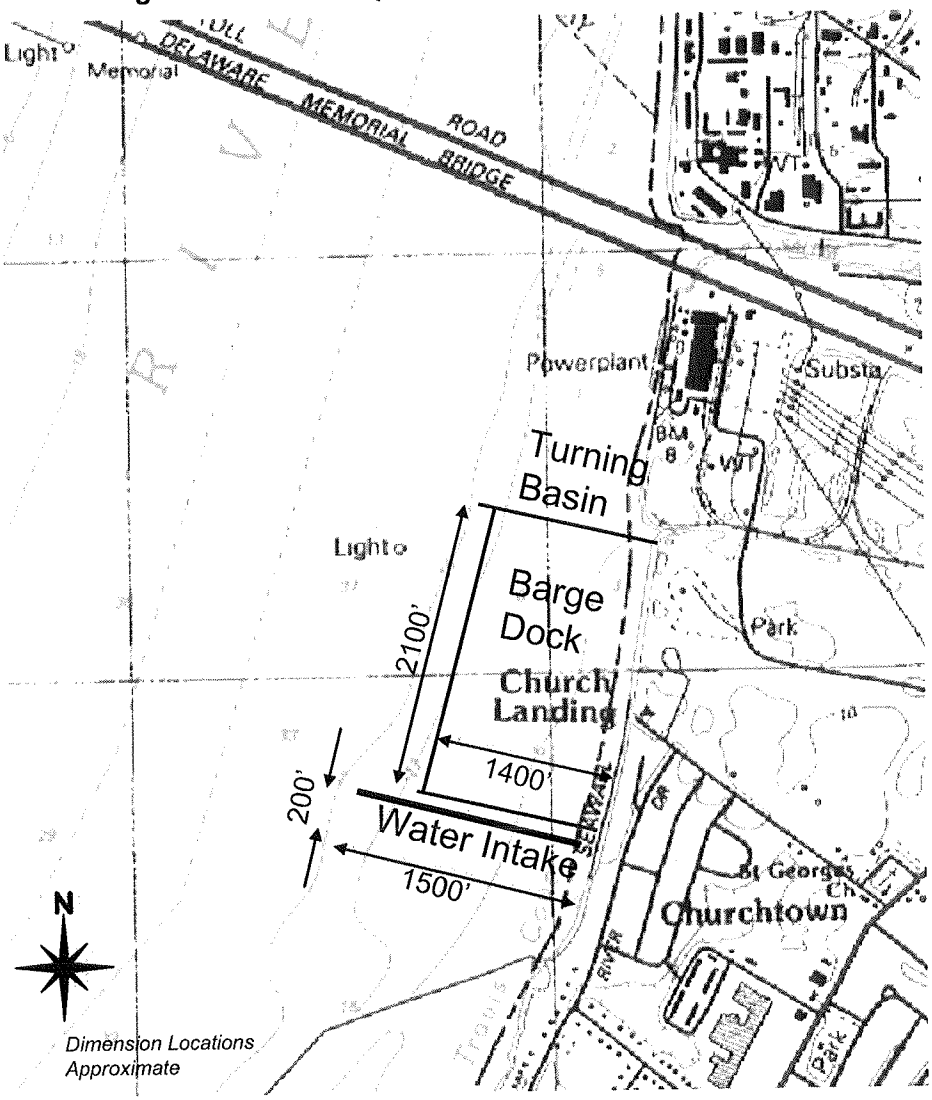
5.4 RESULTS FOR SITE 7-1

Sufficient depth for the water intake is reached approximately 1,500 ft. from shore in the Site 7-1 area. Dredging a channel 200 ft. wide and 1,500 ft. long would produce approximately 7 ac. of bottom disturbance. To reach the required depth of 18 ft., an average of approximately 9 ft. of dredging would be required for this channel, resulting in approximately 100,000 cubic yards of dredged material.

Dredging a barge turning basin that is 1,400 ft. wide by 2,100 ft. long would produce approximately 67 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 10.5 ft. of dredging would be required for this area, resulting in approximately 1,143,000 cubic yards of dredged material. No additional channel would be required for barge ingress/egress because the river depth is sufficient at the end of the turning basin.

The conceptual dredging areas for the water intake and adjacent barge dock locations are shown in Figure 5-2.

Figure 5-2 — Conceptual Dredging Areas for Site 7-1



5.5 RESULTS FOR SITE 7-2

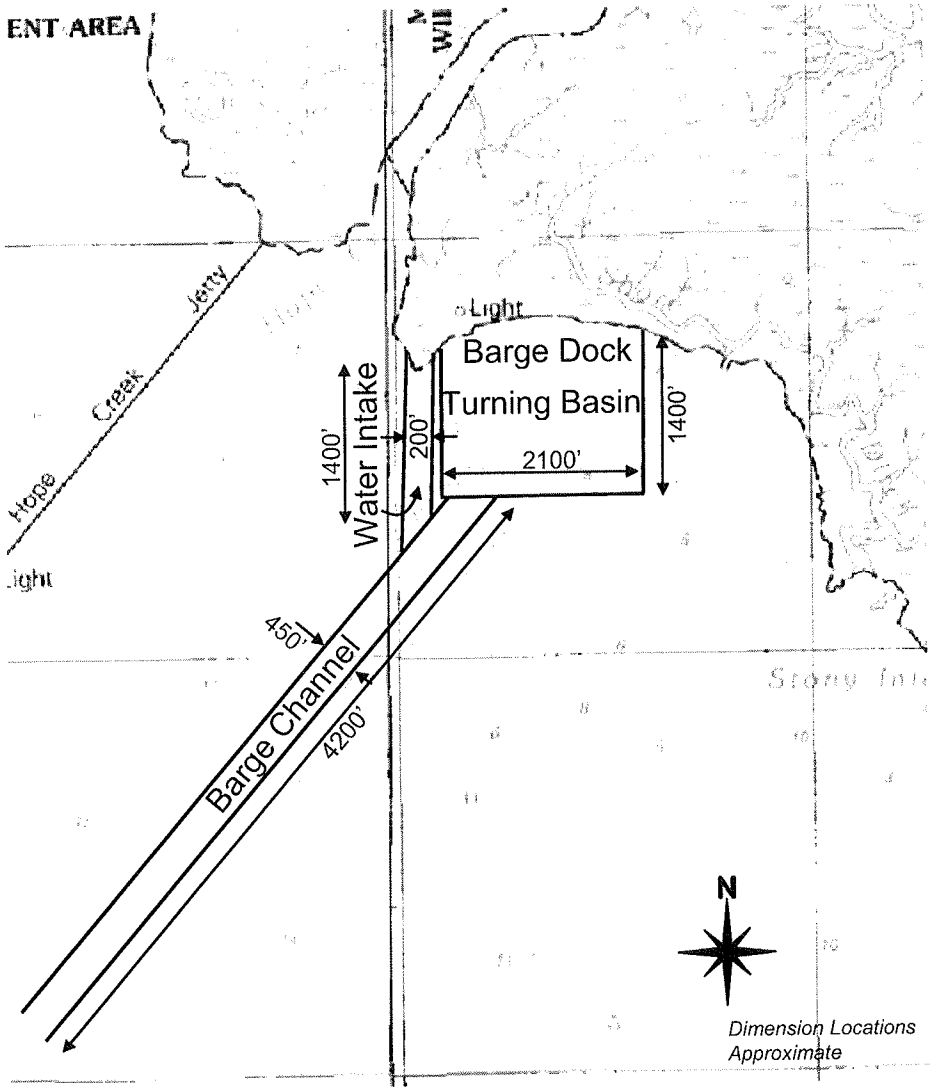
Sufficient depth for the water intake is reached approximately 1,400 ft. from shore in the Site 7-2 area. Dredging a channel 200 ft. wide and 1,400 ft. long would produce approximately 6 ac. of bottom disturbance. To reach the required depth of 18 ft., an average of approximately 14 ft. of dredging would be required for this channel, resulting in approximately 145,000 cubic yards of dredged material.

Dredging a barge turning basin that is 1,400 ft. wide by 2,100 ft. long would produce approximately 67 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 11 ft. of dredging would be required for this area, resulting in approximately 1,197,000 cubic yards of dredged material.

A barge inlet channel that is approximately 450 ft. wide by 4,200 ft. long would be required for Site 7-2. Dredging this area would produce approximately 43 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 7 ft. of dredging would be required for this area, resulting in approximately 490,000 cubic yards of dredge material.

The conceptual dredging areas for the water intake and adjacent barge dock locations are shown in Figure 5-3.

Figure 5-3 — Conceptual Dredging Areas for Site 7-2



5.6 RESULTS FOR SITE 7-3

Sufficient depth for the water intake is reached approximately 2,500 ft. from shore in the Site 7-3 area. Dredging a channel 200 ft. wide and 2,500 ft. long would produce approximately 11 ac. of bottom disturbance. To reach the required depth of 18 ft., an average of approximately 10 ft. of dredging would be required for this channel, resulting in approximately 185,000 cubic yards of dredged material.

Dredging a barge turning basin that is 1,400 ft. wide by 2,100 ft. long would produce approximately 67 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 10 ft. of dredging would be required for this area, resulting in approximately 1,089,000 cubic yards of dredged material.

A barge inlet channel that is approximately 450 ft. wide by 7,900 ft. long would be required for Site 7-3. Dredging this area would produce approximately 82 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 7.5 ft. of dredging would be required for this area, resulting in approximately 990,000 cubic yards of dredge material.

The conceptual dredging areas for the water intake and adjacent barge dock location are shown in Figure 5-4 and Figure 5-5.

Figure 5-4 — Conceptual Dredging Areas for Site 7-3

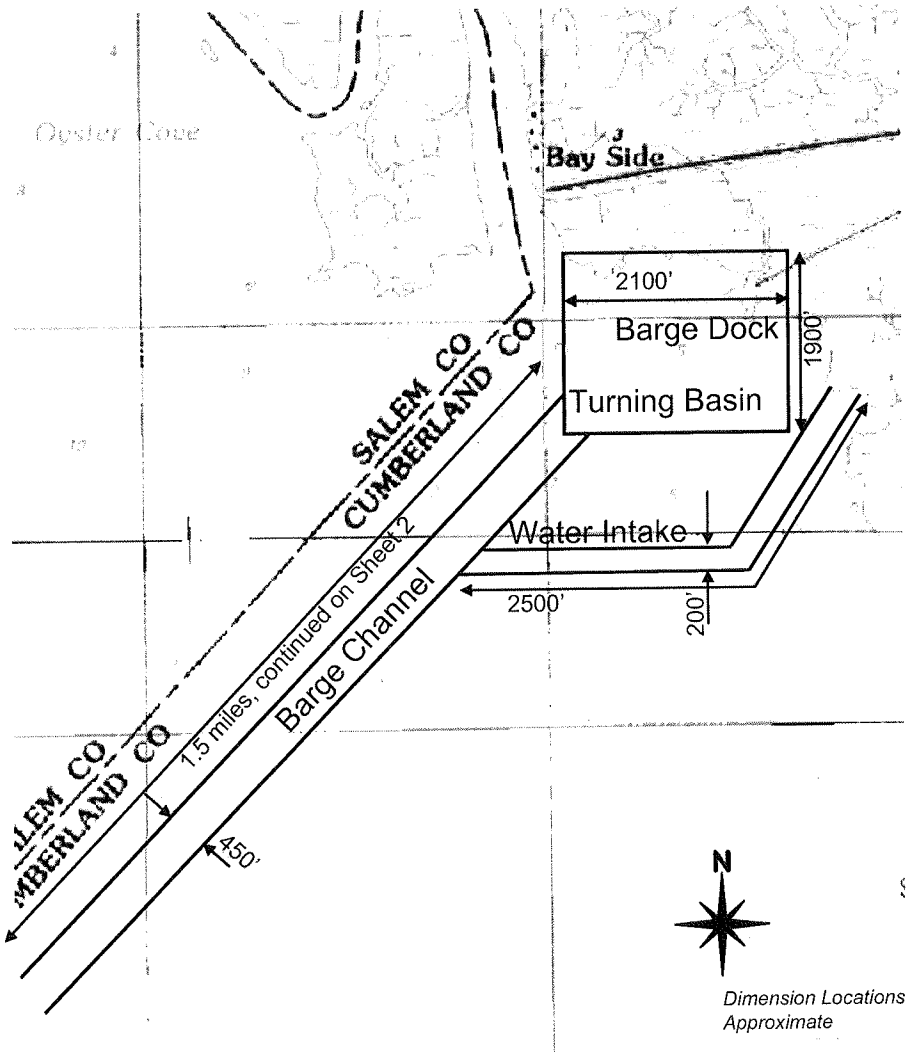
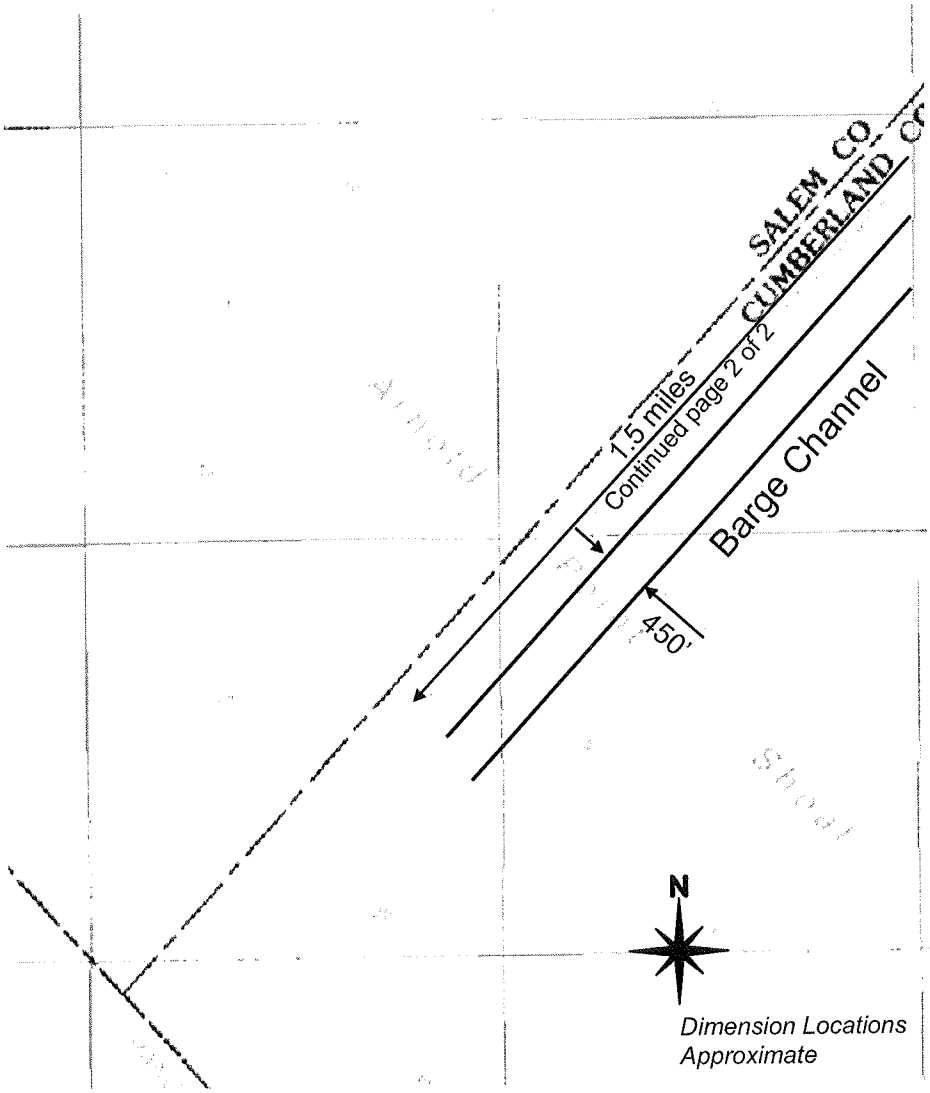


Figure 5-5 — Continuation of Conceptual Dredging Areas for Site 7-3



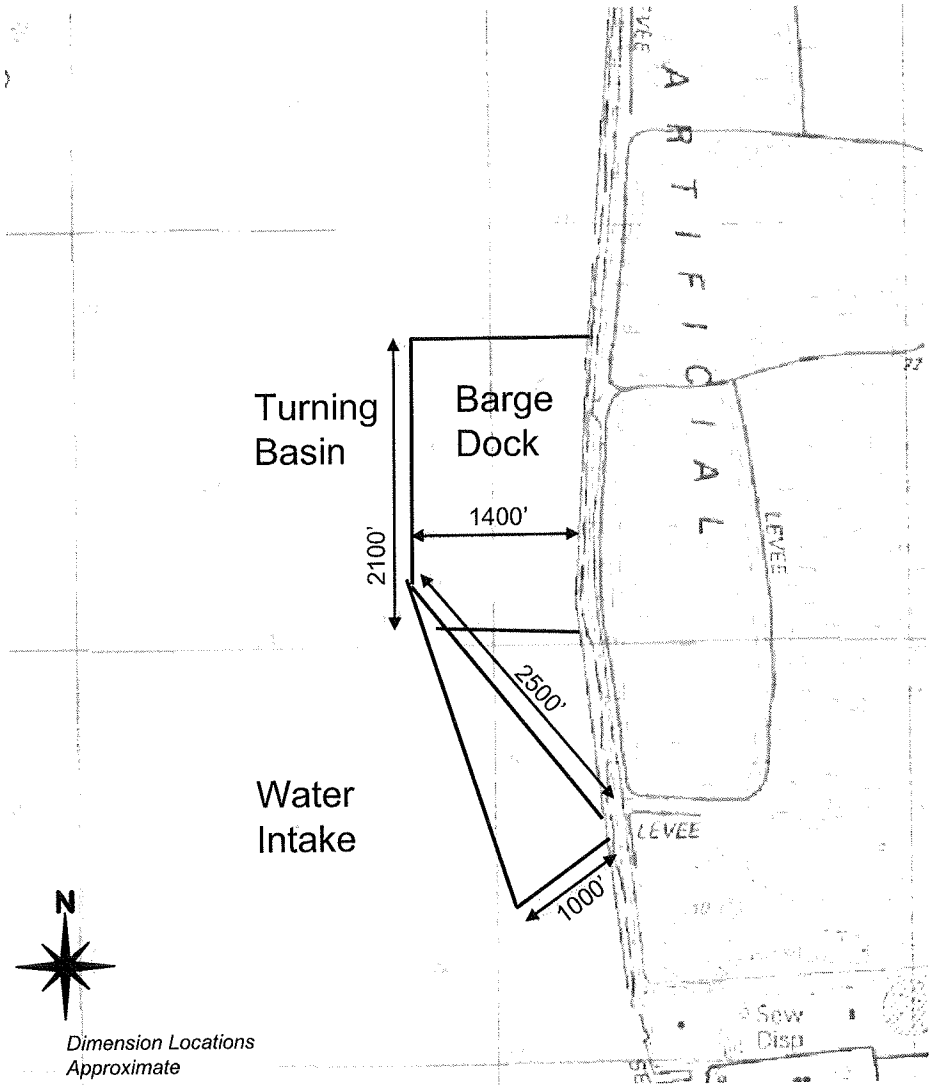
5.7 RESULTS FOR SITE 7-4

Sufficient depth for the water intake is reached approximately 1,200 ft. from shore in the Site 7-4 area. The conceptual design prepared for the ESPA has an intake dredge area fanning out at 90 degrees from shore, which would produce approximately 25 ac. of bottom disturbance. To reach the required depth of 18 ft., an average of approximately 4 ft. of dredging would be required for this channel, resulting in approximately 180,000 cubic yards of dredged material.

Dredging a barge turning basin that is 1,400 ft. wide by 2,100 ft. long would produce approximately 67 ac. of bottom disturbance. To reach the required depth of 15 ft., an average of approximately 4 ft. of dredging would be required for this area, resulting in approximately 441,000 cubic yards of dredged material. No additional channel would be required for barge ingress/egress because the river depth is sufficient at the end of the turning basin.

The conceptual dredging areas for the water intake and adjacent barge dock locations are shown in Figure 5-6

Figure 5-6 — Conceptual Dredging Areas for Site 7-4



5.8 SUMMARY OF DREDGING REQUIREMENTS

The dredging quantities estimated for each site are summarized in Table 5-1. It is clear that Site 4-1 has the least potential dredging impact, primarily because a barge docking facility is not feasible at this site. The absence of a barge docking facility is a disadvantage for delivering large equipment and materials to the site, but an advantage in terms of minimizing dredging requirements. Of the sites where barge delivery is feasible, Sites 7-1 and 7-4 have an advantage in that the river in the site areas is sufficiently deep so that a barge inlet channel from the main shipping channel is not required, which reduces the amount of dredging required for the barge facility. Site 7-3 has the greatest potential dredging impact, primarily because of the large amount of dredging required for the barge inlet channel.

Table 5-1 — Summary of Delaware River Dredging Impacts

Plant Component	Site 4-1	Site 7-1	Site 7-2	Site 7-3	Site 7-4
Intake Structure					
Bottom Disturbance (ac.)	2	7	6	11	25
Dredging Quantity (cubic yards)	35,000	100,000	145,000	185,000	180,000
Barge Dock and Turning Basin					
Bottom Disturbance (ac.)	No barge access	67	67	67	67
Dredging Quantity (cubic yards)	No barge access	1,143,000	1,197,000	1,089,000	441,000
Barge Inlet Channel					
Bottom Disturbance (ac.)	No barge access	Not required	43	82	Not required
Dredging Quantity (cubic yards)	No barge access	Not required	490,000	990,000	Not required
Total Bottom Disturbance (ac.)	2	74	116	160	92
Total Dredging Quantity (cubic yards)	35,000	1,243,000	1,832,000	2,264,000	621,000

Last page of Section 5.

6. SURFACE WATER WITHDRAWAL

The Delaware River would be the primary water source for a new power plant located at any of the Candidate Sites. During plant operation, make-up water for most plant uses would be withdrawn from the river, and wastewater (primarily cooling tower blowdown) would be discharged to the river. The water withdrawn from the river would either be returned to the river as blowdown or lost to the atmosphere through operation of the cooling towers. Water returned to the river as blowdown would not be lost to downstream users or aquatic communities. The difference between the withdrawal rate and the discharge rate represents consumptive water loss, primarily due to evaporation of water from the cooling towers. Potential impacts on the Delaware River were evaluated by comparing the water withdrawal and water consumption rates with the annual average river flow and the 7-day 10-year low flow (7Q10) for each site area. The 7Q10 value is defined as the lowest 7-day average flow with a probability of occurrence of once in ten years. The methods used in this evaluation and the results for each site are summarized below.

6.1 METHODS

According to the water balance calculations developed for the ESPA, the river water withdrawal rate for the new plant at Site 7-4 is estimated to be 78,196 gallons per minute (gpm), and the consumptive water loss (primarily due to evaporation from the cooling towers) is estimated to be 26,420 gpm. These estimates assume that the cooling towers operate at 1.5 cycles of concentration, which is an appropriate value for the brackish water found in the Delaware River at Site 7-4 and in the areas of Sites 7-1, 7-2, and 7-3. However, in the Site 4-1 area, the Delaware River contains fresh water, which would allow the cooling towers to operate at three cycles of concentration or more. At three cycles of concentration, the water withdrawal rate for cooling tower makeup would be approximately half that seen at 1.5 cycles of concentration. Considering additional withdrawals for plant water uses that are not affected by the cycles of concentration, the total water withdrawal for Site 4-1 is estimated to be approximately 40,300 gpm. Consumptive water use would remain the same at approximately 26,420 gpm.

The annual average river flow value and the 7Q10 value for each site area were determined from USGS river monitoring data (Reference 6-1). There are two USGS gauging stations on the Delaware River with available data to determine the appropriate flow values: one located at Belvidere, New Jersey, and the other at Trenton,

New Jersey. Data from the Belvidere gauging station were used for Site 4-1, and data from the Trenton gauging station were used for Sites 7-1, 7-2, 7-3, and 7-4.

The USGS data provide an annual average river flow value for each gauging station. The 7Q10 value was calculated by Sargent & Lundy using the DFLOW computer program developed by the U.S. Environmental Protection Agency (Reference 6-2). This program employs the Log Pearson Type III distribution method to calculate the 7Q10 values. In this method, the lowest consecutive 7-day flow values for each year on record are selected and averaged. These 7-day low flow values for each year are ranked in ascending order and distributed using a normal distribution. The low flow value with a 10% chance of recurrence is then calculated using standard statistical methods.

6.2 RESULTS FOR SITE 4-1

Flow values for Site 4-1 were determined using data collected from 1939 to 2008 at USGS Gauging Station #01446500 near Belvidere, New Jersey. The annual average flow value for this gauging station as provided by the USGS is 3,571,789 gpm. The 7Q10 value as calculated by Sargent & Lundy is 484,736 gpm. Based on these statistics, the estimated withdrawal rate (40,300 gpm) would divert approximately 1.1% of the annual average river flow and approximately 8.3% of the 7Q10 flow. The consumptive water loss (26,420 gpm) would reduce the annual average river flow by approximately 0.7% and the 7Q10 flow by approximately 5.5%.

It should be noted that Gauging Station #01446500 is located at river mile 197.7, while the Site 4-1 conceptual water intake location is more than 30 miles downstream, at river mile 163.7. Therefore, the actual river flows in the site area are expected to be somewhat higher than the flows discussed above, and the impacts of water withdrawal and consumption would be correspondingly lower.

Water withdrawal would have to be permitted by the Delaware River Basin Commission (DRBC) and the New Jersey Department of Environmental Protection (NJDEP), and these agencies would review the proposed withdrawal rates to ensure that they would not adversely affect downstream users or aquatic communities. There are no published DRBC or NJDEP criteria or guidelines concerning the percentage of withdrawal or consumptive use that is acceptable. PSEG is a co-owner of the Merrill Creek Reservoir and has an established allocation of water that can be released from the reservoir to offset consumptive use during periods of declared drought. If a new plant were to be constructed at any of the Candidate Sites, PSEG would submit an application to the DRBC to include the new plant in the existing PSEG allocation. Consumptive water withdrawal for the

new plant could be supported by re-allocation of water among the existing PSEG plants, or additional water allocation rights would be acquired.

6.3 RESULTS FOR SITES 7-1, 7-2, 7-3, AND 7-4

Flow values for Sites 7-1, 7-2, 7-3, and 7-4 were determined using data collected from 1913 to 2007 at USGS Gauging Station #01463500 near Trenton, New Jersey. The annual average flow value for this gauging station as provided by the USGS is 5,318,636 gpm. The 7Q10 value as calculated by Sargent & Lundy is 771,988 gpm. Based on these statistics, the estimated withdrawal rate (78,196 gpm) would divert approximately 1.5% of the annual average river flow and approximately 10.1% of the 7Q10 flow. The consumptive water loss (26,420 gpm) would reduce the annual average river flow by approximately 0.5% and the 7Q10 flow by approximately 3.4%.

It should be noted that Gauging Station #01463500 is located at river mile 131.0, while the conceptual water intake locations for Sites 7-1, 7-2, 7-3, and 7-4 are all more than 60 miles downstream, at river miles 67.9, 48.4, 41.6, and 50.7, respectively. Therefore, the actual river flow in the site areas are significantly higher than the flows discussed for the gauging station, and the impacts of water withdrawal and consumption would be correspondingly lower. In addition, the Delaware River is tidally influenced in the area of Sites 7-1, 7-2, 7-3, and 7-4, and the tidal flows dominate. Information developed for the ESPA indicates that tidal flows in this area average approximately 180 million to 211 million gpm.

Water withdrawal for any of the sites would be permitted by the DRBC and the NJDEP, and these agencies would review the proposed withdrawal rates to ensure that they would not adversely affect downstream users or aquatic communities. There are no published NJDEP or DRBC criteria or guidelines concerning the percentage of withdrawal or consumptive use that is acceptable. PSEG is a co-owner of the Merrill Creek Reservoir and has an established allocation of water that can be released from the reservoir to offset consumptive use during periods of declared drought. If a new plant were to be constructed at any of the Candidate Sites, PSEG would submit an application to the DRBC to include the new plant in the existing PSEG allocation. Consumptive water withdrawal for the new plant could be supported by re-allocation of water among the existing PSEG plants, or additional water allocation rights would be acquired.

As stated earlier, Sites 7-1, 7-2, 7-3, and 7-4 are located in an area where the Delaware River water is brackish. Because consumptive water use at locations with brackish water has a lesser impact on salinity intrusion than an

equal consumption of fresh water, the DRBC has developed an "equivalent impact factor" (EIF) to account for the difference (Reference 6-3). Based on evaluations performed for the ESPA, the EIF in the Site 7-4 area is 0.18. The same factor would be approximately applicable to Sites 7-1, 7-2, and 7-3. Using this factor, the 26,420 gpm consumptive use of Delaware River water is equivalent to a freshwater consumptive use impact of 4,756 gpm. This impact represents approximately 0.1% of the annual average river flow and 0.6% of the 7Q10 flow.

The water withdrawal, water consumption, and equivalent fresh water consumption quantities and percentages estimated for each site are summarized in Table 6-1. It can be seen that the percentage of the river flow diverted due to water withdrawal and the percentage consumed due to total water loss (without applying the EIF) are very similar at all of the sites. None of the sites appears to have a significant advantage or disadvantage regarding these parameters. However, based on the equivalent fresh water consumption, Sites 7-1, 7-2, 7-3, and 7-4 have a significant advantage over Site 4-1. Because the Delaware River is fresh in the Site 4-1 area, the EIF is not applicable there and all of the river water consumed is fresh water. An appropriate water allocation would be necessary at the Merrill Creek reservoir.

Table 6-1 — Summary of Water Withdrawal from the Delaware River

Parameter	Site 4-1	Site 7-1	Site 7-2	Site 7-3	Site 7-4
Total Water Withdrawal					
Withdrawal Rate (gpm)	40,300	78,196	78,196	78,196	78,196
Percentage of Annual Average Flow	1.1	1.5	1.5	1.5	1.5
Percentage of 7Q10 Flow	8.3	10.1	10.1	10.1	10.1
Consumptive Water Loss					
Consumption Rate (gpm)	26,420	26,420	26,420	26,420	26,420
Percentage of Annual Average Flow	0.7	0.5	0.5	0.5	0.5
Percentage of 7Q10 Flow	5.5	3.4	3.4	3.4	3.4
Equivalent Fresh Water Consumption					
Consumption Rate (gpm)	26,420	4756	4756	4756	4756
Percentage of Annual Average Flow	0.7	0.1	0.1	0.1	0.1
Percentage of 7Q10 Flow	5.5	0.6	0.6	0.6	0.6

6.4 REFERENCES

6-1. U.S. Geological Survey, "USGS Real-Time Water Data for the Nation," http://waterdata.usgs.gov/nwis/rt, 2007.

6-2. U.S. Environmental Protection Agency, "Water Quality Models and Tools: DFLOW," http://www.epa.gov/waterscience/models/dflow/, 2009.

6-3. Delaware River Basin Commission, "Water Supply/Demand Status Report for the Delaware River Basin (Draft)," September 2005.

Last page of Section 6.

7. GROUNDWATER WITHDRAWAL

During plant operation, water for potable use and other uses that require fresh water would be withdrawn from the most appropriate groundwater aquifer available at each site. According to the water balance calculations developed for the ESPA, the average groundwater withdrawal rate would be 210 gpm, and the maximum possible rate would be 953 gpm. There would be no wastewater discharges to groundwater.

Potential issues associated with groundwater withdrawal were evaluated by reviewing available information on the major aquifers in New Jersey, the approximate depth and thickness of these aquifers within the counties where the Candidate Sites are located, and data for representative wells in the area of each site, including the location, depth, aquifer within which each well is screened, historical water levels, and approximate yields within each aquifer. The information for the evaluation was gathered from USGS national and New Jersey websites (References 7-1 through 7-4), the Groundwater Protection Council website (Reference 7-5), data published by the New Jersey Geological Survey (Reference 7-6), and groundwater calculations prepared for the ESPA (Reference 7-7).

The results of the evaluations are summarized below.

7.1 OVERALL ASSESSMENT OF GROUNDWATER AVAILABILITY

The geologic formations that form the aquifers in the northern half and southern half of New Jersey differ significantly. The separation occurs along the fall line that runs between Trenton in the south and Raritan Bay in the north. Aquifers north of this line are generally fractured rock and glacial valley fill aquifers, whereas those south of the line are coastal plain aquifers with alternating sand deposits sandwiched between silty and clayey layers that provide confining conditions (Reference 7-1).

Total groundwater withdrawals in the state averaged around 240 billion gallons annually over the period from 1990 through 1999 (Reference 7-5). In Hunterdon County, where Site 4-1 is located, the groundwater withdrawal rate averaged approximately 5 billion gallons per year during the same period. In Salem and Cumberland counties, where Sites 7-1, 7-2, 7-3, and 7-4 are located, the combined annual groundwater withdrawal rate was around 21 billion gallons per year during the same period.

With the exception of two regions designated by the NJDEP as Water Supply Critical Areas (Monmouth, Ocean, and parts of Middlesex counties in the north; and Burlington, Camden, and Gloucester counties, and parts of Atlantic County in the south), adequate groundwater appears to be present both from upper unconfined and lower confined aquifers (Reference 7-4). None of the Candidate Sites are located in a Water Supply Critical Area.

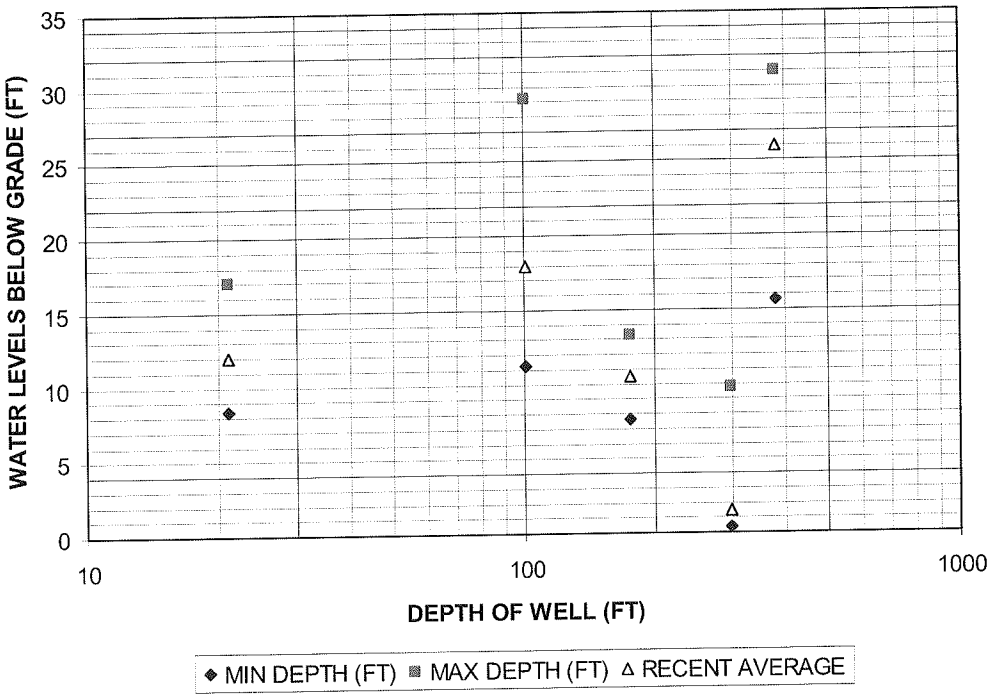
7.2 SITE 4-1

A well drilled in the area of Site 4-1 would withdraw water from the Newark Group Aquifers. The aquifer materials consist of fractured rock (shale, sandstone, and some conglomerate). The aquifers are unconfined to partially-confined to a depth of approximately 200 ft., and confined at greater depths. Well depths in these aquifers typically range from 30 to 1,500 ft., with yields of as much as 1,500 gpm (References 7-1 and 7-2). Water is generally hard and may have large concentrations of iron and sulfate (Reference 7-2).

Records of five wells in the site vicinity (within approximately 6 mi.) were examined. In three of the wells (with depths as much as 380 ft.), the water levels rose by as much as 11 ft. during the last 10-year period. The other two wells showed a decline in water levels on the order of 6 to 8 ft. The specific reasons for this phenomenon have not been identified; however, groundwater levels within fractured rock aquifers can rapidly respond to increased or decreased local pumping levels and to changes in the recharge conditions. Therefore, significant deviations from the average trends are possible within the same region. Figure 7-1 presents a summary of the maximum, minimum, and recent average depths to groundwater measured in these wells. It does not appear that the groundwater levels have been significantly affected by water withdrawal from these wells.

The above information indicates that the plant groundwater requirements (210 gpm average and 953 gpm maximum) could be supplied by one or two wells drilled to the Newark Group Aquifers. Although some parts of these aquifers may have had groundwater drawdown, it is likely that properly located wells at Site 4-1 could supply the plant water needs.

Figure 7-1 — Summary of Depths to Groundwater at Wells in the Site 4-1 Vicinity



7.3 SITE 7-1

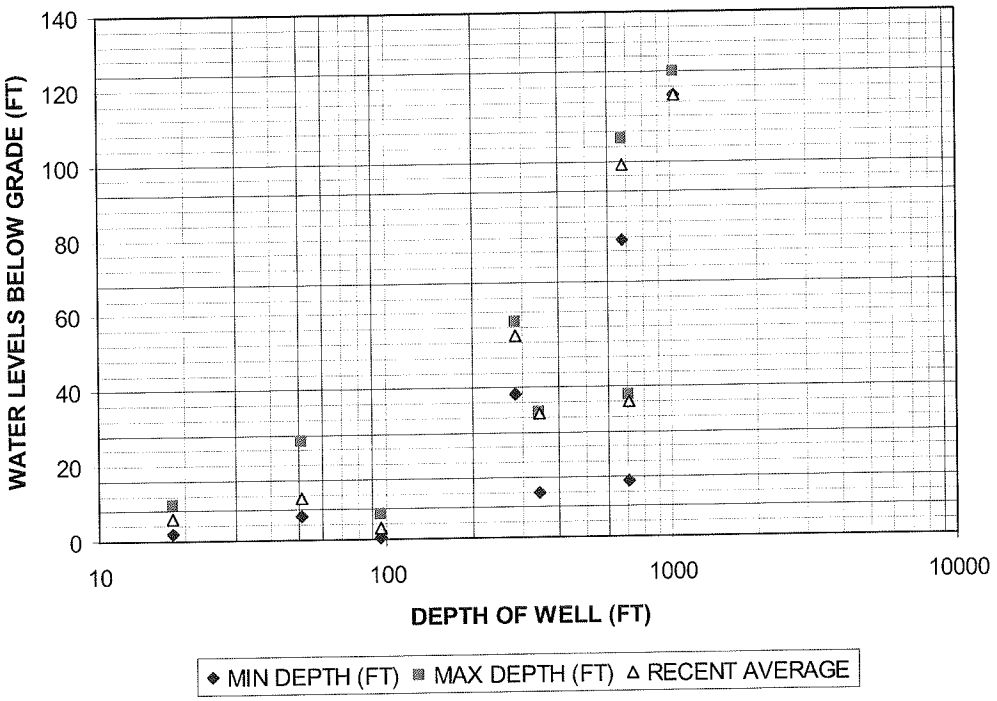
A well drilled in the area of Site 7-1 would withdraw water either from the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer, depending on the depth of the well. Both aquifers consist of fine-to-coarse grained sand. The Kirkwood-Cohansey Aquifer is unconfined, whereas the Atlantic City Aquifer is confined. Well depths within the Kirkwood-Cohansey Aquifer typically range from 20 to 350 ft., and common well yields range from approximately 500 to 1,000 gpm. Well depths within the Atlantic City 800-ft. sand aquifer typically range from 450 to 950 ft., and common well yields range from approximately 600 to 800 gpm (References 7-1 and 7-2).

Water levels within the unconfined Kirkwood-Cohansey Coastal Plain Aquifer have been impacted to a relatively minor degree by groundwater pumping during the last 50-year period. However, within the Atlantic City 800-ft. confined aquifer, water levels have dropped as much as 25 to 30 ft. in some of wells and have risen by 6 to 20 ft. in other wells during the same period (Reference 7-3). Many of the wells in the site area for which groundwater level data are available reach confined aquifers. Figure 7-2 presents a summary of the maximum

and minimum depths to groundwater in several wells within the site vicinity (within approximately 6 mi.). With the exception of the shallowest well (18 ft. deep), all wells shown are screened within the confined aquifer. In wells deeper than 100 ft., the recent approximate average water levels are relatively close to the maximum water depths measured. This is an indication of a gradual drop in groundwater levels in the confined aquifer over time.

The above information indicates that the plant groundwater requirements (210 gpm average and 953 gpm maximum) could be supplied by one or two wells drilled to either the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer. As there is no indication that the Kirkwood-Cohansey Coastal Plain Aquifer has had significant groundwater drawdown, it appears that this aquifer would be adequate to supply the plant water needs.

Figure 7-2 — Summary of Depths to Groundwater at Wells in the Site 7-1 Vicinity



7.4 SITE 7-2

A well drilled in the area of Site 7-2 would withdraw water from the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer, depending on the depth of the well. General information for these aquifers is the same as described above for Site 7-1. Information specific to the Site 7-2 area is discussed below.

Figure 7-3 presents a summary of the maximum and minimum depths to groundwater observed in several wells in the site vicinity (within approximately 6 mi.). Wells shallower than 200 ft. are screened within the unconfined aquifer and show little historical variation in groundwater levels. Deeper wells are screened within the confined aquifer. In wells deeper than 300 ft., the recent approximate average water levels are relatively close to the maximum water depths measured. This is an indication of a gradual drop in the groundwater levels in the confined aquifer over time. In three wells included in Figure 7-3 (all deeper than 375 ft.), large drops (as much as 70 ft.) in the water levels were observed since mid-2004. These drops appear to be the result of increased pumping out of these wells; pumping rates from these wells are not available to confirm this interpretation.

The above information indicates that the plant groundwater requirements (210 gpm average and 953 gpm maximum) could be supplied by one or two wells drilled to either the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer. As there is no indication that the Kirkwood-Cohansey Coastal Plain Aquifer has had significant groundwater drawdown, it appears that this aquifer would be adequate to supply the plant water needs.

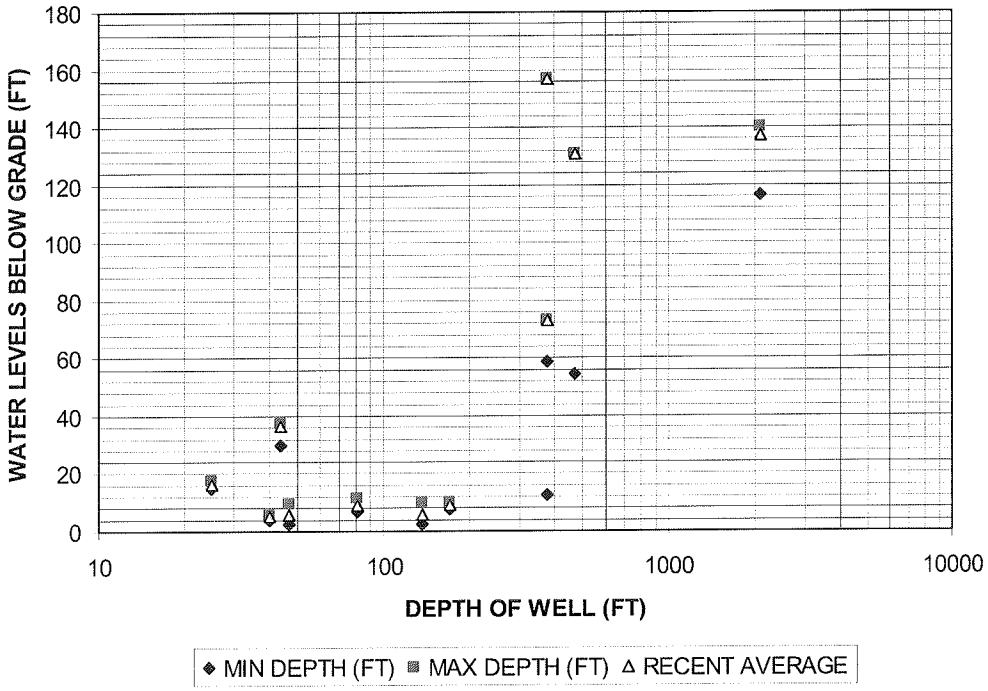
7.5 SITE 7-3

A well drilled in the area of Site 7-3 would withdraw water from the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer, depending on the depth of the well. General information for these aquifers is the same as described above for Site 7-1. Information specific to the Site 7-3 area is discussed below.

Figure 7-3 presents a summary of the maximum and minimum depths to groundwater observed in several wells in the site vicinity (within approximately 6 mi.). Wells shallower than 200 ft. are screened within the unconfined aquifer and show little historical variation in groundwater levels. Deeper wells are screened within the confined aquifer. In wells deeper than 300 ft., the recent approximate average water levels are relatively close to the maximum water depths measured. This is an indication of a gradual drop in the groundwater levels in the confined aquifer over time. In three wells included in Figure 7-3 (all deeper than 375 ft.), large drops (as much

as 70 ft.) in the water levels were observed since mid-2004. These drops appear to be the result of increased pumping out of these wells; pumping rates from these wells are not available to confirm this interpretation.

Figure 7-3 — Summary of Depths to Groundwater at Wells in the Site 7-2 and 7-3 Vicinity



The above information indicates that the plant groundwater requirements (210 gpm average and 953 gpm maximum) could be supplied by one or two wells drilled to either the Kirkwood-Cohansey Coastal Plain Aquifer or the Atlantic City 800-ft. sand aquifer. As there is no indication that the Kirkwood-Cohansey Coastal Plain Aquifer has had significant groundwater drawdown, it appears that this aquifer would be adequate to supply the plant water needs. However, due to the proximity of the site to the Delaware River estuary, shallow wells would have to be monitored for possible salt water intrusion.

7.6 SITE 7-4

A well drilled in the area of Site 7-4 would withdraw water from the Potomac-Raritan-Magothy (PRM) Aquifer at 400 ft. or below (Reference 7-6). At the existing SGS/HCGS site, several water supply wells have been installed at depths that range from about 816 ft. to 1,140 ft. below the existing grade. The water demand from

the existing generating stations is met primarily by four deep wells that have a combined average flow rate of approximately 370 gpm (Reference 7-7).

The ESPA provides data on the highest and lowest water levels measured inside four pumped wells at the SGS/HCGS site for the years 2000 through 2009. One well (PW-6) pumps from the middle PRM Aquifer, whereas the other three wells (PW-5, HC-1, and HC-2) pump from the upper PRM Aquifer. The variation in the water levels for each well during this period is shown in Figure 7-4. From this figure, it is apparent that between 2000 and 2004, the overall water levels inside these wells decreased slightly, whereas between 2004 and 2009, the water levels remained relatively stable. Reference 7-8 states that within the upper, middle, and lower PRM aquifers, the water levels generally remained stable (±5 feet) at the site location during the period from 1998 through 2003. Based on Figure 7-4, this trend is believed to have continued during the 2003 through 2009 period.

In late 2008, sixteen observation well pairs were installed at the SGS/HCGS site into alluvium and underlying Vincentown aquifers. The readings obtained during 2009 indicate that the water levels measured at depths ranging from 35 feet to 110 feet remained relatively constant. However, these wells do not reach the aquifers pumped by the production wells at the SGS/HCGS site and therefore do not indicate the effect that pumping from the PRM Aquifer would have on the potentiometric levels in the site area.

The above information indicates that the plant groundwater requirements (210 gpm average and 953 gpm maximum) could be supplied by wells installed into the PRM Aquifer. Although some parts of this aquifer may have had groundwater drawdown, it is likely that properly located wells at Site 7-4 could supply the plant water needs with no problems. However, due to the proximity of the site to the Delaware River estuary, wells would have to be monitored for possible salt water intrusion.

Figure 7-4 — Summary of Depths to Groundwater at Wells in the Site 7-4 Vicinity

7.7 REFERENCES

7-1. U.S. Geological Survey, "National Water Summary – New Jersey, Principal Aquifers in New Jersey" http://nj.usgs.gov/infodata/images/im_scan1_72.gif

7-2. U.S. Geological Survey, New Jersey Water Science Center, "Aquifer and Well Characteristics in New Jersey" http://nj.usgs.gov/infodata/aquifers/table_1.html

7-3. U.S. Geological Survey, "Active Groundwater Level Network" http://groundwaterwatch.usgs.gov/ and http://groundwaterwatch.usgs.gov/AWLSites

7-4. U.S. Geological Survey, "Summary of the Groundwater Level Hydrologic Conditions in New Jersey, Water Year 2008"

7-5. Groundwater Protection Council, "New Jersey Groundwater Conditions" http://www.gwpc.org/e-library/documents/state_fact_sheets/new%20Jersey.pdf

7-6. New Jersey Geological Survey, 2008, "Correlation of Deep Aquifers using Boreholes and Geophysical Logs in Parts of Cumberland, Salem, Gloucester and Camden Counties" New Jersey Geological Map Series GMS 08-1.

7-7. MACTEC Calculation No. 2251-ESP-GW-002 "Groundwater Model Report," prepared for PSEG Early Site Permit Application.

7-8. V. T. DePaul, R. Rosman, and P. J. Lacombe, 2008, "Water-Level Conditions in Selected Confined Aquifers of the New Jersey and Delaware Coastal Plain."

Last page of Section 7.

8. PROTECTED SPECIES

Protected plant and animal species, including species listed by federal or state agencies as endangered, threatened, or rare, could be affected by construction and operation of the new plant. Information on the endangered, threatened, or rare species that have been recorded within approximately 1 mi. of Sites 4-1, 7-1, 7-2, and 7-3 was obtained from the NJDEP (References 8-1 through 8-4). Information on the endangered, threatened, or rare species that potentially could occur on or near Site 7-4 was obtained from ecological studies conducted for the ESPA. All of the available information was reviewed to identify potential issues associated with protected species at each site. The results of the evaluations are summarized below.

8.1 SITE 4-1

NJDEP information concerning endangered, threatened, or rare species that have been recorded in the area of Site 4-1 is summarized in Table 8-1. According to this information, 13 animal species and 1 plant species have been recorded within approximately 1 mi. of the site. However, based on the relatively minor impacts on natural habitats described in Section 3, it appears unlikely that any of these species would be significantly affected by project construction or operation.

The NJDEP did not identify any Natural Heritage Priority Sites in the Site 4-1 area.

8.2 SITE 7-1

NJDEP information concerning endangered, threatened, or rare species that have been recorded in the area of Site 7-1 is summarized in Table 8-2. According to this information, nine animal species and one plant species have been recorded within approximately 1 mi. of the site. However, based on the relatively minor impacts on natural habitats described in Section 3, it appears unlikely that any of these species would be significantly affected by project construction or operation.

As shown in Table 8-2, the NJDEP also identified two Natural Heritage Priority Sites (specific habitats associated with protected and rare species) in the Site 7-1 area. As shown in Figure 8-1 (at the end of Section 8), both of these Natural Heritage Priority Sites are more than 1 mi. from the Site 7-1 boundaries, and neither is crossed by any of the off-site corridors. Therefore, it does not appear that either Natural Heritage Priority Site would be significantly affected by the project.

Table 8-1 — State and Federal Threatened, Endangered, and Rare Species Recorded Within Approximately 1 Mile of Site 4-1

Common Name	Scientific Name / Description	New Jersey Status – Rank	Federal Status
Plants			
Bush's Sedge	*Carex bushii*	E, LP, HL – S1	
Birds			
Bobolink	*Dolichonyx oryzivorus*	T/SC – S2B, S3N	
Eastern Meadowlark	*Sturnella magna*	SC/SC – S3B, S3N	
Great Blue Heron	*Ardea herodias*	SC/S – S3B, S4N	
Red-Shouldered Hawk	*Buteo lineatus*	E/T – S1B, S2N	
Savannah Sparrow	*Passerculus sandwichensis*	T/T – S2B, S4N	
Veery	*Catharus fuscescens*	S/S – S3B	
Vesper Sparrow	*Pooecetes gramineus*	E – S1B, S2N	
Wood Thrush	*Hylocichla mustelina*	SC/S – S3B	
Amphibians			
Longtail Salamander	*Eurycea longicauda longicauda*	T – S2	
Northern Spring Salamander	*Gyrinophilus p. porphyriticus*	D – S3	
Reptiles			
Eastern Box Turtle	*Terrapene carolina carolina*	SC – S3	
Wood Turtle	*Glyptemys insculpta*	T – S2	
Mammals			
Bobcat	*Lynx rufus*	E – S1	

Notes:

S1	= Critically Imperiled (typically 5 or fewer occurrences)
S2	= Imperiled (typically 6 to 20 occurrences)
S3	= Vulnerable (typically 21 to 100 occurrences)
S4	= Apparently Secure (typically more than 100 occurrences)
S5	= Secure
S#S#	= Rank Range to indicate the range of uncertainty about exact status
x/x	= Dual status: State breeding population/State migratory or winter population
B	= Breeding population
N	= Nonbreeding population
S	= Stable species
D	= Declining species
E	= Endangered species
LP	= Listed by Pinelands Commission as endangered or threatened within their jurisdiction
HL	= Protected by Highlands Water Protection and Planning Act within Highlands Preservation Area
T	= Threatened species
SC	= Special Concern

Source: Reference 8-1

Table 8-2 — State and Federal Threatened, Endangered, and Rare Species Recorded Within Approximately 1 Mile of Site 7-1

Common Name	Scientific Name / Description	New Jersey Status – Rank	Federal Status
Plants			
Leatherwood	*Dirca palustris*	HL – S2	
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	E – S1B,S1N	
Bobolink	*Dolichonyx oryzivorus*	T/SC – S2B, S3N	
Cooper's Hawk	*Accipiter cooperii*	T/S – S2B, S4N	
Great Blue Heron	*Ardea herodias*	SC/S – S3B, S4N	
Osprey	*Pandion haliaetus*	T/T – S2B	
Upland Sandpiper	*Bartramia longicauda*	E – S1B, S1N	
Vesper Sparrow	*Pooecetes gramineus*	E – S1B, S2N	
Reptiles			
Bog Turtle	*Glyptemys muhlenbergii*	E – S1	LT
Eastern Box Turtle	*Terrapene carolina carolina*	SC – S3	
Natural Heritage Priority Sites			
Culliers Run	Floodplain in rich wooded ravine	B4	
Mannington Marsh	Freshwater intertidal marsh	B4	

Notes:

S1	= Critically Imperiled (typically 5 or fewer occurrences)
S2	= Imperiled (typically 6 to 20 occurrences)
S3	= Vulnerable (typically 21 to 100 occurrences)
S4	= Apparently Secure (typically more than 100 occurrences)
S5	= Secure
S#S#	= Rank Range to indicate the range of uncertainty about exact status
x/x	= Dual status: State breeding population/State migratory or winter population
B	= Breeding population
N	= Nonbreeding population
S	= Stable species
HL	= Protected by Highlands Water Protection and Planning Act within Highlands Preservation Area
E	= Endangered species
T	= Threatened species
SC	= Special Concern
LT	= Formally listed as Threatened
B4	= Moderate significance on global level

Source: Reference 8-2

8.3 SITE 7-2

NJDEP information concerning endangered, threatened, or rare species that have been recorded in the area of Site 7-2 is summarized in Table 8-3. According to this information, eight animal species and two plant species have been recorded within approximately 1 mi. of the site. Based on the relatively minor impacts on natural habitats described in Section 3, it appears unlikely that any of these species would be significantly affected by project construction or operation.

As shown in Table 8-3, the NJDEP also identified two Natural Heritage Priority Sites (specific habitats associated with protected and rare species) in the Site 7-2 area. As shown in Figure 8-2 (at the end of Section 8), one of these Natural Heritage Priority Sites is approximately 0.6 mi. from the Site 7-2 boundaries, and the other is approximately 0.8 mi. from the Site 7-2 boundaries. Neither is crossed by any of the off-site corridors. Therefore, it does not appear that either Natural Heritage Priority Site would be significantly affected by the project.

8.4 SITE 7-3

NJDEP information concerning endangered, threatened, or rare species that have been recorded in the area of Site 7-3 is summarized in Table 8-4. According to this information, 13 animal species have been recorded within approximately 1 mi. of the site. However, based on the relatively minor impacts on natural habitats described in Section 3, it appears unlikely that any of these species would be significantly affected by project construction or operation.

The NJDEP did not identify any Natural Heritage Priority Sites in the Site 7-3 area.

Table 8-3 — State and Federal Threatened, Endangered, and Rare Species Recorded Within Approximately 1 Mile of Site 7-2

Common Name	Scientific Name / Description	New Jersey Status – Rank	Federal Status
Plants			
Chinquapin	*Castanea pumila*	E, LP, HL – S1	
Swamp-pink	*Helonias bullata*	E, LP, HL – S3	LT
Birds			
American Kestrel	*Falco sparverius*	SC – S3B, S3N	
Bald Eagle	*Haliaeetus leucocephalus*	E – S1B,S1N	
Cooper's Hawk	*Accipiter cooperii*	T/S – S2B, S4N	
Great Blue Heron	*Ardea herodias*	SC/S – S3B, S4N	
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	T/T – S2B, S2N	
Wood Thrush	*Hylocichla mustelina*	SC/S – S3B	
Amphibians			
Fowler's Toad	*Bufo woodhousii fowleri*	SC – S3	
Reptiles			
Eastern Box Turtle	*Terrapene carolina carolina*	SC – S3	
Natural Heritage Priority Sites			
Franks Cabin Site	Narrow headwater stream corridor	B3	
Pecks Corner	Hardwood-evergreen swamp	B5	

Notes:

S1	= Critically Imperiled (typically 5 or fewer occurrences)
S2	= Imperiled (typically 6 to 20 occurrences)
S3	= Vulnerable (typically 21 to 100 occurrences)
S4	= Apparently Secure (typically more than 100 occurrences)
S5	= Secure
S#S#	= Rank Range to indicate the range of uncertainty about exact status
x/x	= Dual status: State breeding population/State migratory or winter population
B	= Breeding population
N	= Nonbreeding population
S	= Stable species
E	= Endangered species
LP	= Listed by Pinelands Commission as endangered or threatened within their jurisdiction
HL	= Protected by Highlands Water Protection and Planning Act within Highlands Preservation Area
T	= Threatened species
SC	= Special Concern
LT	= Formally listed as Threatened
B3	= High significance on global level
B5	= General biodiversity interest on global level

Source: Reference 8-3

Table 8-4 — State and Federal Threatened, Endangered, and Rare Species Recorded Within Approximately 1 Mile of Site 7-3

Common Name	Scientific Name / Description	New Jersey Status – Rank	Federal Status
Insects			
Bronze Copper	*Lycaena hyllus*	E – S1	
Fish			
Shortnose Sturgeon	*Acipenser brevirostrum*	E – S1	LE
Birds			
Bald Eagle	*Haliaeetus leucocephalus*	E – S1B,S1N	
Black Rail	*Laterallus jamaicensis*	T/T – S2B, S2N	
Great Blue Heron	*Ardea herodias*	SC/S – S3B, S4N	
Northern Harrier	*Circus cyaneus*	E/U – S1B, S3N	
Osprey	*Pandion haliaetus*	T/T – S2B	
Red-Shouldered Hawk	*Buteo lineatus*	E/T – S1B, S2N	
Wood Thrush	*Hylocichla mustelina*	SC/S – S3B	
Amphibians			
Fowler's Toad	*Bufo woodhousii fowleri*	SC – S3	
Reptiles			
Eastern Box Turtle	*Terrapene carolina carolina*	SC – S3	
Eastern King Snake	*Lampropeltis g. getula*	U – S3	
Northern Diamondback Terrapin	*Malaclemys terrapin terrapin*	SC – S3	

Notes:

S1	= Critically Imperiled (typically 5 or fewer occurrences)
S2	= Imperiled (typically 6 to 20 occurrences)
S3	= Vulnerable (typically 21 to 100 occurrences)
S4	= Apparently Secure (typically more than 100 occurrences)
S5	= Secure
S#S#	= Rank Range to indicate the range of uncertainty about exact status
x/x	= Dual status: State breeding population/State migratory or winter population
B	= Breeding population
N	= Nonbreeding population
S	= Stable species
E	= Endangered species
T	= Threatened species
U	= Undetermined species (not enough information available)
SC	= Special Concern
LE	= Formally listed as Endangered

Source: Reference 8-4

8.5 SITE 7-4

Ecological studies conducted for the ESPA identified 13 endangered, threatened, or rare animal species that potentially could occur on or near Site 7-4. These species are summarized in Table 8-5. The detailed field studies conducted for the ESPA concluded that none of these species would be significantly affected by project construction or operation.

No Natural Heritage Priority Sites were identified in the Site 7-4 area.

Table 8-5 — State and Federal Threatened, Endangered, and Rare Species Potentially Occurring On or Near Site 7-4

Common Name	Scientific Name Description	New Jersey Status	Federal Status
Birds			
Cooper's hawk	*Accipiter cooperii*	T	
Red-shouldered hawk	*Buteo lineatus*	E/T[b]	
Northern harrier	*Circus cyaneus*	E	
Bald eagle	*Haliaeetus leucocephalus*	E	
Red-headed woodpecker	*Melanerpes erythrocephalus*	T/T[b]	
Osprey	*Pandion haliaetus*	T/T[b]	
Fish			
Shortnose sturgeon	*Acipenser brevirostrum*	E	E
Atlantic sturgeon	*Acipenser oxyrhynchus*	E	C
Reptiles			
Atlantic green turtle	*Chelonia mydas*	T	T
Atlantic loggerhead turtle	*Caretta caretta*	E	T
Leatherback turtle	*Dermochelys coriacea*	E	E
Kemp's or Atlantic ridley turtle	*Lepidochelys kempii*	E	E
Bog turtle	*Glyptemys muhlenbergii*	-	T

Notes:
E = Endangered; T = Threatened; C = Candidate; Y = Yes
a) Potential for occurrence in "study area" based on habitat types found within the site and 6-mi. vicinity and along proposed causeway
b) Breeding/Non-breeding

Source: PSEG Early Site Permit Application

8.6 REFERENCES

8-1. New Jersey Department of Environmental Protection, Letter to Michael Clayton, Environmental Feasibility Study – Franklin Township, October 26, 2009.

8-2. New Jersey Department of Environmental Protection, Letter to Michael Clayton, Environmental Feasibility Study – Mannington Township, October 26, 2009.

8-3. New Jersey Department of Environmental Protection, Letter to Michael Clayton, Environmental Feasibility Study – Alloway Township, October 26, 2009.

8-4. New Jersey Department of Environmental Protection, Letter to Michael Clayton, Environmental Feasibility Study – Greenwich Township (Block 25.01, Lot1), October 7, 2009.

Figure 8-1 — Natural Heritage Priority Sites Near Site 7-1

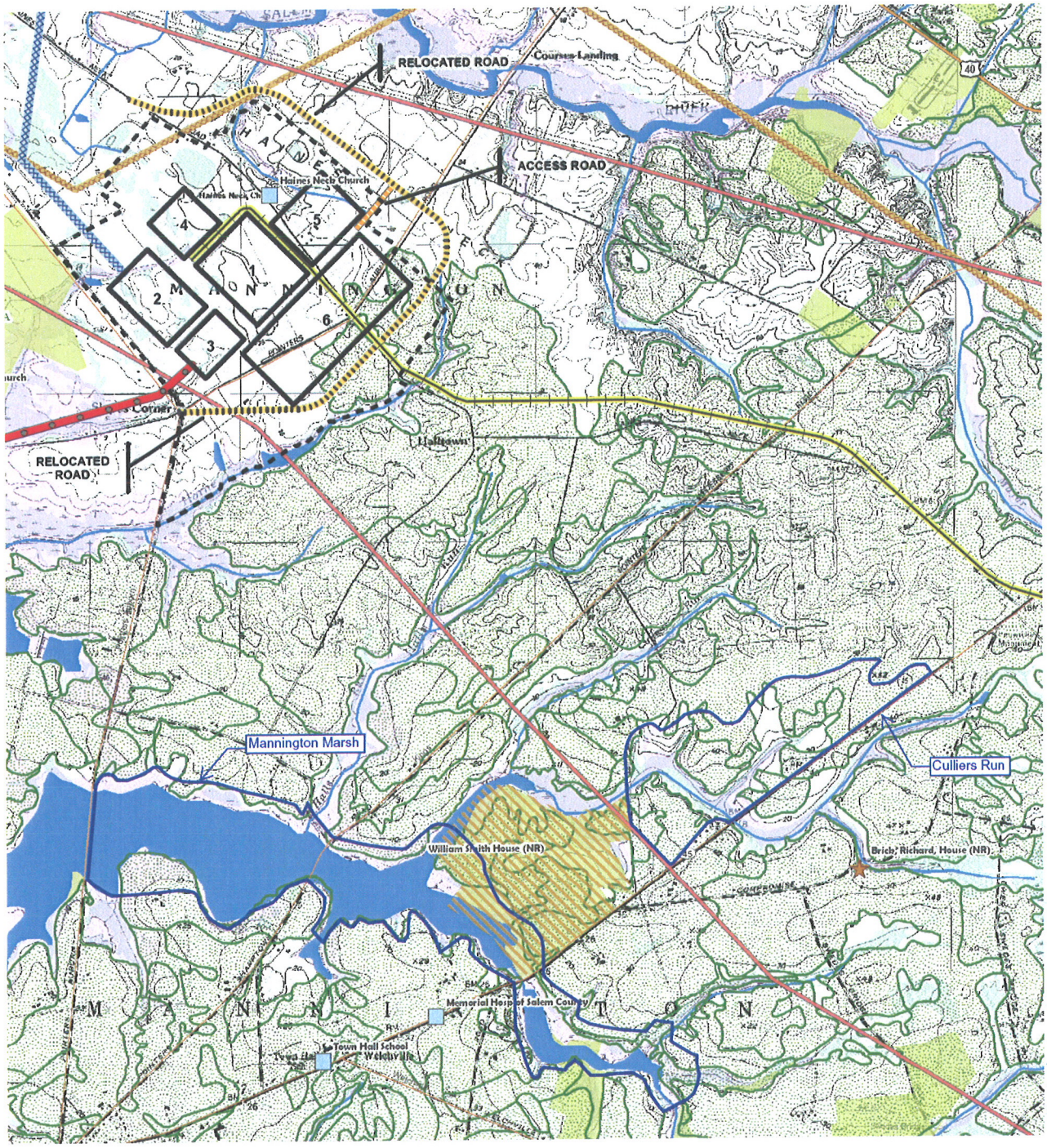
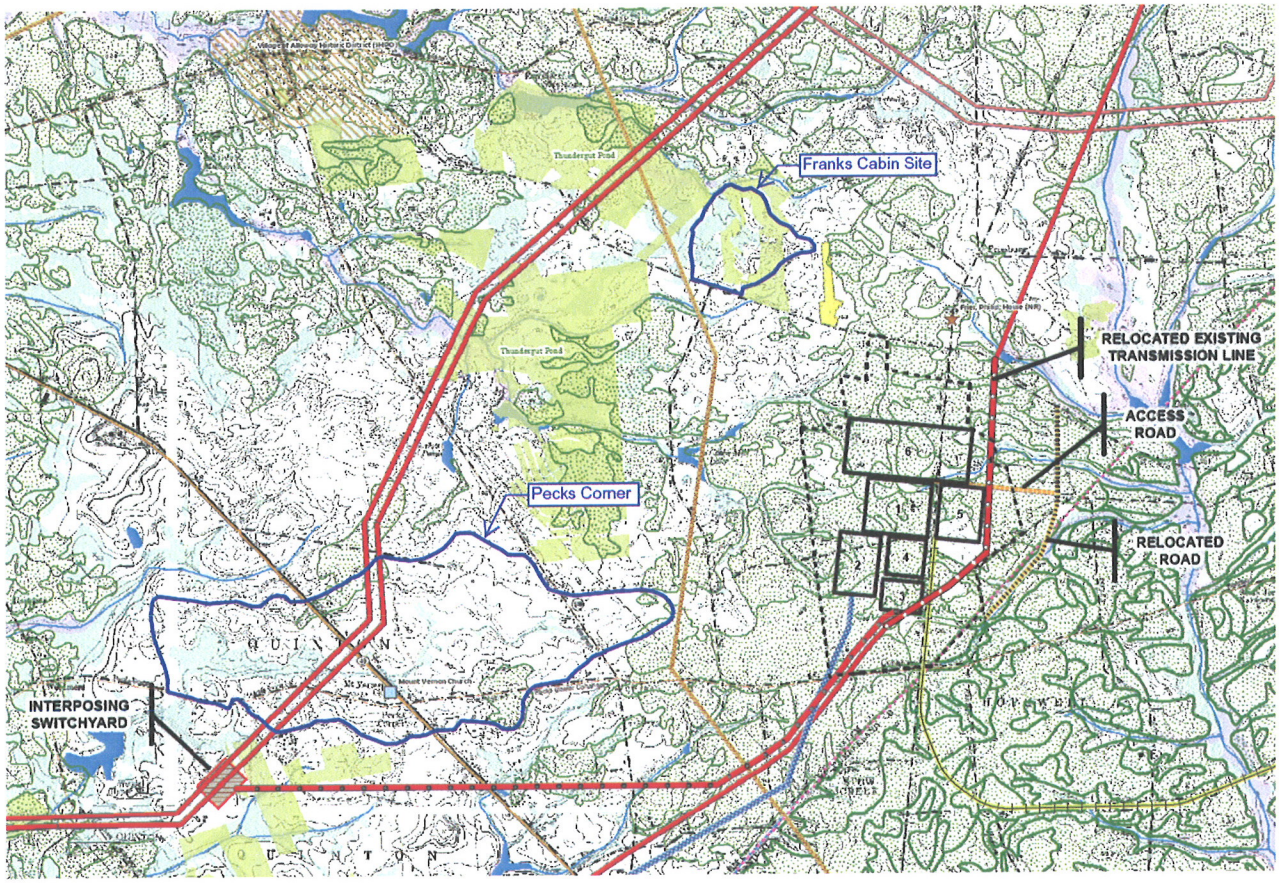


Figure 8-2 — Natural Heritage Priority Sites Near Site 7-2



Last page of Section 8.

9. SUMMARY AND CONCLUSIONS

Potential environmental impacts associated with the five Candidate Sites discussed in the ASE Report, SL-010099, were evaluated using GIS data and other publicly available information. Generally, the quantification of impacts was based on the conceptual site boundaries, plant layouts, and off-site corridors presented in the ASE Report. The quantification of transmission corridors included both the transmission lines required to connect to the nearest 500-kV transmission line (as presented in the ASE Report) and additional transmission lines that may be required to address grid stability issues (as identified by PSEG transmission studies). The evaluations covered potential impacts on natural habitats and sensitive land uses, residences and property parcels, areas dredged for water intake and barge docking facilities, surface water withdrawal, groundwater withdrawal, and endangered, threatened, and rare species of plants and animals.

Natural habitat and sensitive land use impacts for Sites 4-1, 7-1, 7-2, and 7-3 generally were quantified using GIS mapping data. Natural habitat and sensitive land use impacts for Site 7-4 generally were quantified using detailed habitat and land use evaluations developed for the ESPA. Table 3-2 summarizes the impacts associated with the Plant Layout Area, Remaining Site Boundary Area, and access road, rail spur, and water pipeline corridors as required for each site. It can be seen that each of the sites has relatively large impacts in some land cover categories and relatively small impacts in other categories. For example, Site 4-1 impacts the largest total area, the largest quantity of forest, and the second-largest quantity of Prime Farmland and Farmland of Statewide Importance; but Site 4-1 impacts the smallest quantity of streams, the smallest quantity of 100-year floodplains, and the second-smallest quantity of wetlands. Site 7-4 impacts the largest quantity of wetlands and the second-largest quantity of 100-year floodplains; but Site 7-4 impacts the smallest total area and the smallest quantity of forest, cultivated land, Prime Farmland, and Farmland of Statewide Importance. Site 7-4 also impacts the second-smallest quantity of streams. Site 7-1 impacts the largest quantity of streams and Farmland of Statewide Importance; Site 7-2 impacts the largest quantity of cultivated land and Prime Farmland; and Site 7-3 impacts the largest quantity of 100-year floodplains. It should be noted that Site 7-4 impacts the largest quantity of land classified as developed, but virtually all of this impact is to land that was developed for past power plant uses. This situation is distinctly different from that at the other sites, all of which are greenfield sites where developed land typically represents residential land use.

Table 3-3 summarizes the impacts associated with the transmission corridors and interposing switchyard as required for each site. Again, it can be seen that most of the sites have relatively large impacts in some land cover categories and relatively small impacts in other categories. The only exception is Site 7-4; in comparison with the other sites, Site 7-4 does not have especially large impacts in any category and has the smallest or second-smallest impact in almost all categories.

Existing residences were identified primarily through interpretation of recent aerial photographs supplemented with field reconnaissance along public roads in the site areas. Property parcels were identified using property maps obtained from the township where each site was located. The numbers of residences and property parcels potentially affected at each site are summarized in Table 4-1. Site 4-1 has the largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries, and the second-largest number of residences and property parcels inside the site boundaries. Site 7-2 has the largest number of residences and property parcels inside the site boundaries, and the second-largest number of residences inside the plant footprint and within 0.5 mile of the site boundaries. Therefore, these two sites clearly have the greatest potential to impact existing residences and property owners. Site 7-4 has no residences inside the plant footprint, inside the site boundaries, or within 0.5 mile of the site boundaries, and the Site 7-4 boundaries encompass only one property parcel that is not already owned by PSEG. Therefore, Site 7-4 clearly has the least potential to impact existing residences and property owners.

All of the Candidate Sites would require some dredging in the Delaware River to facilitate the construction and operation of a water intake structure and (at most sites) a barge docking facility. It was assumed that the same intake structure and barge facility design would be used at all of the sites; therefore, the required quantity of dredging was estimated based on the river depth and river bottom configuration in each site area. The dredging quantities estimated for each site are summarized in Table 5-1. Site 4-1 has the least potential dredging impact, primarily because a barge docking facility is not feasible at this site. The absence of a barge docking facility is a disadvantage for delivering large equipment and materials to the site, but an advantage in terms of minimizing dredging requirements. Of the sites where barge delivery is feasible, Sites 7-1 and 7-4 have an advantage in that the river in the site area is sufficiently deep so that a barge inlet channel is not required, which reduces the amount of dredging required for the barge facility. Site 7-3 has the greatest potential dredging impact, primarily because of the large amount of dredging required for the barge inlet channel.

The Delaware River would be the primary water source for a new power plant located at any of the Candidate Sites. Potential impacts on the Delaware River were evaluated by comparing the estimated water withdrawal, water consumption, and equivalent fresh water consumption rates with the annual average river flow and the 7Q10 low flow for each site area. The water withdrawal, water consumption, and equivalent fresh water consumption quantities and percentages estimated for each site are summarized in Table 6-1. It can be seen that the percentage of the river flow diverted due to water withdrawal and the percentage consumed due to total water loss are very similar at all of the sites. None of the sites appears to have a significant advantage or disadvantage regarding these parameters. However, based on the equivalent fresh water consumption, Sites 7-1, 7-2, 7-3, and 7-4 have a significant advantage over Site 4-1.

During plant operation, water for potable use and other uses that require fresh water would be withdrawn from the most appropriate groundwater aquifer available at each site. Potential issues associated with groundwater withdrawal were evaluated by reviewing available information on the major aquifers in New Jersey, the approximate depth and thickness of these aquifers within the counties where the Candidate Sites are located, and data for representative wells in the vicinity of each site, including the location, depth, aquifer within which each well is screened, historical water levels, and approximate yields within each aquifer. The available information indicates that the plant groundwater requirements could be supplied by one or more of the aquifers present at each site. Although some parts of some of the aquifers may have had groundwater drawdown, it is likely that properly located wells could supply the plant water needs with no expected problems. None of the sites appears to have a significant advantage or disadvantage regarding groundwater withdrawal.

Information on the endangered, threatened, or rare species that have been recorded within approximately 1 mi. of Sites 4-1, 7-1, 7-2, and 7-3 was obtained from the NJDEP. Information on the endangered, threatened, or rare species that potentially could occur on or near Site 7-4 was obtained from ecological studies conducted for the ESPA. Although several such species could occur at each of the sites, it appears unlikely that any of these species would be significantly affected by project construction or operation. None of the sites appears to have a significant advantage or disadvantage regarding endangered, threatened, or rare species.

The purpose of the evaluations summarized above was to provide an approximation of potential environmental impacts suitable for a conceptual comparison of alternative sites.

Appendix A

Candidate Site Layout Maps

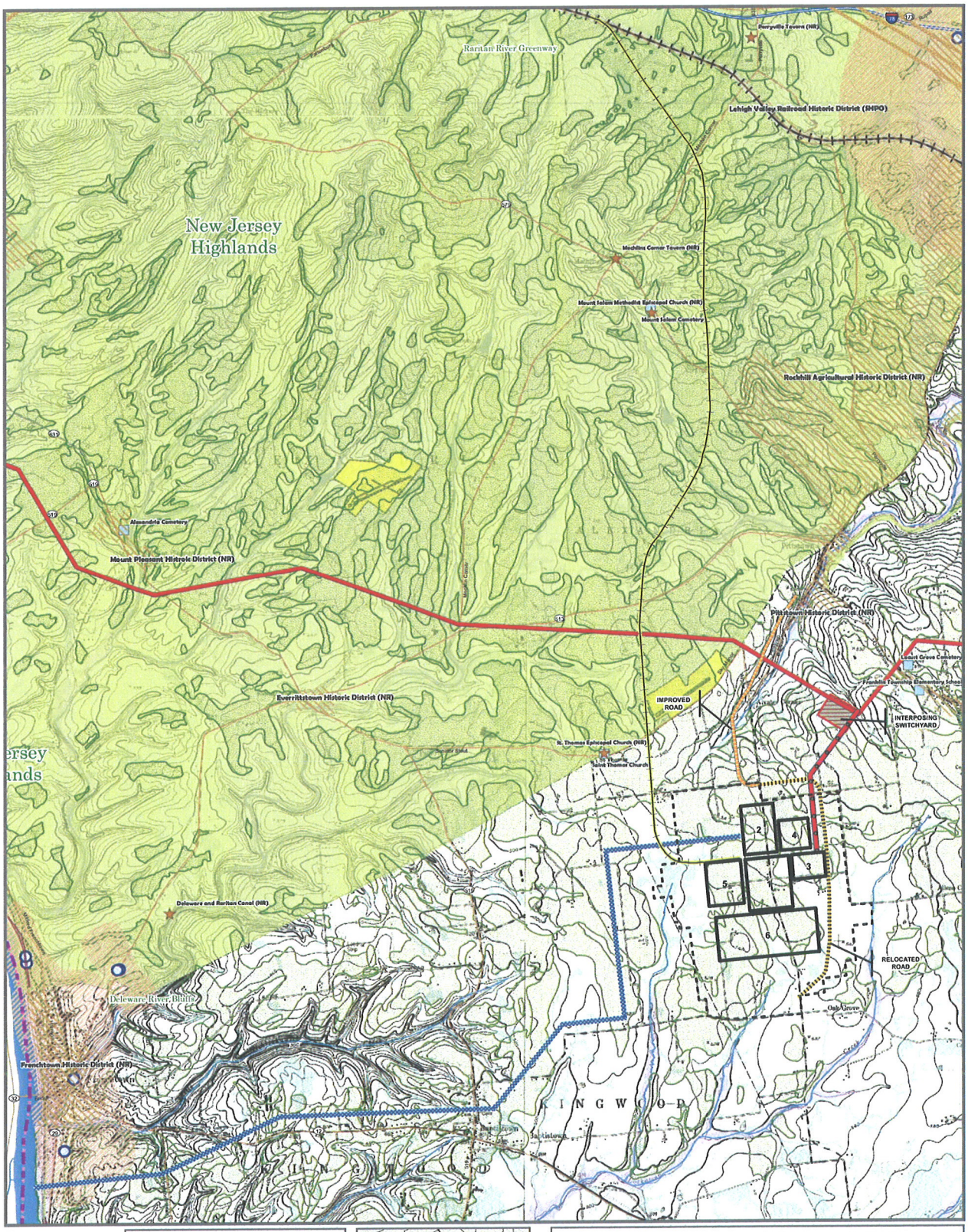


FIGURE 1
Candidate Site 4-1

Sargent & Lundy

1 - Power Block
2 - Cooling Tower
3 - Plant Switchyard
4 - Concrete Batch Plant
5 - Construction Parking
6 - Construction Laydown & Temporary Construction Support Facilities

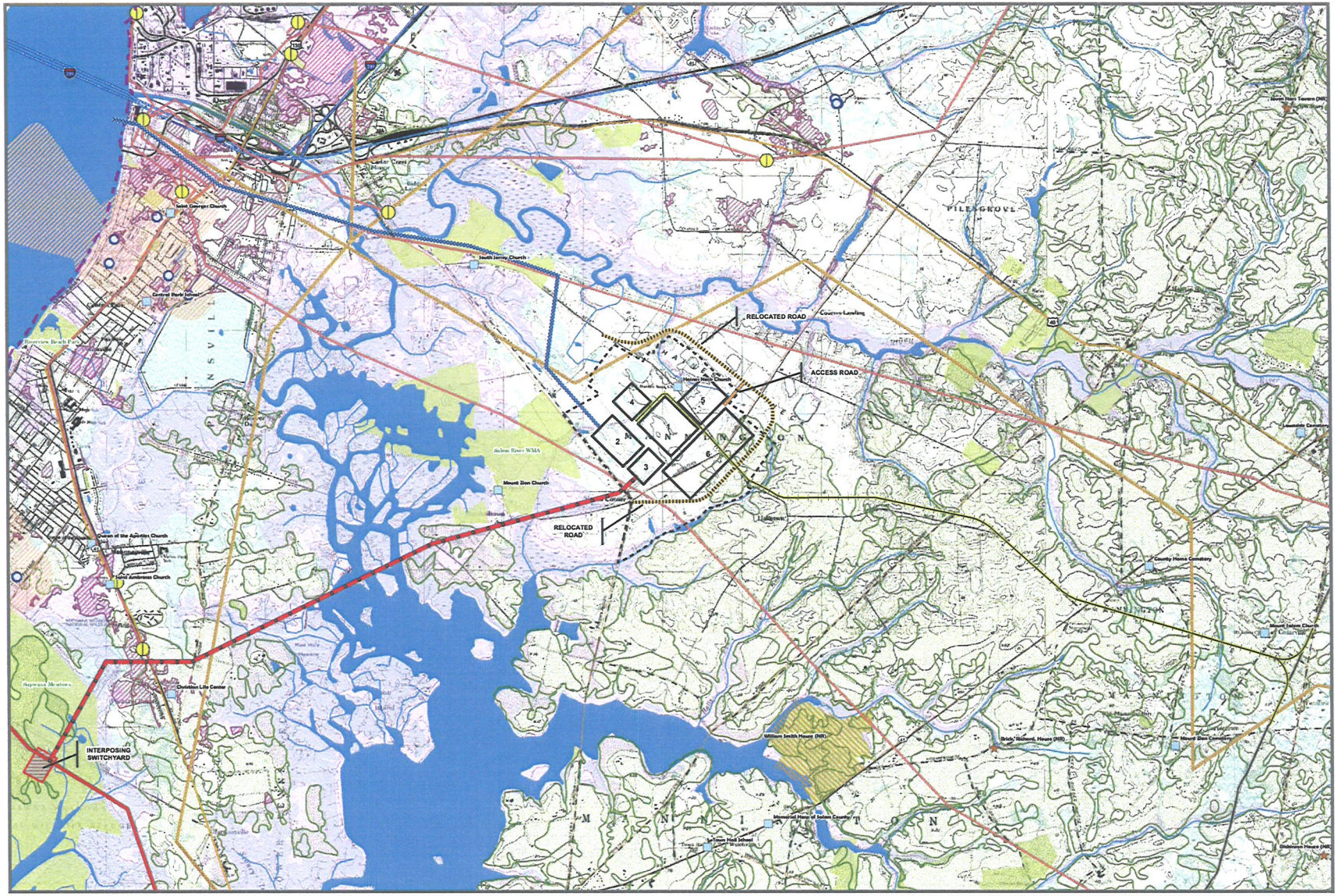


FIGURE 2
Candidate Site 7-1

Sargent & Lundy

1 - Power Block
2 - Cooling Tower
3 - Plant Switchyard
4 - Concrete Batch Plant
5 - Construction Parking
6 - Construction Laydown & Temporary Construction Support Facilities

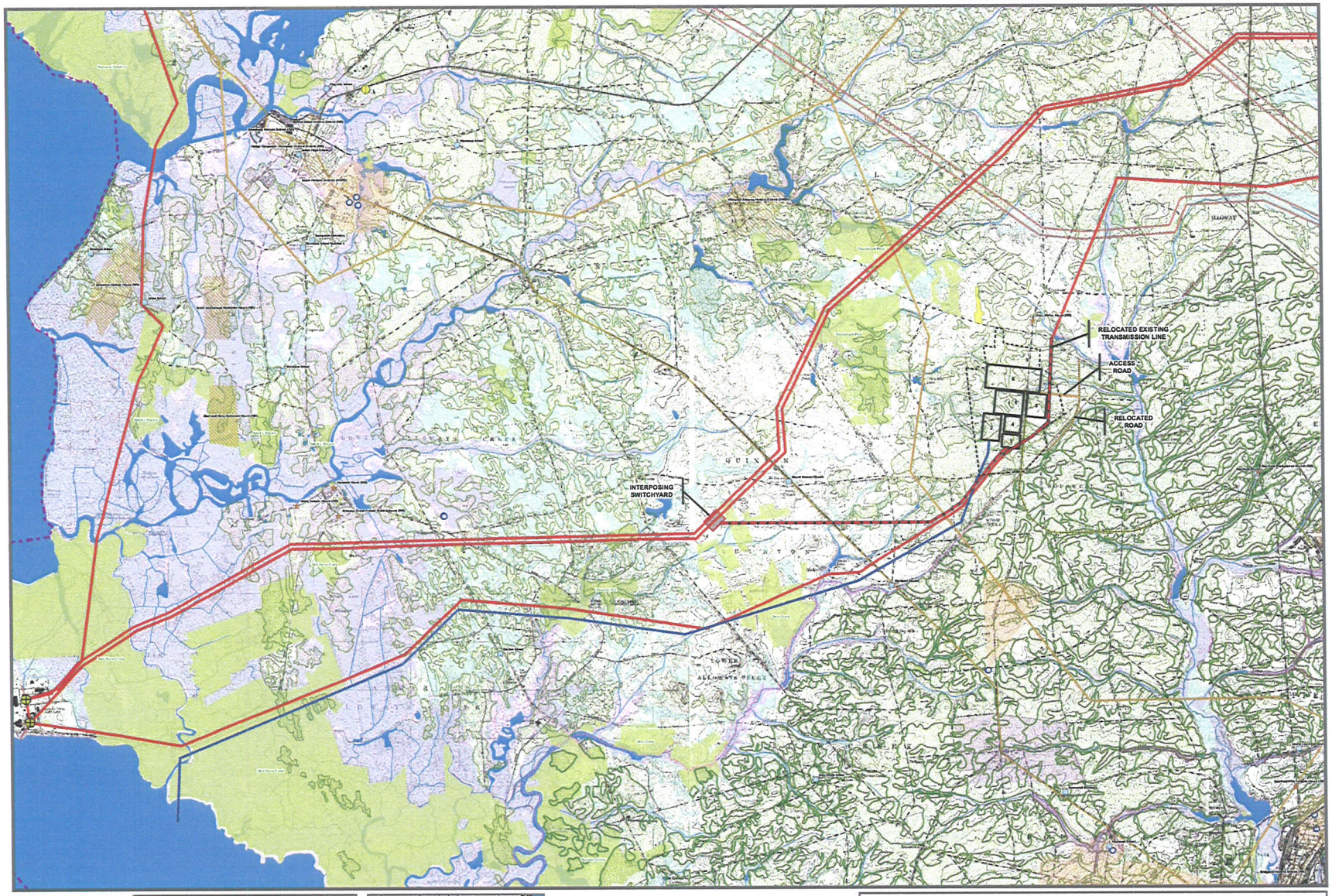


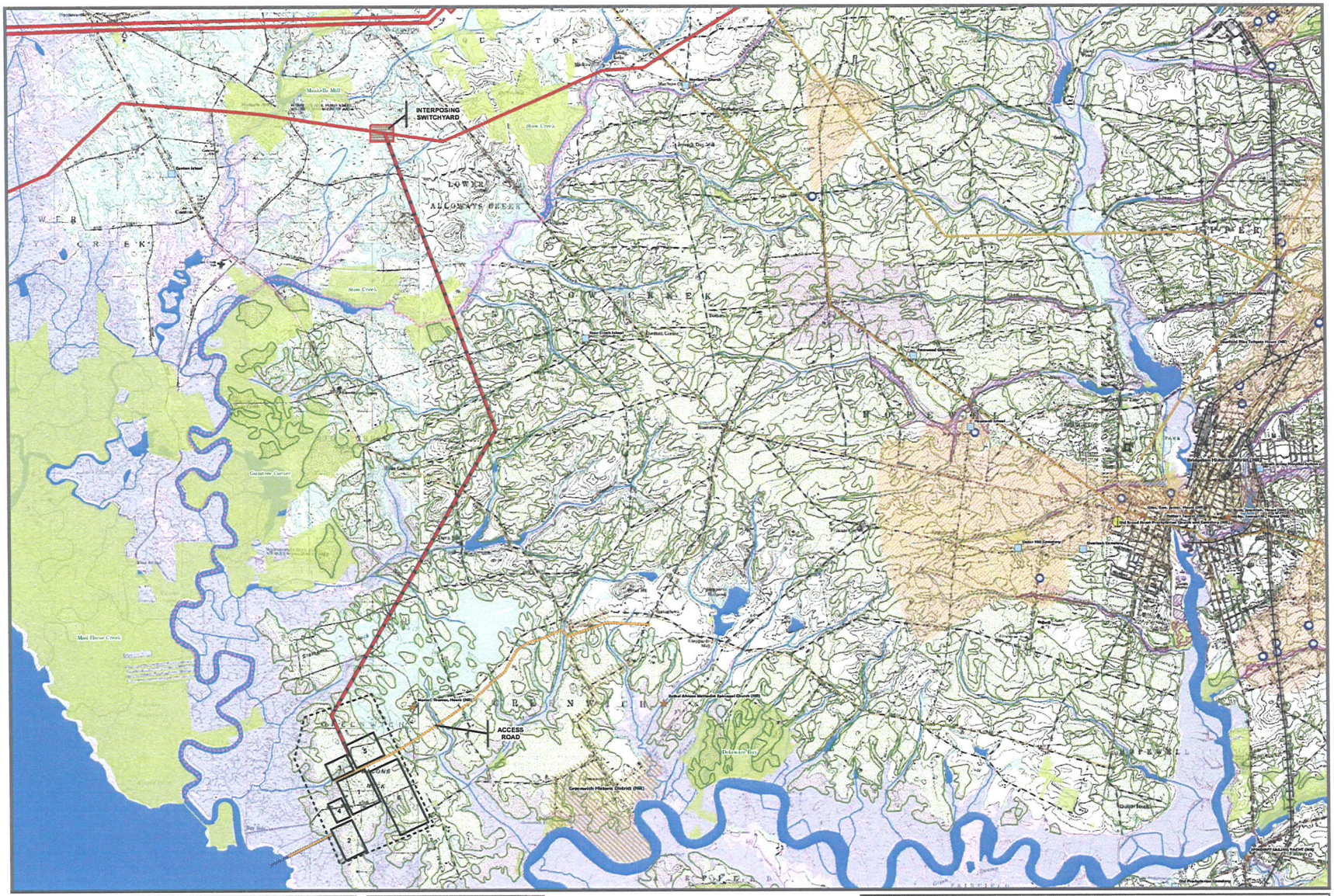
FIGURE 3
Candidate Site 7-2

Sargent & Lundy

N

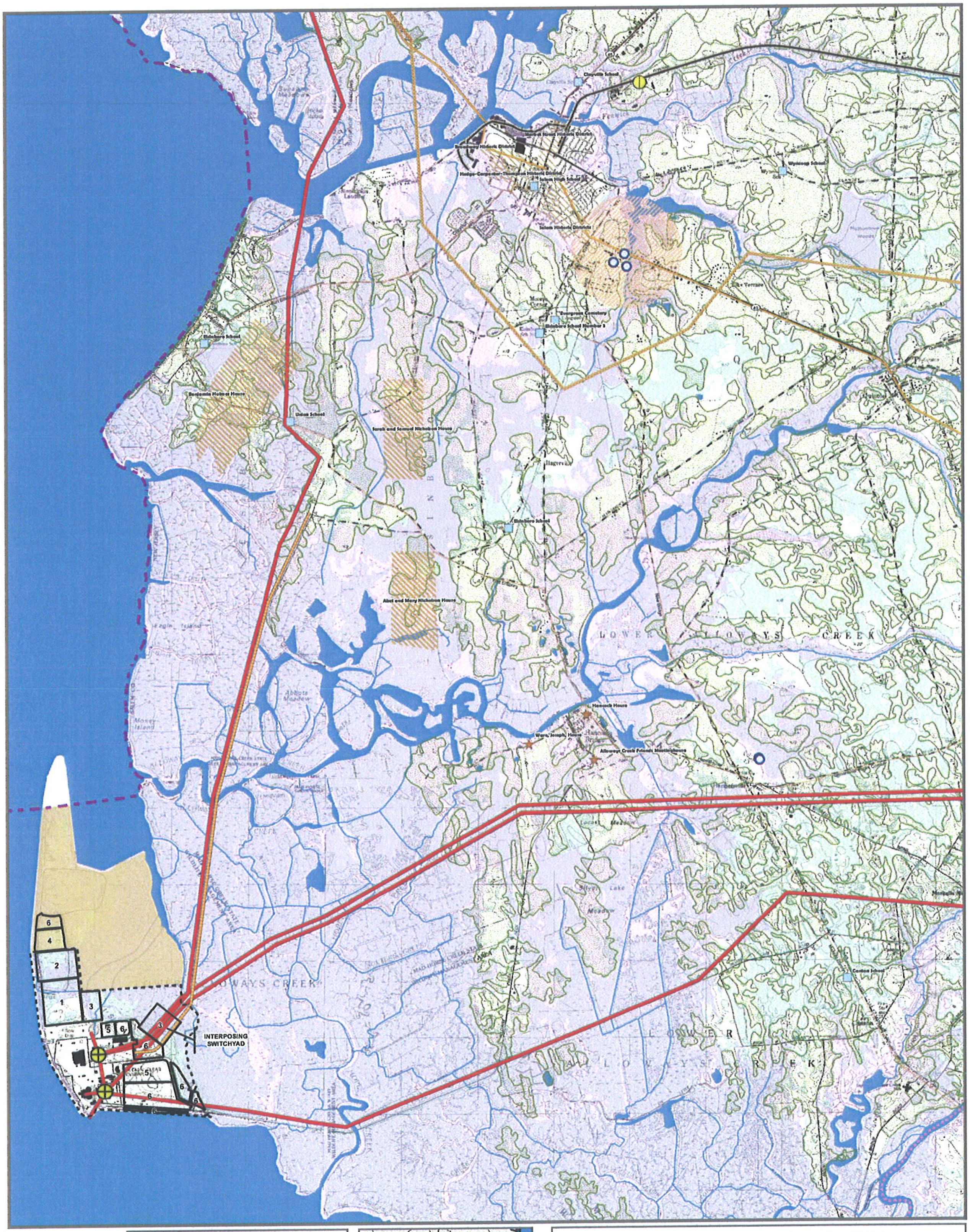
0 1 2 Miles

1 - Power Block
2 - Cooling Tower
3 - Plant Switchyard
4 - Concrete Batch Plant
5 - Construction Parking
6 - Construction Laydown & Temporary Construction Support Facilities



Sargent & Lundy

FIGURE 4
Candidate Site 7-3



Sargent & Lundy

FIGURE 5
Candidate Site 7-4

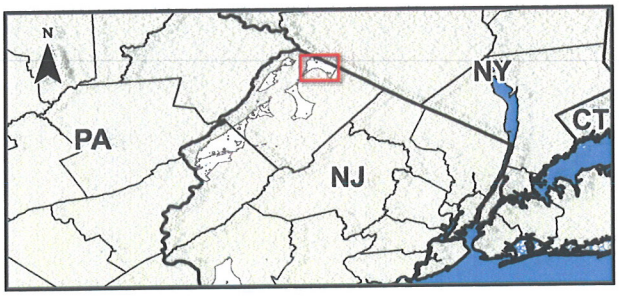
N

0 0.5 1 Miles

1 - Power Block
2 - Cooling Tower
3 - Plant Switchyard
4 - Concrete Batch Plant
5 - Construction Parking
6 - Construction Laydown & Temporary Construction Support Facilities

Legend for Candidate Site Maps

Figure 6



Map Extent

LEGEND - USGS TOPOGRAPHIC BASE MAPS

Existing Site Features

- State Boundary
- County Boundary
- Limited Access Highway
- Highway
- Major Road
- Local Road
- Rail Lines
- Natural Gas Pipelines
- Oil Pipelines
- Transmission Lines < 500 kV
- Transmission Lines > = 500 kV
- Substations < 500 kV
- Substations > = 500 kV
- Public Institutions
- Public Drinking Water Intakes
- Historical Sites
- Historic Districts
- Critical Environmental Sites
- Protected Groundwater Resources
- Airports
- 100-Year Flood Areas
- Parks and Preserves
- Wetlands
- Prime Farmland

Potential Site Features

- Site Boundary
- Plant Layout
- Transmission Line to Plant
- Relocated Existing Transmission Line
- Rail Spur to Plant
- New or Improved Roadway for Plant Access
- Relocated Existing Road
- Makeup Water Pipeline

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Appendix B

Natural Habitat and Land Use Impact Quantification Spreadsheets

Water Pipeline Corridor Impacts

3/12/10

Site	4-1	7-1	7-2	7-3	7-4
Length (feet)	34,852	26,884	67,909	3,603	0
Total Area (acres)	80.0	61.7	155.9	8.3	0.0
NLCD Forest (acres)	15.7	10.1	47.5	0.0	0.0
NLCD Pasture/Hay (acres)	24.8	2.1	12.0	0.0	0.0
NLCD Cultivated Crops (acres)	27.0	27.0	48.8	0.0	0.0
NLCD Total Planted/Cultivated Land (acres)	51.8	29.2	60.8	0.0	0.0
NLCD Developed Land (acres)	1.9	5.2	0.5	0.0	0.0
NLCD Open Water (acres)	0.0	1.3	7.8	2.2	0.0
NLCD Barren Land (acres)	8.0	3.5	2.0	0.0	0.0
Prime Farmland (acres)	49.6	0.0	40.2	0.4	0.0
Farmland of Statewide Importance (acres)	26.2	9.9	46.0	0.0	0.0
FEMA 100-Year Floodplain (acres)	1.3	26.4	49.9	5.6	0.0
Streams (feet)	439	526	6,351	889	0.0
NWI Estuarine and Marine Deepwater (acres)	0.0	1.3	6.8	2.7	0.0
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	32.8	5.5	0.0
NWI Freshwater Emergent Wetland (acres)	0.1	4.2	1.0	0.0	0.0
NWI Freshwater Forested/Shrub Wetland (acres)	2.7	13.6	23.3	0.0	0.0
NWI Other Wetland (acres)	0.3	2.3	0.8	0.0	0.0
NWI Total Wetlands (acres)	3.0	21.5	64.7	8.3	0.0

Note: Impacts for Site 7-4 are based on detailed environmental studies developed for the ESPA.

Rail Corridor Impacts

Site	4-1	7-1	7-2	7-3	7-4
Length (feet)	35,847	36,612	28,431	0.0	0.0
Total Area (acres)	123.4	124.1	97.9	0.0	0.0
NLCD Forest (acres)	45.8	26.7	4.7	0.0	0.0
NLCD Pasture/Hay (acres)	21.1	14.1	33.7	0.0	0.0
NLCD Cultivated Crops (acres)	47.4	75.0	47.4	0.0	0.0
NLCD Total Planted/Cultivated Land (acres)	68.5	89.1	81.2	0.0	0.0
NLCD Developed Land (acres)	2.2	3.6	6.9	0.0	0.0
NLCD Open Water (acres)	0.0	0.0	0.6	0.0	0.0
NLCD Barren Land (acres)	3.2	2.0	2.1	0.0	0.0
Prime Farmland (acres)	76.6	84.0	86.8	0.0	0.0
Farmland of Statewide Importance (acres)	38.6	28.7	8.3	0.0	0.0
FEMA 100-Year Floodplain (acres)	0.0	0.9	4.3	0.0	0.0
Streams (feet)	2,217	617	633	0.0	0.0
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	0.1	0.0
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	0.0	0.0
NWI Freshwater Emergent Wetland (acres)	0.0	0.9	0.4	0.0	0.0
NWI Freshwater Forested/Shrub Wetland (acres)	10.8	9.2	1.4	0.0	0.0
NWI Other Wetland (acres)	1.7	0.2	0.7	0.0	0.0
NWI Total Wetlands (acres)	12.4	10.4	2.5	0.1	0.0

Note: Impacts for Site 7-4 are based on detailed environmental studies developed for the ESPA.

Access Road and Road Relocation Impacts

Site	4-1	7-1	7-2	7-3	7-4
Length (feet)	18,709	17,631	11,624	21,921	25,191
Total Area (acres)	64.4	60.2	39.8	75.5	69.0
NLCD Forest (acres)	7.6	1.3	7.2	11.2	0.1
NLCD Pasture/Hay (acres)	14.2	21.3	13.5	16.8	10.9
NLCD Cultivated Crops (acres)	33.5	36.3	17.6	35.5	0.6
NLCD Total Planted/Cultivated Land (acres)	47.7	57.6	31.0	52.3	11.5
NLCD Developed Land (acres)	0.6	0.4	0.0	1.1	4.0
NLCD Open Water (acres)	0.0	0.0	0.0	0.0	4.6
NLCD Barren Land (acres)	7.5	0.9	0.6	0.7	0.0
Prime Farmland (acres)	24.2	10.8	32.1	45.7	15.9
Farmland of Statewide Importance (acres)	35.2	21.9	6.6	15.2	18.5
FEMA 100-Year Floodplain (acres)	0.0	0.4	3.3	9.8	0.0
Streams (feet)	290	601	1,820	2,558	2,123
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	0.7	NA
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	8.3	NA
NWI Freshwater Emergent Wetland (acres)	0.0	0.0	0.6	0.0	NA
NWI Freshwater Forested/Shrub Wetland (acres)	1.8	1.1	6.6	5.8	NA
NWI Other Wetland (acres)	0.0	0.3	0.0	0.9	NA
NWI Total Wetlands (acres)	1.8	1.3	7.3	15.7	41.0

Note: Impacts for Site 7-4 are based on detailed environmental studies developed for the ESPA.

Transmission Corridor and Interposing Switchyard Impacts

Site	4-1	7-1	7-2	7-3	7-4
Length (feet)	450,805	28,344	31,131	35,759	0
Total Area (acres)	2,135.6	412.1	167.6	510.4	0.0
NLCD Forest (acres)	581.2	63.2	56.4	224.5	0.0
NLCD Pasture/Hay (acres)	328.3	55.4	26.6	76.2	0.0
NLCD Cultivated Crops (acres)	946.6	85.2	78.7	133.0	0.0
NLCD Total Planted/Cultivated Land (acres)	1,274.9	140.6	105.3	209.2	0.0
NLCD Developed Land (acres)	171.2	4.6	2.6	0.3	0.0
NLCD Open Water (acres)	3.2	52.3	0.0	1.7	0.0
NLCD Barren Land (acres)	61.5	8.9	1.2	19.1	0.0
Prime Farmland (acres)	595.3	93.1	84.3	211.5	0.0
Farmland of Statewide Importance (acres)	822.4	101.0	15.8	137.0	0.0
FEMA 100-Year Floodplain (acres)	102.8	252.0	0.0	39.4	0.0
Streams (feet)	32,704	30,936	2,130	9,508	0
NWI Estuarine and Marine Deepwater (acres)	0.0	59.2	0.0	2.1	0.0
NWI Estuarine and Marine Wetland (acres)	0.0	69.7	0.0	23.5	0.0
NWI Freshwater Emergent Wetland (acres)	15.8	5.6	0.0	0.3	0.0
NWI Freshwater Forested/Shrub Wetland (acres)	10.0	89.8	10.9	95.6	0.0
NWI Other Wetland (acres)	10.3	9.2	0.2	0.4	0.0
NWI Total Wetlands (acres)	36.1	233.4	11.1	121.9	0.0

Note: The impacts in this table include all transmission corridors except the macro-corridor to Indian River Substation, which is added in later tables from a different source.

Plant Layout Area Impacts

Site	4-1	7-1	7-2	7-3	7-4
Total Area (acres)	401.3	432.3	393.8	395.4	430.5
NLCD Forest (acres)	11.8	36.5	5.3	29.9	0.0
NLCD Pasture/Hay (acres)	144.9	133.8	219.4	172.5	0.0
NLCD Cultivated Crops (acres)	178.1	231.6	161.7	133.8	0.0
NLCD Total Planted/Cultivated Land (acres)	323.0	365.4	381.1	306.3	0.0
NLCD Developed Land (acres)	6.9	1.5	0.4	1.9	91.7
NLCD Open Water (acres)	0.0	0.0	0.0	0.0	40.3
NLCD Barren Land (acres)	46.7	18.1	6.0	35.0	0.0
Prime Farmland (acres)	323.4	27.4	349.5	382.3	0.0
Farmland of Statewide Importance (acres)	77.8	271.7	26.5	2.3	0.0
FEMA 100-Year Floodplain (acres)	0.0	4.8	0.0	44.9	152.0
Streams (feet)	0	7,223	906	300	7,265
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	0.1	NA
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	7.4	NA
NWI Freshwater Emergent Wetland (acres)	0.0	0.0	2.6	1.4	NA
NWI Freshwater Forested/Shrub Wetland (acres)	1.8	17.6	0.0	4.2	NA
NWI Other Wetland (acres)	0.0	0.0	0.8	0.0	NA
NWI Total Wetlands (acres)	1.8	17.6	3.4	13.0	187.7

Note: Impacts for Site 7-4 are based on detailed environmental studies developed for the ESPA.

Remaining Site Boundary Area Impacts

Site	4-1	7-1	7-2	7-3	7-4
Total Area (acres)	726.8	555.0	601.8	490.9	0.0
NLCD Forest (acres)	138.9	41.5	30.5	81.2	0.0
NLCD Pasture/Hay (acres)	240.2	176.6	337.0	94.5	0.0
NLCD Cultivated Crops (acres)	195.6	253.5	211.4	121.9	0.0
NLCD Total Planted/Cultivated Land (acres)	435.8	430.0	548.4	216.4	0.0
NLCD Developed Land (acres)	5.1	2.7	3.1	0.0	0.0
NLCD Open Water (acres)	0.0	2.6	0.0	0.0	0.0
NLCD Barren Land (acres)	113.3	22.0	18.5	79.1	0.0
Prime Farmland (acres)	369.4	80.3	503.8	348.9	0.0
Farmland of Statewide Importance (acres)	329.6	275.7	57.5	63.7	0.0
FEMA 100-Year Floodplain (acres)	0.0	48.9	0.0	159.8	0.0
Streams (feet)	6,415	13,265	1,920	11,138	0.0
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	3.2	0.0
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	76.0	0.0
NWI Freshwater Emergent Wetland (acres)	9.6	2.9	0.0	5.2	0.0
NWI Freshwater Forested/Shrub Wetland (acres)	58.1	44.2	5.6	51.1	0.0
NWI Other Wetland (acres)	4.9	15.7	3.4	0.0	0.0
NWI Total Wetlands (acres)	72.6	62.8	9.0	135.6	0.0

Note: Impacts for Site 7-4 are based on detailed environmental studies developed for the ESPA.

Site 4-1 Overall Non-Transmission Impacts

Resource Category	Plant Layout Area	Remaining Area within Site Boundary	Total Site Impact	Off-Site Corridors (Non-Transmission)	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	401.3	726.8	1,128.1	267.8	1,395.9	93,750.4	1.5%
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	0.0	0.0	0.0	0.0%
NWI Freshwater Emergent Wetland (acres)	0.0	9.6	9.6	0.1	9.6	635.9	1.5%
NWI Freshwater Forested/Shrub Wetland (acres)	1.8	58.1	59.9	15.2	75.1	5,174.8	1.5%
NWI Other Wetland (acres)	0.0	4.9	4.9	2.0	6.9	1,356.7	0.5%
NWI Total Wetlands (acres)	1.8	72.6	74.4	17.3	91.6	7,167.3	1.3%
NLCD Forest (acres)	11.8	138.9	150.7	69.1	219.8	35,232.2	0.6%
NLCD Pasture/Hay (acres)	144.9	240.2	385.1	60.1	445.2	14,328.0	3.1%
NLCD Cultivated Crops (acres)	178.1	195.6	373.7	107.9	481.7	29,342.9	1.6%
NLCD Total Planted/Cultivated Land (acres)	323.0	435.8	758.8	168.0	926.8	43,670.9	2.1%
NLCD Developed Land (acres)	6.9	5.1	12.0	4.7	16.7	6,535.4	0.3%
NLCD Open Water (acres)	0.0	0.0	0.0	0.0	0.0	620.7	0.0%
NLCD Barren Land (acres)	46.7	113.3	159.9	18.7	178.6	4,759.0	3.8%
Prime Farmland (acres)	323.4	369.4	692.7	150.4	843.2	24,503.3	3.4%
Farmland of Statewide Importance (acres)	77.8	329.6	407.4	100.0	507.4	46,122.9	1.1%
FEMA 100-Year Floodplain (acres)	0.0	0.0	0.0	1.3	1.3	6,101.0	0.0%
Streams (feet)	0.0	6,415.0	6,415.0	2,946.0	9,361	2,253,912	0.4%

Site 4-1 Overall Transmission Impacts

Resource Category	Primary Transmission Corridor and Interposing Switchyard	Additional Transmission Corridor	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Length (feet)	5,724.0	445,080.0	450,804.0		
Total Area (acres)	100.0	2,035.6	2,135.6	93,750.4	2.3%
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	0.0	0.0%
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	0.0	0.0%
NWI Freshwater Emergent Wetland (acres)	0.0	15.8	15.8	635.9	2.5%
NWI Freshwater Forested/Shrub Wetland (acres)	0.0	10.0	10.0	5,174.8	0.2%
NWI Other Wetland (acres)	0.4	9.9	10.3	1,356.7	0.8%
NWI Total Wetlands (acres)	0.4	35.6	36.1	7,167.3	0.5%
NLCD Forest (acres)	16.4	564.8	581.2	35,232.2	1.6%
NLCD Pasture/Hay (acres)	27.3	301.1	328.3	14,328.0	2.3%
NLCD Cultivated Crops (acres)	51.8	894.8	946.6	29,342.9	3.2%
NLCD Total Planted/Cultivated Land (acres)	79.1	1,195.8	1,274.9	43,670.9	2.9%
NLCD Developed Land (acres)	0.2	171.0	171.2	6,535.4	2.6%
NLCD Open Water (acres)	0.0	3.2	3.2	620.7	0.5%
NLCD Barren Land (acres)	2.6	58.9	61.5	4,759.0	1.3%
Prime Farmland (acres)	66.1	529.2	595.3	24,503.3	2.4%
Farmland of Statewide Importance (acres)	24.4	798.0	822.4	46,122.9	1.8%
FEMA 100-Year Floodplain (acres)	0.0	102.8	102.8	6,101.0	1.7%
Streams (feet)	533	32,171	32,704	2,253,912	1.5%

Note: The Additional Transmission Corridor follows existing transmission lines from the interposing switchyard to Limerick Substation.

Site 7-1 Overall Non-Transmission Impacts

Resource Category	Plant Layout Area	Remaining Area within Site Boundary	Total Site Impact	Off-Site Corridors (Non-Transmission)	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	432.3	555.0	987.3	246.0	1,233.2	93,243.0	1.3%
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	1.3	1.3	10,170.3	0.0%
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	0.0	0.0	5,196.7	0.0%
NWI Freshwater Emergent Wetland (acres)	0.0	2.9	2.9	5.1	8.0	2,261.7	0.4%
NWI Freshwater Forested/Shrub Wetland (acres)	17.6	44.2	61.8	24.0	85.8	12,610.3	0.7%
NWI Other Wetland (acres)	0.0	15.7	15.7	2.8	18.5	3,382.3	0.5%
NWI Total Wetlands (acres)	17.6	62.8	80.4	33.2	113.5	33,621.4	0.3%
NLCD Forest (acres)	36.5	41.5	78.0	38.1	116.0	13,014.5	0.9%
NLCD Pasture/Hay (acres)	133.8	176.6	310.3	37.5	347.8	13,172.6	2.6%
NLCD Cultivated Crops (acres)	231.6	253.5	485.1	138.3	623.4	28,181.6	2.2%
NLCD Total Planted/Cultivated Land (acres)	365.4	430.0	795.4	175.8	971.2	41,354.2	2.3%
NLCD Developed Land (acres)	1.5	2.7	4.2	9.2	13.5	9,827.7	0.1%
NLCD Open Water (acres)	0.0	2.6	2.6	1.3	3.9	19,474.2	0.0%
NLCD Barren Land (acres)	18.1	22.0	40.0	6.4	46.4	2,260.6	2.1%
Prime Farmland (acres)	27.4	80.3	107.7	94.8	202.5	30,145.2	0.7%
Farmland of Statewide Importance (acres)	271.7	275.7	547.4	60.5	608.0	16,090.9	3.8%
FEMA 100-Year Floodplain (acres)	4.8	48.9	53.7	27.7	81.4	24,608.0	0.3%
Streams (feet)	7,223.0	13,265.0	20,488.0	1,744.3	22,232	2,722,667	0.8%

Site 7-1 Overall Transmission Impacts

Resource Category	Primary Transmission Corridor and Interposing Switchyard	Additional Transmission Corridor	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	412.1	2,445.0	2,857.1	93,243.0	3.1%
NWI Estuarine and Marine Deepwater (acres)	59.2	97.0	156.2	10,170.3	1.5%
NWI Estuarine and Marine Wetland (acres)	69.7	381.0	450.7	5,196.7	8.7%
NWI Freshwater Emergent Wetland (acres)	5.6	42.0	47.6	2,261.7	2.1%
NWI Freshwater Forested/Shrub Wetland (acres)	89.8	189.0	278.8	12,610.3	2.2%
NWI Other Wetland (acres)	9.2	21.0	30.2	3,382.3	0.9%
NWI Total Wetlands (acres)	233.4	730.0	963.4	33,621.3	2.9%
NLCD Forest (acres)	63.2	365.0	428.2	13,014.5	3.3%
NLCD Pasture/Hay (acres)	55.4	275.0	330.4	13,172.6	2.5%
NLCD Cultivated Crops (acres)	85.2	942.0	1,027.2	28,181.6	3.6%
NLCD Total Planted/Cultivated Land (acres)	140.6	1,217.0	1,357.6	41,354.2	3.3%
NLCD Developed Land (acres)	4.6	130.0	134.6	9,827.7	1.4%
NLCD Open Water (acres)	52.3	202.0	254.3	19,474.2	1.3%
NLCD Barren Land (acres)	8.9	28.0	36.9	2,260.6	1.6%
Prime Farmland (acres)	93.1	750.0	843.1	30,145.2	2.8%
Farmland of Statewide Importance (acres)	101.0	576.0	677.0	16,090.9	4.2%
FEMA 100-Year Floodplain (acres)	252.0	920.0	1,172.0	24,608.0	4.8%
Streams (feet)	30,936	69,168	100,104	2,722,667	3.7%

Note: The Additional Transmission Corridor represents approximately 96 miles of the macro-corridor to Indian River Substation.

Site 7-2 Overall Non-Transmission Impacts

Resource Category	Plant Layout Area	Remaining Area within Site Boundary	Total Site Impact	Off-Site Corridors (Non-Transmission)	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	393.8	601.8	995.7	293.6	1,289.2	92,912.0	1.4%
NWI Estuarine and Marine Deepwater (acres)	0.0	0.0	0.0	6.8	6.8	137.6	5.0%
NWI Estuarine and Marine Wetland (acres)	0.0	0.0	0.0	32.8	32.8	291.2	11.3%
NWI Freshwater Emergent Wetland (acres)	2.6	0.0	2.6	2.0	4.6	767.6	0.6%
NWI Freshwater Forested/Shrub Wetland (acres)	0.0	5.6	5.6	31.3	36.9	10,839.2	0.3%
NWI Other Wetland (acres)	0.8	3.4	4.2	1.5	5.7	1,051.7	0.5%
NWI Total Wetlands (acres)	3.4	9.0	12.4	74.5	86.9	13,087.3	0.7%
NLCD Forest (acres)	5.3	30.5	35.8	59.4	95.1	28,082.9	0.3%
NLCD Pasture/Hay (acres)	219.4	337.0	556.4	59.2	615.5	20,782.7	3.0%
NLCD Cultivated Crops (acres)	161.7	211.4	373.1	113.8	486.9	32,911.3	1.5%
NLCD Total Planted/Cultivated Land (acres)	381.1	548.4	929.5	173.0	1,102.4	53,694.0	2.1%
NLCD Developed Land (acres)	0.4	3.1	3.4	7.3	10.7	3,783.3	0.3%
NLCD Open Water (acres)	0.0	0.0	0.0	8.4	8.4	533.0	1.6%
NLCD Barren Land (acres)	6.0	18.5	24.5	4.7	29.2	1,869.0	1.6%
Prime Farmland (acres)	349.5	503.8	853.3	159.0	1,012.3	56,000.1	1.8%
Farmland of Statewide Importance (acres)	26.5	57.5	84.0	60.9	144.9	21,528.0	0.7%
FEMA 100-Year Floodplain (acres)	0.0	0.0	0.0	57.5	57.5	5,760.0	1.0%
Streams (feet)	906.0	1,920.0	2,826.0	8,804.0	11,630	1,384,973	0.8%

Site 7-2 Overall Transmission Impacts

Resource Category	Primary Transmission Corridor and Interposing Switchyard	Additional Transmission Corridor	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Relocated Transmission Line (feet)	9,422.0				
Connecting Transmission Line (feet)	21,708.0				
Total Area (acres)	167.6	2,728.0	2,895.6	92,912.0	3.1%
NWI Estuarine and Marine Deepwater (acres)	0.0	109.0	109.0	137.6	79.2%
NWI Estuarine and Marine Wetland (acres)	0.0	425.0	425.0	291.2	145.9%
NWI Freshwater Emergent Wetland (acres)	0.0	47.0	47.0	767.6	6.1%
NWI Freshwater Forested/Shrub Wetland (acres)	10.9	210.0	220.9	10,839.2	2.0%
NWI Other Wetland (acres)	0.2	23.0	23.2	1,051.7	2.2%
NWI Total Wetlands (acres)	11.1	814.0	825.1	13,087.3	6.3%
NLCD Forest (acres)	56.4	408.0	464.4	28,082.9	1.7%
NLCD Pasture/Hay (acres)	26.6	307.0	333.6	20,782.7	1.6%
NLCD Cultivated Crops (acres)	78.7	1,051.0	1,129.7	32,911.3	3.4%
NLCD Total Planted/Cultivated Land (acres)	105.3	1,358.0	1,463.3	53,694.0	2.7%
NLCD Developed Land (acres)	2.6	146.0	148.6	3,783.3	3.9%
NLCD Open Water (acres)	0.0	225.0	225.0	533.0	42.2%
NLCD Barren Land (acres)	1.2	31.0	32.2	1,869.0	1.7%
Prime Farmland (acres)	84.3	837.0	921.3	56,000.1	1.6%
Farmland of Statewide Importance (acres)	15.8	642.0	657.8	21,528.0	3.1%
FEMA 100-Year Floodplain (acres)	0.0	1,026.0	1,026.0	5,760.0	17.8%
Streams (feet)	2,130	77,088	79,218	1,384,973	5.7%

Note: The Additional Transmission Corridor represents the 107 mile macro-corridor to Indian River Substation.

Site 7-3 Overall Non-Transmission Impacts

Resource Category	Plant Layout Area	Remaining Area within Site Boundary	Total Site Impact	Off-Site Corridors (Non-Transmission)	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	395.4	490.9	886.3	83.8	970.1	91,276.7	1.1%
NWI Estuarine and Marine Deepwater (acres)	0.1	3.2	3.2	3.4	6.7	37,691.0	0.0%
NWI Estuarine and Marine Wetland (acres)	7.4	76.0	83.4	13.8	97.2	19,684.4	0.5%
NWI Freshwater Emergent Wetland (acres)	1.4	5.2	6.6	0.0	6.6	810.9	0.8%
NWI Freshwater Forested/Shrub Wetland (acres)	4.2	51.1	55.3	5.8	61.2	4,743.6	1.3%
NWI Other Wetland (acres)	0.0	0.0	0.0	0.9	0.9	529.0	0.2%
NWI Total Wetlands (acres)	13.0	135.6	148.6	24.0	172.6	63,459.0	0.3%
NLCD Forest (acres)	29.9	81.2	111.1	11.2	122.3	9,704.2	1.3%
NLCD Pasture/Hay (acres)	172.5	94.5	267.0	16.8	283.8	5,810.2	4.9%
NLCD Cultivated Crops (acres)	133.8	121.9	255.8	35.5	291.3	13,582.8	2.1%
NLCD Total Planted/Cultivated Land (acres)	306.3	216.4	522.8	52.4	575.1	19,393.0	3.0%
NLCD Developed Land (acres)	1.9	0.0	1.9	1.1	3.0	640.2	0.5%
NLCD Open Water (acres)	0.0	0.0	0.0	2.2	2.2	73,737.0	0.0%
NLCD Barren Land (acres)	35.0	79.1	114.1	0.7	114.8	1,192.1	9.6%
Prime Farmland (acres)	382.3	348.9	731.2	46.1	777.3	18,290.6	4.2%
Farmland of Statewide Importance (acres)	2.3	63.7	66.0	15.2	81.2	11,449.6	0.7%
FEMA 100-Year Floodplain (acres)	44.9	159.8	204.7	15.4	220.0	26,894.6	0.8%
Streams (feet)	300.0	11,138.0	11,438.0	3,447.0	14,885	4,121,978	0.4%

Site 7-3 Overall Transmission Impacts

Resource Category	Primary Transmission Corridor and Interposing Switchyard	Additional Transmission Corridor	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	510.4	2,728.0	3,238.4	91,276.7	3.5%
NWI Estuarine and Marine Deepwater (acres)	2.1	109.0	111.1	37,691.0	0.3%
NWI Estuarine and Marine Wetland (acres)	23.5	425.0	448.5	19,684.4	2.3%
NWI Freshwater Emergent Wetland (acres)	0.3	47.0	47.3	810.9	5.8%
NWI Freshwater Forested/Shrub Wetland (acres)	95.6	210.0	305.6	4,743.6	6.4%
NWI Other Wetland (acres)	0.4	23.0	23.4	529.0	4.4%
NWI Total Wetlands (acres)	121.9	814.0	935.9	63,459.0	1.5%
NLCD Forest (acres)	224.5	408.0	632.5	9,704.2	6.5%
NLCD Pasture/Hay (acres)	76.2	307.0	383.2	5,810.2	6.6%
NLCD Cultivated Crops (acres)	133.0	1,051.0	1,184.0	13,582.8	8.7%
NLCD Total Planted/Cultivated Land (acres)	209.2	1,358.0	1,567.2	19,393.0	8.1%
NLCD Developed Land (acres)	0.3	146.0	146.3	640.2	22.9%
NLCD Open Water (acres)	1.7	225.0	226.7	73,737.0	0.3%
NLCD Barren Land (acres)	19.1	31.0	50.1	1,192.1	4.2%
Prime Farmland (acres)	211.5	837.0	1,048.5	18,290.6	5.7%
Farmland of Statewide Importance (acres)	137.0	642.0	779.0	11,449.6	6.8%
FEMA 100-Year Floodplain (acres)	39.4	1,026.0	1,065.4	26,894.6	4.0%
Streams (feet)	9,508	77,088	86,596	4,121,978	2.1%

Note: The Additional Transmission Corridor represents the 107 mile macro-corridor to Indian River Substation.

Site 7-4 Overall Non-Transmission Impacts

Resource Category	Plant Layout Area	Remaining Area within Site Boundary	Total Site Impact	Off-Site Corridors (Non-Transmission)	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	430.5	0.0	430.5	69.0	499.5	91,977.0	0.5%
NWI Estuarine and Marine Deepwater (acres)	NA	0.0	0.0	0.0	0.0	33,601.2	0.0%
NWI Estuarine and Marine Wetland (acres)	NA	0.0	0.0	0.0	0.0	25,755.2	0.0%
NWI Freshwater Emergent Wetland (acres)	NA	0.0	0.0	0.0	0.0	2,097.4	0.0%
NWI Freshwater Forested/Shrub Wetland (acres)	NA	0.0	0.0	0.0	0.0	3,308.6	0.0%
NWI Other Wetland (acres)	NA	0.0	0.0	0.0	0.0	569.3	0.0%
NWI Total Wetlands (acres)	187.7	0.0	187.7	41.0	228.7	65,331.7	0.4%
NLCD Forest (acres)	0.0	0.0	0.0	0.1	0.1	4,122.8	0.0%
NLCD Pasture/Hay (acres)	0.0	0.0	0.0	10.9	10.9	5,478.1	0.2%
NLCD Cultivated Crops (acres)	0.0	0.0	0.0	0.6	0.6	18,099.6	0.0%
NLCD Total Planted/Cultivated Land (acres)	0.0	0.0	0.0	11.5	11.5	23,577.7	0.0%
NLCD Developed Land (acres)	91.7	0.0	91.7	4.0	95.7	1,135.4	8.4%
NLCD Open Water (acres)	40.3	0.0	40.3	4.6	44.9	61,792.1	0.1%
NLCD Barren Land (acres)	0.0	0.0	0.0	0.0	0.0	794.8	0.0%
Prime Farmland (acres)	0.0	0.0	0.0	15.9	15.9	6,941.7	0.2%
Farmland of Statewide Importance (acres)	0.0	0.0	0.0	18.5	18.5	5,623.6	0.3%
FEMA 100-Year Floodplain (acres)	152.0	0.0	152.0	0.0	152.0	39,034.5	0.4%
Streams (feet)	7,265	0	7,265	2,123	9,388	4,726,229	0.2%

Note: Impacts are based on detailed environmental studies developed for the ESPA.

Site 7-4 Overall Transmission Impacts

Resource Category	Primary Transmission Corridor and Interposing Switchyard	Additional Transmission Corridor	Grand Total Impact	6-Mile Vicinity	Percentage of Vicinity Impacted
Total Area (acres)	0.0	2,728.0	2,728.0	91,977.0	3.0%
NWI Estuarine and Marine Deepwater (acres)	0.0	109.0	109.0	33,601.2	0.3%
NWI Estuarine and Marine Wetland (acres)	0.0	425.0	425.0	25,755.2	1.7%
NWI Freshwater Emergent Wetland (acres)	0.0	47.0	47.0	2,097.4	2.2%
NWI Freshwater Forested/Shrub Wetland (acres)	0.0	210.0	210.0	3,308.6	6.3%
NWI Other Wetland (acres)	0.0	23.0	23.0	569.3	4.0%
NWI Total Wetlands (acres)	0.0	814.0	814.0	65,331.7	1.2%
NLCD Forest (acres)	0.0	408.0	408.0	4,122.8	9.9%
NLCD Pasture/Hay (acres)	0.0	307.0	307.0	5,478.1	5.6%
NLCD Cultivated Crops (acres)	0.0	1,051.0	1,051.0	18,099.6	5.8%
NLCD Total Planted/Cultivated Land (acres)	0.0	1,358.0	1,358.0	23,577.7	5.8%
NLCD Developed Land (acres)	0.0	146.0	146.0	1,135.4	12.9%
NLCD Open Water (acres)	0.0	225.0	225.0	61,792.1	0.4%
NLCD Barren Land (acres)	0.0	31.0	31.0	794.8	3.9%
Prime Farmland (acres)	0.0	837.0	837.0	6,941.7	12.1%
Farmland of Statewide Importance (acres)	0.0	642.0	642.0	5,623.6	11.4%
FEMA 100-Year Floodplain (acres)	0.0	1,026.0	1,026.0	39,034.5	2.6%
Streams (feet)	0	77,088	77,088	4,726,229	1.6%

Note: The Additional Transmission Corridor represents the 107 mile macro-corridor to Indian River Substation.