February 14, 2024

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From	Blair Shoniker, Nigel Joyce, Erika Brown	**Project No.**	11197486
Project Name	Oyster Creek Nuclear Generation Station		
Subject	100 Year Land Use Outlook – Categorization and Justification		

1. Introduction

This White Paper (WP) documents the evaluation of the suitability of Oyster Creek Nuclear Generating Station (OCNGS) Site for a continued industrial use as the reasonably foreseeable land use. This WP provides an overview of the existing OCNGS as well as an evaluation of the suitability of the Site for a continued Industrial use as the reasonably foreseeable land use, including considerations from a Local and State perspective. As part of the Land Use categorization, exposure scenarios in accordance with the NUREG-1757 Guidelines (Guidelines) were provided by Holtec Decommissioning International (HDI) and incorporated to this WP.

2. Summary Description of the Existing Site

The OCNGS licensed site boundary (Site) is located adjacent to Oyster Creek in the Forked River section of Lacey Township and Ocean Township in Ocean County, New Jersey (Figure 2.1). The Site is bounded to the east by Route 9 and to the north and west by the Intake/Discharge Canal (IDC). The southern Site boundary is located just south of Oyster Creek within Ocean Township.

The area identified as "Site Vicinity" (not licensed) is generally bounded to the south by Oyster Creek, to the north by the South Branch of the Forked River, to the east by the IDC (save for the southwest corner), and to the west by Garden State Parkway.

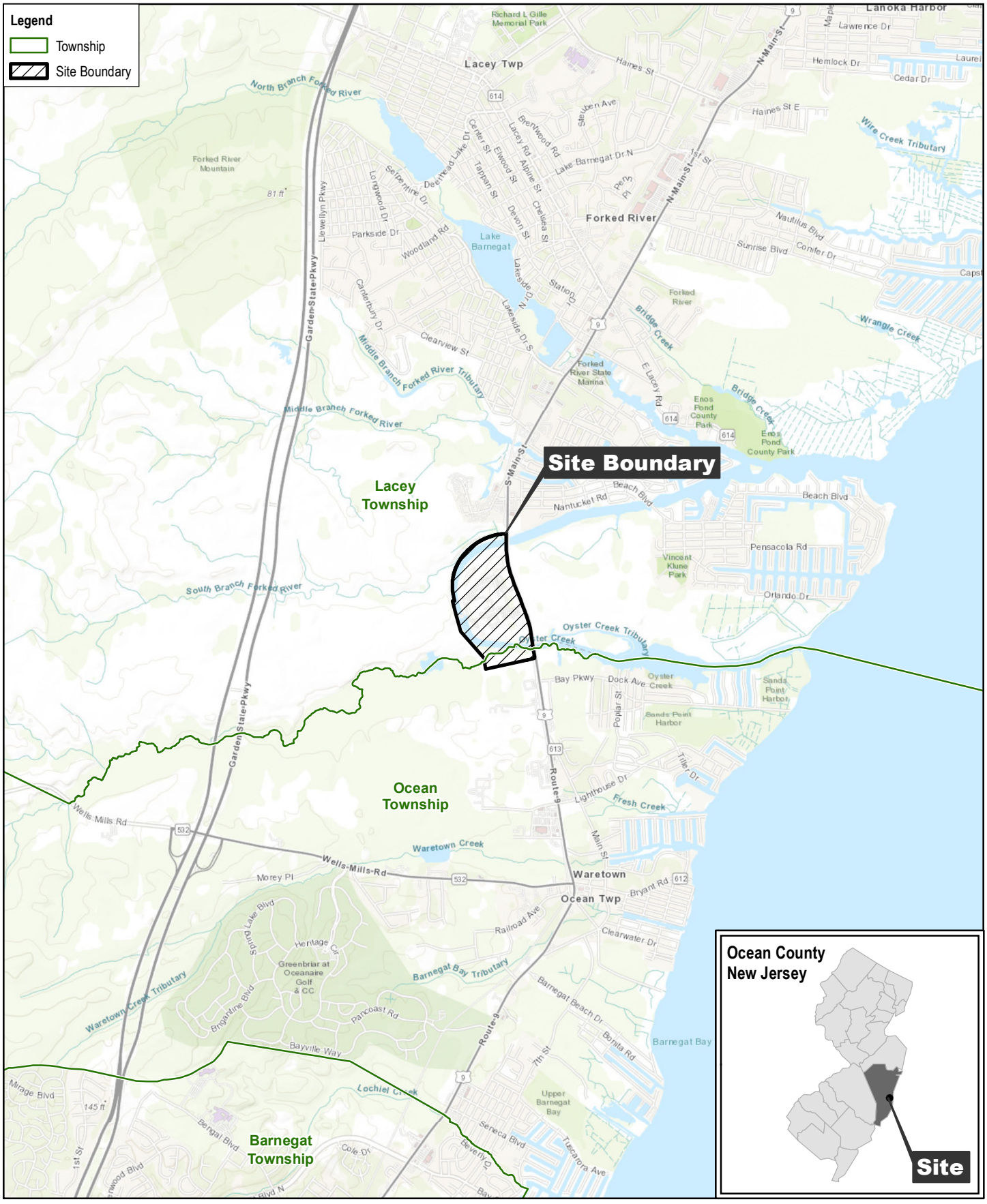
The operational area of the Site is 152 acres in size and is located mostly in Lacey Township in Ocean County, New Jersey. A small portion of the Site is in Ocean Township within Ocean County. The property consists of:

- BLOCK 100, LOT 4.02 in Lacey Township consisting of 139.374 acres
- BLOCK 41, LOT 43 in Ocean Township consisting of 11.106 acres

The facility is about two miles inland from the shore of Barnegat Bay and about seven miles west-northwest of Barnegat Light. The Discharge Canal flows east through the Oyster Creek stream channel to Barnegat Bay, bordered to the north by the currently undeveloped, former Finninger property (now owned by HDI) to the north and the south by land developed for commercial and residential use.

2.1 Infrastructure

The majority of the Site is occupied by the OCGNS facility and associated buildings and infrastructure, including underground commodities, transmission lines, auxiliary buildings and parking lots. The outer fringes of the Site contain natural areas along with some wetlands.


Legend
Township
Site Boundary
Site Boundary
Lacey Township
Ocean Township
Barnegat Township
Lacey Twp
Forked River
Ocean Twp
Waretown
Lanoka Harbor
Lake Barnegat
Forked River Mountain
Richard L Gille Memorial Park
Forked River State Marina
Enos Pond County Park
Vincent Klune Park
Sands Point Harbor
Greenbriar at Oceanaire Golf & CC
Upper Barnegat Bay
Barnegat Bay
North Branch Forked River
Middle Branch Forked River
Middle Branch Forked River Tributary
South Branch Forked River
Oyster Creek
Oyster Creek Tributary
Bridge Creek
Wire Creek Tributary
Wrangle Creek
Fresh Creek
Waretown Creek
Waretown Creek Tributary
Barnegat Bay Tributary
Lochiel Creek
Garden State Pkwy
N Main St
S Main St
Route 9
Wells Mills Rd
Wells-Mills-Rd
Beach Blvd
Bay Pkwy
Railroad Ave
Barnegat Beach Dr
Ocean County
New Jersey
Site
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Feet
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane New Jersey FIPS 2900 Feet
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GHD
EXELON GENERATION COMPANY
OYSTER CREEK NUCLEAR GENERATING STATION
741 US-9, FORKED RIVER, NEW JERSEY
100 YEAR LAND USE OUTLOOK
SITE LOCATION
Project No. 11197486
Date Feb 9, 2024
FIGURE 2.1
Q:\GIS\PROJECTS\11197000s\11197486\Layouts\202309_100 Year Land Use Outlook\11197486_202309_100YearLandUseOutlook_GIS001.mxd
Data source: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community.
Site Boundary/Site Vicinity: Ocean County Department of Planning, 2022 Ocean County Parcel & ModIV Geodatabase
Township source: New Jersey Office of GIS, NJGIN Open Data, Municipal Boundaries of NJ
Creator: tmiles

The Site is currently serviced with domestic water via a private well; however, Lacey Township is in the process of servicing the Site with a municipal water supply for all future potable water needs. This is in keeping with Lacey Ordinance #93-31.[1] wherein HDI is compelled to connect to the adjacent municipal water supply. Sewer servicing is provided via an onsite pump station that discharges into the Ocean County Utilities Authority (OCUA) trunk sewer along Route 9.

There is the potential for infrastructure on Site to remain as part of the future 100-year outlook for use of the site. Utilizing pre-existing infrastructure and utilities (to the extent possible), including underground commodities, transmission lines, auxiliary buildings and parking lots, for future uses (i.e. industrial) may create efficiencies and minimize the need for costly new installations.

The offsite area adjacent to the west of the IDC, is comprised of substations, transmission lines, auxiliary buildings and parking lots and unoccupied and natural areas to the north, west and south.

2.2 Natural Environment

2.2.1 Habitat Characterization

The habitat characterization cover types for the Site are summarized as below and in Figure 2.2:

Surface Water: Oyster Creek within the southern portion of the Site and the IDC along the north and western boundary and within the southern portion of the Site. The banks of the IDC are steep, covered with a bituminous stone mixture (AC-20), and are primarily unvegetated. Common vegetation along the top of bank of the IDC consists of eastern red cedar (*Juniperus virginiana*), pine species (*Pinus* spp.),bushclover (*Lespedeza* spp.), and redtop (*Agrostis gigantea*).

Wetlands: Freshwater forested/shrub wetlands and freshwater emergent wetlands occur in the southern portion of the Site along Oyster Creek. A small patch of wetland including a potential vernal pond[2] is located in the southeastern portion of the Site, north of the IDC. Wetland vegetation includes Atlantic white cedar (*Chamaecyparis thyoides*), red maple (*Acer rubrum*), bayberry (*Morella* spp.), sweet pepperbush (*Clethra alnifolia*), common reed (*Phragmites australis*), and rice cutgrass (*Leersia oryzoides*).

Non-forested / Herbaceous Uplands: Herbaceous uplands are located along the north and south of the Site. Common vegetation within the herbaceous uplands on the Site included bushclover, panic grasses (*Panicum* spp.), daisy fleabane (*Erigeron annuus*), blackeyed susan (*Rudbeckia hirta*), goldenrods (*Solidago* spp.), Virginia creeper (*Parthenocissus quinquefolia*), broomsedge (*Andropogon* spp.), milkweed (*Asclepias* spp.), black cherry (*Prunus serotina*) saplings, and red cedar saplings.

Forested Uplands: A few wooded patches occur along the eastern portion of the Site. The forested areas are dominated by pitch pine (*Pinus rigida*), red oak (*Quercus rubra*) and white oak (*Quercus alba*).

Industrial, Paved, and Structural Uplands: This cover type occurs in the central portion of the Site in areas previously disturbed by Site activities or currently occupied by facility buildings, parking lots, structures, and storage areas. These areas are generally unvegetated. Common reed was observed in areas where puddles typically form.

Utility Line ROW and Service Roads: Overhead utility lines, right of ways (ROWs), and service roads transect the Site in various locations. The areas beneath the overhead utilities are generally maintained/mowed. Service roads generally occur along the utility line ROWs.

[1] Lacey Ordinance #93-31, 329-2. Connections to available waterlines required; sealing of wells; exemptions – "*The owner of any building adjoining any public street in the Township of Lacey in which a water service is now or may hereafter be constructed shall connect such building and all water facilities therein to said waterline…"*

[2] **Vernal Pools (Level 1), 2016, Northeast | Northeast CPA (databasin.org)**

Legend

- Potential Vernal Pool
- Water
- Forrested Uplands
- Industrial Paved Structural Uplands
- Non-Forrested Uplands
- Powerline ROW Service Roads
- Surface Water
- Wetlands
- Site Boundary

USGS Protected Areas Database of the U.S. (PAD-US)

- Managed for biodiversity - Disturbance events suppressed
- No known mandate for biodiversity protection

Header ControllerFEMA's National Flood Hazard Zone

- Zone A: 1% Annual Chance Flood Hazard
- Zone AE: 1% Annual Chance Flood Hazard
- Zone X: 0.2% Annual Chance Flood Hazard
- Zone X: Area of Minimal Flood Hazard

Paper Size ANSI B

0 410 820

Feet

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane New Jersey FIPS 2900 Feet

N

GHD

EXELON GENERATION COMPANY
OYSTER CREEK NUCLEAR GENERATING STATION
741 US-9, FORKED RIVER, NEW JERSEY
100 YEAR LAND USE OUTLOOK

HABITAT COVER TYPE

Project No. **11197486**
Date **Feb 9, 2024**

FIGURE 2.2

Q:\GIS\PROJECTS\11197000s\11197486\Layouts\202309_100 Year Land Use Outlook\11197486_202309_100YearLandUseOutlook_GIS002.mxd

Data source: USGS NAIP, Imagery Date 7/12/2022
Floodplain: U.S. Department of Homeland Security, FEMA, National Flood Hazard Layer
Vernal Pools: Northeast Conservation Planning Atlas, DataBasin, "Vernal Pools (Level 1), 2016, Northeast"
Woodland protection area: USGS, Protected Areas Database of the United States (PAD-US) Data Explorer
Creator: tmiles

2.2.2 Wildlife

During GHD's previously completed Site and Site Vicinity visits[3] observed wildlife that is typical of the habitats present (e.g. white-tailed deer (*Odocoileus virginianus*), eastern chipmunk (*Tamias striatus*), bald eagle (*Haliaeetus leucocephalus*), American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), Canada goose (*Branta canadensis*) and gulls (*Larus* spp)). Within the IDC, GHD observed several minnows, blue crabs (*Callinectes sapidus*), and jellyfish.

A requested review of the Natural Heritage Database by the New Jersey Department of Environmental Protection (NJDEP) determined that the following vascular plants, rare wildlife species or wildlife habitat occur on Site and in the Site Vicinity:

- New Jersey rush (*Juncus caesariensis*), State listed endangered species, Pinelands Commission listed endangered or threatened species, and Highlands Water Protection and Planning Act protected species;
- Knieskern's beaked-rush (*Rhynchospora knieskernii*), Federally listed threatened species, State listed endangered species, Pinelands Commission listed endangered or threatened species, and Highlands Water Protection and Planning Act protected species;
- Pale beaked-rush (*Rhynchospora pallida*), Highlands Water Protection and Planning Act protected species.
- Pine barrens treefrog (*Hyla andersonii*), State listed threatened species. Observation includes breeding sighting, occupied habitat, and vernal pool breeding;
- Bald eagle (*Haliaeetus leucocephalus*), State listed endangered species. Observation includes foraging, and nesting;
- Barred owl (*Strix varia*), State listed threatened species. Observation includes breeding sighting, and non-breeding sighting;
- Black skimmer (*Rynchops niger*), State listed endangered species. Observation includes foraging;
- Clack-crowned night-heron (*Nycticorax nycticorax*), State listed threatened species. Observation includes foraging;
- Common tern (*Sterna hirundo*), State listed special concern species. Observation includes foraging;
- Cooper's hawk (*Accipiter cooperii*), State listed special concern species. Observation includes breeding sighting and nesting;
- Glossy ibis (*Plegadis falcinellus*), State listed special concern species. Observation includes foraging;
- Little blue heron (*Egretta caerulea*), State listed special concern species. Observation includes foraging;
- Snowy egret (*Egretta thula*), State listed special concern species. Observation includes foraging;
- Tricolored heron (*Egretta tricolor*), State listed special concern species. Observation includes foraging;
- Dotted skipper (*Hesperia attalus slossonae*), State listed special concern species. Observation includes casual flyby;
- Georgia satyr (*Neonympha helicta*), State listed special concern species. Observation includes casual flyby;
- Eastern box turtle (*Terrapene carolina carolina*), State listed special concern species. Observation includes occupied habitat;
- Northern pine snake (*Pituophis melanoleucus melanoleucus*), State listed threatened species. Observation includes occupied habitat;

[3] July 28 to 30, 2020 and September 23 to 24, 2020

- Spotted turtle (*Clemmys guttata*), State listed special concern species. Observation includes occupied habitat; and
- Northern diamondback terrapin (*Malaclemys terrapin terrapin*), Endangered and Nongame Species Program tracked species.

2.2.3 Environmentally Sensitive Natural Resources

Environmentally Sensitive Natural Resources (ESNRs) are defined as habitats where concern for plant and wildlife exposure to Site Contaminants of Potential Ecological Concern (COPECs) is paramount[4]. As reported in the Ecological Evaluation Report[5], much of the terrestrial area was found to be developed or highly disturbed. The remaining, less disturbed terrestrial areas of the Site and Site Vicinity do not constitute "prime forest". Hence, these upland areas are not ESNRs. The primary ESNRs within the Site Vicinity are the IDC and the two small stream courses and their associated wetlands.

2.2.4 Regional and Site-Specific Geology and Hydrogeology

2.2.4.1 Regional and Site-Specific Geology

The Site and Site Vicinity lies within the Coastal Plain Physiographic Province. According to the New Jersey Geologic Survey the Coastal Plain Physiographic Province is generally a seaward-dipping wedge of Cretaceous and Tertiary sediments sloping gently to the southeast from 10 to 60 feet per mile.

The topography of the Site/Site Vicinity is generally flat with elevations ranging from approximately 10 to 23 feet above mean sea level (msl). The regional stratigraphy includes beds of sand, gravel, clay, and marl dipping gently to the southeast. These Tertiary-Age coastal plain deposits are overlain by more recent sands and gravels. The Oyster Creek region is underlain by three stratigraphic units: the Cape May (Pleistocene-Age – 1-2 million years before present), Cohansey (Miocene-Age – 7-25 million years before present), and the older Kirkwood (Miocene-Age) Formations.

The Cape May Formation has an average thickness of 40 feet and consists of a light gray to tan, medium to fine sand, with trace silt and coarse sand. It is poorly compacted and commonly contains a thin, shallow black clay bed in coastal areas.

The Cohansey Formation lies beneath the Cape May Formation. The average thickness of the Cohansey Formation is 60 feet and is primarily composed of a red-brown and tan, medium to fine sand, trace silt, coarse sand, and some coarse to fine gravel. Lenticular beds of clay are sometimes found. The lower portions of the Cohansey are densely compacted.

The Cohansey is underlain by the Kirkwood Formation which consists of light gray to yellow-brown micaceous ilmenitic, lignitic, very fine to fine grained quartz sand, and some coarse to fine gravel. It is densely compacted and extends from a depth of about 100 feet to at least 250 feet below the surface.

Site/Site Vicinity geology has been extensively investigated with a long history of core sampling, groundwater level measurements, and groundwater sampling and analysis that began with a preliminary Site survey in 1960. Surface elevation in the vicinity of plant structures is approximately 23 feet above msl.

The following stratigraphic units are found at the Site/ Site Vicinity, from shallow to deep:

- fill
- the Cape May Formation
- the Upper Clay
- the Upper Cohansey Formation

[4] New Jersey Department of Environmental Protection (NJDEP) Ecological Evaluation Technical Guidance (N.J.A.C. 7:26E-1.19 and 3.11)
[5] GHD, 2021. Ecological Evaluation Report.

- the Lower Clay
- the Kirkwood Formation.

The following descriptions of these formations are based on boring logs from the 1999/2000 Site Investigation/Remedial Investigation, and the review of additional boring logs from other previous Site investigations and reports.

Fill

The fill is a tan, medium to fine grained sand with trace to some silt with no evidence of soft sediment structures, such as lenses of silt or coarse sand. The density is typically less than that of the Cape May Formation. Based on the description of the fill, the majority of the fill appears to be excavated Cape May Formation material generated by Site development activities.

The fill thickness from soil boring logs varies from 0 feet to 38 feet below ground surface (bgs) (elevation 23 feet to elevation –15 feet). The maximum thickness of fill is in the borings closest to the Turbine Building. The maximum fill thickness is estimated to be 53 feet (ranging in elevation from 23 feet (surface) to –30 feet) in the vicinity of the Reactor Building, based on the depth of the excavation for these structures.

Cape May

The Cape May Formation is the youngest formation in the Oyster Creek Region and is described as a light gray to tan, medium to fine grained sand with trace to some silt and occasional coarse sand. It is generally poorly compacted.

The Cape May Formation at the Site varies from 0 feet to 21.5 feet thick. The variation is largely due to the amount of material excavated and replaced by fill as part of the Site construction/development excavation processes. The thickness of the Cape May Formation where it has not been excavated generally ranges from 17 feet to 20 feet.

Upper Clay

This clay is hard, gray, plastic organic clay containing inclusions (also described as lenses or partings) of dense fine-grained sand with trace to some organic silt. The deposits of fine sand within the Upper Clay layer have high relative densities and are believed to be in the form of lenses or inclusions. Some boring logs describe the “sand lenses” as the dominant feature over a 1 foot to 5 foot thickness. In the area southwest of the Turbine Building, approximately half of the total thickness of the Upper Clay is silty sand.

The Upper Clay is approximately 15 feet to 18 feet thick (where not impacted by excavation). Information from outside the study area (boring logs from the area west of the intake and discharge canals and data from the Route 9 area) suggests a thinning trend from east to west, with the Upper Clay present at 17 feet elevation +/- 3 feet throughout the Site.

Cohansey Formation

The Cohansey Formation is a yellow-brown to tan, medium to fine-grained sand with trace to some silt. It also contains pockets of coarse to fine-grained sand, and occasional gravel and pockets of sandy silt. The lower portion of the Cohansey Formation was deposited in either a beach or beach barrier environment, while the upper portion is a fluvial deposit.

Lower Clay

The lower clay is a dense gray medium to fine-grained sand containing a trace to some organic silt and layers or inclusions of hard gray organic clay. The thickness of the lower clay is estimated to be on the order of 10 feet to 20 feet.

Kirkwood Formation

- The Kirkwood Formation is a medium to fine-grained sand with trace silt. The thickness at the Site is unknown but, based on deep water supply wells drilled in the area, extends to depths on the order of 500 feet and more.

2.2.4.2 Regional and Site-Specific Hydrogeology

The nearest surface water bodies include the South Branch of the Forked River (north of the Forked River within the Site Vicinity) and Oyster Creek (south of the Forked River within the Site). In addition, man-made intake and discharge canals, designed to provide non-contact cooling water to the OCNGS, are located along the north and west perimeter of the Site, and within the southern section of the Site and connect the South Branch of the Forked River with Oyster Creek.

Both the Cape May and Cohansey Formations contain shallow aquifers. Occasional clay layers in these Formations cause slightly artesian conditions in localized areas, but, in general, these two Formations communicate hydrologically. A clay layer separates the Kirkwood Formation from the Cohansey Formation. The clay layer acts as a confining layer and artesian heads as high as 22 feet above msl have been found in wells that penetrate the Kirkwood Formation.

Shallow groundwater flow in the area bounded by the Intake and Discharge Canals is different than the surrounding region. In the area bounded by the canals, the direction of flow is generally to the west. On a regional scale, groundwater flows generally to the southeast toward the coast, following the trend of the coastal basin sedimentary bedding. Water supplies in the area are derived from wells. These wells are generally 60 to 70 feet in depth (into the Cohansey Formation), or more, and typically penetrate at least one clay boundary to preclude contamination from salt water intrusion or leachate from the area septic systems. The deeper wells in the area penetrate the Kirkwood Formation aquifer and yield higher quality water.

According to the NJDEP GeoWeb, a Non-Community Wellhead Protection Area (WPA) is located on the Site centered at the southwestern portion of the OCNGS (within the IDC horseshoe). The Tier 1, 2, and 3 protection areas for this well are within the boundary of the Site. The nearest WPA not on-Site is located approximately 2,200 feet south of the OCNGS, along Route 9.

2.2.5 Soils

In New Jersey, the farmland classification categories include, in order of importance: prime farmland, farmland of statewide importance, farmland of statewide importance (if drained), farmland of unique importance, and Farmland of Local importance[6]. As reported in the USDA Natural Resources Conservation Service Custom Soil Resource Report for Ocean County, New Jersey Oyster Creek (2020) and shown in Figure 2.3, the following soil series are mapped on the Site:

- MakAt Manahawkin muck; 0 to 2 percent slopes; frequently flooded; very poorly drained; hydric; Farmland of unique importance
- LakB Lakehurst sand; 0 to 5 percent slopes; moderately well drained; Farmland of Local importance
- PstAt Psammaquents; sulfidic substratum; 0 to 2 percent slopes; frequently flooded; very poorly drained; hydric; Not prime farmland
- PssA Psamments; 0 to 2 percent slopes; well drained; Not prime farmland
- WHe1 Herring Creek mucky silt loam; 0 to 1 meter water depth; subaqueous; Not prime farmland

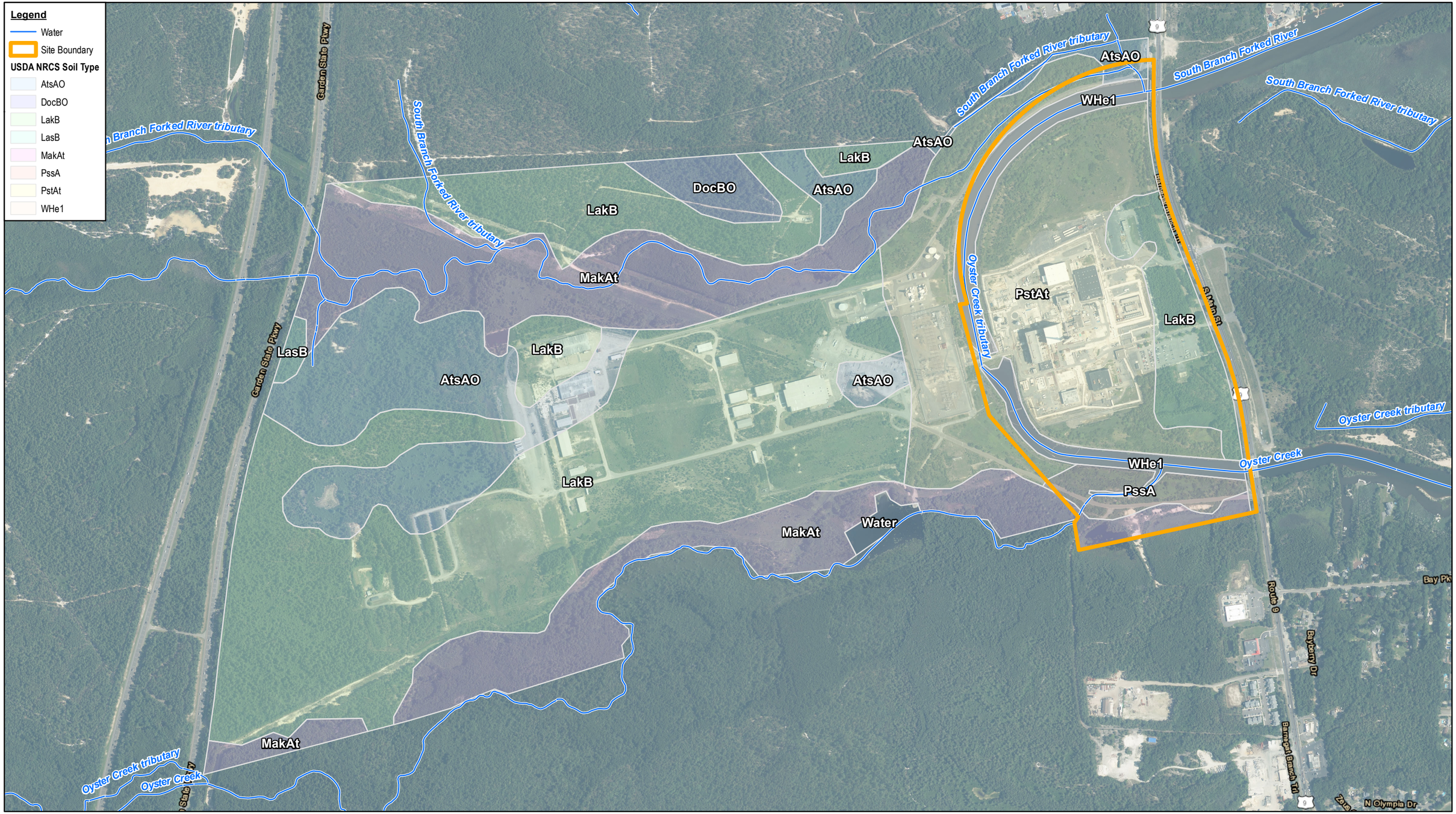
None of the soils identified on the Site are considered prime farmland. Manahawkin muck (MAkAt) and Atsion sand (AtsAO) soils are classified as farmland of unique importance (i.e. not common, may support unique crop production). Lakehurst sand (LakB) and Lakewood sand (LasB) soils are considered Farmland of Local

[6] Soils of Importance 2022 (usda.gov)

Importance, which is a classification made at the county level (i.e. the same soil found in other New Jersey counties may not be considered of local importance).[7].

Soils are therefore not favorable for agricultural uses as none are categorized as prime farmland or farmland of statewide importance and the Site is not located within or in proximity to any planning areas that prioritize agriculture under local or State land use planning policies. Further, due to land use trends, soil conditions, and groundwater use restrictions, using the Site for commercial agriculture or to support raising livestock for meat and milk production is not considered plausible.

[7] Soils of Importance 2022 (usda.gov)



AtsAO: Atsion sand, 0 to 2 percent slopes, Northern Tidewater Area
DocBO: Downer loamy sand, 0 to 5 percent slopes, Northern Tidewater Area
LakB: Lakehurst sand, 0 to 5 percent slopes
LasB: Lakewood sand, 0 to 5 percent slopes
MakAt: Manahawkin muck, 0 to 2 percent slopes, frequently flooded

PssA: Psamments, 0 to 2 percent slopes
PstAt: Psammaquents, sulfidic substratum, 0 to 2 percent slopes, frequently flooded
Water: Water
WHe1: Herring Creek mucky silt loam, 0 to 1 meter water depth

Paper Size ANSI B
0 410 820
Feet
Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane New Jersey FIPS 2900 Feet

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GHD

EXELON GENERATION COMPANY
OYSTER CREEK NUCLEAR GENERATING STATION
741 US-9, FORKED RIVER, NEW JERSEY
100 YEAR LAND USE OUTLOOK

SOIL SURVEY

Project No. **11197486**
Date **Feb 9, 2024**

FIGURE 2.3

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Data source: USGS NAIP, Imagery Date 7/12/2022
Soil Data: USDA Natural Resources Conservation Service, Web Soil Survey
Creator: tmiles

2.3 Land Use

2.3.1 Planning Documentation

Portions of the Site and Site Vicinity are currently designated by Lacey Township's Master Plan and the New Jersey State Development and Redevelopment Plan as the Oyster Creek Industrial Node (Figures 2.4 and 2.5)[8,9].

The majority of the Site, located within Lacey Township, is zoned as industrial zone M-100 and the southern portion of the Site, located within Ocean Township, is zoned as Environmental Conservation District (EC)[10]. The Site Vicinity is zoned as industrial zone M-6. Lacey Township's industrial zones allow for a wide variety of uses including manufacturing, corporate, institutional and research. The M-6 zone specifically permits the manufacture or assembly of elevators and elevator equipment and enamel and electro plating. The M-100 zone specifically permits electric generating, transmission and distribution facilities, including but not limited to nuclear power facilities and accessory uses and structures which are needed for the proper and efficient operation of the nuclear power facility or which may be required by the United States Nuclear Regulatory Commission (NRC). Protection and conservation of natural resources is the principal objective of the EC District; however, conditional uses, such as major utility installations as necessary to serve the needs of the public shall be permitted subject to issuance of a conditional use permit[11].

The Site and Site Vicinity are located within and surrounded by Environmentally Sensitive Planning Area per the New Jersey State Development and Redevelopment Plan[12]. The area surrounding the Site and Site Vicinity is primarily vacant land. The Lacey Business Park Industrial Node is located north of the Site on Route 9. The Site and Site Vicinity are located neither adjacent to or in proximity of Rural Planning Area, where agriculture and other related economic developments are supported and prioritized per the New Jersey State Development and Redevelopment Plan[13].

The Site and portions of the Site Vicinity are classified as Rural Development Area per the New Jersey Pinelands Commission[14]. Rural Development Area is identified as transitional area, balancing environmental and development values with conservation and growth areas, and permits light industrial uses. It is further noted that the Site is not adjacent to or in the vicinity of any lands designated as Agricultural Production Area per the New Jersey Pinelands Commission[15].

Lacey Township has identified that the closure of the OCNGS will have an adverse impact to the economic base of the Township. In 2012 Lacey Township identified the need to plan for the decommissioning of the OCNGS as the plant employs approximately 700 full time employees and fees paid by the plant contribute 42 percent of Lacey Township's annual budget. A feasibility study was conducted by Lacey Township in 2012 to examine the potential of constructing a new non-nuclear power generation facility to offset both the employment and power supply needs of the Township. The study identified that a gas fired combined cycle power generation facility would be the most feasible option in terms of time, statewide energy goals, existing infrastructure, and similarity of scale to the existing facility[16]. More significant to this exercise; however, was the

[8] Township of Lacey, Ocean County New Jersey Master Plan, 191.
[9] New Jersey, State Development and Redevelopment Plan. https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf
[10] **otwp_zoningWEST072516.pdf (twpoceannj.gov)**
[11] **Township of Ocean, NJ District Regulations (ecode360.com)**
[12] New Jersey, State Development and Redevelopment Plan. https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf
[13] New Jersey, State Development and Redevelopment Plan. https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf
[14] **New Jersey Pinelands Commission | Management Areas (nj.gov)**, https://www.nj.gov/pinelands/home/maps/maps/documents/ltr.pdf
[15] **New Jersey Pinelands Commission | Management Areas (nj.gov)**, https://www.nj.gov/pinelands/home/maps/maps/documents/ltr.pdf
[16] Birdsall Services Group, 2012 Feasibility Study for New Power General Facility, Block 1001 4.06, Lacey Township New Jersey.

recommendation to change the zoning of the Site to make it more inclusive to a wider variety of uses providing the town with flexibility in planning future industrial uses. This was reconfirmed in the 2012 and 2018 Municipal Master Plan Re-Examinations[17],[18].

Lacey Township identifies in their Master Plan that there is a deficit of industrial lands compared to the national average. In addition, at the county level, Ocean County had the highest job deficit in the state in 2015. Lacey Township identified an insufficiency of higher skilled jobs. The 2018 Master Plan Re-examination identified the need to make additional investment and designate more area to industrial nodes to reverse some of these regional trends.

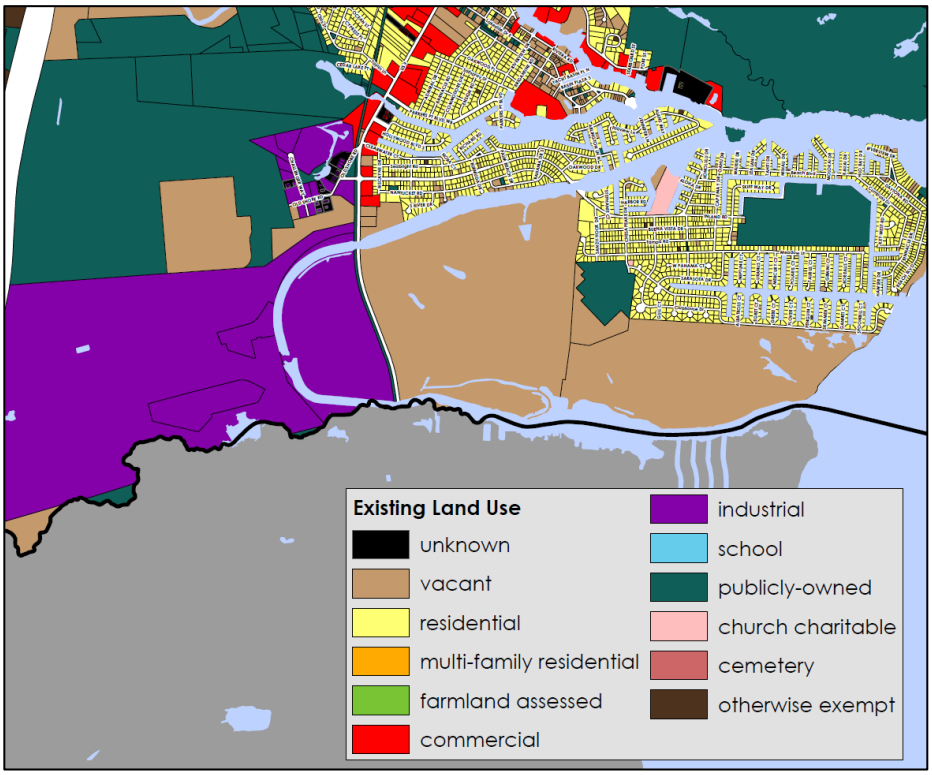

Figure 2.4 Existing Land Use, Lacey Township Plan Endorsement[19]

[17] Township of Lacey Planning Board, 2012. Master Plan Re-examination Report.
[18] Township of Lacey Planning Board, 2018. Master Plan Re-Examination Report.
[19] Township of Lacey, 2017. Existing Land Use, Lacey Township Plan Endorsement.

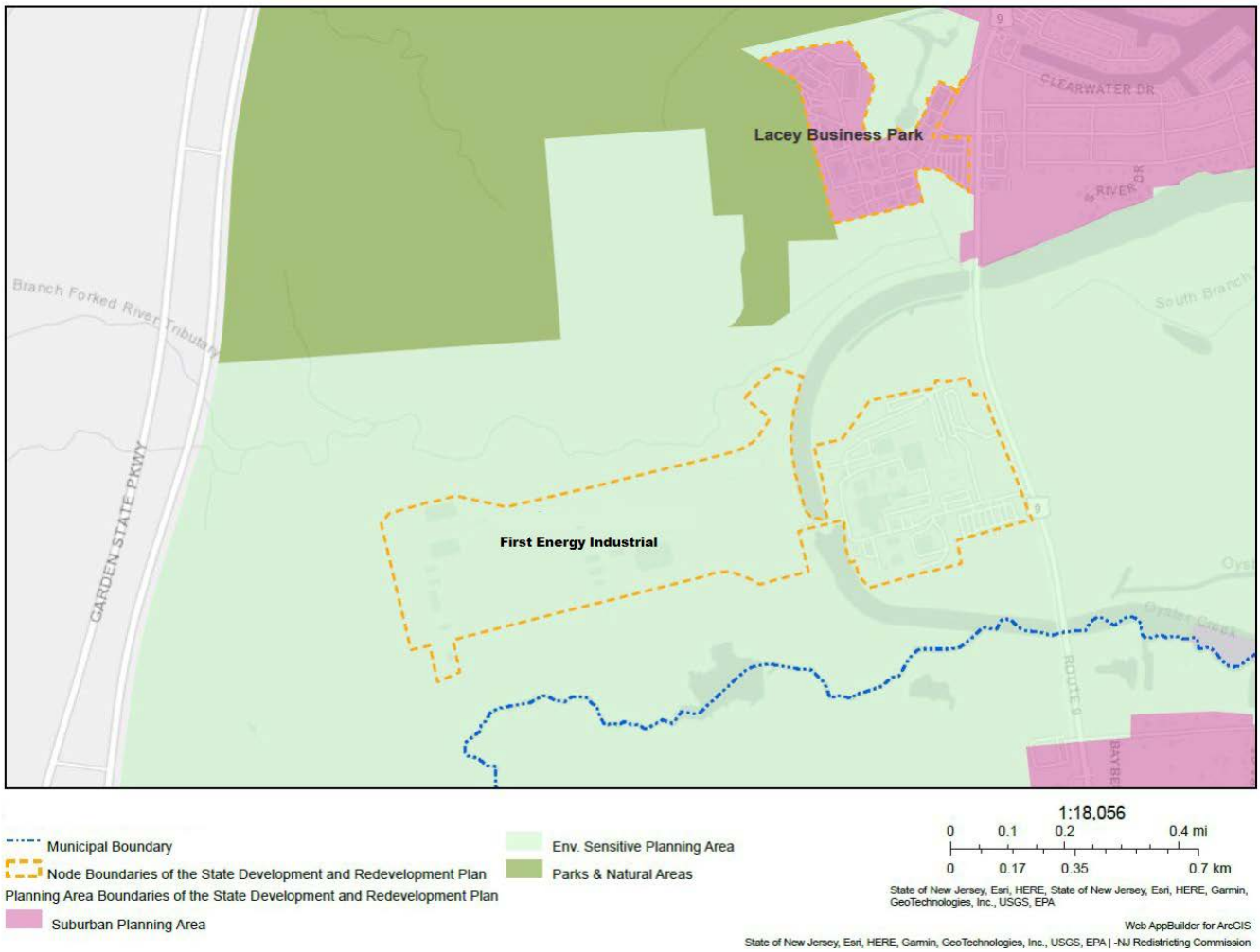

Figure 2.5 Existing Land Use, New Jersey State Development and Redevelopment Plan.[20]

[20] New Jersey, State Development and Redevelopment Plan. **https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf**. Area to the west of the Site is owned by First Energy Industrial

3. Reasonably Foreseeable Land Use – Industrial

HDI commissioned a review of site operations in order to provide a number of plausible or Reasonably Foreseeable Land Uses for future use of the Site. This includes land continuing for industrial purposes in addition to residential and recreational use. The scenarios are provided here for context, as well as to build on the existing rationale for maintaining the lands as Industrial developed in this WP.

Recreational Scenario

Although it is possible that the Site could be used for recreational purposes, it is not likely since there are numerous park facilities nearby with recreational access to water for swimming, fishing, and boating; the OCNGS Site is relatively small and does not offer any unique shoreline, boat launch, inland features, flora or fauna. It is plausible that the Site could be used for recreational purposes at sometime within the next 100 years, and that the recreational uses could include fishing from the intake and discharge canal areas, but unlikely.

Residential Scenario

As described in the discussion of potential land use for agricultural purposes, the area in the vicinity of the Site has experienced rapid population growth in the last several decades, and numerous multi-family developments are under construction or have recently been completed within a five-mile radius of the Site, and additional land is available to support future build-out. Given the fact that adequate land is available nearby for residential and commercial development and considering the attractive qualities of the OCNGS Site for industrial development, it is unlikely that the Site would be a likely candidate for residential development. In the event that the Site was used for residential development within the next 100 years, is plausible that multi-family or single-family housing could be constructed and that small areas could be set aside for gardening to produce a small fraction of a resident's vegetable intake. Therefore, using the Site for residential development with the potential for personal gardening is considered less likely but plausible.

Industrial Scenario

The OCNGS land and facilities make the Site a prime candidate for future use by HDI or another technology provider for manufacturing, constructing, and operating a commercial power production facility, including but not limited to Small Modular Reactors.

Based on reasonably foreseeable land use, the OCNGS compliance dose scenario is assumed to be an Industrial Reuse Scenario. The Industrial Reuse scenario is reasonable because:

- The Site is currently zoned industrial and will remain zoned industrial.
- Road and water routes are readily available for the movement of heavy equipment.
- A spent fuel storage facility and supporting infrastructure is on the Site.
- Site infrastructure, including buildings and structures that will remain, can support industrial reuse applications such as warehousing, office space, and possible industrial surface water/cooling water.
- Electrical transmission facilities are available in close vicinity to the Site.
- The Site is a prime candidate for manufacturing, construction, and operation of Small Modular Reactors based on the above conditions.
- Industrial gas and solar power production installations and support facilities are located adjacent to the Site.

Residential and Recreational uses are less likely but plausible because:

- A spent fuel storage facility will remain on the Site for the foreseeable future.
- The Site does not offer any unique shoreline, inland features, flora, or fauna that would be attractive for recreational purposes.
- Portions of the Site are not available for development due to the presence of wetlands or protected woodlands.
- Soil conditions and land use trends make it clear that the use of the Site for agricultural purposes is unlikely.
- There is adequate property to support residential built-out in the region for the foreseeable future.

Farming use is also considered unlikely due to the previously described poor agricultural soils described in Section 2.5.5 and the groundwater Classification Exception Area (CEA) delineated across a major portion of the site that will prevent groundwater use in the area.

Section I.3.3.3 of NUREG-1757 provides guidance on land use considerations for decommissioned nuclear facilities. The section emphasizes that the land use should be consistent with the decommissioning plan and the future use of the land should not pose any risk to public health and safety[21]. Decommissioned nuclear lands are valuable resources that have the potential to serve a variety of purposes. NUREG-1757, with its comprehensive guidelines for the management of decommissioned nuclear facilities, plays a crucial role in ensuring the safe and efficient use of these lands.

Keeping decommissioned nuclear lands designated as industrial lands can have several benefits. For instance, it can help to preserve the existing infrastructure and facilities, which can be repurposed for other industrial activities, which can help to reduce the costs associated with decommissioning and demolition of the facilities[22]. Additionally, keeping the land designated as industrial can help to maintain the value of the land and prevent it from being converted to other uses that may not be compatible with the surrounding area[23].

Furthermore, keeping the land designated as industrial can help to promote economic development in the area by attracting new businesses and industries, which can help to create new jobs and generate revenue for the local community[24].

Future land uses of the Site are suitable to remain as Industrial due to the existing Site conditions and planned land uses, as summarized above. The Township has identified, through their planning documents, a focus on economic development and have identified the continued use of the Site as an industrial node as being crucial, which aligns with the New Jersey State Development and Redevelopment Plan designation. The Site is well located for industrial purposes on Route 9 close to the other industrial areas (Lacey Business Park) and separated from residential uses. In addition, the Site is not well suited to agricultural uses due to the existing soil conditions (i.e., soil characteristics, absence of prime farmland and limited farmland of statewide or unique importance), lack of agricultural industries nearby to support synergies, and absence of agriculturally designated areas within its vicinity.

With the above in mind, GHD has provided a rationale to maintain the land as Industrial as the *reasonably foreseeable land use* focusing on:

- Economic viability and job creation
- Infrastructure and utilities in place
- Regulatory compatibility

[21] Regulatory Analysis for Revision 2 of NUREG-1757, “Consolidated Decommissioning Guidance,” Volume 2, “Characterization, Survey, and Determination of Radiological Criteria”, NRC, July, 2022.
[22] Ibid
[23] Ibid
[24] Ibid

- Site-specific adaptability
- Continued revenue generation

Economic Viability and Job Creation

The NUREG-1757 Guidelines recognize the importance of considering land uses that fosters economic development in the communities surrounding decommissioned nuclear facilities. Designating these lands for industrial use promotes economic viability by providing space for new businesses, industries, and research and development facilities. Industrial zones often lead to increased job opportunities, stimulating the local economy and benefiting the community. This not only aligns with the Guideline's intent, but also contributes to the overall well-being of the region, directly addressing the deficit of industrial lands compared to the national average and insufficiency of higher skilled jobs identified within the Lacey Township Master Plan as well as the high job deficit reported for 2015 in Ocean County.

Infrastructure and Utilities in Place

One of the key aspects outlined in Section I.3.3.3 of the NUREG-1757 Guidelines is the need for existing infrastructure and utilities when determining land use. Decommissioned nuclear lands often come equipped with well-established infrastructure, such as power lines, water supply, and transportation networks. Utilizing these pre-existing resources for industrial purposes minimizes the need for costly new installations and aligns with the Guideline's call for efficient land use.

As noted above, the majority of the Site is occupied by the OCGNS facility and associated buildings and infrastructure, including underground commodities, transmission lines, auxiliary buildings and parking lots. A continued Industrial use would allow for the potential continued use of some or all of the existing infrastructure.

At present, a continued Industrial use for the Site could either service its domestic water needs via the private well or connect to the Lacey Municipal Utilities Authority water facilities located in the adjacent business park just north of the Site and along Route 9; however, Lacey Township is in the process of installing a municipal potable water supply to the Site for all future potable water needs. Likewise, sewer servicing could be provided via the existing private pump station that discharges into the OCUA trunk sewer east of Route 9.

Regulatory Compatibility

The NUREG-1757 Guidelines underscore the importance of compliance with regulatory requirements and considerations when determining land use. Industrial facilities on decommissioned nuclear lands can be carefully planned and regulated to meet all necessary safety and environmental standards. This ensures that the land continues to adhere to rigorous regulatory guidelines, safeguarding public health and environmental integrity.

Groundwater use is restricted based on the CEA, which has been established as part of the JCP&L ISRA case to monitor groundwater contamination plumes. The impacted aquifers on the Site are the Cape May and the Cohansey Formations. These formations are classified as Class IIA aquifers. The vertical extent of the CEA is 25 feet in the Cape May Aquifer and 65 feet in the Cohansey Aquifer. Groundwater quality does not meet Class IIA Groundwater Quality Standards (GWQS); therefore, both Formations will be subject to a Well Restriction Area. The contaminants exceeding the standards include tetrachloroethene in the Cape May Formation and tetrachloroethene and trichloroethene in the Cohansey Formation. In addition, a number of PAHs exceed the GWQS.

Because there are no identifiable sources for the groundwater contamination, the general persistence of PAHs in groundwater, and the persistent Site-wide low-levels of VOCs and PAHs in groundwater, the projected duration of the CEA is indeterminate. The CEA will remain in effect for as long as the concentrations of contaminants in groundwater exceed the applicable GWQS.

Site-Specific Adaptability

Every decommissioned nuclear facility has unique characteristics, and land use decisions should take these into account, as indicated in the NUREG-1757 Guidelines. The industrial designation allows for site-specific adaptations that build on previous land uses in a progressive manner. This approach ensures that the potential of each site is fully realized, addressing the Guideline's emphasis on considering the specific attributes of the land.

Continued Revenue Generation

Industrial land use generates revenue through property taxes and leasing agreements. This revenue can be reinvested into the community, funding infrastructure improvements, public services, and educational programs. Designating the Site as industrial aligns with NUREG-1757's goal of maximizing the benefits to the community while adhering to safety and environmental concerns.

4. Local and State Considerations

Lacey Township has been awarded funding under the Nuclear Closure Communities grant made available by the US Economic Development Administration to undertake a planning exercise to *analyze options for the community to replace the high paying jobs, business tax receipts and corporate citizenship lost by Oyster Creek's premature closure which threatens the short and long-term economic and social wellbeing of the township*.[25]. Components of this study involve a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis, Supply and Demand Study for target industries, Economic impact (Input-Output), Market and Benefit-Cost Analyses for potential business development, Site Reuse Planning (including zoning, infrastructure, environmental impact, permitting required, Site pre-development costs, coastal vulnerability), Community Involvement, and an Action Plan for the Township. It is understood that the SWOT analysis has been completed in draft form and is presently under review by Lacey Township. The findings from this SWOT analysis is expected to influence the future land use for the Site from a local and State level. It is noted that Lacey Township's reasoning behind the creation of the Oyster Creek Industrial Node in 2017 was to build off of the existing industrially-zoned area of the Site as well as neighboring areas, making the Site more likely to attract tenants requiring higher impervious thresholds for their operations, resulting in a future economic asset.[26]. This Industrial Node designation was also adopted by the State of New Jersey in their Development and Redevelopment Plan.[27]. As such, it is considered that both the Township of Lacey and State of New Jersey would support a continued Industrial Use for the Site.

5. Industrial Land Use Summary

The following table provides a summary of the existing designation or zoning per the applicable planning instruments and their compatibility with a proposed continued Industrial use for the Site, including any necessary land use planning requirements.

[25] Bid Related Documents accessed here: **Nuclear Communities Grant Planning Consultant | BidNet**
[26] **427065542.pdf (ecode360.com)**
[27] New Jersey, State Development and Redevelopment Plan. https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf

Table 5.1 Continued Industrial Land Use Compatibility Summary

Planning Authority	Planning Instrument	Current Designation/ Zoning	Permitted Uses	Compatibility with Continued Industrial Use	Planning Requirements
Lacey Township	Master Plan.[28]	Oyster Creek Industrial Node	Industrial	Compatible	
	Zoning	Industrial (M-100)	M: manufacturing, corporate, institutional and research M-100: Electric generating, transmission and distribution facilities, including but not limited to nuclear power facilities and accessory uses and structures which are needed for the proper and efficient operation of the nuclear power facility or which may be required by the United States Nuclear Regulatory Commission (NRC)	Compatible	
Ocean Township	Zoning	Environmental Conservation District (EC).[29]	Detached single-family dwellings; public service infrastructure or public facilities owned and/or operated by the Township of Ocean or any agency of the Township of Ocean; public preserves and open space; public parks and passive recreation facilities. Conditional uses include major utility installations as necessary to serve the needs of the public (subject to issuance of a conditional use permit).[30].	May not be compatible	May be required
New Jersey State	Development and Redevelopment Plan.[31]	Oyster Creek Industrial Node	Industrial	Compatible	
	Pinelands Commission.[32]	Rural Development Area	Light industrial uses	May not be compatible	May be required

[28] Township of Lacey, Ocean County New Jersey Master Plan, 191.
[29] **otwp_zoningWEST072516.pdf (twpoceannj.gov)**
[30] **Township of Ocean, NJ District Regulations (ecode360.com)**
[31] New Jersey, State Development and Redevelopment Plan. https://www.nj.gov/state/planning/assets/docs/2001-state-plan/stateplan030101.pdf
[32] **New Jersey Pinelands Commission | Management Areas (nj.gov)**, https://www.nj.gov/pinelands/home/maps/maps/documents/ltr.pdf

6. Summary

The Site remaining as Industrial as the reasonably foreseeable land use is supported through the following rationale:

Soils and Agriculture – soils are not favorable for agricultural uses as none are categorized as prime farmland or farmland of statewide importance and the Site is not located within or in proximity to any planning areas that prioritize agriculture under local or State land use planning policies. Further, due to land use trends, soil conditions, and groundwater use restrictions, using the Site for commercial agriculture or to support raising livestock for meat and milk production is not considered plausible.

Groundwater – groundwater use is restricted based on the CEA and impacts the Cape May and the Cohansey Formations Class IIA aquifers. Groundwater quality does not meet Class IIA GWQS; therefore, both Formations will be subject to a Well Restriction Area. Due to the absence of identifiable sources for the groundwater contamination, the general persistence of PAHs in groundwater, and the persistent Site-wide low-levels of VOCs and PAHs in groundwater, the projected duration of the CEA is indeterminate and will remain in effect for as long as the concentrations of contaminants in groundwater exceed the applicable GWQS. It is assumed that wells located on the Site outside the CEA could be used for irrigation purposes. It should be noted that the site has been serviced with domestic water.

Local Land Use – Lacey Township, through its Municipal Master Plan Re-Examinations, has reconfirmed its recommendation to change the zoning of the Site to allow for flexibility in planning future industrial uses, and identified the need to make additional investment and designate more area to industrial nodes. The continued Industrial use of the Site is also supported by its designation under the New Jersey State Development and Redevelopment Plan as the Oyster Creek Industrial Node.

Economic Viability and Job Creation – designating these lands for continued Industrial use promotes economic viability by providing space for new businesses, industries, and research and development facilities; thereby increased job opportunities, stimulating the local economy and benefiting the community. A continued Industrial use would directly address the deficit of industrial lands compared to the national average and insufficiency of higher skilled jobs identified within the Lacey Township Master Plan as well as the high job deficit reported for 2015 in Ocean County.

Infrastructure and Utilities in Place – utilizing the pre-existing Site infrastructure and utilities to the extent possible, including underground commodities, transmission lines, auxiliary buildings and parking lots, for future industrial purposes may create efficiencies and minimize the need for costly new installations. At present, domestic water needs could be serviced via the private well or connection to the Lacey Municipal Utilities Authority water facilities located in the adjacent business park just north of the Site and along Route 9; however, Lacey Township is in the process of installing a municipal potable water supply to the Site for all future potable water needs. Sewer servicing could be provided via the existing private pump station that discharges into the OCUA trunk sewer east of Route 9. Site access is readily available via road, and water transportation routes are available to support heavy equipment shipment. A major electrical transmission substation, gas-fired power station, and solar power production support facilities are located adjacent to the property.

Site-Specific Adaptability – a continued Industrial land use designation allows for flexibility in land use planning, enabling site-specific adaptations and ensuring that the Site's full potential is realized.

Continued Revenue Generation – Industrial land use generates revenue through property taxes and leasing agreements, which can be reinvested into the community, funding infrastructure improvements, public services, and educational programs, thereby maximizing community benefit while adhering to safety and environmental concerns.