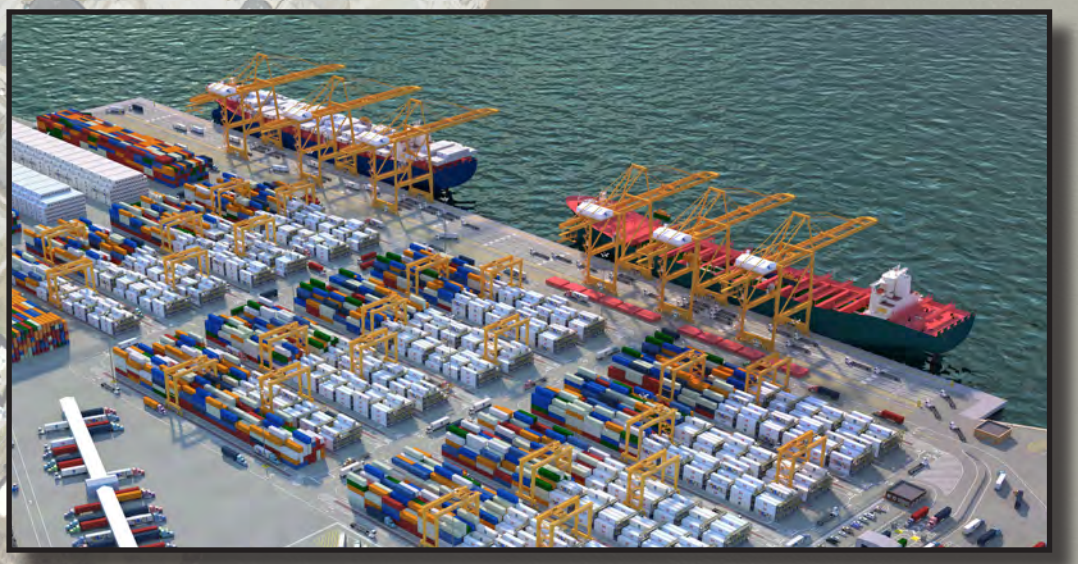
WILMINGTON HARBOR
EDGEMOOR EXPANSION



ENVIRONMENTAL ASSESSMENT
TECHNICAL DOCUMENT

March 2020
Revised June 2020

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Revision 1 – June 2020

This revision modifies the EATD and supporting assessments to include potential reuse of dredged sediment on the Edgemoor site. The revision also includes the potential of using several existing U.S. Army Corps of Engineers dredge material storage facilities, all located in the State of Delaware. Section 4.1.4 has been revised to include additional detail regarding Federal Emergency Management Agency flood plain information and how the project design uses that information. Section 4.1.5 has been revised to include the State of Delaware/University of Delaware projects of future sea level rise.

1.0 INTRODUCTION, PURPOSE AND NEED

1.1 Introduction

Diamond State Port Corporation (DSPC), New Castle County, Delaware (hereinafter referred to as "the Applicant") applied to the United States Army Corps of Engineers (USACE) for a Clean Water Act Section 404 permit, and a Rivers and Harbors Act Section 10 permit for dredging related to the construction of a primary harbor access channel and ship berth development (hereinafter referred to as the "proposed project") at the applicant's Edgemoor property (hereinafter referred to as the "Edgemoor Site"), on March 25, 2019 (reference Permit Application CENAP-OP-R-2019-278). In accordance with the National Environmental Policy Act (NEPA), this Environmental Assessment Technical Document (EA) has been prepared to analyze and document the potential impacts of the proposed project and reasonable alternatives to the natural and human environment and recommend a preferred alternative.

Additionally, the purpose of this EA is to support the requirements of 33 U.S.C 408 to get approval from the USACE prior to modification of an existing Federal project, and to support the USACE in the determination of the Federal interest in the Assumption of Maintenance (AOM) of non-federal sponsor (NFS) improvements to the primary harbor access channel under Section 204(f) of Water Resources Development Act (WRDA) 1986. The area from the mean high water (MHW) line of the Edgemoor site to approximately 300 feet riverward of the wharf face is not included in NFS improvements and will not be included in the AOM. Separate and submissions for 408 approval and for AOM under Section 204(f) will be made.

1.1.1 Proposed Action and Location

The proposed project is located adjacent to and north of the Federal navigation channel, in the southern portion of Reach B of the Delaware River, at the intersection of the Cherry Island and Bellevue Ranges. The proposed project is offshore of the Applicant's property located along Hay Road, in Edgemoor, Delaware (Figure 1-1). The Applicant proposes to deepen portions of the Delaware River adjacent to the Federal Navigation Channel to create a primary access channel that will serve the proposed berth construction at the Edgemoor Site.

The proposed project supports the redevelopment of the Edgemoor Site into a multi-user containerized cargo port. The primary harbor access channel will provide access to an approximately 2,600 foot long wharf structure. The berth and access channel will be excavated to the 45-foot mean lower low water (MLLW) project depth. At the riverward edge of the wharf the future river bottom will be shaped to slope upward to a quay wall along the landside of the wharf. The quay wall will support the elevation transition from the river bottom to the grade of land within the new port. The 45-foot MLLW project depth matches the maintained depth of the Federal navigation channel.

Proposed project activities producing direct impacts are considered to result from the proposed deepening of an area approximately 4,000 feet in length and a width

extending from the boundary of the federal navigation channel to approximately 300 feet offshore of the Site at MLLW (Figure 1-1). This area encompasses approximately 1.5 million square feet (approximately 87 acres). The direct impacts are also considered to be associated with the construction of the approximately 2,600-foot wharf structure to accommodate ships and other incidental structures located water-ward of MHW.

Figure 1-1: Project Location Sketch

The development of infrastructure needed to support the operation of a container port and constructed on the upland portion of the Applicant's property, site of the former Chemours Edge Moor Facility, are considered incidental to the project, since the Edgemoor Site previously was developed for industrial use, including chemical processing with car, truck, and rail access for moving people, raw materials, wastes, and finished products.

The initial dredging for the berth and primary harbor access is anticipated to require removal of an approximate volume of 3.3 million cubic yards of river sediments and the underlying soils. Project planning anticipates that this material will be placed in

existing USACE Confined Disposal Facilities (CDFs) along the Delaware River proximate to the Edgemoor Site. The Applicant is anticpating completing a WRDA Sectoin 217b approval to allow the use of the facilities and determine the compensation to mitigate adverse impacts to USACE regarding their mission to maintain navigation in the Delaware River. A portion of the dredged material is anticipated to be placed onsite for use during the port development.

1.1.2 Project Background

DSPC (the Applicant) is a corporate entity of the State of Delaware and was established in 1995 by an act of the Delaware General Assembly to manage and operate the Port of Wilmington after the port was purchased from the City of Wilmington by the State of Delaware (7 Del.C. Chapter 87 – Appendix 1).

The Port of Wilmington is located approximately two miles down river from the proposed project site at the confluence of the Delaware and Christina Rivers. According to the Diamond State Port Corporation Strategic Master Plan, dated July 29, 2016 (DSPC Strategic Master Plan -- Appendix 2), in 2015 the Port of Wilmington accounted for approximately five percent of East Coast ports' international waterborne trade.

Cargoes handled at the Port of Wilmington are varied. During 2015, over 6.8 million tons of cargo were handled at the port mainly comprised of containerized goods (33%), dry/break bulk (32%), and liquid bulk (32%). For inbound trade,

89 percent of imported commodities include: petroleum products (35%), bananas (26%), industrial salt (20%), various minerals (4%), and pineapples (4%).

The majority of the Port of Wilmington's berths are located on the Christina River, which has a controlling depth of 38 feet MLLW between the Delaware River and the upper end of the Port's turning basin, roughly adjacent to Berth 5. Additional berths (Berths 6 and 7) upriver of the turning basin are maintained at 35 feet MLLW.

Following the completion of Panama Canal Lock Expansion Project in 2017, New Panamax ships, or vessels that were too large to traverse the Panama Canal prior to expansion, are able to more efficiently reach East and Gulf Coast Ports. Capacities of New Panamax ships can be as large as 12,000 twenty-foot container equivalent units (TEU) and standard draft requirements are 49 ft. With increases in capacity capability through the Panama Canal, there is an expectation that cargo volume will increase at East and Gulf Coast ports from the Asia/U.S. trade. According to the DSPC Strategic Master Plan, conservative assumptions forecast that the share of the Asian trade arriving at East Coast ports will expand between 27 to 32 percent above the average volumes experienced over the past five years.

In response to the increasing size of modern shipping vessels, and to remain competitive with other ports along the eastern seaboard, USACE embarked on the Delaware Main Channel Deeping Project in 2010. The deepening provides for more efficient transportation of cargo to the Delaware River ports. To capitalize on the economic benefits of the deepening project, Delaware River ports will also need to deepen their harbors.

In addition to the relatively shallow navigation channel in the Christina River, the land-based configuration of the Port of Wilmington constrains capacity. In an effort to expand port operations and acquire a portion of the projected increases in future market demand, DSPC purchased the Edgemoor Site in 2016, as identified in the DSPC Strategic Master Plan. The current deed to the property has been included in Appendix 3. The Edgemoor Site was purchased with the intent of re-developing the property into a multi-user containerized cargo port capable of accepting New Panamax cargo ships. In October 2018, the State of Delaware signed a $500 million, 50-year concession agreement to operate and expand the Port of Wilmington and to construct a nw containerized cargo port at the Edgemoor Site. The agreement included a commitment to invest approximately $400 million to construct the Edgemoor facility.

The Edgemoor Site formerly was developed as a titanium dioxide and ferric chloride manufacturing facility, which reportedly initiated operations in the early 1930s. Production at the manufacturing facility ceased in 2015 followed by decommissioning and demolition of the process equipment by the former owner. DSPC has since demolished and removed most of the buildings that remained after decommissioning in preparation of redevelopment.

1.2 Purpose

The purpose of this project is to modernize the State of Delaware's international waterborne trade capabilities, allow for the State of Delaware port to remain competitive within the Delaware River international trade market, meet the rising demand for modern containerized ports, and to continue, and strengthen, waterborne trade's importance to the State of Delaware and regional economy. International waterborne trade is considered an essential part of the State of Delaware's economy. According to the DSPC Strategic Master Plan, the Port of Wilmington supports over 4,000 jobs annually, generates nearly $340 million in business revenue, over $300 million in personal revenue, and $31 million in state and regional taxes. The State of Delaware's position along the Delaware River places it within a competitive international trade market with the Port of Philadelphia, just 25 miles upriver of the Port of Wilmington.

1.3 Need

The need for this project is driven by the following considerations:

- **Vessel Capacity Constraints.** With the completion of the Panama Canal Lock Expansion, Asia/U.S. trade shipping to the eastern seaboard is forecasted to increase. The increase is expected to come through the use of new ships that are larger than those currently in service, due to the inherent efficiency of shipping goods in the largest vessel possible. These larger vessels will be known as New Panamax ships, several of which are now in service. To accommodate the increase in modern, New Panamax ships entering east coast ports, the Applicant anticipates that there will be demand for expansion of East Coast port operations. Ports capable of accepting vessels with 45-foot or greater drafts are positioned to most readily accept New Panamax vessels. Currently, no ports in the State of Delaware are capable of accepting New Panamax vessels. The Port of Wilmington berths capable of handling containerized cargos currently are

maintained to a depth of 38 ft. MLLW. Therefore, container vessels that are bound for Ports in the State of Delaware would need to be light-loaded (loaded at a reduced capacity) or lightened prior to arrival at the port. Either option decreases the efficacy of operations and increases the potential for impacts to the environment through greater air emissions from a higher number of smaller, possibly older ships and the risks associated with increased handling of cargo.

- **Cargo Handling Constraints.** To meet the increasing demand of international waterborne trade, and to continue DSPC's mission to contribute to the State of Delaware's economic vitality, the volume of cargo entering and exiting Delaware's ports needs to continue to expand. According to the DSPC Masterplan, there are constraints to expanding port operations at the Port of Wilmington, but arguably the most constrictive limitation is the lack of backland storage capacity. Any capital improvement project to increase berth capacity likely would require the development of additional backland storage. Expansion needed to create such backland storage is constrained by the degree of private, industrial, and commercial development along the Port of Wilmington's inland boundaries and by the USACE Wilmington Harbor South confined dredge facility (CDF) located along the Delaware River. Increases in backland use for containerized cargo would come at the loss of dry/break bulk cargo capacity which would work against the purpose of increasing the current economic benefits associated with the Port of Wilmington. Dry/ break bulk cargo currently accounts for 32% of the Port's annual cargo throughput.

1.4 Project Datum

This project references Mean Lower Low Water (MLLW) as its project datum. The MLLW is defined by the U.S. National Oceanic and Atmospheric Adminstration (NOAA) as the average height of the lowest tide recorded at a local tide station each day during a 19-year recording period.

1.5 Assessment Approach – National Environmental Policy Act (NEPA) Scope

As required under NEPA, the Philadelphia District of USACE engaged 20 state and federal agencies, programs, and recognized tribes and nations through a December 20, 2018 letter describing the project, outlining potential issue areas and seeking comments on the proposed project. The letter also identified the approach that would be taken through the Environmental Assessment in order to analyze the project—including an examination of alternatives that consider the location of the project, dredging depth of the proposed project, and storage of the dredged materials. This approach is based on two scenarios: 1) expansion of the existing Port of Wilmington location, and 2) expansion and development of a new marine terminal located along the Delaware River.

In considering alternatives, the letter identified the following issues that will be examined:

- Land use/acquisition challenges;
- Vessel/capacity improvements;
- Operation/navigation;

- Environmental Considerations;
- Dredged material management;
- Project site access; and
- Order of magniture cost estimates.

In addition to the alternatives analysis, this Environmental Assessment will include identification and assessment of secondary and cumulative impacts associated with the preferred alternative. A copy of the scoping letter has been enclosed in Appendix 4.

1.6 National Environmental Policy Act Scope – Agency Comments

Three agencies: U.S. Environmental Protection Agency (USEPA), the National Oceanic Atmospheric Administration National Marine Fisheries Service (NMFS), and the Delaware Department of Natural Resources and Environmental Control (DNREC) provided written comments in response to the scoping letter (Appendix 5).

Comments generally can be categorized in the following areas:

Essential Fish Habitat – The agencies commented on the likely need for assessment of the proposed project's impact on any essential fish habitat (EFH) including the potential for on-site inspection, fishery independent and dependent surveys and passive sampling. Recommendations included the characterization of abundance, biomass, production and diversity of fish and their prey, including benthic invertebrates.

Endangered Species – The Delaware River is home to both the shortnose and Atlantic sturgeon, both of which are federally listed as endangered species. Agency comments suggested that a biological assessment be conducted to ensure that any action authorized, funded, or carried out by USACE is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction or adverse modification of critical habitat. An analysis from anticipated ship traffic as a result of the project was also recommended.

Wetlands and Submerged Aquatic Vegetation – Wetlands impacts from the project, including those that may be created by the development of a confined disposal facility for dredged material, should be assessed along with any impacts to submerged aquatic vegetation from dredging, as well as turbidity sedimentation in and adjacent to the project should be identified and considered.

Community Impacts – an evaluation of air quality impacts through a general conformity analysis and other potential community impacts from construction of the project such as light and noise is recommended.

Cumulative Impacts – A review of cumulative impacts from the project, existing and planned development, and navigation activity in the Delaware River and Bay is recommended to include an assessment of impacts on endangered species.

Permitting and Approvals – Agencies identified the following permitting/approvals that may be needed for the project:

- Federal Consistency Certification – Delaware Coastal Management Program
- State of Delaware Subaqueous Lands Permit
- Clean Water Act Section 401 Water Quality Certification

Project Alternatives – An analysis of alternatives relative to essential fish habitat, the Fish and Wildlife Coordination Act, and the Endangered Species Act should be evaluated.

2.0. ALTERNATIVES ANALYSIS

2.1 Introduction

This section discusses the reasonable alternatives that were considered during the preparation of this EA. As part of the DSPC Strategic Master Plan, alternatives for expanding cargo handling capacity of the Port of Wilmington were developed and reviewed. Port capacity expansion was viewed as a means of improving operating economics and increasing socio-economic benefits to the local population, the State of Delaware, and the tristate (Delaware, New Jersey, and Pennsylvania) region. The developed alternatives were compared in regard to capacity improvements, environmental considerations and orders of magnitude cost estimates. Because an alternative analysis was already performed as part of the DSPC Strategic Master Plan, this previous assessment is considered to be an alternative screening. The Master Plan was considered an alternative screening tool in that it generally conforms to USACE procedures for implementing NEPA and describes the needs and defines the purpose for expansion of the Port of Wilmington. It also identifies alternatives, describes and analyzes alternatives for practicability and identifies environmental considerations and the alternative that meets the needs of the Port. The Master Plan considered costs, existing conditions and technologies and logistics in assessing practicability. Alternatives considered in the alternative screening are detailed below.

2.1.1 Alternative Screening

The alternatives suggested in DSPC's Strategic Master Plan were structured on two scenarios detailed below.

1. Scenario one includes expanding operations at the Port of Wilmington's current location. In order to increase the backland storage capacity required to expand port operations, a 66-arce property located adjacent to the Port of Wilmington would need to be developed. Under scenario one, two alternatives were assessed.

    - **Alternative 1:** Alternative 1 included investments into capital infrastructure improvements for existing customers, which would be required to maintain the handling of the existing volume of cargo.

      The alternative does not include any projects to accommodate growth in new business.

    - **Alternative 1A:** Alternative 1A includes investments in capital infrastructure improvements to meet the demand of growth in existing commodities at the port. Proposed improvements did not include deepening the Christina River to 45 feet MLLW to accommodate larger New Panamax vessels.

2. Scenario two included the expansion and development of a new multi-use marine terminal on the Delaware River. Under scenario two, three alternatives were assessed.

- **Alternative 2:** Alternative 2 included the construction of a new berth at the Port of Wilmington. Two options under Alternative 2 proposed moving port operations from the Christina River to the new berth along the Delaware River.

- **Alternative 3:** Alternative 3 proposed the construction of a new port at the Riveredge Site, which is an industrial park located in New Castle County approximately 2.5 miles downriver of the Port of Wilmington.

- **Alternative 4:** Alternative 4 proposed the construction of a new container port at the Edgemoor Site. The Edgemoor Site is located 2 miles upriver from the existing Port of Wilmington.

Out of the four alternatives assessed, Alternative 4 was selected by DSPC as most viable. The Edgemoor Site was purchased by the State of Delaware in 2016 with the intention to expand port operations to the site. Because of the State's acquisition, and due to the limitations of the Port of Wilmington to expand its footprint to accommodate New Panamax ships and the physical limitations of dredging the existing berths and access to 45 MLLW, the Port of Wilmington alternatives 1A and 2 were not considered further in this assessment.

2.1.2 Selected Alternatives

The selected alternatives were chosen to assess the potential actions at the Riveredge Site and the Edgemoor Site. The alternatives are compared based on their viability to meet the State's goals of economic growth through expanding port operations with minimum environmental impact. After the screening discussed above, three alternatives were selected for further analysis in this assessment as detailed below. Additionally, in accordance with NEPA, the assessment of no action alternative is also included.

- **Alternative 1: No Action.** The no action alternative does not include any improvements at the Port of Wilmington or the Edgemoor Site. Although the no action alternative does not meet the purpose and needs of the project, it provides a comparative counterpoint to the proposed action, in accordance with NEPA.
- **Alternative 2: Create a new container port at Riveredge**. The initial concept for the project would consist of construction of a two-berth container port at Riveredge which is located on the Delaware River within the Riveredge Industrial Park, New Castle. The site is located approximately 2.5 miles south of the existing Port of Wilmington and just south of the Delaware Memorial Bridge. This alternative considers construction of a pile-supported berth structure with a 45-foot MLLW access channel to accommodate New Panamax vessels.
- **Alternative 3: Dredge the Edgemoor Site to -40 feet MLLW.** The project would consist of dredging an approximate 500-foot to 800-foot widening of the 800-foot existing width of the federal Delaware River Navigation Channel to a depth of -40 feet MLLW. Initial concepts about the port include the capability to berth two container ships simultaneously, with each ship being approximately

1,000 feet in length. This alternative examines the viability of the project at a depth shallower than the -45 feet MLLW of the federal navigation channel. While DSPC anticipates that most container ports along the Delaware River will be deepened to -45 feet MLLW to take advantage of the depth of the federal navigation channel, the current standard depth for other commercial ports along the Delaware River (e.g., Philadelphia, Camden, and Paulsboro) is -40 feet MLLW.

- **Alternative 4: Dredge the Edgemoor Site to -45 feet MLLW.** The project would consist of dredging an approximate 500-foot to 800-foot widening of the 800-foot existing width of the federal Delaware River Navigation Channel to a depth of -45 feet MLLW. This project proposes to construct a berth to accommodate two container ships simultaneously, with each ship being approximately 1,000 feet in length. By dredging to -45 MLLW, the proposed project will make the Port compatible with New Panamax Vessels and take advantage of the deepening of the federal navigation channel as was forecast by that project. The proposed project is based on this alternative.

2.2 Alternative Evaluation

The four alternatives selected for assessment were evaluated to compare their viability of meeting the purpose and needs of this project. To evaluate the alternatives, the following criteria were used for the assessment.

- **Vessel and Cargo Capacity Improvements.** As mentioned above, current port operations are limited due to vessel size and cargo throughput constraints. Vessel size constraints are mainly due to the inability to accept fully loaded New Panamax vessels at the -38 feet MLLW Port of Wilmington berths. Additionally, while several cargo handling and storage constraints have been identified at the port, any improvement to increase port operations is limited due to the amount of backland storage availability.

  Multiple factors figure into determining cargo capacity. For this assessment, cargo capacity of each alternative is based on berth capacity and onsite storage capacity. Berth capacity is assessed on the volume of general cargos (e.g., containers, cold storage, breakbulk), dry bulk, and roll-on/roll-off (RO-RO) transferred annually at the berth.

  Environmental Considerations. This assessment will compare the alternatives in terms of opportunities to minimize the impact to the environment. Environmental considerations are balanced between positive and negative impacts. In consideration of positive environmental impacts, the project is anticipated to remove river sediment during dredging that will consequently result in the removal of sediments that contain hazardous substances, such as aromatic hydrocarbons (PAHs), metals, dioxins and furans and polychlorinated biphenyls (PCBs). PCBs are of particular concern in the Delaware River due to their bio-accumulating properties, chemical stability, and environmental toxicity. Potential PCB removal will be assessed for each alternative.

  Conversely, there are potential adverse environmental impacts associated with the removal of the dredge material related to the disturbance of established benthic habitat, which may be of value for ecological health of the river system. Benthic habitats commonly occur along the Delaware River riverbed and in general consist of soft

sediments containing benthic organisms in the project area. The existing benthic ecosystems may act as important foraging grounds for several fish species, including the federal endangered Atlantic and short-nosed sturgeons. Impact to the benthic habitat for each alternative will be assessed.

Additional environmental considerations are related to the potential reuse of dredged material and the placement of the material for storage in the absence of reuse. This includes the use of existing CDFs and the potential for development of new storage facilities needed to support both the initial construction of the berth area and access channel as well as the long-term maintenance to assure adequate access and maximizing efficiencies for the shipping market and customers of the Port. The DSPC Strategic Master Plan identified and evaluated four potential locations to be used as CDFs to accommodate dredged sediments from expansion alternatives—the Port of Wilmington, Riveredge, and Edgemoor. The storage sites were:

- Wilmington Harbor South (WHS), a USACE-owned CDF currently used for placement of materials from dredging the Port of Wilmington berth on the Christina River;
- Developing capacity at the Oldmans Creek (15G) site in New Jersey;
- Lands currently owned by the Delaware City Refining Company near Delaware City, Delaware; and
- A former waste lagoon at First State Crossing known as Operable Unit 2 (formerly Claymont Steel) in Claymont, Delaware.

The report estimates the long-term life of WHS to be 12.3 million cubic yards with the three other locations all estimated to have the potential to hold similar capacities if developed. The current capacity of WHS is estimated at 4 million cubic yards following the completion of an ongoing dike raisings. The DSPC Strategic Master Plan also estimated construction costs for these areas and also maintenance costs for existing CDFs– Wilmington Harbor South and Wilmington Harbor North.

Two primary factors determine the potential for reuse and/or long-term storage of dredged material—grain size and composition and levels of contaminants in the sediments. Much of the dredged material in the area of the Delaware River where the project is located has historically been primarily smaller grain silts which are generally unsuitable for beneficial reuse for construction purposes and therefore have been deposited in CDFs. The CDFs serve as locations where dredged material dries over time and are permitted to allow the discharge of water that drains from the sediments back to the Delaware River. The second factor is the level of contaminants that may be found in sediments. Higher levels of contaminants may exceed threshold standards that are designed to protect public health and the environment and render the material as unsuitable for reuse in certain construction activities.

Alternatives for storage of dredged material are included in this analysis and based on evaluations that were included in the Port of Wilmington Strategic Master Plan.

- **Cost Effectiveness.** Total project cost and cost effectiveness are considerations in comparing the alternatives. Evaluation of these factors relies primarily on the Port of Wilmington Strategic Plan.

- **Economic Development and Sustainability.** The purpose of this project is to modernize and grow the State of Delaware's international maritime trade capabilities to support the State of Delaware's and the region's economy. The project is expected to increase economic growth based on the attraction of business to the region. The alternatives will be assessed based on their potential to benefit the State of Delaware's and the region's economy.

2.2.1 Alternative 1 - No Action Alternative

The no action alternative involves no channel or port improvements at the Port of Wilmington. No actions would be performed at the Riveredge or Edgemoor sites.

2.2.1.1 Vessel and Cargo Capacity Improvements.

Under the no action alternative, no vessel or cargo capacity improvement would be made at Port of Wilmington or at the Riveredge or Edgemoor sites. According to the DSPC Strategic Master Plan, the current capacity at the Port of Wilmington's berths is estimated to be 3.7 million tons of cargo. Approximately 1.7 million tons of that capacity is used for dry bulk, which isn't stored at the Port of Wilmington. Based on the available storage capacity, it is estimated that the Port of Wilmington only has the space to accept 79% of the containers, 27% of the RO-RO, 30% of the cold storage, and 35% of the berth's breakbulk capacity based on 2015 throughput.

2.2.1.2 Environmental Considerations

Under the no action alternative, no new impacts (either positive or negative) to the environment are anticipated as no new infrastructure would be added to the Port of Wilmington or at either the Riveredge or Edgemoor sites.

2.2.1.3 Cost Effectiveness

Under the no action alternative, no new capital costs are anticipated. However, DSPC estimates that the State of Delaware spends approximately $15 million each year subsidizing operating losses and capital expenses at the Port of Wilmington. With no new investment, those operating losses are expected to continue.

2.2.1.4 Economic Development and Sustainability

Under the no action alternative, no significant increases to economic development would be anticipated. The Port of Wilmington is estimated to currently sustain approximately 5,600 jobs and per year generates $417 million in business revenue, $391 million in personal income, and $39 million in regional tax revenue. Without expansion of the Port's capability, the relevance of the Port may dwindle in comparison to the other east coast ports that can and will be able to accept New Panamax shipping, and jeopardize or diminish these positive economic attributes of the Port.

2.2.2 Alternative 2 – Riveredge

Alternative 2 proposes to expand the Port of Wilmington at the Riveredge site through the construction of a new two-berth fully automated container terminal at the industrial park currently on the site. This alternative is based on the concept identified in the DSPC Strategic Master Plan as Alternative 3.

This proposal presumes construction of the new berth to a maintained depth of -45 feet MLLW and that new demand for a containerized cargo shipping would support the proposed facility.

2.2.2.1 Vessel and Cargo Capacity Improvements

New construction to support the operation would include an estimated nine support buildings, new electrical substation and distribution system, and new access roadway to Cherry Lane.

Cargo capacity for the facility is projected at 970,000 TEUs (5,700,000 tons) with no dry bulk or RO/RO cargo anticipated. Rail access is available with construction of seven new freight rail sidings from the existing Norfolk Southern Delaware City railroad and service from Norfolk Southern, which provides services in the immediate vicinity.

2.2.2.2 Environmental Considerations

Impacts to potentially high value wetlands and a significant dredge load from initial construction and annual maintenance are identified as considerations such that the environmental and site civil permitting for this alternative are considerably more challenging than other alternatives evaluated in the DSPC Strategic Master Plan.

The Riveredge project site spans separate local government jurisdictions between the City of New Castle and New Castle County. These jurisdictions have different development ordinances and development requirements. Those differences represent a degree of complication that does not exist with the other alternatives.

Dredging of the berth will require a subaqueous lands permit from Delaware DNREC and an individual permit under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act from the USACE. Any fill in the flood plain will require the approval of New Castle County.

Approximately 23 acres of wetlands under state and federal jurisdiction are expected to be impacted by construction of the facility. The filling, if permitted, will require mitigation for the loss of the wetlands. The habitat value of the wetlands is not known. However, the wetlands are located within the feeding radius of the Pea Patch Island Heronry as it is identified in the management plan for that resource. That fact alone suggests that the wetlands habitat value might preclude issuance of a permit to fill the wetlands or increase the challenge of designing an appropriate mitigation for the impacts. Initial construction of the berth and 4,000-foot long access channel through

shallow tidal flats is expected to require removal of 7.5 million (MM) to 8MM cubic yards of sediment, with annual maintenance dredging expected to require removal of 1MM to 2MM cubic yards.

The preliminary estimate of the area impacted by dredging an access channel and berth at Riveredge is 130 acres. Developing a berth at the Riveredge site likely will require several new disposal areas to manage initial construction and maintenance dredging needs.

Environmental characterization of the sediments to be excavated would be necessary to support assessment of potential impacts to water quality and biota at the project location and impacts to a future dredge material storage location. Although specific environmental conditions of sediments are not known, as a general assumption, the removal of sediments containing elevated concentrations of hazardous substances should be considered a benefit to the ecological health of the Delaware River and Bay, assuming the sediments meet regulatory standards that allow for their placement in a storage facility. (DSPC Master Plan). Environmental conditions of the landside portion of the proposed facility were not evaluated at the time the DSPC Master Plan was prepared and are in fact, unknown.

2.2.2.3 Cost Effectiveness

According to the DSPC Strategic Master Plan, costs for construction of a new container port at Riveredge to include cranes and yard equipment, buildings and berth is estimated at $882.4MM (2016 dollars). Not included are costs for property acquisition, site demolition work, off port roadway improvements, or environmental mitigation for wetland impacts. Although a return on investment was prepared as part of the Master Plan, results were not made public due to the confidential nature of the information. Total time to implement plans for the Port to operational readiness was estimated at more than seven years.

A new fully automated container port at Riveredge is expected to effectively double the Port's general cargo capacity, increasing it by 6,040,000 tons. Dredged to -45 feet MLLW, the facility is expected to accommodate New Panamax ships.

Because the volume of dredge material from Riveredge is much larger than the other alternatives, containment of the sediments generated by initial dredging of an access channel for the site limits available options of sites with sufficient capacity to contain this volume. Developing a berth at the Riveredge site likely will require several new disposal areas to manage initial construction and maintenance dredging needs.

2.2.2.4 Economic Development and Sustainability

Although well-positioned to serve the mid-Atlantic region, a new container port facility at Riveredge would be placed in the competitive market with the

other ports in the region, including the larger ports of New York/New Jersey, Norfolk, Philadelphia and Baltimore.

While the overall growth of trade at container ports in the U.S. was 5.7 percent between 1995-2015, growth is predicted to slow to 3.8 percent over the next 20 years. The four main container ports in the mid-Atlantic area from New York/New Jersey to Norfolk, including Philadelphia and Baltimore, handled a combined 10.2 million TEUs in 2015. Projected growth for these ports is expected at about 4 percent annually with total new, incremental volume at 2.6 million TEUs between 2015 and 2020, with another 6.4 million TEUs between 2020 and 2035. (DSPC Strategic Master Plan)

In order to maintain access for New Panamax ships and take full advantage of the main channel depth of the Delaware River, the access channel and berth area would need to be maintained at -45 feet MLLW. Preliminary estimates indicate that 1MM to 2MM cubic yards of material would need to be removed annually in order to maintain the -45 feet MLLW depth in both the channel and berth. This estimated volume and estimated volumes for initial construction of the access channel and berth would require construction of additional dredge storage areas.

Norfolk Southern does not serve the site currently, but has a railroad nearby and could serve the facility, which would require construction of new rail infrastructure to provide connectivity. Access to double stack rail connectivity to the regional freight network is challenged due to the number of overhead bridge height restrictions. This restriction is common to all of the alternatives.

2.2.3 Alternative 3 - Edgemoor Site Dredging to -40 feet MLLW.

Alternative 3 includes the construction of a new berth at the Edgemoor Site, which would be dredged and maintained at -40 feet. MLLW. Constructing a new berth at the Edgemoor Site with a maintained depth of -40 feet would include the following:

- Construction of a harbor access channel with a maintain depth of -40 feet. MLLW; and,
- Construction of a containerized cargo berth with a maintain depth of -40 feet MLLW.

This alternative is based on the initial development proposed during DSPC Strategic Master Plan as alternative 4. However, rather than a proposed depth of -45 feet MLLW, the access channel and berth depth will be limited to -40 feet. MLLW. This alternative was requested by USACE to assess the project at an interim depth.

2.2.3.1 Vessel and Cargo Capacity Improvements.

This proposal considers the construction of a new 2-berth container terminal with a pile-supported wharf structure. Due to the limited dredge depth of -40 feet MLLW, this alternative would not allow for the acceptance of fully load

New Panamax vessels. Without the ability to accept New Panamax vessels, the new port will not perform at an optimum efficiency and the goal of the USACE's Main Channel Deepening to maintain the Delaware River ports as competitive deep water ports would not be fulfilled.

While vessel capacity improvement would not be fully achieved as a result of only a -40 feet MLLW maintained depth, an increase in cargo capacity is anticipated with the new berth. The Master Plan estimated the Edgemoor container terminal capacity at 970,000 TEUs (5,700,000 tons). No dry bulk or RO/RO is expected to be handled at the facility.

2.2.3.2 Environmental Considerations

The development of a container port facility at the Edgemoor site will repurpose the property from its former use as a heavy industry facility (chemical manufacturing plant). The Chemours Edge Moor Facility was closed under the oversight of the Delaware Department of Natural Resources and Environmental Control (DNREC) through a Resource Conservation Recovery Act (RCRA) Corrective Action. Specific areas of the facility with engineered controls in place required by the RCRA Closure will need to be considered in plans for the landside infrastructure. Potential modification or alterations to the engineered controls will require the review and approval and oversight by DNREC.

As with the Riveredge site, the environmental conditions in the sediments and soils of the proposed berth and access channel areas for the Edgemoor site were not evaluated as part of the DSPC Master Plan development. Sediment, soil and water quality have been quality have since been characterized to support dredging, storage and reuse of the materials within the project area (Appendix 2). An assessment of the site following the DSPC Strategic Master Plan development found no jurisdictional wetlands at the Edgemoor Site. Dredging of the berth will require a subaqueous lands permit from Delaware DNREC and an individual permit under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act from the USACE. Any fill in the flood plain will require approval of New Castle County.

An assessment of the proposed berth area as benthic or essential habitat was conducted following the development of the DSPC Master Plan and concluded that there is no submerged aquatic vegetation in the area proposed to be dredged to construct the berth and access area. The issue of benthic habitat is discussed in more detail in Appendices 11 and 13.

The project also requires evaluation for its potential impacts on rare, threatened or endangered species. A Biological Assessment was conducted following the development of the DSPC Master Plan. Both the Atlantic and shortnose sturgeon are found in the project area and both are listed as federally endangered species therefore both species are of primary concern. Sea turtles and whales are considered of secondary concern for purposes of this assessment as although none are found in the direct vicinity of the

project, a number of species of both are found in the larger Action Area of the project, downriver of the project site in the Delaware River and Bay.

The Biological Assessment concluded that the impacts of the project; dredging, pile driving and associated activities are insignificant on sturgeon, turtles and whales, although impacts to Atlantic Sturgeon may result from vessel traffic, but those impacts do not jeopardize the continued existence of the species. The Biological Assessment and conclusions are found in Appendix 13.

The site is located in an area of the Delaware River known to be associated with maximum turbidity conditions and potentially high depositional rates of sediments for some areas outside of the channel and deeper reaches of the river. This will require periodic maintenance dredging potentially accompanied by the installation of anti-sedimentation technology in the wharf area to minimize accumulation of sediments in the berth.

Analysis for storage of dredged material from construction of the Edgemoor site at 40 feet MLLW is consistent with that identified in the alternatives description for Edgemoor in Section 2.2.2.2 in that four locations were assessed in the DSPC Master Plan for potential use in supporting the expansion of a new container port facility at the current Port, Riveredge and Edgemoor locations.

Because of the location and proximity of the Edgemoor site and potential berth to the main channel of the Delaware River, the Master Plan indicated that dredging and maintenance requirements were expected to be minor compared to the Riveredge site. Total volume of dredged material from initial construction of the berth and access channel is estimated at 2.3 MM cubic yards. These estimates were developed following the completion of the DSPC Strategic Master Plan.

2.2.3.3 Cost Effectiveness

The DSPC Strategic Master Plan estimated the cost of building a new conventional container port at Edgemoor to be $477,200MM (2016 dollars). Costs were estimated with the assumption that a new port facility would be dredged to a depth of -45-feet MLLW.

Dredging to a depth of -40 feet MLLW would result in lower costs due to less material being dredged which is estimated at 2.3 MM cubic yards due to a shallower depth. The overall dimension of the berthing area will be the same under both the -40 foot and -45 foot alternatives.

Beyond those categorical costs associated with dredging, costs associated with landside infrastructure needed to support operations would be expected to be similar to a facility constructed to -45 feet MLLW. Container storage and transportation improvements, including road and rail, energy systems, water, sewer and other utility needs would be approximate. Administrative and security requirements likewise would be similar. Under a -40 foot

MLLW alternative, smaller cranes may be utilized to load and offload containers due to smaller ships utilizing the port.

Although a more shallow port would not be able to accommodate New Panamax class ships, the TEU volume expected would likely still require the full buildout of the Edgemoor site to accommodate container handling and storage. This is based, in part, on the transfer of container ship loading and offloading that is expected to be relocated from current operations at the Port of Wilmington to the Edgemoor location to allow expansion of other cargo handling at the Port of Wilmington.

2.2.3.4 Economic Development and Sustainability

Construction of a new container port is estimated at approximately $400 million and does not include any costs for land acquisition as the Edgemoor property has already been acquired by the Diamond State Port Corporation. The footprint of the property is expected to be fully utilized by the infrastructure planned for the site. Any expansion of the Port requiring additional acreage would necessitate the acquisition of adjoining or nearby lands.

The expansion at Edgemoor is expected to allow for the handling of approximately 970,000 TEU or 5.7 million tons. With the expansion of Philaport in Philadelphia, this will increase the Delaware River ports' capacity to accommodate new growth in the container market and take advantage of the deeper 45-foot channel depth of the Delaware River. The Ports of New York/New Jersey, Baltimore and Norfolk have already deepened their berths to 50 feet. Other ports along the east coast from Boston to Florida are planning or have initiated deepening of their berths beyond 45 feet to accommodate greater container cargoes of up to 14,000 TEU per ship.

The DSPC Strategic Master Plan concluded that container cargo capacity in 2016 was between 238,000 – 325,000 containers at the existing Port of Wilmington and noted that storage capacity for fruit operations was limited. Even with the transfer of this volume of container operations to Edgemoor, with East Coast ports either already at -45-feet or planning deeper draft facilities, the construction of a new container port in Delaware to only -40-feet does not appear economically sustainable given the conservative estimates of growth of the container cargo market in the mid-Atlantic region. As fleet turnover continues with new, larger ships comprising a larger percentage of the available fleet, ports will seek to accommodate these vessels in order to remain economically competitive.

The Edgemoor site is immediately adjacent to I-495 providing quick access to the region's interstate highway system and markets in the mid-Atlantic and Northeast region. Site feature limitations are limited and allow for design of truck entrance and exit routes that will maximize efficiency for container loading and unloading.

Norfolk Southern rail infrastructure currently serves the existing property and will continue to serve the facility. Rail access connects to the facility and includes a near dock intermodal yard at the site. As with all of the alternatives, double stack rail connectivity to the regional freight network is challenged by the number of overhead bridge height restrictions.

Access of the site to adequate electrical transmission and distribution systems will allow for cargo handling equipment such as cranes, lifts and rubber tired gantrys to be powered with electricity rather than diesel engines, minimizing air emissions that might otherwise contribute to Delaware and the region's air quality challenges associated with meeting standards for ground-level ozone. The use of electric-powered equipment will also assist the facility in minimizing its greenhouse-gas emissions.

The location and elevation of the Edgemoor location provides resiliency from the effects of climate change and sea level rise. DNREC, in its *Sea Level Rise Vulnerability Assessment for the State of Delaware*, examined the potential impact of sea level rise on the state's industrial and manufacturing sectors. The inundation model showed the inundation risk to upland buildings was low in the industrialized area along the Delaware River in New Castle County but that other associated structures could be affected. Under the scenario of a 1 meter rise in sea level, the report identified only the existing docking facility that served the former Chemours plant and a limited area of shoreline, as being exposed. (DNREC Preparing for Tomorrow's High Tide 2012).

The upland footprint of the Edgemoor site is expected to be fully utilized in order to accommodate needed infrastructure and container storage. Any future expansion of the facility would require the acquisition of adjoining or nearby property.

2.2.4 Alternative 4 - Edgemoor Dredging to -45 feet MLLW.

2.2.4.1 Vessel and Cargo Capacity Improvements.

This alternative proposes the construction of a new 2-berth container terminal with a pile-supported berth structure to a depth of -45 feet MLLW. A berth constructed at this depth allows the Edgemoor facility to accommodate the full range of container vessels that are able to navigate the Delaware River at its new completed depth of -45 feet. MLLW, including larger ships being introduced into US routes as the average size of container ships increases with time.

Vessels serving ports with dry bulk, liquid bulk and Ro/Ro have all increased in size but the largest recent increases in ship size has been in container ships

due in part to the intense competition within the containerized trades and the need for ship owners to minimize costs. As the newest and largest vessels are introduced in the Asia-Europe trade, the size of vessels that serve the United States will likely increase due to the cascading of vessels from the Asia-Europe trade. (Port Performance Freight Statistics Program – USDOT)

The wharf will be designed to accommodate two ships capable of holding up to 12,000 TEUs to be docked simultaneously and is expected to be approximately 2,600 feet in length. The design also includes a 1700 ft. turning basin to allow safe navigation in and out of the berth from the main channel of the Delaware River.

2.2.4.2 Environmental Considerations

Most of the environmental considerations associated with the Edgemoor -40 foot MLLW alternative also hold for the Edgemoor -45 foot alternative with the primary difference being the amount of dredged material from the initial construction of the berth. The total estimated volume of material generated from construction to -45ft. MLLW is 3.2 M cubic yards..

The development of a container port facility at the Edgemoor site will repurpose the property from its former use as a heavy industry location with a chemical manufacturing plant. The Chemours Edge Moor Plant was closed under the oversight of the Delaware Department of Natural Resources and Environmental Control (DNREC) through a Resource Conservation Recovery Act (RCRA) Corrective Action. Specific areas of the facility with engineered controls in place required by the RCRA closure will need to be considered in plans for the landside infrastructure. Potential modifications or alterations to the engineered controls will require the review, approval and oversight by DNREC.

The environmental condition of the proposed berth area that will require dredging is also a consideration regarding the level of any contamination in the sediments and the appropriate reuse and/or storage of the dredged sediments. Dredging to -45 feet MLLW would not be expected to change the concentrations or types of any contaminants found in the sediments. Persistent bio-accumulative toxic contaminants such as polychlorinated biphenyls, dioxins and furans are generally found in the upper layers of sediments, primarily silty materials that accumulate in the river over time as a function of runoff from upland areas.

The area also was assessed following the development of the DSPC Strategic Master Plan for its value as wetland or benthic habitat for aquatic life. The assessment determined that there are no jurisdictional wetlands that will be impacted by the project. Dredging of the berth will require a subaqueous lands permit from Delaware DNREC and an individual permit under Section 404 of the Clean Water Act and Section 10 of the River and Harbors Act from the USACE. Fill in the flood plain will require approval of New Castle County.

An assessment of the proposed berth area as benthic or essential habitat was also conducted following the DSPC Master Plan and concluded that there is no submerged aquatic vegetation in the area proposed to be dredged to construct the berth and access area. The issue of benthic habitat is discussed in more detail in Appendix 11.

The project also must be evaluated for its potential impacts on rare, threatened or endangered species. A Biological Assessment was conducted following the development of the DSPC Master Plan. Both the Atlantic and shortnose sturgeon are found in the project area and both are listed as federally endangered species therefore both species are of primary concern. Sea turtles and whales are considered of secondary concern for purposes of this assessment as although none are found in the direct vicinity of the project, a number of species of both are found in the larger Action Area of the project, downriver of the project site in the Delaware River and Bay. Any impacts on these species are not expected to be any greater than if the -40 – foot dredge alternative was pursued.

The Biological Assessment conducted following development of the DSPC Master Plan concludes that the impacts of the project; dredging, pile driving and associated activities are insignificant on sturgeon, turtles and whales although impacts to Atlantic Sturgeon may result from vessel traffic but those impacts do not jeopardize the continued existence of the species. The Biological Assessment and conclusions are found in Appendix 13.

The site is located in an area of the Delaware River known to be associated maximum turbidity conditions and potentially high depositional rates of sediments for some areas outside of the channel and deeper reaches of the river. This will require maintenance dredging potentially accompanied by the installation of anti-sedimentation equipment in the wharf area to minimize accumulation of sediments in the berth. Sedimentation issues are expected to be similar at either a -40 foot MLLW or -45 foot MLLW alternative.

Analysis for storage of dredged material from construction of the Edgemoor site at -45 feet MLLW is consistent with that identified in the alternatives description for Edgemoor in Section 2.2.2.2 in that four locations were assessed in the DSPC Strategic Master Plan for potential use in supporting the expansion of a new container port facility at the current Port, Riveredge and Edgemoor locations.

Because of the location and proximity of the Edgemoor site and potential berth to the main channel of the Delaware River, the Master Plan indicated that dredging and maintenance requirements were expected to be minor compared to the Riveredge site. Total volume of dredged material from initial construction of the berth and access channel is estimated at 3.2 MM cubic yards. These estimates were developed following the completion of the DSPC Strategic Master Plan.

2.2.4.3 Cost Effectiveness

Issues of cost effectiveness between the -40 feet and - 45 ft. Edgemoor alternatives are primarily centered around the initial construction costs associated with dredging and the efficiency of accommodating 45-foot draft vessels. Cost considerations of other elements of the project such as wharf construction, and site development costs for utilities, buildings, container transport and storage and related infrastructure are expected to be approximate between the two alternatives. One potential difference in cost is the expected larger size of cranes needed to offload New Panamax sized ships that could utilize a 45 ft- berth.

The 45-foot alternative will require removal of approximately 3.2 MM cubic yards of material which would result in higher costs than the -40-foot alternative which is expected to require removal of approximately 2.3 MM cubic yards. The construction dredging is expected to be completed over a two-year (three cycle) period in order to adhere to time of year restrictions to minimize impacts to fish populations.

This alternative also proposes to make use of the Wilmington Harbor South confined disposal facility for placement of the material. The facility is owned by the USACE and utilized for storage of dredged material from the ongoing maintenance of the Port of Wilmington on the Christina River.

2.2.4.4 Economic Development and Sustainability

Construction of a new container port is estimated at approximately $400 million and does not include any costs for land acquisition as the Edgemoor property has already been acquired by the Diamond State Port Corporation. The footprint of the property is expected to be fully utilized by the infrastructure planned for the site. Any expansion of the Port requiring additional acreage would necessitate the acquisition of adjoining or nearby lands.

Economic development opportunities are enhanced through the construction of a 45-ft. berth as a result of the ability to attract larger container vessels and the associated reduced transportation costs per TEU. A new container port with a berth at less than 45-feet will not be competitive in the mid-Atlantic region and, over time, with the average size of the container ship fleet increasing, would not expect to be economically sustainable.

The Edgemoor location provides additional benefits that should be considered, as identified in the 40-ft. alternative. These include:

- Access to the regional markets through proximity to I-495 and the Interstate highway system;
- Existing rail infrastructure and service availability to the site from Norfolk Southern

- Access to electrical transmission and distribution systems capable of delivering power to allow use of electric cranes, gantries and other infrastructure and equipment necessary to support port operations.
- Sufficient elevation of the site to allow sustainable operation in the event of sea level rise modeled to a 1 meter increase.

2.3 Comparison of Alternatives

The four alternatives evaluated in this assessment range from taking no action, constructing a new container port on the Delaware River at Riveredge or constructing a new container port at Edgemoor at either a 40-foot berth depth or a 45- foot depth.

Given the expected growth in the container market in the mid-Atlantic area, the forecasted container terminal capacity shortage in the mid-Atlantic area, the conclusion to expand container operations is a clear one. This conclusion eliminates the no action alternative from consideration.

A comparison of the Riveredge site to the Edgemoor alternative concludes that the Edgemoor location is the preferred site for further analysis. Primary considerations for eliminating the Riveredge site include the significant volume of sediments that would be required to be dredged in order to construct and maintain the berth and the amount of potentially high value wetlands that would be impacted by construction of the berth, wharf and upland infrastructure. The costs associated with dredging, constructing a new storage facility in the area to hold dredged sediments and mitigating wetlands impacts are key factors.

The final analysis to determine a preferred alternative is a comparison between a 40 ft. and 45 ft. berth at Edgemoor.

Limiting the depth of Edgemoor to less than the current 45-ft. navigation channel depth of the Delaware River ignores the need to lower transportation costs and the need to accommodate the container trades markets.

All of the container trades continue to evolve to larger containerships to lower transportation costs. As the Ultra Large Container Vessels (ULCVs) are deployed in the East-West trades, there is a cascading of relatively smaller, but still large vessels, to cover North-South trades, including the South America to US reefer trades. These cascaded vessels require depths of water of at least 45 feet to be economically efficient.

The need for the Edgemoor terminal is due to the forecasted terminal capacity shortage in the New York/New Jersey to Norfolk coastal range. The cargo growth will begin to exceed terminal capacity before 2023, when Edgemoor is planned to start operation. Edgemoor is projected to be fully utilized within five years of its start of operations.

That incremental international capacity will be transported on ships that require the 45- feet depth and more. As the main channel is limited to 45 feet, the terminal harbor is restricted to depths suitable to addressing vessels that can use the 45-feet depth within tide cycles.

A depth below 45 feet will not relieve the pressure created by the projected international container capacity shortfalls for the NYNJ-NRF region, as use of the terminal will not attract container services.

Environmental impacts associated with dredging to 40 versus 45 feet are similar with no distinct advantages associated with the shallower depth. The deeper depth would foster use of larger ships inherently improving fuel consumption per ton of cargo moved. The reduction in fuel consumption translates to fewer pollutant emissions to air, primarily nitrogen oxide, particulate matter and carbon dioxide.

The dredging of the Edgemoor harbor to less than 45 feet (navigation channel depth) is rejected, as it will not be able to attract sufficient usage by container lines, will not address international container capacity shortfalls for the NYNJ-NRF region and will not lower transportation costs, and affords no appreciable environmental benefit over a dredge to 40 feet.

This analysis also considers the alternatives identified for potential storage of dredged material from initial construction and future maintenance. The Master Plan included several locations in Delaware and New Jersey for construction of a new CDF and also assessed the potential use of the existing CDFs that are currently utilized for maintenance of the Christina River. The Master Plan estimated construction costs for new CDFs ranged from $4,3M to $88M. Wilmington Harbor South is an existing, permitted CDF located approximately 2.5 miles from the Edgemoor site and, with some modification, is able to accommodate the initial volume of dredged material from construction of a -45 MLLW berth and access channel at the Edgemoor location. The site is also able to accommodate future maintenance dredging needs from both the Port of Wilmington and the Edgemoor location, again with additional modifications. The USACE has indicated its desire to utilize WHS for as long as it is able to support maintenance dredging on the Christina River and has plans for raising the dikes to potentially 70 feet.

2.4 Applicant's Preferred Alternative

This comparison between the Riveredge and Edgemoor locations is weighted by the actions of the DSPC and the State of Delaware which acquired the Edgemoor location in 2016 for the purpose of expanding operations for the Port of Wilmington. The acquisition followed an extensive review during which time DSPC conducted its due diligence to identify any recognized environmental conditions and other issues that might impact the future use of the site.

The acquisition of the Edgemoor site was followed by the issuance of a request for proposals by DSPC to seek potential partners that would assume operations at the Port of Wilmington through a lease agreement, commit investments for upgrades at the Port and construct a new container port at Edgemoor. As a result of this process, a recommendation to enter into a 50-year concession agreement for the operation of the Port that includes capital expenditures by the leaser of $500 million, including a commitment to construct and operate the cargo facility at Edgemoor was approved by the DSPC Board of Directors and approved by the Delaware General Assembly in 2017.

The applicant's preferred alternative is to develop a new container port at Edgemoor at -45-feet MLLW.

The DSPC Master Plan developed alternatives for the disposal of the dredged material crated during future DSPC projects, including the creation of the during the Edgemoor harbor.

Several potential new disposal sites were identified and evaluated based on land acquisition and construction cost as well as environmental considerations. The evaluation also considered the anticipated long term disposal capacity in the existing USACE and private CDF's in this reach of the Delaware River and Christina Rivers. The applicant's selected disposal alternative consist utilizing existing USACE CDF for the placement of dredged material from the harbor construction through a WRDA Section 217(b) application for additional capacity. In accordance with the implementation guidance this process would begin following the evaluation of the project through a USACE regulatory action (e.g. Section 10/404 and Section 408 permits). Accordingly this EATD has been prepared based on the use of four CDFs along the Delaware River that are feasible for use of that will be included in the Section 217(b) evaluation. The Section 217(b) process determines the required compensated for by the applicant.

In addition to the placement of the majority of the dredged material in existing CDFs, a small portion of the dredged material (less than 10 percent) is anticipated to be beneficially reused onsite. The beneficial reuse is proposed to consist of the hydraulic placement of small quantities of the dredged material with limited onsite dewatering to prepare the material for use onsite as structural fill.

3.0 SUMMARY OF APPLICANTS PREFERRED PROJECT

3.1 INTRODUCTION

This section provides additional information and discussions of the details of the preferred alternative that is considered in the EATD. Information related to the sizing of the basin, wharf structures, dredging and construction activities are also included. Summaries of studies which have been performed at the site are also provided.

3.2 PROJECT DETAIL

3.2.1 Hydraulic Dredging Process

Based on volumes of dredging proposed for the Preferred Alternative, hydraulic dredging is proposed for the initial construction. The yearly maintenance dredging of the harbor access of the project is also proposed to be performed by hydraulic dredging. Hydraulic dredging is considered one of the most common methods for larger scale dredging operations. It consists of a ship which utilizes hydraulic pumps to suction a mix of sediments and water from the river bottom and pump the effluent through a discharge pipe up to several miles away. The suction intake contains a cutter head which rotates to disturb, or dig, the soil to be removed and mixes the cuttings with the suction water. The soil-water slurry then travels though the pump and piping until it discharges to the storage location. Figure 3.1.2-1 graphically depicts this process. The ship sweeps though the proposed dredge area, cutting away 2 to 3 foot sections of material per pass. The slurry material generally contains 25 to 30% sediment and 70 to 75% water based on USACE Engineering Manuals.

Typically, dredging occurs over a 15 to 18-hour cycle per day, and the production rate is dependent upon parameters such as the type of dredge, pipeline length, dredging depth, and sedimentology of the material.

The dredge discharge pipe is typically oriented to discharge into a confined disposal facility (CDF). CDFs can be constructed in water, along shore, or in “upland” areas along the river banks. There are a number of active CDFs along both shores of the Delaware River in the vicinity of the project site. Once inside the CDF, the dredged slurry begins to settle in a general succession according to grain size and/or flocculate (formed by aggregation of suspended solids) size, so that the finest sediment typically remains in suspension over the longest distance.

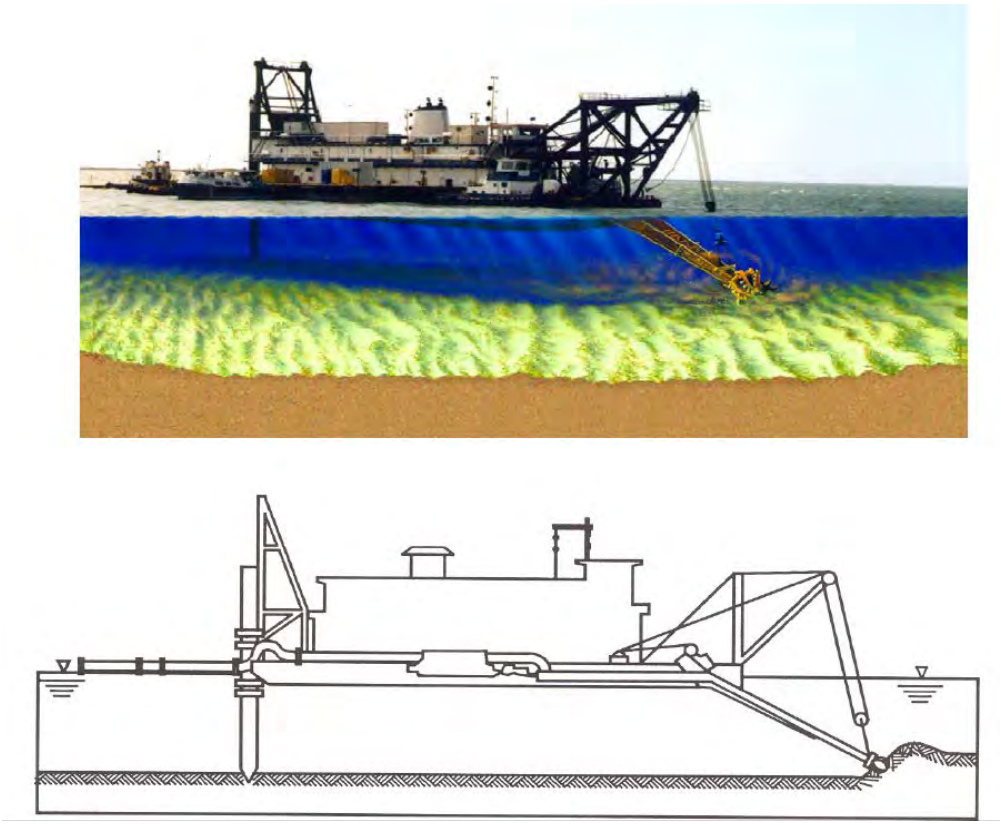


Figure 3.2.1-1: Hydraulic Dredging (USACE EM 1110-2-5025, 2015)

On the opposite end of the basin, a sluice box with a series of weirs is installed and is set at an elevation that controls the ponding depth within which flocculation of the fine-grained solids from the supernatant water occurs. As the settled solids accumulate on the bottom of the CDF, the ponding depth is adjusted so that the water depth can be maintained (typically at least 2 feet of water depth is maintained for effective flocculation). This is commonly achieved through the insertion of additional weir boards at the sluice boxes on an as-needed basis.

The downstream side of the sluice box contains a discharge pipe, which discharges the suitable effluent back to the river. This process is depicted in Figure 3.1.2-2.

Interior baffle dikes are used to create a longer flow path to provide additional retention time and increased efficiency for sedimentation to occur. Following dredging, the decanting of clean water from the surface of the CDF continues through the removal of weir boards until the free water is substantially removed, and the sediment remains as depicted in Figure 3.1.2-3.

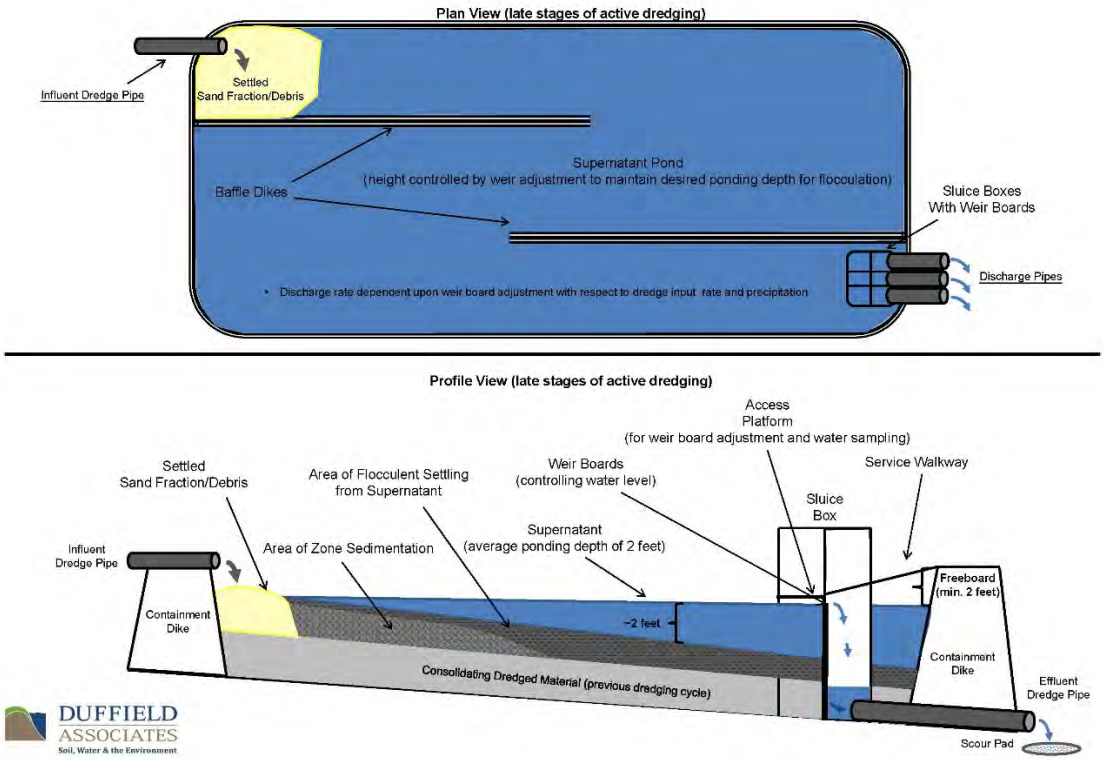


Figure 3.2.1-2: Schematic of CDF During Dredge Event

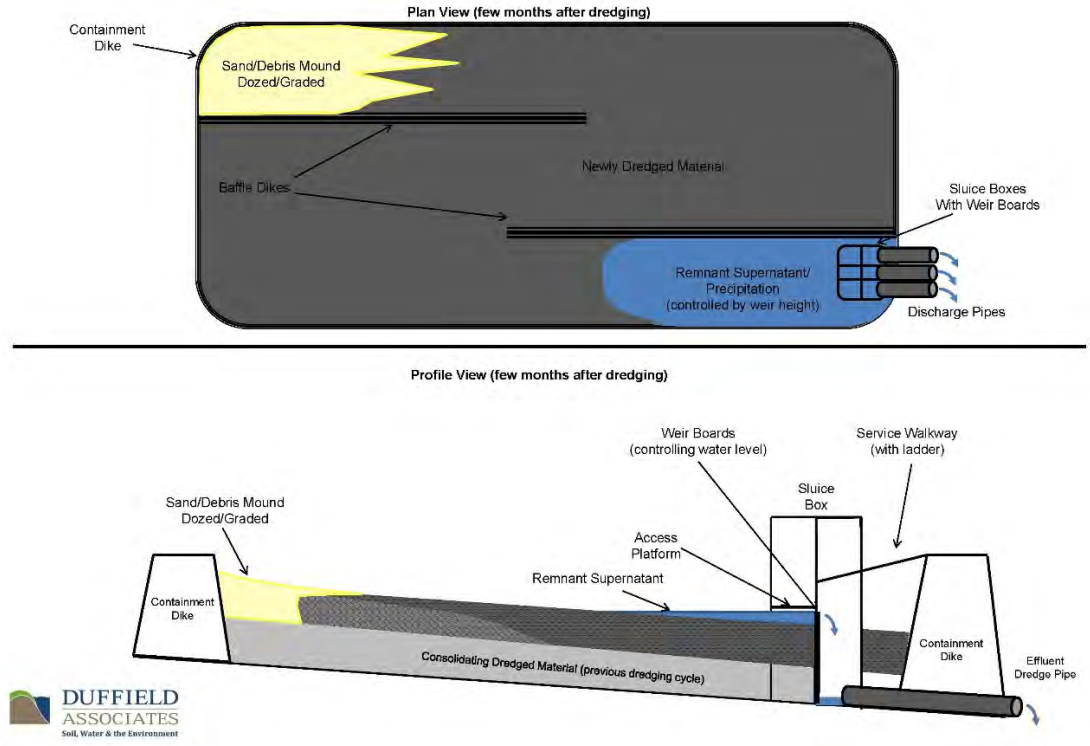


Figure 3.2.1-3: Schematic of CDF Following Dredge Event

Between dredge events, maintenance ditches excavated through the soft surface of the CDF promotes dewatering of the soil allowing for consolidation of the layers of sediment as well as removal of precipitation from the CDF as shown in Figure 3.1.2-4

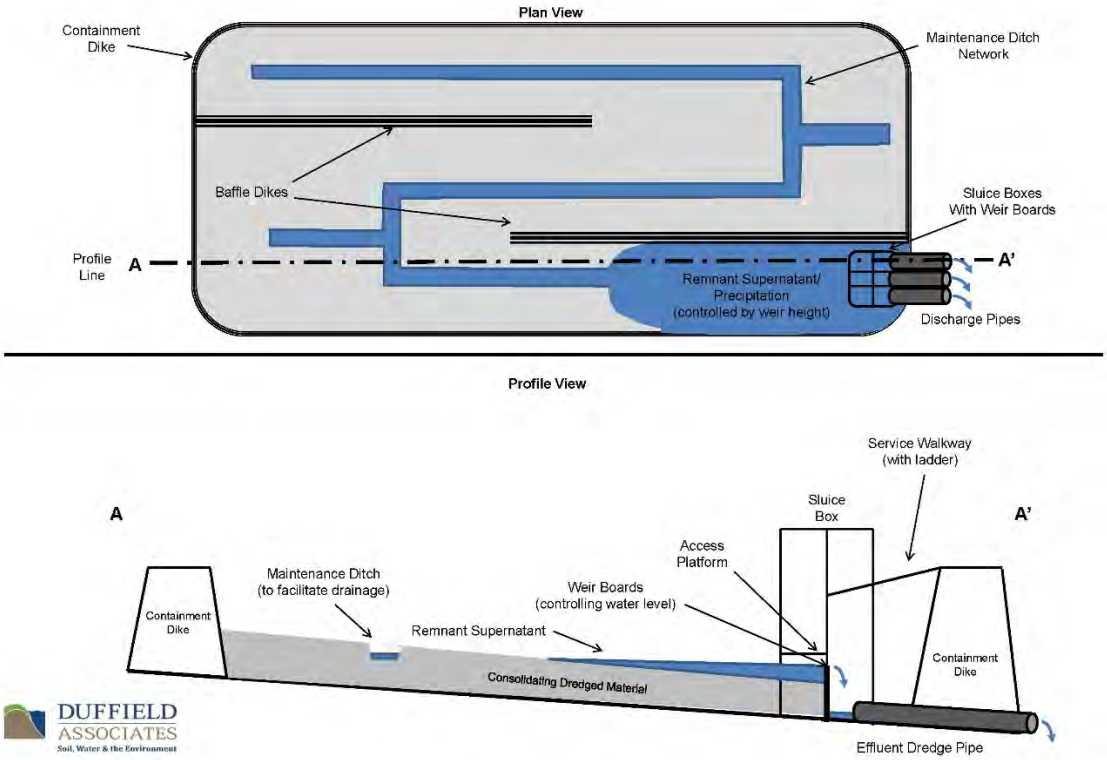


Figure 3.2.1-4: Schematic of CDF Between Dredge Event

By design, CDFs provide for a residence time that allows for a desired flocculation of the soil water slurry to maintain effluent concentrations that are set in accordance with regulatory limits. Generally, discharge from the CDF is limited by a minimum of 80% removal of total suspended solids (TSS) from the slurry; however the actual limits are set based on the local regulation and are site specific. The effluent suspended solids concentration is typically monitored throughout the dredging process and can be used to guide ponding depth adjustments at the weir (e.g., if suspended solids concentrations are too high, add weir boards at the sluice box to provide additional ponding depth to enhance flocculation from the supernatant. If concentrations are low and storage volume is limited, remove weir boards to reduce ponding depth). It should be noted that it is the standard of practices that operating procedures require at least 2 feet of dike freeboard beyond the anticipated bulked storage in the facility, so that the vertical limit of disposal of new material is predicated by the maximum dike height allowable for stability, the height of bulked storage from previous dredging cycles, and the minimum ponding depth (2 feet).

Near the peak of the dredging operation, effluent flow rate through the weir could approximate the influent flow rate from the dredge pipeline. However, it may remain below the influent rate depending on the sedimentation/flocculation rates of the

slurry. After a period of time (generally one to two months) the effluent volume released from the site gradually lessens, and is dependent upon such factors as rainfall and compression settling of the dredged deposit. Active maintenance activities, such as ditching, can be used to enhance dewatering and the rate of compaction to prepare the site for the next dredge cycle or dike raising.

3.2.2 Harbor Dredging and Dredged Material Disposal Plan

The Preferred Alternative includes dredging of the river bottom along the Delaware River main channel and the construction of harbor access and berthing areas along the port facility. The harbor access is proposed to include the construction of a 1,700-foot diameter turning basin on the downstream portion of the project sufficient for the largest design ship expected to use the facility, a 12,000 TEU container ship. The turning basin is inclusive of the Delaware River main shipping channel, with the harbor extending approximately 1,000 feet from the edge of the shipping channel at its widest. The proposed harbor layout is shown in the permit drawings included as Appendix 7.

The harbor of the Preferred Alternative is to be constructed with a flat bottom corresponding to a maintained depth of -45 feet MLW consistent with the maintained depths of the main shipping channel and is proposed to cover an area of 64.5 acres. The transitions into the harbor from the up river and down river subaqueous slopes are to be dredged to a 6 horizontal to 1 vertical slope, and the slope along the shore is proposed to be dredged to a 3 horizontal to 1 vertical slope for a total area of 86.9 acres of dredged footprint. This grading profile results in a total dredge (excavation) volume of 3,325,000 cubic yards of material.

A study establishes that the with pre-dredging dike maintenance USACE Reedy Point Complex (includes both Reedy Point North and Reedy Point South CDFs), as shown in Figure 3.2.2-1 would have adequate air capacity to dispose of the dredged material generated during construction of the project, if USACE determines that excess capacity to the USACE project. As such, the Reedy Point Complex currently is the primary choice for the bulk of the dredge material dewatering and storage needs. The study establishes that Reedy Point North Disposal Area has sufficient capacity to facilitate the disposal of the dredged material from the Edgemoor construction dredging in its existing diked footprint of 115 acres. However, use of the site would require maintenance to the infrastructure (e.g. replacement of sluice box) to permit dredging activities. Reedy Point South Disposal Area is an active disposal area which would not require dike raising or infrastructure maintenance prior to use for the project. However, Reedy Point South is more regularly utilized for other local projects which might affect Edgemoor Expansion Project scheduling. A copy of this study is provided in Appendix 6.

Additional CDFs along the Delaware River shoreline include Wilmington Harbor South and Wilmington Harbor North Disposal Areas as shown in Figure 3.2.2-1. The Edgemoor expansion initial construction dredging is planned over at least three dredge cycles into existing CDFs located along the Delaware River. The applicant performed a study to evaluate the feasibility of utilizing the Wilmington Harbor

South Disposal Area for the disposal of the initial dredged material. A copy of the evaluation has been included as Appendix 6.

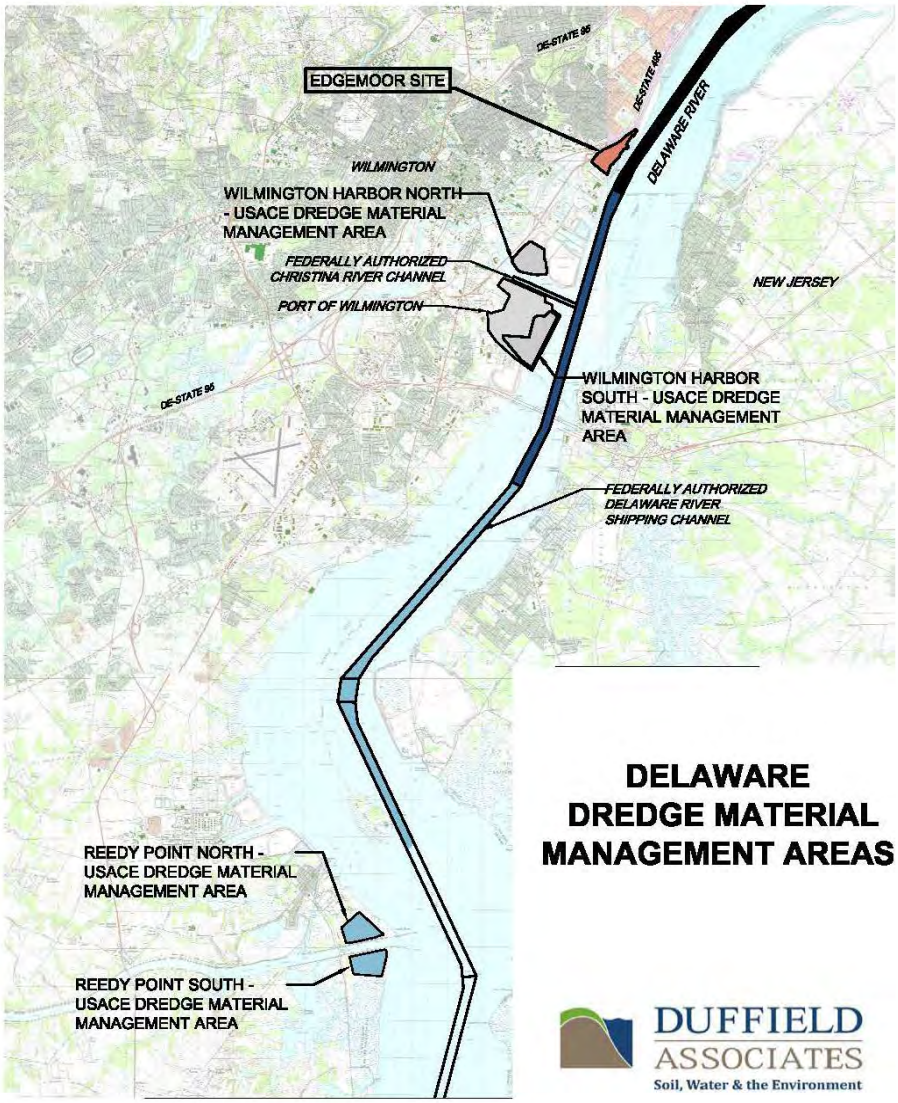


Figure 3.2.2-1: Delaware Dredged Material Management Areas.

The study establishes that the Wilmington Harbor South Disposal Area would have sufficient "air capacity" to store the construction dredged material over multiple dredge events with minimum dike height of 11 feet at the start of construction; however, the disposal area would be utilized to its short term (e.g. diked capacity) during the first two events, with dewatering activities between to establish additional capacity. The study also indicates that it may be appropriate for a contingency disposal area to be available based on the volume of the proposed dredging events.

The study demonstrates that portions of the dredged material, which consist of a combination of soft mud soil, dense sand soils, and dense clay soils could be dredged to these areas. The cost associated with the additional pumping equipment and

disposal area preparation necessary to utilize these CDFs for some of the dredged material of the dredge may be prohibitive; but they are suitable options for the project. Limited diked capacity also remains in the Wilmington Harbor North Disposal Area (on the order of 500,000 cubic yards). While it does not appear practical to perform additional dike raisings in this facility, the remaining capacity would be suitable for use as a contingency disposal, or to facilitate project staging.

Further, reuse of several hundred thousand cubic yards of dredged sediments as fill on the Edgemoor site is being considered. Likely, a purpose constructed CDF on the Edgemoor site would be necessary to facilitate this potential reuse option. The fill would be dewatered, stored and used as fill above the elevation of mean high water as part of site construction. Fill placed below the elevation of mean high water, along the land side of the proposed bulkhead would consist of imported granular borrow suitable for the use.

The study also establishes that there is sufficient capacity in these existing Delaware confined disposal facilities to accommodate the yearly maintenance dredging. It is noted that if the Applicant's submission for AOM of the harbor channel under Section 204(f) of the Water Resources Development Act (WRDA) 1986 is approved, the CDFs utilized for the maintenance dredging would be the responsibility of the Operations Section of the Philadelphia District of the USACE and may be modified.

3.2.3 Associated Construction Activities

The Preferred Alternative also includes the portion of the landside development which transitions to the harbor dredging. This includes the associated construction of the wharf structure integrated with a site retention system along the docks and the extension and termination of the site retention system at each end of the site. These structures have been considered in the permitting process and are defined further herein and depicted in the project permit drawings included as Appendix 7.

The wharf structure is proposed to extend along the Delaware River and is to provide 2,600 feet of berth footage along the riverside face. The structure is to consist of a high-deck structural concrete structure with fendering along the river side. The dock structure is proposed to be 125 feet wide (for a total wharf square footage of 325,000 square feet not including the fender system). The wharf will be supported by a pile system consisting of 24" diameter steel pipe piles spaced roughly 10 foot on center. The piles will be coated with an epoxy coating for corrosion protection.

The deck will include two crane rails for support of a series of electric mobile gantry cranes for ship loading and unloading. The crane rail will be structurally integrated with the deck structure with an additional row of piles spaced at 5 foot on center along the full length of the dock face. No isolated mooring structures or floating dock structures are proposed.

The deck will transition to land at the landward side of the wharf structure at a sheet pile retaining wall/bulkhead. The sheet pile wall, which will also be coated for corrosion protection similar to the piles, will span an exposed height on the order of 25 feet. The retaining wall will include a dead man anchorage constructed in the landside fill. The retaining wall will be integral with the wharf along the 2,600 foot

deck. On the up river side, the retaining wall returns toward the site transitions out of the subaqueous lands and terminates. On the down river end of the site, the sheet pile wall extends out of the subaqueous lands and continues to the property line to facilitate the site grading requirements.

3.2.4 Sediment Fans

In order to reduce the volume of maintenance dredging associated with this project and to maintain functionality of the berths, the Applicant is proposing to install a sedimentation reduction device along the face of the wharf consisting of a series of sediment fans consisting of a SedCon® Turbo System. The sediment fans are to be spaced every 200 feet along the wharf face. The units are secured to the dock structure on a batter pile extending beneath the dock structure as depicted in the permit plans in Appendix 7.

An illustration of a Sediment fan unit is provided as Figure 3.2.4-1. In operation, water is drawn into the top of a 48-inch diameter ("J-shaped" tube), passes through a hydraulically powered pump impellor, and is discharged as a jet along the bottom of an area being protected. The hydraulic power is provided from a landside structure which provides the hydraulic pressure to the fully submerged unit. The hydraulic fluid consist of a biodegradable vegetable oil suitable for water applications. The fans within the units are configured to rotate at speeds on the order 275 revolutions per minute and provide a 4 inch screen at the larger intake end and provide an open space of 1½ feet between blades.

Figure 3.2.4-1: Individual Sediment Fan Unit

The devices operate during periods of tidal current (ebb and flood) and slowly rotate in a semicircle to direct the discharge jet in the direction of tidal current flow,

thereby, enhancing the velocity of the ebb and flood currents in the berth area. The run-time for each unit during a specific tide is typically 30 minutes, during which time the unit completes 90^{o} of rotation. The units would operate four times per day, twice during flood tides and twice during ebb tides and are idol during slack tidal current. The effective sedimentation prevention distance covered by each unit is anticipated to be approximately 160 feet channel-ward from the breasting line of the berth.

3.3 Supporting Studies

This section provides a summary of the supporting studies performed in the preparation of the EATD.

Port of Wilmington Strategic Master Plan

The Diamond State Port Corporation produced a Strategic Master Plan for the Port of Wilmington in 2016. The Plan was based around two specific scenarios that were not mutually exclusive. The first included optimizing the existing Port facility while attempting to sustain and grow existing operations. The second involved the evaluation of other "off-port" properties on the Delaware River to capture additional market for the development of a new terminal. The Edgemoor location was identified in the Master Plan.

A copy of the Master Plan has been included as Appendix 2.

Dredged Materials Disposal Plan - Feasibility Evaluation

The disposal of the dredged materials from the construction represent a volume that is larger than typical maintenance dredging volumes in the region. The feasibility of the dredged material disposal was studied considering the anticipated staged dredging operations. The Applicant performed a survey or used available topographic information of the disposal areas and developed grading for three alternative dike configurations representing ongoing maintenance and construction at the Wilmington Harbor South site. The Reedy Point Complex dike configurations are adequate with nominal dike maintenance and infrastructure maintenance. The feasibly study evaluated the staging that would be required for the dredged material to be placed and dewatered in the Wilmington Harbor South disposal area.

The evaluation has been included as Appendix 6.

Phase 1 Environmental Site Assessment

A Phase 1 Environmental Site Assessment of the land side parcel of the project was performed by Duffield Associates as part of the Due Diligence phase of the site purchase and is summarized in an August 2016 report. The assessment was performed in general accordance with the practice outlined in ASTM International's "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessments Process"

(ASTM E1527-13). The ASTM E1527-13 practice is recognized under the United States, Environmental Protection Agency's (EPA) "Standards and Practices for All Appropriate Inquiries" (Code of Federal Regulations, Title 40, Part 312)

The assessment has been included as Appendix 8.

Wetland Delineation Report

A wetland delineation of the shoreline of the project site was performed by Duffield Associates as summarized in an October 23, 2019 report. The identification and delineation of wetlands was based upon the methods outlined in U.S. Army Corps of Engineers' Wetlands Delineation Manual as modified by the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region.

The delineation report has been included as Appendix 9.

Hydrodynamic Analysis Report

A hydrodynamic analysis of the channel modifications was performed by Mott MacDonald as summarized in a report dated October 2, 2019. The objective of the analysis was to evaluate potential impacts of the proposed harbor construction as a result of the dredging on hydrodynamics, salinity, sediment transport and erosion/deposition in the surrounding area. The analysis utilized 3D estuary-wide numerical modeling of hydrodynamics, sediment transport and morphology using the MIKE3 model. The hydrodynamic modeling simulations included ocean tides, discharges from multiple rivers and the Chesapeake and Delaware Canal, storm surge, local winds, and salinity.

The report has been included as Appendix 10.

Essential Fish Habitat (EFH) Evaluation Report

An assessment of potential essential fish habitat was prepared to characterize the benthic habitat and community including substrates, seagrasses, microbenthic organisms and water conditions in the affected environments. The report also compares the benthic community in the project area and adjacent areas and shallow and deep water habitats. The assessment compares the affected environment of the project area to areas where essential fish habitat designated species are known to occur in the Delaware Estuary and characterizes the ambient environmental conditions in the affected environment.

The report has been included as Appendix 11.

Appendix 12 has been reserved for documentation related to the official consultation with National Marine Fisheries and Fish and Wildlife.

Endangered Species Biological Assessment and Opinion

A biological assessment evaluating the potential effects of construction and operation of the project on endangered species has been prepared by Environmental Research and Consulting. A draft of this report has been included. The report will be revised upon completion of the Essential Fish Habitat Report.

The report has been included as Appendix 13.

Appendix 14 has been reserved for biological opinion.

U.S. Fish and Wildlife Service Certified Species List – Endangered Species Act and State of Delaware Environmental Review

Duffield Associates utilized the U.S. Fish and Wildlife Service Information for Planning and Consultation (IPaC) website, to perform a regulatory review and produce a species list, fulfilling the requirements of the USFWS under section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. DNREC's Species Conservation and Research Program also conducted a review of the project site.

A copy of the USFWS letter has been included as Appendix 15 and DNREC's letter is included as Appendix 16.

Geotechnical Data Report

Harbor access channel test borings, site retainage and berth test borings and vibracores in the harbor access channel were conducted in 2016, 2018 and 2019 respectively. Five Standard Penetration Test (SPT) borings were performed within the proposed dredge area to provide an assessment of the environmental and geotechnical conditions in the Delaware River sediments and soils. Six SPT borings were performed to assess geotechnical conditions to support the evaluation of subaqueous slopes and 33 vibracore borings were performed to further evaluate the environmental and geotechnical conditions of subaqueous materials proposed to be dredged. In addition, Duffield collected composite sediment samples and soils samples that were subjected to index testing.

The report has been included as Appendix 17.

Geotechnical Slope Stability Report

The purpose of this evaluation was to analyze stability of the subaqueous slopes to be dredged as part of the proposed Berth and expanded Navigation Channel creation. It is proposed to widen the Delaware River Federal Navigation Channel (Federal Navigation Channel) to the proposed DSPC facility, located at the former Chemours (a.k.a. DuPont) Edgemoor Site. The maintained berth and approach channel elevation would be a maximum of -45 feet Mean Lower Low Water (MLLW) with a 3-foot initial over-dredge to match the

maintained depth of the Federal Navigation Channel. The subaqueous slopes are to support the deepening required to provide an approximate 500-foot to 800-foot widening of the existing Delaware River Federal Navigation Channel. The access channel slopes were analyzed assuming a proposed slope configuration with 6:1 (Horizontal: Vertical) slopes, while the wharf slopes were analyzed with a 3:1 slope configuration.

The report has been included as Appendix 18.

Economics Impact Study

This report estimates the economic impacts of the Port of Wilmington on the region and was conducted by Seabury Maritime PFRA in November, 2017. The study area includes the U.S. Census-defined Philadelphia-Wilmington-Camden Metropolitan Statistical Area (MSA) and separately the State of Delaware. The report concludes that the Port of Wilmington has experienced an average annual expansion of 5.4 percent since 2010, generated 5,717 total jobs and $363 million in payments to labor.

The report has been included as Appendix 19.

Sediment and Water Quality Assessment

Water samples were collected at the site and analyzed for comparison to State of Delaware Water Quality Standards and Delaware River Basin Commission Water Quality Standards. Sediment samples were collected from silt, sand and clay strata of the river bottom and analyzed for comparison with human health screening levels of Delaware's Hazardous Substances Cleanup Program.

The report is included as Appendix 20.

Geophysical/Cultural Resource Survey Supporting the Edgemoor Container Port Project

R. Christopher Goodwin & Associates Inc. (RCG&A) conducted an archaeological assessment of the proposed container port facility proposed at Edgemoor, Delaware, resulting in more than 130 acres being surveyed. The project was conducted pursuant to the national Historic Preservation Act, the National Environmental Policy Act, the Archaeological and Historic Preservation Act, and the Abandoned Shipwreck Act. Bathymetric data was also collected in the analysis which concluded that no targets indicative of submerged cultural resources were identified within the project's Area of Potential Effect (APE). The report was provided to the State Division of Historical and Cultural Affairs (DHCA).

The report has been included as Appendix 21. The review of the report was done by the Delaware DHCA in accordance with a Section 106 Consultation. The review letter has been enclosed as Appendix 22.

Full Mission Ship Simulation for Edgemoor Navigation Feasibility Study

The Maritime Institute of Technology and Graduate Studies (MITAGS) conducted a desktop and Full Mission Bridge Navigation Simulation Study to determine the navigation feasibility for a new terminal container port at Edgemoor. The purpose of the study was to evaluate the design of the terminal and turning basin and ensure that containerships are able to safely transit to the Edgemoor terminal on a regular basis with minimum impact to existing vessel traffic in the main channel of the Delaware River. The simulations were conducted under a variety of weather and tidal conditions and ship traffic scenarios. The evaluation resulted in Pilots identifying design considerations to deepen a portion of the berth approach to provide additional maneuvering space for inbound vessels. Modifications to the design were made to address the issue.

The report and correspondence from project stakeholders that participated in the simulation has been included as Appendix 23.

Air Conformity Analysis

The project requires the issuance of a federal permit under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act and therefore involves a federal action that is subject to a General Conformity determination under the Clean Air Act and State of Delaware regulations. An analysis of emissions from the project (dredging, wharf construction and dredged material management) was conducted and compared to the State's emissions budget for Criteria Air Pollutants. Results indicate that the project emissions are not anticipated to cause or contribute significantly to excursions from National Ambient Air Quality Standards (NAAQS); increase the frequency or severity of NAAQS excursions; or delay timely attainment of NAAQS, interim emission reductions, or other milestones.

A copy of this report has been included as Appendix 24.

4.0 PREFERRED ALTERNATIVE – AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES AND MITIGATION

4.1 Physical Environment

This section provides a discussion of direct and indirect impacts the project will have on the non-living resources of the physical environment in the project area. General information and an analysis of direct and indirect impacts is provided for the action area, climate, geology, topography, soils, physical oceanography, and the water and sediment quality.

4.1.1 Description of Action Area Geography and Climate

The project site is located along the right descending side of the Delaware River, in northern New Castle County, Delaware. The property adjoining the project site is zoned industrial and is the former location of the Chemours Edge Moor Plant where titanium dioxide and ferric chloride previously were manufactured. Above grade vestiges of the former plant have been demolished.

Water-ward, the project site is bounded by the federal navigation channel in the Delaware River. The channel recently has been deepened to a maintained depth of 45 feet, based on mean lower low water datum (MLLW). The federal channel extends from Cape May and Cape Henlopen at the mouth of Delaware Bay identified as river mile 0 (RM 0) to Trenton, New Jersey. The project site is located at approximate river mile 73.2 (RM 73.2), at the intersection of the Bellevue and Cherry Island navigation reaches. The action area is considered to extend down-river from the project site at RM 73.2 to RM 0 at the mouth of Delaware Bay due to the vessels making calls at the proposed port transiting the bay and the river from locations in the Atlantic Ocean.

The main stem of the Delaware River spans approximately 330 miles flowing south from the State of New York to the Delaware Bay. The river is fed by approximately 216 tributaries and drains approximately 14,000 square miles of land (delawareestuary.org).

Landside within the action area, the project site is adjoined by the former Chemours Edge Moor Plant. The former Chemours Edge Moor Plant roughly is bounded on the inland side by Hay Road, Interstate Highway 495 (I-495), an industrial property owned by IKO Production, Inc., where asphaltic roofing shingles are manufactured, another industrial property owned by Diamond State Port Corporation where Holland Mulch recycles yard waste, and a small parcel owned by Suez Water Delaware, Inc. that contains a pumping station for potable water. Upriver, the project site is bounded by Fox Point State Park, a former landfill that was remedied by the State of Delaware through its Brownfield Program. Downriver, the project site is bounded by electricity generating facilities, identified as Hay Road 5-8 Power Complex in the New Castle County database and an industrial park.

Access to the former Chemours Edge Moor Plant is gained by Edgemoor Road (Delaware State Highway 3), an arterial road, and Hay Road, a local street. Hay Road extends from 12th Street in Wilmington to Edgemoor Road and serves the industrial developments along the Delaware River.

West of the former Chemours Edge Moor Plant, Edgemoor Road crosses: I-495; the Northeast Corridor Railroad, which serves Amtrak, SEPTA and Norfolk Southern passenger and freight trains; and Governor Printz Boulevard (U.S. Highway 13). There is an interchange between I-495 and Edgemoor Road. Vehicular traffic to and from the proposed port is expected to use that interchange. Properties located along Governor Printz Boulevard in the area of the site are developed for commercial purposes. Residential developments are present to the west of the commercial properties along Governor Printz Boulevard. The distance to the closest residential properties is approximately 0.41 miles as measured from the project site and approximately 0.26 miles from the intersection of Edgemoor and Hay Roads, based on estimates developed from aerial photographs.

The climate of the State of Delaware and the Delaware Estuary is considered a transition zone between humid subtropical climate conditions to the south and humid continental conditions to the north (DNREC climate). Delaware experiences lesser temperature extremes compared to nearby areas because of the moderating effects of nearby water bodies including the Atlantic Ocean, Delaware Bay, and Chesapeake Bay. The continental type climate typically brings Delaware cold winter temperatures, hot summer temperatures and a significant amount of precipitation throughout the year. Average temperatures in Delaware range from a low of 27 degrees Fahrenheit (°F) in January to a high of 87°F in July (usclimatedata). The average annual precipitation in Delaware is 46.1 inches of rainfall with 16 inches of that precipitation coming as snowfall without adjustment to water content (usclimatedata). However, precipitation amounts can vary appreciably year to year between approximately 30 and 60 inches.

Delaware can be affected by seasonally occurring severe weather. Winter and spring nor'easters can produce heavy snow and rain which can cause flooding in the coastal regions. Tropical storm systems occasionally pass through the project area, most commonly during the autumn months, and can bring high velocity winds, abundant precipitation, and coastal flooding. Severe thunderstorms sometimes occur in the spring and summer. The variability in precipitation influences the sediment and nutrient fluxes to the Delaware Estuary.

The Office of the Delaware State Climatologist published a report written by the State of Delaware Department of Natural Resources and Environmental Control (DNREC) titled, "Climate Change Analysis for Delaware and the Delaware Estuary." For this report, an analysis was conducted on the historical climate and related environmental data for Delaware and the Delaware Bay Estuary for the period of 1895 through 2011 to determine statistically significant trends in diverse climate variables for the region. The report concluded that temperatures across Delaware have been increasing at a rate of approximately 0.2°F per decade since 1895. The long-term trend in increasing temperatures is suggested to be caused by increasing minimum temperatures. Generally, cold days with temperatures below 20°F are

becoming fewer during the winter and the number of days with minimum temperatures above 75°F are becoming more frequent in recent decades. Trends in precipitation indicate a large annual and seasonal precipitation variability, with a statistically significant increasing trend in the amount of precipitation of 0.27 inches per decade occurring during autumn (DNREC climate).

4.1.1.1 Direct Impacts to the Physical Environment and Climate

The initial dredging and berth construction will produce greenhouse gases, most notably carbon dioxide from engine emissions, which contribute to the increase in global climate change. These emissions are temporary and will exist for the duration of construction, which is expected to last for approximately three years. These emissions are accounted and further considered in section 4.3.9.

Dredging will physically alter the hydrodynamics of the Delaware River at the construction site. The deeper water within the access channel and berth area is expected to result in slowing floodtide and ebbtide water velocities in the construction site. In turn, the slower velocities are expected to allow suspended sediment to settle in the berth and perhaps the access channel. The settling of sediment is addressed in section 4.1.6.

4.1.1.2 Indirect Impacts to the Physical Environment and Climate

With the implementation of the project, landside development of the new port can proceed. The indirect impacts of the marine construction on the adjacent landside property are not significant. The property previously was developed as an industrial facility and the proposed changes to that property to support port operations will not change ground surface cover, habitats and the like in a meaningful manner.

No adverse impacts to the action area climate are anticipated to result from implementation of the project as the project is replacing a former industrial use at the same location. Conversely, changing global climate conditions have potential to affect project site, primarily through sea level rise. This subject has been addressed in this section, section 4.1.1 and is further discussed in Section 4.1.5.

4.1.2 Topography and Bathymetry

The existing ground surface on the former Chemours Edge Moor Plant property generally slopes toward the Delaware River, from high points along Hay Road. The highest elevations range close to 25 feet, based on North American Vertical Datum of 1988 (NAVD88). The lowest elevations are close to sea level along the Delaware River, as illustrated on Sheet 4 of Appendix 7, Permit Drawings. Pavements and impermeable capping systems cover much of the former Chemours Edge Moor Plant property. The capping systems were installed over former waste lagoons as part of the State of Delaware Department of Natural Resources and Environmental Control (DNREC) approved closure plan under the auspices of the federal Resource Conservation and Recovery Act (RCRA).

The Delaware River shoreline at the project site generally is armored with mixes of retaining walls (bulkheads) and large stone (rip-rap). A wetlands assessment found no wetlands to be present within the project site (See Appendix 9). The river is tidal and at low tide there typically is exposed beach water-ward of the armoring systems.

Existing bathymetric conditions are also shown on Sheet 4 of the Permit Drawings included in Appendix 7. Bathymetric surveys indicate that a subtidal shelf extends water-ward from the low tide line to approximately 450 feet in the northern (upriver) portion of the site and approximately 550 feet in the southern portion of the site. This shelf is characterized by gradually deepening water (slopes between 1.8% and 2%) to a depth of approximately -10 feet MLLW. Between the edge of the edge and the federal navigation channel, the side slope of river bottom steepens, dropping approximately 35 feet across a horizontal distances of approximately 350 feet (10% slope) in the upriver portion of the site and 250 feet (14% slope) in the southern portion of the site.

4.1.2.1 Direct Impacts to Bathymetry and Sediments

Implementation of the project will alter local benthic conditions in the Delaware River. The project will deepen the river locally resulting in the removal of the existing shallow water shelf that extends along the descending right side of the Delaware River and the habitats associated with the shallow water shelf. This subject is addressed by the Assessment of Habitat and Benthic Resources and the Biological Assessment as it pertains to threatened or endangered species provided in Appendices 11 and 13. The findings of those assessments are summarized in Section 4.2.

The deepening of the river is expected to lower floodtide and ebbtide velocities within the berth and perhaps the access channel that will be created. The lower water velocities would be expected to promote settling of fine sediment similar in physical character to the existing surface soil within the dredged areas. (See Appendix 20)

4.1.2.2 Indirect Impacts to Bathymetry and Sediments

A potential indirect impact associated with implementation of the project is an increased demand of drying and storage facilities for sediments associated with maintenance dredging of sediments from the berth and access channel. The project is minimizing this potential indirect adverse impact through the installation of a system of shoaling prevention fans. The fans are intended to prevent the settling of sediments from the fluidized mud that will enter the berth and access channel as part of the tidal flow within the Delaware River. The fans will be installed at intervals along the face of the pile supported wharf structure. The fans will draw water from the mid-depth of the berth (approximately -29 feet MLLW) and discharge water parallel to the bottom of the berth at a depth of approximately -48 feet MLLW. Use of such fans in berths at other harbors in the United States has shown them to be successful at reducing maintenance dredging where high sedimentation rates are present, without transferring the burden of dredging to other locations. Prior studies of potential environmental impacts

associated with the operation of such fans has shown them to be minimal on flora and fauna, including ichthyoplankton. Further information regarding shoaling prevention fan systems is provided in Section 3.2.4 and in the Permit Drawings included in Appendix 7, specifically Sheet 11.

4.1.3 Geology

The upland property adjacent to the project site is located just south of the transition from the Piedmont to Atlantic Coastal Plain physiographic provinces. Delaware Geologic Survey (DGS) Geohydrology of the Wilmington Area, *Hydrogeology Map Series, No. 3, Sheet 1 - Basic Geology Coastal*, maps the upland areas of that property as Potomac Formation. More recent DGS online mapping (GeoMap 13 New Castle County) indicates a surficial presence of Delaware Bay Group sediments on the upland portions of the site.

The DuPont Company, the predecessor of the Chemours Company, investigated environmental conditions and achieved closure of the facility in accordance with RCRA, as administered by DNREC. Assessments performed as part of the RCRA Closure process included soil borings at locations illustrated in Figure 4.1.3-1. The soil borings are documented in a Phase I RCRA Facility Investigation (Phase I RFI) that was submitted to DNREC in April of 2009 and a Phase II RCRA Facility Investigation (Phase II RFI) that was submitted to DNREC in March of 2011. The Phase I and Phase II RFIs indicate that the former Chemours Edge Moor Plant is underlain by approximately 150 feet of undisturbed Potomac Formation soils. Fill material was encountered by soil borings beneath pavements and other surface coverings. The fill material has varying thickness and grain size depending on the location. Selected geologic sections through the uplands are provided as Figure 4.1.3-2 and Figure 4.1.3-3.

Figure 4.1.2.2-1 Soil Boring, Monitoring Well and Geologic Sections on Former Chemours

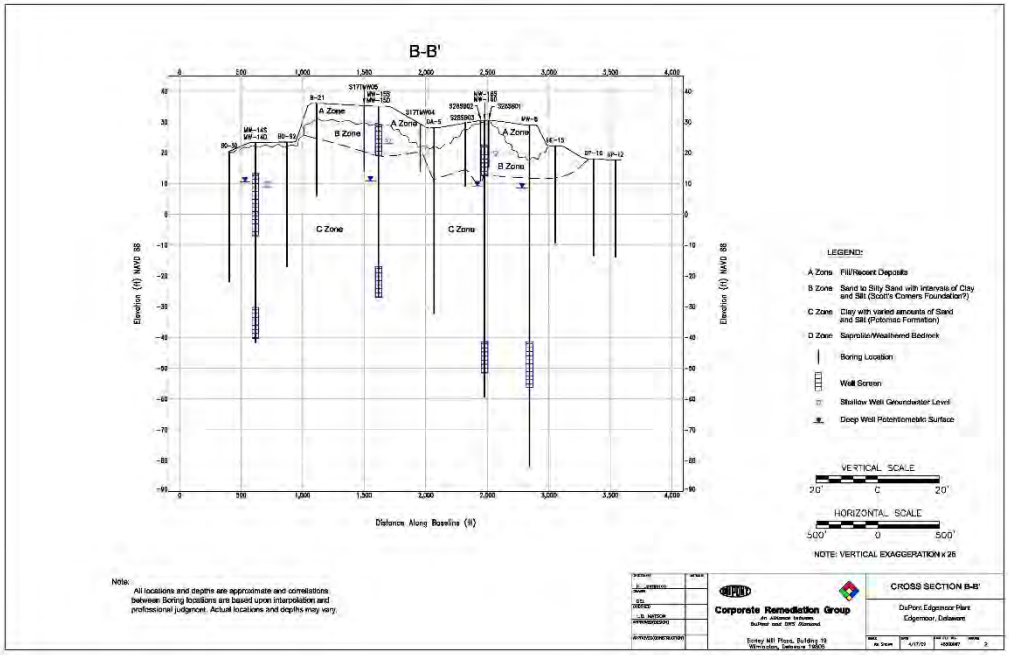


Figure 4.1.3-2 Geologic Section B-B

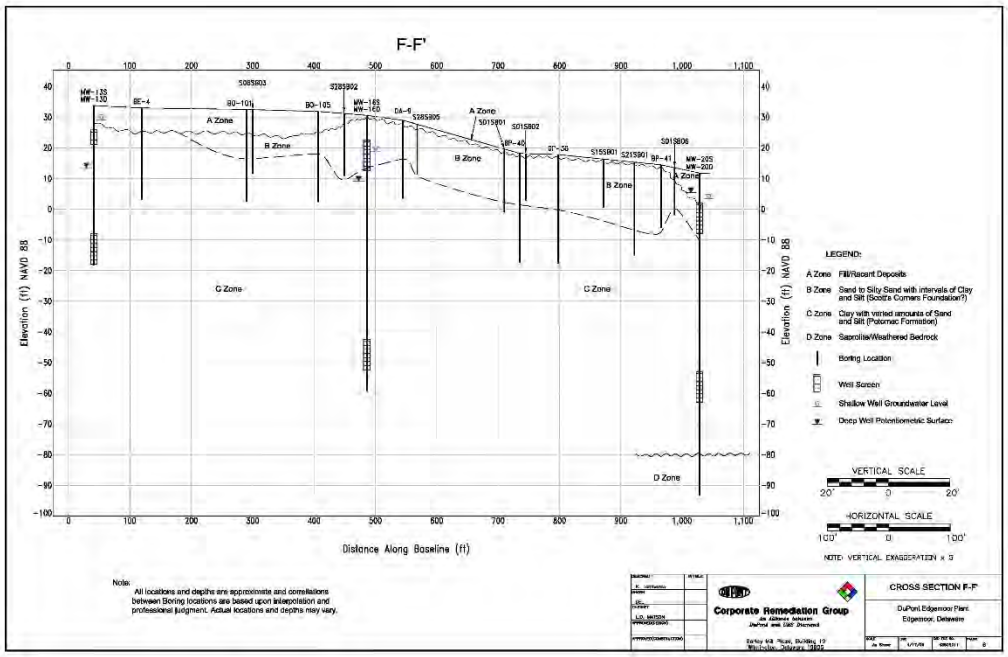


Figure 4.1.3-3 Geologic Section F-F

Standard Penetration Test (SPT) borings have been completed within the proposed dredge area to characterize riverbed geologic conditions. The boring logs from the two separate assessments, one performed in 2016 and one in 2018, can be found in Appendix 17, Geotechnical Data Report, and the test boring locations are illustrated in Sheets 12 and 13 of the Permit Drawings in Appendix 7. Both sets of borings point to Potomac Formation clays extending from the current shoreline through the proposed dredge area. Appendix F within Appendix 17 of this report provides stratigraphic profiles of the proposed area of dredging as well as Figure 3 in Appendix 20, Sediment Study, of this report. Based on the soil borings, the river bottom generally consists of very soft silt sediment deposits of thicknesses varying between approximately 4 feet at the location of TB-2 to approximately 11 feet at the location of TB-3, before thinning to 5 feet at the location of TB-4, close to the federal navigation channel. This silt commonly covers a layer primarily consisting of sandy sediments with some interlayered silt sediments. These apparently fluvial sediments were underlain by apparently undisturbed clays and clayey sand typical of the Potomac Formation to the depth of proposed dredging.

Test Borings TB-6 through TB-10 were performed to assess geotechnical conditions to the depth of apparent bedrock. TB-6 through TB-10 indicate the Potomac Formation clays extend to weathered rock. Weathered rock was encountered between approximately 60 feet and approximately 90 feet below MLLW.

4.1.3.1 Direct Impacts to Geology

No significant direct impacts to project site geology are expected to occur if the project is implemented.

4.1.3.2 Indirect Impacts to Geology

No significant indirect impacts to project site geology are expected to occur if the project is implemented.

4.1.4 Site Hydrogeology

Based on topographic conditions and known groundwater elevations, groundwater beneath the upland adjacent to the dredge site is anticipated to flow in an easterly direction towards the Delaware River. The Phase I and Phase II RFI reports have indicated that groundwater is located in isolated lenses within the general clayey matrix of the site soils. Geologic cross-sections Figure 4.1.3-2 and Figure 4.1.3-3 indicate that shallow groundwater is present but not connected. The inconsistent water levels in the wells supports that conclusion in the RFI reports.

As indicated by the Phase I RFI report, the Former Chemours Edge Moor Facility appears to have two permeable units separated by fine-grained material (predominantly red clay of the Cretaceous-age Potomac Formation). In portions of the site, there is little to no permeable zone above the clay. At monitoring well locations within the site, the first water bearing lenses are located as much as 75 to 85 feet below the ground surface. Fill material, designated as Zone A, is present under much of the Former Chemours Edge Moor Facility with varying thickness and grain size depending on the location (see Figure 4.1.3-1 through Figure 4.1.3-3 above).

Some portions of the site also contained natural sand (Zone B) interpreted as Scotts Corners Formation above the Potomac clay (Zone C). Zone A has permeability (K) values ranging from 4.5×10^{-8} centimeters per second (cm/sec) to 5.3×10^{-6} cm/sec per the RFIs. Zone B has a K value of 6.5×10^{-3} cm/sec at the location of MW-19S and K values of 8.6×10^{-8} cm/sec to 9.7×10^{-7} cm/sec at the locations of MW-15S and MW-18S per the RFIs. Zone C has K values range from 5.4×10^{-9} cm/sec to 2.6×10^{-7} cm/sec per the RFIs.

These values indicate that the Scotts Corners sand is the most permeable zone on the Former Chemours Edge Moor Facility. Where present, the Scotts Corners sand acts as the upper permeable zone, though shallow saturated conditions are laterally discontinuous and are likely perched and/or ephemeral per the RCRA assessments. A RCRA assessment report concluded that a clay unit is present near the surface that limits the extent of the shallow permeable unit. Therefore, groundwater in the shallow zone is not present at much of the site.

The Delaware River extends through the dredge site and is tidal. The normal tidal range at the site is approximately 5.6 feet, based on the tide gauge records for Marcus Hook, Pennsylvania, identified as National Oceanographic and Atmospheric Administration (NOAA) monitoring location 8540433.

Tidal influence on groundwater elevations within the uplands adjoining the dredge site was reported in the Phase I and Phase II RFI reports with an amplitude of 0.5 to 3 feet depending on the location within the site. Though most of the groundwater within the site is discontinuous, tidal influence, reportedly, is laterally consistent.

Delaware River flooding at the site primarily is controlled by tidal conditions and storm surges. Severe flooding at the site is not associated with precipitation within the Delaware River watershed. The site spans two Federal Emergency Management Agency (FEMA) map panels, panels 10003C0176K and 10003C0088L. These maps indicate that the site is subject to wave action during flooding events by the mapping abbreviation VE. The VE values indicated on the mapping reflect the elevation of the base flood plus the anticipated height of waves during a once in one hundred year flooding event, also known as the 100-year flood. The VE elevations at the site range from a low of 12 feet NAVD83 to 14 feet NAVD, with the higher values associated with longer wind fetches under modelled conditions anticipated to occur during a 100-year storm surge event. The modelled storm surge typically is based on a tropical cyclone (hurricane) or a nor'easter storm approaching Delaware Bay from the Atlantic Ocean.

4.1.4.1 Direct Impacts to Site Hydrogeology

No significant direct impacts to site hydrogeology are anticipated to result from implementation of the project. Local groundwater is expected to continue to flow to the Delaware River. Groundwater within the permeable zones of the Potomac Formation will continue to interact with tidal conditions in the Delaware River.

4.1.4.2 Indirect Impacts to Site Hydrogeology

No significant indirect impacts to site hydrogeological conditions are anticipated to result from implementation of the project.

4.1.5 Physical Oceanography

The Delaware River extends along the southeastern side of the project site and is influenced tidally. The normal tidal range at the site is approximately 5.6 feet, based on the tide gauge records for Marcus Hook, Pennsylvania identified as NOAA monitoring location 8540433. A mathematical model of the Delaware River Estuary was created to assess tides, currents, water levels and salinity. The model was developed from publically available physical information regarding the estuary including bathymetric sections created for the U.S. Army Corps of Engineers (USACE) and tidal records acquired by the NOAA. Model documentation and an assessment of conditions is provided in Appendix 10, Hydrodynamic Analysis.

Changes in local or relative sea level reflect the integrated changes in global or eustatic sea level. Eustatic sea level is defined as the distance from the center of the earth to the sea surface and can be influenced by changes in glaciation, ocean temperature, plate tectonics and other large scale changes in the volume of sea water and ocean basins.

Local tidal conditions are measured by tide gauges. The closest Delaware River tide gauge to Edgemoor, Delaware is located in Marcus Hook, Pennsylvania. The Marcus Hook, PA tidal gauge record length is shorter than 40 years. The manual on Sea Level Measurement and Interpretation (Intergovernmental Oceanographic Commission 1985, 2012) recommends that a tidal record should be of at least two-tidal epoch duration (about 40 years) before being used to estimate a local mean sea level (MSL) trend. Another Delaware River tide gauge is located at Reedy Point, downriver from the project site near the confluence of the Chesapeake and Delaware Canal with the Delaware River. The Reedy Point gauge has a record length of 51 years and was used to estimate the local MSL trend at Edgemoor, DE. In comparing the Marcus Hook and Reedy Points tidal gauges, there appears to be minimal discrepancies between the tidal trends.

Based on 51 years of tide gauge data recorded at Reedy Point, DE (NOAA), 2013), the historic rate of relative MSL rise is estimated at 0.0112 feet per year (ft./yr.). In accordance with Engineer Circular (EC) 1165-2-212, Sea Level Change Considerations for Civil Works Programs, the local subsidence rate may be estimated from tidal analysis by subtracting the rate of global mean seal level (GMSL) change from the historic rate of relative mean sea level (RMSL) change. Assuming the historic rate of GMSL change is equal to the globally averaged rate of 0.00561 ft./yr., the resulting estimated observed subsidence rate for the project area would be 0.00558 ft./yr. Using this estimated local subsidence rate for the project area, changes in relative MSL in the project area over the 50-year period of analysis would be:

- 0.83 feet using the historic rate of GMSL change,
- 1.31 feet using the intermediate rate of accelerated GMSL change, and

- 2.86 feet using the high or accelerated rate of GMSL change.

Figure 4.1.5-1 displays the computed sea level rise based on guidance from the USACE for the low (historic) rate, the intermediate (Modified NRC Curve I) rate, and the high (Modified NRC Curve III) rate. The computed sea level rise given here assumes a 50-year project life, and gives the predicted rise for the years 2016-2066.

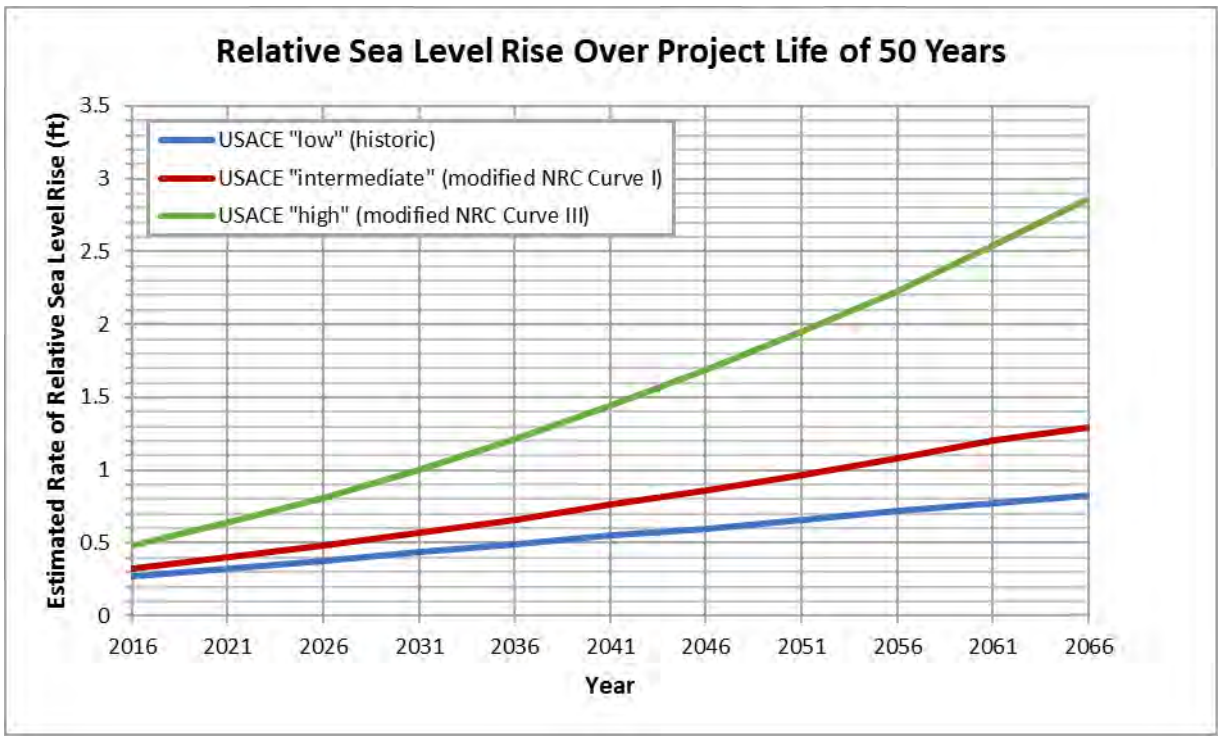


Figure 4.1.4.2-1 Relative Sea Level Rise over the 50 Year Project Life

Another source of information, DNREC and the University of Delaware, provide a low rise forecast of 1.6 feet (0.5 meters) and an extreme forecast of sea level may rise as 4.9 feet (1.5 meters) within 100 years (by 2117 instead of the 2066 date used by USACE). Given the differing time period, these DNREC / University of Delaware estimates are lower than the USACE predictions. The high USACE prediction was used for design of the wharf deck elevation.

For design, the deck elevation of the wharf has been based on the highest forecast 100-year flood plus VE elevation of 14 feet NAVD83 plus the largest USACE forecast of sea level rise for Delaware, approximately 3 feet, yielding a foreseeable flood height of 17 feet NAVD within the next 50-years. One foot of freeboard was included in the design to arrive at the design elevation of 18 feet NAVD as an additional hedge against uncertainty about future conditions.

4.1.5.1 Direct Impacts on Tides, Currents, Water Levels and Salinity

No significant direct impacts on tides (magnitude or duration), water levels or salinity are expected to ensue from dredging the proposed access channel and berth or construction of the proposed wharf. Ebb and flood tide currents are anticipated to be slower within the project site than those currently occurring. This change is forecast to be limited to the project site, with no appreciable change to locations outside of the limits of the project. Generally, the action area will be unaffected.

The project will not affect relative sea level rise. Conversely, forecast rises in sea level will affect the project. In response, the elevation of the wharf and adjacent land-side areas of the future port are being set to reduce threats associated with storm events and sea level rise.

4.1.5.2 Indirect Impacts on Tides, Currents, Water Levels and Salinity

No significant indirect impacts are anticipated on tides, water levels or salinity are expected to ensue from dredging the proposed access channel and berth or construction of the proposed wharf. The forecast change in currents has the potential to increase sedimentation within the project site, which would necessitate maintenance dredging and a corresponding increase in the demand for dredged material dewatering and storage. The use of shoaling prevention fans is being considered for the project to reduce the frequency of maintenance dredging and the volume of material that would be removed by maintenance dredging.

4.1.6 Sediment and Water Quality

4.1.6.1 Sediment Quality

Sediment samples recovered from standard penetration test borings and vibracore borings within the project site indicate that there are two generalized strata of sediments blanketing the in-situ river bottom. Soil and sediment boring locations are illustrated in Figure 2 within the Sediment and Surface Water Quality Assessment in Appendix 20. Selected geologic sections through the site are provided in Figures 3 and 4 within Appendix 20 as well.

The first stratum, Stratum A, consists primarily of fine grain fluvial silt. Stratum A generally is present in shallow water at a thickness of 0-4 feet and gradually increases to a thickness of 12-15 feet where water depths begin to slope more severely. The thickness of Stratum A material quickly thins to not being present near the federal navigation channel. On average, Stratum A is 9 to 12 feet thick. Figure 5 within the Sediment and Surface Water Quality Assessment in Appendix 20 provides an interpretation of the extent and thickness of Stratum A and assesses the environmental character of the sediments.

Stratum A sediments are believed to be formed locally through a sedimentation process. Sedimentation in the project area primarily is

associated with the deposition of fluidized mud that forms in response to the initial mixing of saltwater with freshwater. This mud tends to precipitate and flocculate metals formerly suspended or dissolved in freshwater. The fluidized mud is associated with the turbidity maximum of the Delaware River Estuary, which is where the project site is located. The head of the fluidized mud moves up-river into the Marcus Hook Reach of the federal navigation channel during incoming tides and down-river into the New Castle Reach during outgoing tides. Records generated by the University of Delaware (Cook et al., 2007) indicate total suspended solid concentrations in river water ranging from approximately 275 milligrams per liter (mg/L) near New Castle, Delaware to approximately 80 mg/L near Tinicum Island, Pennsylvania.

Based on the movement of fluidized mud in the turbidity maximum, Stratum A sediments are expected to continue to form in this portion of the river after the project is constructed. Continued deposition of Stratum A sediments in the proposed berth and access channel after construction is complete is anticipated to occur unless action is taken to minimize sediment settling.

The second stratum, Stratum B, consists primarily of fluvial sands, when present and is typically found below Stratum A. Stratum B is exposed in the intertidal and shallow subtidal areas of the site. Stratum B is thickest in the intertidal areas of the site at a thickness between 15 and 18 feet on average. Stratum B gradually thins to not being present near the federal navigation channel. Figure 6 within the Sediment and Surface Water Quality Assessment in Appendix 20 provides an interpretation of the extent and thickness of Stratum B and assesses the environmental character of the sediments.

Stratum B sediments are believed to have been transported to the site from upstream locations under higher energy (higher water velocity) conditions than are prevalent currently. As such, no significant deposition of Stratum B sediments is anticipated to occur within the project site following construction.

The environmental quality of the sediments and soils that will be dredged and placed into upland storage was assessed preliminarily during 2016 and in more detail during 2019. An assessment of the risk associated with sediment and water quality has been performed and is summarized in the Sediment and Surface Water Quality Assessment (Appendix 20). Figure 2 of the Sediment and Surface Water Quality Assessment shows the sediment sampling locations.

4.1.6.1.1 Direct Impacts of Dredging Sediment on Human Health and Aquatic Life

The human health impact of sediments and soils to be dredged has been evaluated in detail within Appendix 20. The risks posed to human health during dredging and human exposure to

dredge material placed in the CDF facility during dewatering and storage will be acceptable, based on reported substance concentrations and risk modeling calculations employed.

Based on the analytical results, Stratum A sediments have elevated concentrations of benzo[a]pyrene, PCB-126, total PCBs, dioxins and furans, arsenic, and thallium above human health screening levels developed by DNREC for use in the State of Delaware remedial programs authorized by the Hazardous Substance Cleanup Act (HSCA). Table 4.1.6.1-1 below shows the number of samples with concentrations of each of these substances that are elevated above the human health screening levels.

Table 4.1.6.1-1 Summary of Stratum A Analytical Result above Human Health Screening Levels

Analysis	Substance or Characteristic	DNREC SIRS Human Health Soils Screening Levels (Feb 2018)	
			count
TCL SVOCs	Benzo[a]pyrene	Above	12
PCB-126	-	Above	2
Total PCB	-	Above	3
Dioxins and Furans	TEQs	Above	19
TAL Inorganics	Arsenic	Above	16
	Thallium	Above	14

Generally, Stratum B sediment samples contained total PCBs, toxic equivalency quotients (TEQs), arsenic and thallium concentrations above human health screening levels (see Table 4.1.6.1-2 below).

Table 4.1.6.1-2 Summary of Stratum B Analytical Result above Human Health Screening Levels

Analysis	Substance or Characteristic	DNREC SIRS Human Health Soil Screening Levels (Feb 2018)	
			count
Total PCB	-	Above	1
Dioxins and Furans	TEQs	Above	1
TAL Inorganics	Arsenic	Above	5
	Thallium	Above	5

Stratum C samples were reported to contain iron at concentrations above the human health screening level. Since the material in Stratum C is beneath Strata A and B and is undisturbed by human activities, elevated concentrations of metals in Stratum C appear to be associated with the Potomac Formation, without influence from anthropogenic activities.

Stratum C material will be the new bottom of the area being dredged and will be replacing Stratum A material, which is the current bottom within much of the area to be dredged. Based on the substances of potential concern, the removal of Stratum A is expected to remove benzo(a)pyrene, PCBs, dioxins, furans, and dioxin-like PCBs, pesticides, arsenic, thallium, and cyanide as substances of potential concern to human health and aquatic life. Such substances are not of concern in Stratum C material. Therefore, Stratum C as the new bottom is expected to minimize the impact of sediment quality on aquatic life and human health, and is expected to be a net benefit to the environmental conditions at the project site.

Human health risk has been assessed during the dredging of material and sequestering of material at an upland CDF. Based on the US Environmental Protection Agency's (EPA's) Risk Assessment Information System (RAIS) Calculator, the substance concentrations in the sediment to be removed from the project site pose acceptable risk to human health, if they are dried and stored in a CDF. A summary of the risk assessment results for Strata A, B, and C can be found in Table 4.1.6.1-3. This risk assessment assumes that humans are in contact with the material at the same exposure level as an excavation worker or recreator.

Table 4.1.6.1-3 Summary of Human Health Risk Assessment Results

Scenario	Stratum A		Stratum B		Stratum C	
	Total Carcinogenic Risk	Total Hazard Index	Total Carcinogenic Risk	Total Hazard Index	Total Carcinogenic Risk	Total Hazard Index
Excavator	1E-07	0.004	4E-08	0.001	None	0.03
Recreator	1E-05	0.04	4E-06	0.02	None	0.3

The ecological impact of sediment quality on aquatic life was assessed in addition to the human health impact. Comparing Stratum A analytical results to ecological screening levels for sediments, 13 SVOCs, two pesticides, total PCBs, dioxin TEQs and 13 inorganic substances were detected at concentrations above screening levels (see Table 4.1.6.1-4 below).

Table 4.1.6.1-4 Summary of Stratum A Analytical Result above Ecological Screening Levels

Substance Group	Substance	DNREC SIRS Screening Level Ecological Sediment Fresh (Feb 2018)		DNREC SIRS Screening Levels Ecological Surface Soils (Feb 2018)	
			count		count
TCL SVOCs	2-Methylnaphthalene	Above	13	-	-
	Acenaphthene	Above	14	-	-
	Anthracene	Above	8	-	-
	Benzo[a]anthracene	Above	13	-	-
	Benzo[a]pyrene	Above	15	-	-
	Benzo[k]fluoranthene	Above	10	-	-
	Chrysene	Above	14	-	-
	Dibenz(a,h)anthracene	Above	13	-	-
	Fluoranthene	Above	8	-	-
	Fluorene	Above	2	-	-
	Indeno[1,2,3-cd]pyrene	Above	14	-	-
	Phenanthrene	Above	12	-	-
	Pyrene	Above	14	-	-
TCL Pesticides	4,4'-DDD	Above	2	-	-
	4,4'-DDE	Above	2	-	-
Total PCBs	-	Above	4	-	-
Dioxins and Furans	TEQs	Above	20	Above	20
TAL Inorganics	Arsenic	Above	16	Above	16
	Cadmium	Above	5	-	-
	Chromium	Above	21	Above	21
	Copper	Above	14	Above	4
	Iron	Above	15	-	-
	Lead	Above	14	Above	14
	Manganese	Above	16	-	-
	Nickel	Above	13	Above	8
	Selenium	-	-	Above	14
	Thallium	Above	7	Above	7
	Vanadium	-	-	Above	21
	Zinc	Above	14	Above	21
	Mercury	Above	16	Above	7

Stratum B analytical results were reported above the ecologic screening levels in 2-methylnaphthalene, total PCBs, TEQs, and 7 inorganic substances (see Table 4.1.6.1-5).

Table 4.1.6.1-5 Summary of Stratum B Analytical Result above Ecological Screening Levels for Sediments in Fresh Water

Substance Group	Substance	Ecological Screening Levels for Sediment in Fresh Water (Feb 2018)	
			count
TCL SVOCs	2-Methylnaphthalene	Above	1
Total PCBs	-	Above	2
Dioxins and Furans	TEQs	Above	12
TAL Inorganics	Arsenic	Above	5
	Chromium	Above	5
	Copper	Above	6
	Iron	Above	5
	Lead	Above	6
	Manganese	Above	2
	Zinc	Above	4

In Stratum C, chromium, iron, manganese, and selenium were the TAL inorganic substances found above the ecological sediment screening levels. Stratum C will become the new bottom once initial dredging is completed and take the place of Stratum A as the river bottom at the site. The removal of Stratum A is expected to remove benzo(a)pyrene, PCBs, dioxins, furans, and dioxin-like PCBs, pesticides, arsenic, thallium, and cyanide as substances of potential concern to human health and aquatic life. Such substances are not of concern in Stratum C material. Overall, the removal of the current river bottom sediments would be beneficial to the aquatic life due to the removal of potentially harmful organic substances and reductions in the concentration of inorganic substances.

In comparison to NOAA Screening Quick Reference Table (SQuiRT) levels used for assessing the risk of sediment to benthic organisms, Strata A, B, and C have concentrations of metals that may pose risk to benthic organisms. Since each of these strata will be removed from the project site, the project will also remove the associated risks to benthic organisms.

Terrestrial life could be exposed to dredged materials after placement into upland storage. Therefore, analytic testing results reported for Strata A, B, and C also were compared to

DNREC's ecological surface soil screening levels. Inorganic substances appear to be the compounds found above the surface soil screening levels (see Table 4.1.6.1-6).

Table 4.1.6.1-6 Summary of Analytical Results above Ecological Screening for Surface Soils

Substance Group	Substance	Stratum A	Stratum B	Stratum C
		Above Ecological Screening Levels for Surface Soils (Feb 2018)		
TAL Inorganics	Arsenic	16	5	0
	Chromium	21	20	5
	Cobalt	2	0	1
	Copper	4	3	0
	Lead	14	5	0
	Mercury	7	14	0
	Nickel	8	0	0
	Selenium	14	5	1
	Thallium	7	0	0
	Vanadium	21	20	5
	Zinc	21	20	1

Risk calculations indicate that reuse of Stratum B sediments would be acceptable from a risk perspective so long as the area of reuse would have an exposure level equivalent to an excavation worker, recreator, or composite worker. Reuse of the dredged materials would not be acceptable for a residential or unconstrained use. A summary of the human health risk assessment results can be found in Table 4.1.6.1-7.

Table 4.1.6.1-7 Summary of Material Reuse Human Health Risk Assessment Results

Scenario	Stratum A		Stratum B		Stratum C	
	Total Carcinogenic Risk	Total Hazard Index	Total Carcinogenic Risk	Total Hazard Index	Total Carcinogenic Risk	Total Hazard Index
Excavator	1E-07	0.004	4E-08	0.001	-	0.03
Recreator	1E-05	0.04	4E-06	0.02	-	0.3
Composite Worker	1E-05	0.02	4E-06	0.01	-	0.1
Outdoor Worker	1E-05	0.02	4E-06	0.005	-	0.1
Resident	**5E-05**	0.2	**2E-05**	0.1	-	**2**

In terms of geotechnical quality of material, Stratum B (sandy material) would be suitable for reuse while Stratum A and Stratum C sediments (silty and clayey materials) would not be suitable for most reuses. In order to utilize a USACE-owned CDF the applicant has two alternatives: (1) remove a volume of material equivalent to 1.5 times the volume the applicant

adds to the CDF, or (2) pay approximately $70 per cubic yard to USACE to offset the costs associated with creating new storage capacity at another location.

4.1.6.1.2 Indirect Impacts of Dredging Sediment on Human Health and Aquatic Life

One indirect impact anticipated by dredging sediments is the removal and reduction of PCBs and substances of concern in the river. Duffield estimated that approximately 2.7 tons of sediment with PCBs attached are expected to be removed from the river during the initial dredging of the site. The removal of material is expected to reduce the availability of substances of concern within the project site. Bio magnification of substances have been demonstrated to occur in the food chain. The removal of these substances from the River sediments within the project area should help to reduce the food chain impacts, which supports the Clean Water Act goal of edible fish. In turn, restrictions on recreational fishing by sediment and water quality will decrease.

4.1.6.2 Water Quality

Affects to Delaware River water quality at the project site and at the location where dredged material will be placed into upland storage to dry was assessed preliminarily during 2016 and in more detail during 2019. See the Sediment and Surface Water Quality Assessment in Appendix 20 for a detailed assessment of the risk associated with water quality.

4.1.6.2.1 Direct Impacts of Dredge Water Quality on Human Health and Aquatic Life

The impact of current surface water quality on human health was evaluated based on the most recent surface water sampling data collected in 2019. The substances of concern in the surface water are believed to be reflective of the current Delaware River water conditions. The testing results reported for the five surface water samples collected were compared to the Delaware River Basin Commission's Stream Quality Objectives (DRBC SQOs) per 14 CFR Part 410, Water Quality Regulations (last updated 2013). Where the DRBC Water Quality Regulations do not specify SQOs and/or procedural requirements, the Delaware Water Quality Criterion per 7 Del. Code §7401 Surface Water Quality Standards (DE SWQS) apply. In order to assess the impact of current surface water quality on human health, the SQOs for human ingestion of fish were used for comparison to the analytic testing results. Since the Delaware River is not designated as a Public Water Supply, fish and water ingestion criterion are not applicable. Benzo[a]pyrene, total

PCB, dioxin, furan, and dioxin-like PCB concentrations were reported above the fish ingestion SQO.

Duffield also evaluated the analytical results for current river water samples in comparison to acute and chronic SQOs for aquatic life to identify potential ecologic concerns. The reported aluminum and copper concentrations were elevated with respect to the criteria for acute exposure. Total PCBs, aluminum, copper, iron, and lead concentrations were reported above the criteria for chronic exposure. PCB-126 concentrations were above the DE SWQS for fresh water aquatic life.

During dredging, concentrations of substances dissolved into the water column from the sediment are expected to remain below acute DRBC SQOs for aquatic life in a freshwater environment. Stratum A sediments are expected to generate 4,4'-DDE, total PCBs, and copper concentrations during dredging that are above chronic DRBC SQOs. Stratum B sediments are expected to generate 4,4'-DDE concentrations in water during dredging that are above chronic DRBC SQOs. Dredging of Stratum C sediments is not expected to generate concentrations of substances above the chronic DRBC SQOs. Based on this evaluation, aquatic life is not expected to be impacted by acute exposures, which occur over a 1-hour time period. This comparison to SQOs suggests that substance concentrations have potential to impact aquatic life through chronic exposures, which occur over a 4-day time period. However, the removal and sequestration of sediments containing the substances of concern ultimately will provide a net reduction in concentrations of substances in the sediments in the Delaware River. See the Sediment and Surface Water Quality Assessment in Appendix 20 for further details.

DRBC human health quality objectives for carcinogens and systemic toxicants absorbed through fish ingestion in freshwater environments were compared to the concentration of substances transferred from sediment to water during dredging. Current recreational uses of the project site are limited, and the water quality of this portion of the Delaware River does not support fish and water ingestion. Substances in Stratum A sediment that may be transferred to the water column at concentrations above the DRBC human health carcinogen SQOs for fish ingestion include 4,4'-DDD, 4,4'-DDE, dioxins, furans, dioxin-like PCBs, total PCBs, and benzo(a)pyrene. Stratum B sediment substances that may transfer concentrations to the water column above the DRBC carcinogen SQOs for fish ingestion include 4,4'-DDD, 4,4'-DDE, heptachlor, dioxins, furans, dioxin-like PCBs, and total PCBs. Stratum C sediments may transfer total

PCBs to the water column at concentrations above the DRBC carcinogen SQOs for fish ingestion. Other substances concentrations in Stratum C materials were not indicated to be problematic. As stated in the sediment quality section above, Section 4.1.6.1.1, Stratum C will be replacing Stratum A as the river bottom at the site. Since the quality of Stratum C material has been indicated to have less potential to be impactful than Stratum A to human health, the initial dredging activity is expected to bring this portion of the Delaware River closer to the Clean Water Act goal of supporting a recreational fishery.

According to recent real estate approvals issued for use of the USACE CDF, the following two limitations are required to be placed on the effluent from a CDF along the Delaware River: (1) an instantaneous effluent TSS concentration of 4,000 mg/L, and (2) an average TSS concentration of 3,000 mg/L over the period of the project. Therefore, dredge effluent from the project, placed in an upland CDF is expected to implement these TSS limits.

At the discharge into a CDF, the influent slurry is expected to have concentrations of the following substances above the DRBC SQOs for acute and chronic exposure to aquatic life and for human health carcinogens and systemic toxicants through fish ingestion (see Table 4.1.6.2-1).

Table 4.1.6.2-1 Substance Concentrations above DRBC SQOs in CDF Influent

DRBC SQOs Acute	DRBC SQOs Chronic	DRBC SQOs Carcinogens - Fish Ingestion Only	DRBC SQOs Systemic Toxicant - Fish Ingestion Only
µg/L	µg/L	µg/L	µg/L
Dredge Cycle 1			
4,4'-DDE	4,4'-DDD	4,4'-DDD	4,4'-DDD
Total PCBs	4,4'-DDE	4,4'-DDE	4,4'-DDE
Aluminum	4,4'-DDT	4,4'-DDT	4,4'-DDT
Copper	Heptachlor	Heptachlor	Heptachlor
	Total PCBs	Total PCBs	Total PCBs
	Aluminum		Cadmium
	Cadmium		
	Copper		
Dredge Cycle 2			
Aluminum	Total PCBs	Total PCBs	Total PCBs
Copper	Aluminum		Copper
	Copper		
Dredge Cycle 3			
Aluminum	Total PCBs	Total PCBs	Total PCBs
Copper	Aluminum		Copper
	Copper		

CDFs are designed and operated to reduce the suspended sediment concentration in the dredge slurry between the influent and the effluent. The effluent from a CDF is expected to meet the average TSS criteria of 3,000 mg/l and the instantaneous concentration of 4,000 mg/l. The concentration of each substance in the effluent from a CDF at an average TSS of 3,000 mg/L was calculated. Based on the calculations performed, the following substances may exceed the DRBC SQOs for acute and chronic exposure to aquatic life and for human health carcinogens and systemic toxicants through fish ingestion (see Table 4.1.6.2-2).

Table 4.1.6.2-2 Substance Concentrations above DRBC SQOs in CDF Effluent

DRBC SQOs Acute	DRBC SQOs Chronic	DRBC SQOs Carcinogens - Fish Ingestion Only	DRBC SQOs Systemic Toxicants - Fish Ingestion Only
µg/L	µg/L	µg/L	µg/L
Dredge Cycle 1			
Aluminum	Aluminum	Aluminum	Aluminum
		Total PCBs	
Dredge Cycle 2			
Aluminum	Aluminum	Aluminum	Aluminum
		Total PCBs	
Dredge Cycle 3			
Aluminum	Aluminum	Aluminum	Aluminum
		Total PCBs	

The concentration of each substance in the effluent from a CDF at an instantaneous time was calculated using a TSS limit of 4,000 mg/L. The same substances are expected to have concentrations above the DRBC SQOs as listed above for the average TSS limit.

It is important to this discussion to note that total PCB and aluminum concentrations in the ambient Delaware River water currently exceed the DRBC SQOs. Treatment of the dredge slurry in a CDF is anticipated to reduce the concentrations of aluminum and total PCBs by approximately 99.4% and 99.9%, respectively. Current aluminum concentrations in the river are above the DRBC SQO for acute aquatic life exposure by approximately 18%, while CDF effluent is expected to raise aluminum concentrations by 0.8 – 1% within an allowable mixing zone under worse case conditions of no flow (slack tidal currents) in the river. Current total PCB concentrations in the river are 340 times greater than the DRBC SQO for human carcinogens. The CDF effluent is expected to raise the concentration of total PCBs by approximately 16% within the mixing zone. Relative to the elevated concentrations currently in the river, the final concentration in the river mixing zone after the addition of the CDF effluent is considered a minimal impact to the river.

Conversely, the removal of sediment from the project site is expected to aid bringing water quality of the River closer to the long term goal of supporting recreational fishing by removing large quantities of substances of concern from the ecosystem. Fewer substances of potential concern to the environment and

aquatic life will be present in the aquatic environment after dredging. The more limited presence of substances of potential concern, specifically chlorinated organic compounds such as PCBs, dioxins, and furans, will also reduce potential bio magnification of such substances in the aquatic food chain. For instance, the project is expected to remove approximately 2.7 tons of sediment containing PCBs from the local aquatic environment during the initial dredging. Calculations and further explanation in relation to this section can be found in Appendix 20, Sediment and Surface Water Quality Assessment.

4.1.6.2.2 Indirect Impacts of Dredge Water Quality on Human Health and Aquatic Life

Vessel hull paints, fuels, lubricants, and operations have potential to impact water quality in the Delaware River. This impact may increase due to the project because of increased ship traffic. Mariners are expected to operate ships in compliance with laws and regulations that are intended to minimize the potential for water quality impacts. Assuming that vessel operators comply with existing laws and regulations, water quality impacts due to ship traffic, ship operations, and exterior paint and oils associated with the ship are expected to be minimal and *de minimis*.

4.2 Biological Resources

4.2.1 Impacts on Biological Resources

This section provides a discussion of impacts the project may have on identified biological resources. General information and an analysis of direct and indirect impacts, when appropriate, is provided for the following topics:

- Threatened and endangered species;
- Critical habitat;
- Essential fish habitat;
- Species of special concern;
- Vegetation;
- Wildlife; and
- Invasive species.

The specific "action area" varies for each of the above identified biological resources, but can generally be defined as including one or more of the following affected environments:

4.2.1.1 Dredging Area

The Dredging Area is an approximately 85 acres (including side slopes) of estuarine subtidal and intertidal habitat with existing water depths ranging from 0 to 45 feet mean lower low water (MLLW). Bottom substrate generally consists of fine-grained sediments in subtidal locations. Intertidal bottom typically consists of sandy materials. There are no submerged aquatic vegetation (SAV) or vegetated wetlands within the dredging area. Dredging will facilitate the establishment of the berth and approach channel.

4.2.1.2 Construction Area

The Construction Area is a nearshore waterfront area where the approximately 2,600 linear-foot wharf is to be constructed. The aquatic habitat is estuarine subtidal and intertidal with existing water depths ranging from 0 to 5 feet while bottom substrate consists primarily of sand and gravel with some rubble. The area experiences high energy from wind, tide and shipping traffic. No wetlands or SAV were identified within this area.

4.2.1.3 Uplands

The Uplands are an approximately 112-acre property adjoining the project site. The property is zoned industrial and is the former location of the Chemours (DuPont) Edge Moor Plant. Above grade vestiges of the former plant have been demolished. The entire property is enclosed by security fencing and has received Resource Conservation and Recovery Act (RCRA) closure. Closure requires keeping impermeable caps over former sludge lagoons and covers over the other former solid waste management units (SWMUs) on the property. Currently, the covering materials typically are existing pavements and crushed stone.

Due to vessels making calls at the proposed port and transiting the bay and the river from locations in the Atlantic Ocean, the following affected environments include areas extending downriver of the project site, from RM 73.2 to RM 0:

4.2.1.4 Delaware River federal navigation channel (RM 0 to RM 73.2)

Located adjacent to and downriver of the project site and maintained at a controlling depth of 45 feet MLLW. Substrate within the channel varies widely from silty clay to gravel while salinity within the channel ranges from tidal freshwater/oligohaline in the upper reaches to saltwater near the mouth of the Delaware Bay.

4.2.1.5 Lower Delaware Estuary

Entire waterbody between the project site (RM 73.2) and the mouth of the Delaware Bay (RM 0). Width of the estuary ranges between approximately 1.5 miles at the project site, 10 miles at the mouth of the bay to 26 miles at

the widest point within the bay. Salinities range from those typical of marine water at the mouth to brackish oligohaline water at the head of the bay (just below Artificial Island). Project site is located in a transition zone between the head of the bay and the riverine portion of the estuary, a location characterized by low salinity and high turbidity.

4.2.2 Physical Environment

The main stem of the Delaware River extends approximately 330 miles flowing south from the State of New York to the Delaware Bay. The river is fed by approximately 216 tributaries and drains approximately 14,000 square miles of land (delawareestuary.org). The project site is located at RM 73.2, where the Bellevue and Cherry Island navigation reaches intersect, within a transition zone generally characterized as a low salinity, high turbidity region. The transition zone lies between the bay and riverine regions of the Delaware estuary. At the project site, water depths range between the height of tide and 45 feet below MLLW, while the width of the estuary at the site is approximately 1.5 miles.

The property adjoining the project site is zoned industrial and is the former location of the Chemours Edge Moor Plant where titanium dioxide and ferric chloride previously were manufactured. Above grade vestiges of the former plant have been demolished. The entire property is enclosed by security fencing.

Water-ward, the project site is bounded by the federal navigation channel in the Delaware River. The channel recently has been deepened to a maintained depth of 45 feet MLLW. The federal channel extends from Cape May and Cape Henlopen at the mouth of Delaware Bay (RM 0) to Trenton, New Jersey.

4.2.3 Threatened and Endangered Species

The following sections include a discussion regarding threatened and endangered species under federal and/or State of Delaware jurisdiction as well as potential project-related impacts to those identified species. The action area for threatened and endangered species includes the following affected environments:

- Dredging area;
- Construction area; and
- Delaware River federal navigation channel.

4.2.3.1 National Marine Fisheries Service (NMFS)

A Biological Assessment (BA) was prepared to evaluate potential effects of construction and operation of the proposed Edgemoor container port on the following species, identified in Table 4.2.3.1-1, protected by the Endangered Species Act (ESA):

Table 4.2.3.1-1 Summary of listed species that are known to occur in the dredging and construction areas as well as the Delaware River federal navigation channel

Common Name	Scientific Name	Federal Conservation Status
Shortnose sturgeon	Acipenser brevirostrum	Endangered
Atlantic sturgeon	Acipenser oxyrinchus	Endangered (New York Bight DPS)
Kemp's ridley sea turtle	Lepidochelys kempi	Endangered
Leatherback sea turtle	Dermochelys coriacea	Endangered
Loggerhead sea turtle	Caretta caretta	Threatened (Northwest Atlantic Ocean DPS)
Green sea turtle	Chelonia mydas	Threatened (North Atlantic DPS)
Right whale	Eubalaena glacialis	Endangered
Fin whale	Balaenoptera physalus	Endangered

DPS = Distinct Population Segment

For the purposes of the BA, shortnose sturgeon and Atlantic sturgeon were considered species of primary concern because they are known to occur within the immediate vicinity of the project. Sea turtles and whales were considered species of secondary concern because they do not occur in the immediate vicinity of the project, but may occur within the larger action area (i.e., the federal navigation channel of the Delaware River and Bay downriver of the project).

The BA assessed potential impacts from the following project-related activities:

- Dredging – Entrainment;
- Dredging – Effects on movement/migration;
- Dredging – Effects on water quality;
- Dredging – Effects on prey communities;
- Dredged material disposal;
- Pile driving;
- Placement of fill;
- Shoaling Prevention Fans;
- Vessel traffic from construction; and
- Vessel traffic from port operations.

With the exception of vessel traffic from port operations, the BA indicated that project-related activities will have no effect or an insignificant effect on ESA-listed species. Increased vessel traffic, specifically the addition of 261 vessels

per year (87 container ships and 174 tugs operated in support of the container ships) within the Delaware River federal navigation channel as a result of port operations may adversely affect but will not jeopardize the continued existence of Atlantic sturgeon. Specifically, operation of the proposed Edgemoor container port may result in one additional Atlantic sturgeon mortality every 5.5 years. The potential effect of increased vessel traffic on shortnose sturgeon was considered discountable with one additional mortality every 85 years.

The use of shoaling prevention fans (anti-sedimentation devices) along the proposed wharf is being considered for the project. Shoaling prevention fans do not increase turbidity, but allow sediment to stay suspended within the water column rather than settling on the river bottom. The use of shoaling prevention fans is not anticipated to impact listed species since they can move away from the fans. Further, the use of shoaling prevention fans is also intended to reduce the frequency of maintenance dredging (currently anticipated to occur annually).

A summary of the potential effects of project-related activities are summarized in Table 4.2.3.1-2 below:

Table 4.2.3.1-2 Summary of potential effects of project-related activities

Common Name	Atlantic Sturgeon	Shortnose Sturgeon	Sea Turtles	Whales
Federal Status	Varies with DPS	Endangered	Varies by Species	Endangered
Dredging – Entrainment	Insignificant	Insignificant	No effect	No effect
Dredging – Effects on movement/migration	Insignificant	Insignificant	No effect	No effect
Dredging – Effects on Water Quality	Insignificant	Insignificant	No effect	No effect
Dredging – Effects on Prey Communities	Insignificant	Insignificant	No effect	No effect
Dredged Material Disposal	Insignificant	Insignificant	No effect	No effect
Operation of Shoaling Fans	Insignificant	Insignificant	No effect	No effect
Pile Driving	Insignificant	Insignificant	No effect	No effect
Placement of Fill	Insignificant	Insignificant	No effect	No effect
Vessel Traffic from Construction	Insignificant	Insignificant	No effect	No effect
Vessel Traffic from Operations	May adversely affect, but not jeopardize the continued existence	Discountable	Insignificant	Insignificant
Effects of Upland Activities	Insignificant	Insignificant	No effect	No effect

A copy of the BA has been submitted to the NMFS for review and issuance of a Biological Opinion. The BA is included as Appendix 13.

4.2.3.2 US Fish and Wildlife Service (USFWS) and State of Delaware

Based on an online USFWS Information for Planning and Consultation (IPaC) environmental review process, one listed species, the Northern Long-eared Bat, was identified as being potentially present on the uplands adjacent to the project site. However, an environmental review by the DNREC's Species Conservation and Research Program (SCRP) indicated that no state-rare or federally listed species under the jurisdiction of the State Natural Heritage program exist at the project site. The database utilized by the DNREC-SCRP is comprehensive and site-specific unlike the IPaC review which utilizes a generalized, five-mile radius search around the project site.

As such, the project site does not lie within a State Natural Heritage site nor does it lie within a Delaware National Estuarine Research Reserve. In addition, the Delaware Division of Fish and Wildlife requested that no in-water work occur from March 15th through June 30th to minimize potential impacts to Atlantic sturgeon and shortnose sturgeon (both currently listed as endangered) and other commercially and recreationally valuable species during their spawning periods. No additional species were identified that differed from those identified under NMFS' jurisdiction. A certification letter provided by the USFWS is included in Appendix 15 and a copy of the DNREC-SCRP's environmental review response letter, dated October 16, 2019, is included in Appendix 16.

4.2.4 Critical Habitat

The entire tidal Delaware River estuary, which includes the project site, has been designated critical habitat for the New York Bight DPS of Atlantic sturgeon. The critical habitat rule identified four "habitat units" (i.e., physical and/or biological factors (PBFs)) that are essential to the conservation of the species. Generally, the PBFs are as follows:

- PBF 1 – Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters defined as 0.0 to 0.5 parts per thousand (ppt) generally encountered upriver of river mile 67 for settlement of fertilized eggs, refuge, growth, and development of early life stages;
- PBF 2 – Aquatic habitat with a gradual downstream salinity gradient from 0.5 ppt up to 30 ppt and soft substrate (e.g., sand, mud) between the river mouth and spawning sites for juvenile foraging and physiological development;
- PBF 3 – Water of appropriate depth and absent physical barriers to passage (e.g., locks, dams, thermal plumes, turbidity, sound, reservoirs, gear, etc.) between the river mouth and spawning sites; and

- PBF 4 – Water, between the river mouth and spawning sites, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support spawning, annual and inter-annual life stage survival as well as growth, development, and recruitment.

The proposed project will not impact PBF 1 as there is no habitat meeting the criteria of PBF 1 in the dredge area, construction area or the federal navigation channel for settlement of fertilized eggs, refuge, growth, and development of early life stages. The nearest hard bottom substrate that may be used by Atlantic sturgeon for spawning is located four miles upriver of the site.

The project site contains some of the elements of PBF 2 (soft substrate for juvenile foraging and may seasonally have salinities within the specified range). While dredging will disturb the soft substrate and impact benthic organisms, the impacts will be temporary and *de minimis*. Further, the benthic organisms identified within the dredge area or construction area are common, widely distributed and can readily be found in adjacent areas of the river.

Construction and operation of the proposed Edgemoor container port will not impede the movement of various sturgeon life stages or the staging, resting or holding of subadults or spawning adults. PBF 3 habitat will not be impacted as a result of the project.

Significant impact to PBF 4 habitat, specifically temperature and salinity, is not anticipated. Suspension of sediment during dredging may result in a temporary reduction in dissolved oxygen concentrations although this condition will be minimal and localized. Modeling has indicated that salinity will not change as a result of the project. Like salinity, water within the estuary is well mixed due to tidal currents resulting in relatively uniform temperatures at specific locations. The proposed deepening of the river bank to create the access channel and berth is not anticipated to alter water temperatures in a meaningful manner.

Hydrodynamic and sediment analysis, intended to evaluate potential impacts of the project on hydrodynamics (including salinity), sediment transport and erosion/deposition in the surrounding areas, was performed for the project. The analysis indicated that hydrodynamics are only impacted within one berth length or less of the terminal and impacts are negligible outside the immediate vicinity of the terminal. In addition, salinity, sediment transport and morphology are also unaffected outside the terminal area. Please refer to the Hydrodynamic Analysis report included in Appendix 10 for additional details.

4.2.5 Essential Fish Habitat

Essential Fish Habitat (EFH) was defined by the U.S. Congress in the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act, or Magnuson-Stevens Act, as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." Regulations clarified that waters include all aquatic areas and their physical, chemical, and biological properties;

substrate includes the associated biological communities that make these areas suitable for fish habitats, and the description and identification of EFH should include habitats used at any time during the species' life cycle. EFH includes all types of aquatic habitat, such as wetlands, coral reefs, sand, seagrasses, and rivers.

In an effort to assess the potential presence of EFH or habitat of value within the dredging and construction areas and, if present, the possible impacts that port construction and port operation may have on EFH, an assessment consisting of the following two components was performed:

- Benthic resources assessment including beach seining, benthos sampling and a search for submerged aquatic vegetation (SAV); and
- Literature search of relevant fish population/stock assessment data that has been performed within the dredging and construction areas and nearby estuary area.

The purpose of the assessment was to:

1. Characterize the benthic habitat and community including substrate, seagrasses, microbenthic organisms, and ambient water conditions within the dredging and construction areas;

2. Compare similarities and differences in the benthic community between the dredging and construction areas and adjacent areas as well as between shallow and deep water depths;

3. Compare benthic habitat and community in the dredging and construction areas to areas where EFH-designated/fisheries species/Federally-managed species and prey species are known to occur in the Delaware River estuary; and

4. Characterize environmental water quality by measuring parameters such as dissolved oxygen, temperature, salinity and water clarity within the dredging and construction areas.

4.2.5.1 Benthic Resource Assessment

Affected environments associated with benthic resources include the dredging and construction areas. The benthic resource assessment consisted of the collection of benthos samples at 17 locations covering three depth strata, three beach seine samples and three trawl hauls within the mid-depth (16 - 20 feet) strata. In addition, a search for SAV occurred in the same 17 locations as the benthos sampling.

The results of the benthic resource assessment within the affected environments indicated the following:

- No habitat of value or SAV was identified within the dredging or construction areas;

- Benthic organisms identified within the affected environments do not represent a diverse assemblage, are primarily pollution tolerant species and are readily available within adjacent areas of the river; and
- Three fish species, with low individual counts, were collected during the beach seining effort. Of 50 total fish caught, 34 were bay anchovy.
- Of the 478 total fish identified in the three trawl hauls, Atlantic croaker was the most abundant with 220 fish (46%), while white perch, bay anchovy and sand shrimp followed at 20%, 17% and 7%, respectively. A total of six striped bass were identified (1.3% of total); and
- No difference between shallow (defined as less than three feet in depth) and deep water with respect to benthic resources was identified.

4.2.5.2 Literature Review

In support of the benthic resource assessment to evaluate potential EFH, a review of available and published literature was performed to compile fish population/abundance data that was or is currently being collected in areas that overlap the project site boundaries and/or in areas adjacent to/in the vicinity of the project site.

Several surveys used by the Atlantic State Marine Fisheries Council (ASMFC) to understand fish population trends within an area, including the project site are:

- Delaware River Seine Survey (1980 – present) conducted by the New Jersey Department of Environmental Protection (NJDEP);
- Delaware Finfish Trawl Survey (1966/1980 – present) facilitated by DNREC;
- Delaware River Striped Bass Spawning Stock Assessment (1991 – present) conducted by DNREC;
- Fisheries and Biological Sampling for the PSEG Power Plant (1995 – present) conducted by PSEG

Fish population surveys used by ASFMC that have been conducted in areas adjacent to the project site include:

- Crown Landing LNG (2005 – 2006);
- Benthic Sampling (2008- 2010) – Partnership for the Delaware Estuary; and
- National Coastal Assessment (2000 – 2006) – US Environmental Protection Agency (USEPA).

The surveys identified above provide stock assessment data and status indicators that are used to monitor population trends for a wide variety of finfish and shellfish species in the Delaware estuary. In addition, the surveys serve as platforms for collecting specimens for genetics research, contaminant studies, tagging studies,

water quality studies as well as age and growth investigations. Many of the surveys have been conducted annually for many years, allowing researchers to not only be aware of population fluctuations but also predict future fishery management needs.

Hydrodynamic and sediment analysis, intended to evaluate potential impacts of the project on hydrodynamics (including salinity), sediment transport and erosion/deposition in the surrounding areas, was performed for the project. The analysis indicated that hydrodynamics are only impacted within one berth length or less of the terminal and impacts are negligible outside the immediate vicinity of the terminal. In addition, salinity, sediment transport and morphology are also unaffected outside the terminal area. Please refer to the Hydrodynamic Analysis report included in Appendix 10 for additional details.

Based on the absence of resources suitable for fish spawning, breeding, feeding and growth within the dredging and construction areas, no habitat of special value was identified within the affected environments. Specifically, no SAV or wetlands are present. While some benthic organisms were identified within the affected environments, they do not represent a diverse assemblage, are primarily low value (i.e., organisms that can survive in environments with reduced water/sediment quality) and can be found in adjacent areas of the river.

The majority of fish species identified during the survey are not species of special concern. Further, the affected environments are within the turbidity maximum transition zone of the estuary and the potential increases in turbidity associated with construction activities are unlikely to adversely affect fish species that are adapted to the prevailing turbid conditions. In addition, dredging and pile driving activities are anticipated to occur during the fall and winter months (i.e., outside the migratory fish spawning window which is typically March 1st – July 15th) when the majority of key species are no longer present within the area. The project does not include the construction and/or installation of waterway obstructions.

Additional details regarding EFH/benthic resources can be found in the EFH Assessment, provided in Appendix 11.

4.2.6 Commercial and Recreational Fisheries

4.2.6.1 General

The Delaware Estuary provides important spawning habitat and nursery areas for many key biological species, particularly the anadromous species. With the exception of sturgeon, these are not Federally-managed species, but do constitute the majority of the commercial and recreational fisheries. These species include:

- American shad;
- Alewife;
- Blueback herring;

- Striped bass;
- Spot;
- Scup;
- White perch; and
- Sturgeon

With respect to biomass, species such as Atlantic menhaden and bay anchovy constitute a large proportion of fishery biomass within the estuary. Also contributing to the commercial and recreational fisheries within the Delaware estuary are species more akin to marine waters including weakfish, bluefish and summer flounder.

Since about 1880, quantitative information to describe historical trends in commercial fisheries, particularly for fish and shellfish species, has been available. The trends are associated with human activities in and around the estuary. Historically, overfishing and a decline in water quality have been linked to reductions in anadromous fish stocks such as alewife and shad. However, improvements in overall water quality (mainly dissolved oxygen concentrations) since the initial enactment of the Clean Water Act in the 1972 are associated with the return of fish species to the estuary. Another impediment to the restoration of some anadromous species abundance, such as herrings and shads, are the presence of physical obstructions to migration, such as dams, in tributaries to the main stem of the Delaware River. Such obstructions impede fish migration/movement to historical spawning locations.

In general, anadromous species migrate from offshore or downriver overwintering areas to upriver spawning and foraging sites during the spring and early summer months. The majority of juvenile anadromous fish travel downstream in the fall to overwinter in deeper waters of the Delaware Bay or offshore. Species such as weakfish, bluefish and summer flounder typically use the saline lower portion of the estuary, specifically the transition zone and the bay. During the fall months, the majority of key species move down towards the bay or to deeper offshore waters. The majority of key species leave the estuary during the winter, seeking deeper offshore waters. Notable exceptions to this general pattern are sturgeon. Adult and juvenile shortnose sturgeon typically stay in the Delaware River all year and generally avoid saline waters. Juvenile Atlantic sturgeon typically spend several years in fresh to low salinity portions of the estuary before migrating to saltwater.

4.2.7 Project Site

Fish sampling performed by others in the vicinity of the project site has indicated use of this section of the estuary by a variety of species, most notably striped bass, river herring and alewife. Cherry Island flats, located on the opposite side of the federal navigation channel from the project site, is a geomorphic feature where gravid

females aggregate and various other life stages of striped bass use as nursery, foraging and resting habitat.

Based on a decline in populations indicated by landing statistics and the number of fish observed on spawning runs, alewife and river herring have been designated as Species of Concern by the NOAA. The decline has been attributed to habitat loss, habitat degradation/modification and increases in turbidity.

While construction of the proposed Edgemoor container port will result in the removal of substrate, no SAV or habitat of value was identified at the project site during the Assessment of Habitat and Benthic Resources. Further, while construction may cause increases in turbidity, these conditions will be temporary. The project site is located in the turbidity maximum of the estuary and the potential increases in turbidity associated with construction activities are unlikely to adversely affect fish species that are adapted to the prevailing turbid conditions. Based on salinity alone, it is unlikely Federally-managed species, particularly adults, will be found within the project footprint. Dredging and pile driving activities are anticipated to occur outside the spawning window (typically March 1st – July 15th), minimizing the impact to fish movement/migration during spawning runs. Dredging and pile driving activities are anticipated to occur during the fall and winter months when the majority of key species are no longer present within the area. The project does not include the construction and/or installation of waterway obstructions.

Construction of the proposed container port is likely to have beneficial impacts, both direct and indirect, to the commercial and recreational fisheries populations. Removal of contaminated sediment and the creation of a cleaner and deeper bottom is likely to allow for a healthier, more diverse benthic community to establish. The potential installation of shoaling prevention fans to manage sedimentation within the berth area is intended to reduce the frequency of maintenance dredging. The reduction in disturbance frequency may promote colonization of beneficial benthic organisms in the newly exposed and cleaner river bottom in place of the pollution tolerant and invasive species currently found at the project site.

Hydrodynamic and sediment analysis, intended to evaluate potential impacts of the project on hydrodynamics (including salinity), sediment transport and erosion/deposition in the surrounding areas, was performed for the project. The analysis indicated that hydrodynamics are only impacted within one berth length or less of the terminal and impacts are negligible outside the immediate vicinity of the terminal. In addition, salinity, sediment transport and morphology are also unaffected outside the terminal area. Please refer to the Hydrodynamic Analysis report included in Appendix 10 for additional details.

4.2.8 Vegetation

The action area associated with vegetation includes the affected environment defined as uplands above. Vegetation on the property adjacent to the project site is typical of those found on a disturbed industrial landscape. Large remnants of impervious surfaces remain at the site following the closure and the demolition of the former Chemours Edge Moor Plant. No vegetation of habitat value are present on the property. Woody plants are forbidden to become established on the impervious

covers installed over the former sludge lagoons. No SAV was detected within the dredging and construction areas. There are no vegetated wetlands within the dredging area and construction area.

In summary, no significant adverse impact to vegetation is anticipated to result on the uplands adjacent to the dredging and construction areas. There is no wetland vegetation or SAV to be impacted within the dredging and construction areas.

4.2.9 Wildlife

The affected environment for terrestrial wildlife includes the uplands located adjacent to the project site. The uplands property is completely enclosed by fencing and is currently patrolled by security services. The fencing would likely preclude the migration and/or movement of wildlife on to the site. As a result, no adverse impact to terrestrial wildlife is anticipated to result from the project.

4.2.10 Invasive Species

One invasive organism was identified during the Assessment of Habitat and Benthic Resources within the dredging and construction areas. Corbiculidae, commonly known as basket clams, are a family of bivalve mollusk originating in Asia. Of the total 648 organisms found in the 14 benthic resource assessment sediment samples, 12 Corbiculidae were identified. Various species within this family are known to reproduce rapidly and be tolerant of cold temperatures, resulting in uncontrolled growth of population sizes.

The removal of sediment (via dredging) that contains invasive species may allow endemic species to re-establish within the aquatic ecosystem. No other invasive species are known to be present within the dredging or construction areas or the adjacent uplands.

4.3 Human Environment

4.3.1 Affected Environment: Population

This section describes the demographic characteristics of the study area population pursuant to Executive Order (EO) 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations and EO 13045 Protection of Children from Environmental Health Risks and Safety Risks. Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks) requires federal agencies to identify and address environmental health and safety risks that may disproportionately affect children. Environmental health and safety risks are those attributable to products or substances that a child is likely to touch or ingest (e.g., air, food, drinking water, recreational waters, soil, or products they might use or to which they may be exposed).

4.3.1.1 Human Resources

Regional Setting

The City of Wilmington is located within New Castle County, Delaware, which is a part of the Philadelphia-Camden-Wilmington Metropolitan Statistical Area (MSA) as defined by the US Census Bureau. The MSA is the aggregation of eleven counties in four states: New Castle County, Delaware, Cecil County, Maryland, Burlington, Camden, Gloucester, and Salem Counties, New Jersey, and Bucks, Chester, Delaware, Montgomery, and Philadelphia Counties, Pennsylvania. The US Census Bureau estimates the population of the MSA in 2017 at 6,065,644 people. With an estimated population of 555,036 people, New Castle County, Delaware represents 9.2 percent of the total population of the MSA. As depicted in Figure 4.3.1.1-1, counties adjacent to New Castle County, Delaware include the counties of Chester and Delaware in Pennsylvania, Gloucester and Salem Counties in New Jersey, and Cecil County, Maryland. Note that the northern portion of the border between New Castle County, Delaware and New Jersey is along the left descending bank of the Delaware River, rather than the centerline of the river. The border is located in the centerline of the river and Delaware Bay south of Artificial Island.

Figure 4.3.1.1-1 Regional Setting of the Port of Wilmington

Table 4.3.1.1-1 shows decadal census data for the MSA, states, and counties in the vicinity of the project site from 1980 through 2010 and includes the 2017 Census Bureau population estimates. At the MSA, state, and county levels, the region has experienced population growth in the last 40 years, except for Salem County, NJ and Delaware County, PA showing near steady population levels.

Table 4.3.1.1-1 Regional Population 1980-2017

Locale	Designated Type	Population					
		1980	1990	2000	2010	2017	% change 1980-2017
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	MSA	5,240,438	5,435,468	5,687,147	5,965,353	6,065,644	15.7%
Delaware	State	594,338	666,168	783,600	897,934	943,732	58.8%
New Castle County, DE	County	398,115	441,946	500,265	538,479	555,036	39.4%
New Jersey	State	7,364,823	7,730,188	8,414,350	8,791,894	8,960,161	21.7%
Gloucester County, NJ	County	199,917	230,082	254,673	288,288	291,372	45.7%
Salem County, NJ	County	64,676	65,294	64,285	66,083	63,776	-1.4%
Pennsylvania	State	11,863,895	11,881,643	12,281,054	12,702,379	12,790,505	7.8%
Chester County, PA	County	316,660	376,396	433,501	498,886	514,652	62.5%
Delaware County, PA	County	555,007	547,651	550,864	558,979	563,384	1.5%

Source: U.S. Census Bureau

Local Setting

Figure 4.3.1.1-2 depicts the local communities in Delaware in the vicinity of the project site, including the Cities of Wilmington and New Castle and Towns of Bellefonte, Elsmere, and Newport. Unincorporated communities, which are Census Designated Places (CDP) for reporting purposes, include Edgemoor, Claymont, Greenville, and Wilmington Manor. On the east side of the Delaware River in New Jersey, nearby communities include the Borough of Penns Grove and the unincorporated CDPs of Pennsville and Carneys Point.

Figure 4.3.1.1-2 Local Setting of the Port of Wilmington

Table 4.3.1.1-2 shows decadal census data for communities near the project site from 1980 through 2010 and includes the 2017 Census Bureau population estimates. With an estimated 2017 population of 71,276, the City of Wilmington represents 1.2 percent of the population of the MSA. Decadal data for Greenville, DE and Carneys Point, NJ are presented for the years available. In general, the smaller local communities have experienced relatively modest population decline in the last 40 years, with Cities of Wilmington and New Castle, Delaware showing modest increases in population; however, these modest population gains are much less than the overall population increase in the State of Delaware. Most population growth in Delaware has occurred in southern portion of the state (Figure 4.3.1.1-3).

Table 4.3.1.1-2 Local Setting of the Port of Wilmington

Locale	Designated Type	Population					
		1980	1990	2000	2010	2017	% change 1980-2017
Wilmington, DE	City	70,195	71,529	72,664	70,851	71,276	1.5%
New Castle, DE	City	4,907	4,837	4,862	5,285	5,364	9.3%
Bellefonte, DE	Town	1,279	1,243	1,249	1,193	1,202	-6.0%
Elsmere, DE	Town	6,493	5,935	5,800	6,131	6,097	-6.1%
Newport, DE	Town	1,167	1,240	1,122	1,055	1,295	11.0%
Claymont, DE	CDP	10,022	9,800	9,220	8,253	8,707	-13.1%
Edgemoor, DE	CDP	7,397	5,853	5,992	5,677	6,178	-16.5%
Greenville, DE	CDP	**	**	2,332	2,326	2,305	
Wilmington Manor, DE	CDP	9,233	8,568	8,262	7,889	7,608	-17.6%
Penns Grove, NJ	Borough	5,760	5,228	4,886	5,147	4,917	-14.6%
Pennsville, NJ	CDP	12,467	12,218	11,657	11,888	11,380	-8.7%
Carneys Point, NJ	CDP	**	7,686	6,914	7,382	7,100	

** Decadal census data are not available. Source: U.S. Census Bureau

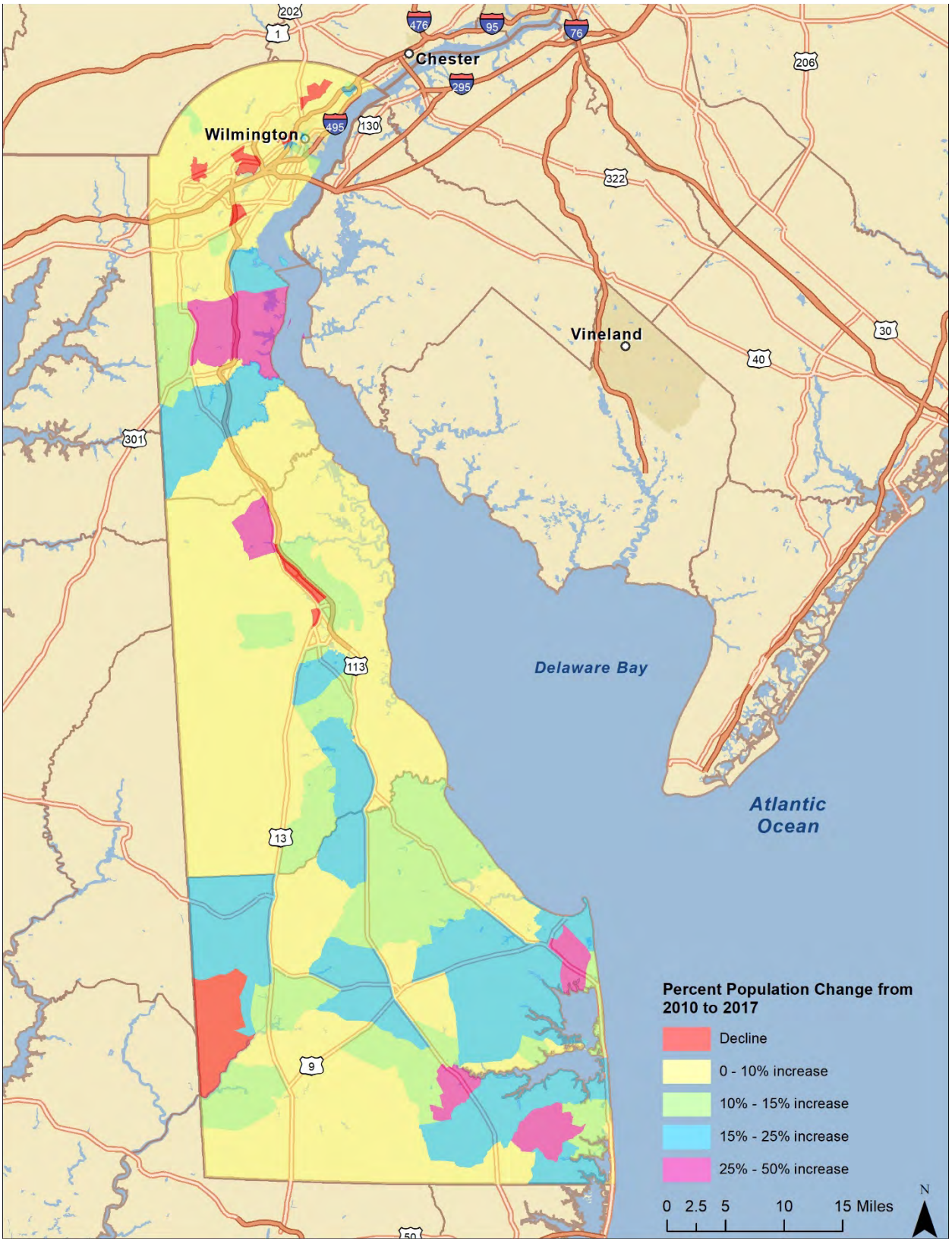


Figure 4.3.1.1-3 Percent Population Change from 2010 to 2017 in Delaware by Census Tract

4.3.1.2 Employment

Industry and employment in the City of Wilmington region historically have been dominated by specific industries. For much of the 20th century, the chemical company DuPont, with corporate and research headquarters in the City of Wilmington, was a fixture in the local economy. The company expanded outside of the region after World War II.

For over a century, the State of Delaware has been the leading jurisdiction for corporate entity formation, with more than 66 percent of the Fortune 500 companies incorporated in Delaware. This fact coupled with a judiciary widely recognized as the premier venue for dispute resolution, has resulted in the legal and corporate services industries being significant employers in Wilmington. In addition, with the enactment of the Financial Center Development Act in 1981 and other measures, Delaware has become a center for the financial services industry, including JPMC, Bank of America, Capital One and other financial institutions. The impact of these jobs on the regional employment is shown in Table 4.3.1.2-2 Top 20 Private Employers in New Castle County, Delaware 2019. While the corporate/legal and financial services industries provide important employment opportunities, only 15% of those jobs are held by City of Wilmington residents, in part, because the jobs require particular skills such that employers look outside the city and state to fill those positions[1].

Traditionally, many City of Wilmington residents secured employment in the manufacturing sector but growth in that sector the last 10 years has been slow compared to the other industries (as can been seen in the Table 4.3.1.2.3). The 10-year comparison also does not likely fully capture the significant contraction that occurred to the once robust manufacturing sector in New Castle County, Delaware. Three long-time centers of good paying manufacturing jobs shuttered, including the Chrysler Newark Assembly Plant, which began producing tanks for the Army in 1951 and converted to automobile assembly in 1957. The facility closed in 2008, with the loss of approximately 1,100 jobs. The General Motors Boxwood plant closed soon thereafter after 60 years of production, with the loss of approximately 550 employees and 575 hourly workers. Also in 2009, Valero ceased operations at its Delaware City Refinery and with it the elimination of an estimated 500 employees, 250 contractors and many employees of ancillary businesses. The refinery, however, restarted under the ownership of PBF in 2011, leading to the rehiring of employees and contractors. The Evraz Steel facility in Claymont permanently shuttered operations in 2013, which eliminated approximately 350 jobs. Importantly,

[1] https://nextcity.org/features/view/fortune-500-companies-a-central-location-and-low-taxes-cant-fix-wilmington

the loss of these jobs in the auto and steel industry went beyond the quantitative loss in that these particular employers represented a unique source of stability and opportunity for advancement, particularly for those without a college degree.

The creation of jobs associated with the expansion of the Port of Wilmington at Edgemoor, though not categorized as part of the manufacturing employment sector, will provide opportunities to the local and regional labor pool that was impacted by the closing of these facilities.

Table 4.3.1.2-1 Top 20 Private Employers in New Castle County, Delaware 2019

Company/Organization	Estimated No. of Local Employees
ChristianaCare	11,856
JPMorgan Chase	11,000
Bank of America	6,400
University of Delaware	4,493
Nemours Children's Health System	3,795
DuPont	3,400
Amazon	3,000
Capital One	2,200
Port Of Wilmington	2,000
M&T Bank / Wilmington Trust	1,800
AstraZeneca	1,500
Barclays	1,500
Discover	1,441
Siemens Healthineers	1,410
Sallie Mae	1,200
CSC	1,176
Blackrock	1,104
Chemours	1,000
WSFS	937
Agilent	800

Note: Excludes government and school districts. Retailer employment estimates not available by county and excluded here.

Sources: Company websites, Delaware Business Times Book of Lists, DPP research

Table 4.3.1.2-2: New Castle County Job Growth by Sector 2009-2019

	Total Employment, 2019	Jobs Added, 2009-2019	Employment Percentage Change, 2009-2019
Education and Health Services	58,300	13,000	29%
Trade, Transportation & Utilities	52,300	5,800	12%
Professional and Business Services	51,600	6,600	15%
Financial Activities	42,700	5,900	16%
Government	40,600	5,600	16%
Leisure and Hospitality	29,400	7,400	34%
Natural Resources & Construction & Mining	15,000	2,700	22%
Other Services	12,500	-1,500	-11%
Manufacturing	12,200	500	4%
Information	2,900	-2,000	-41%
TOTAL	**317,500**	**44,000**	**16%**

Source: Delaware Department of Labor

Within the population of the residents of the City of Wilmington, with a total estimated civilian labor force of 30,393 in 2017, the US Census Bureau estimates the primary employment sectors included healthcare and social assistance, retail, finance, and food services. Together, these sectors comprise more than 50% of the employment within the City of Wilmington.

Regional inflation-adjusted median wages (i.e., real median wages) generally have declined over time, implying that available jobs are of lesser benefit to employees. However, this decline is most notable in the City of Wilmington where the inflation-adjusted median household income has dropped from $50,400 in 2000 to $40,200 in 2017 – a decline of more than 20%. New Castle County, which includes the City of Wilmington, also showed a drop in median household income. The New Castle County income levels of $75,200 in 2000 and $68,300 in 2017 are higher than the City of Wilmington and greater than the overall median household income for the State of Delaware, revealing a disparity between urban and suburban household incomes in the region.

The income figures presented in Table 4.3.1.2-5 have been adjusted for inflation from their original values using the US Bureau of Labor Statistics' online inflation calculator[1] and rounded for ease of comparison across time. This comparison is valuable because, without adjustment for inflation,

[1] https://www.bls.gov/data/inflation_calculator.htm

wages in the region generally appear to have increased. However, when adjusted for inflation, real wages actually have declined since 2000.

Table 4.3.1.2-3 Regional Median Household Income

Locale	2000	2010	2017
Delaware	68,000	64,400	63,000
New Castle County, DE	75,200	69,800	68,300
City of Wilmington, DE	50,400	42,900	40,200
Pennsylvania	57,500	56,300	57,000
Chester County, PA	93,700	94,700	92,400
Delaware County, PA	71,900	69,200	69,800
New Jersey	79,100	78,000	76,500
Gloucester County, NJ	77,900	81,200	81,500
Salem County, NJ	65,400	66,500	63,900

Source: US Census Bureau (https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml).

Unemployment in the City of Wilmington consistently has been higher than the surrounding areas for the last 40 years (Table 4.3.1.2-6). In 2017, the City's unemployment rate was 6.4 percent, reflecting a decrease from 11.3 percent in 2010, after the recession of 2009. Unemployment in 1990 and 2000 was 6.0 percent and 5.0 percent, respectively.

Table 4.3.1.2-4 Regional Unemployment Rate

Locale	1990	2000	2010	2017
Delaware	4.7	3.7	8.4	4.5
New Castle County, DE	5.1	3.6	8.3	4.4
City of Wilmington, DE	6.0	5.0	11.3	6.4
Pennsylvania	5.5	4.1	8.5	4.9
Chester County, PA	3.3	3.0	6.2	3.6
Delaware County, PA	4.0	3.7	8.0	4.5
New Jersey	5.1	3.7	9.5	4.6
Gloucester County, NJ	5.6	3.6	10.3	4.7
Salem County, NJ	5.2	3.9	11.7	6.2

Source: Bureau of Labor Statistics (https://beta.bls.gov/dataQuery/find?)

Poverty status is determined from various statistics gathered through the census and is measured on a family to family basis. The computation is based on a "poverty threshold" for an individual or family (based on family size), where earnings in a calendar year are compared to the threshold. The U.S. Census Bureau data on poverty for the City of Wilmington shown in Table 4.3.1.2-7 indicates that the poverty rate increased from 21.3 percent in 2000 to 23.4 percent in 2010 and to 27.0 percent in 2017. The City of Wilmington poverty rates are more than double the rate in almost all surrounding areas.

Table 4.3.1.2-5 Regional Poverty Rate

Locale	2000	2010	2017
Delaware	9.2	11.3	12.1
New Castle County, DE	8.4	10.4	11.9
City of Wilmington, DE	21.3	23.4	27.0
Pennsylvania	11.0	12.8	13.1
Chester County, PA	5.2	6.1	6.9
Delaware County, PA	8.0	9.4	10.4
New Jersey	8.5	9.5	10.7
Gloucester County, NJ	6.2	7.1	7.9
Salem County, NJ	9.5	10.5	14.2

Source: US Census Bureau (https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml).

4.3.1.3 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Population and Low-Income Populations, directs federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations[2] (Executive Order, 1994). When conducting National Environmental Policy Act (NEPA) evaluations, the Council on Environmental Quality (CEQ) directs federal agencies to incorporate Environmental Justice (EJ) considerations into both the technical analyses and the public involvement (CEQ, 1997).

The CEQ guidance defines "minority" as individual(s) who are members of the following population groups: American Indian or Alaskan native, Asian or Pacific Islander, Black, not of Hispanic origin, and Hispanic (CEQ, 1997). When defining areas for analysis, the CEQ defines a minority

[2] Low income is defined as a person whose household income is at or below the current Department of Health and Human Services poverty guidelines.

population as meeting the following criteria: the minority population of the affected area exceeds 50 percent of the total population, the percentage of minority population in the affected area meaningfully is greater than the minority population percentage in the general population or other appropriate unit of geographical analysis. In addition, federal agencies have interpreted the CEQ EJ guidance to include identifiable minority communities with the potential to be disrupted, even when the population does not meet the threshold of 50 percent or meaningfully greater.

Low-income populations, as defined for the purposes of EJ analyses, are identified using statistical poverty thresholds from the Bureau of the Census Current Population Reports, Series P-60 on Income and Poverty (U.S. Census Bureau, 2010). In identifying low-income populations, a community may be considered either as a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. The U.S. Census Bureau defines a poverty area as a census tract or other area where at least 20 percent of residents are below the poverty level (U.S. Census Bureau 2013). The poverty threshold[3] for a family of four for 2017 was an annual income of $24,858 (U.S. Census Bureau, 2019).

The Executive Order directs federal and state agencies to incorporate environmental justice as part of their mission by identifying and addressing the effects of all programs, policies and activities on minority and low-income populations. The fundamental principles of EJ are as follows:

1) Ensure the full and fair participation by all potentially affected communities in the decision-making process;

2) Prevent the denial of, reduction in or significant delay in the receipt of benefits by minority and low-income populations; and

3) Avoid, minimize or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority populations and low-income populations.

Table 4.3.1.3-1 shows the 2017 U.S. Census population data (as a percentage) for the City of Wilmington and the surrounding areas. As stated above, minority populations are identified when either the minority population of the affected area exceeds 50-percent of the total population, or the percentage of minority population in the affected area is meaningfully greater than the minority population percentage in the general

[3] Poverty status is determined from various statistics gathered through the census and is measured on a family to family basis with the computation based on a "poverty threshold" for an individual or family (based on family size), where earnings in a calendar year are compared to the threshold.

population or other appropriate unit of geographical analysis. According to the Council's guidance on EJ populations, the conditions necessary to define both a minority population and a population with more than 20 percent below the poverty level are present in the City of Wilmington.

Table 4.3.1.3-1 2017 Population, Race, and Percent Below Poverty Threshold

Geographic Area	2017 Population	Race Percent of Total					Percent Below Poverty Threshold
		White	Black	American Indian	Hispanic*	Asian	
Delaware	943,732	69.1	21.9	0.4	9.0	3.9	12.1
New Castle County, DE	555,036	64.8	24.6	0.3	9.6	5.5	11.9
City of Wilmington, DE	71,276	34.0	58.1	0.2	10.8	1.5	27.0
Pennsylvania	12,790,505	81.1	11.1	0.2	6.8	3.3	13.1
Chester County, PA	514,652	85.8	5.9	0.1	7.2	4.9	6.9
Delaware County, PA	563,384	69.7	21.2	0.1	3.6	5.5	10.4
New Jersey	8,960,161	67.9	13.5	0.2	19.7	9.4	10.7
Gloucester County, NJ	291,372	81.7	10.3	0.0	5.8	3.1	7.9
Salem County, NJ	63,776	80.6	13.3	0.2	8.3	1.0	14.2

* Hispanics may be of any race, so also are included in applicable race categories.

Figure 4.3.1.3-1 and Figure 4.3.1.3-2 depict the distribution of areas within New Castle County that satisfy the Council's guidance for EJ populations based on poverty rates and minority populations, respectively.

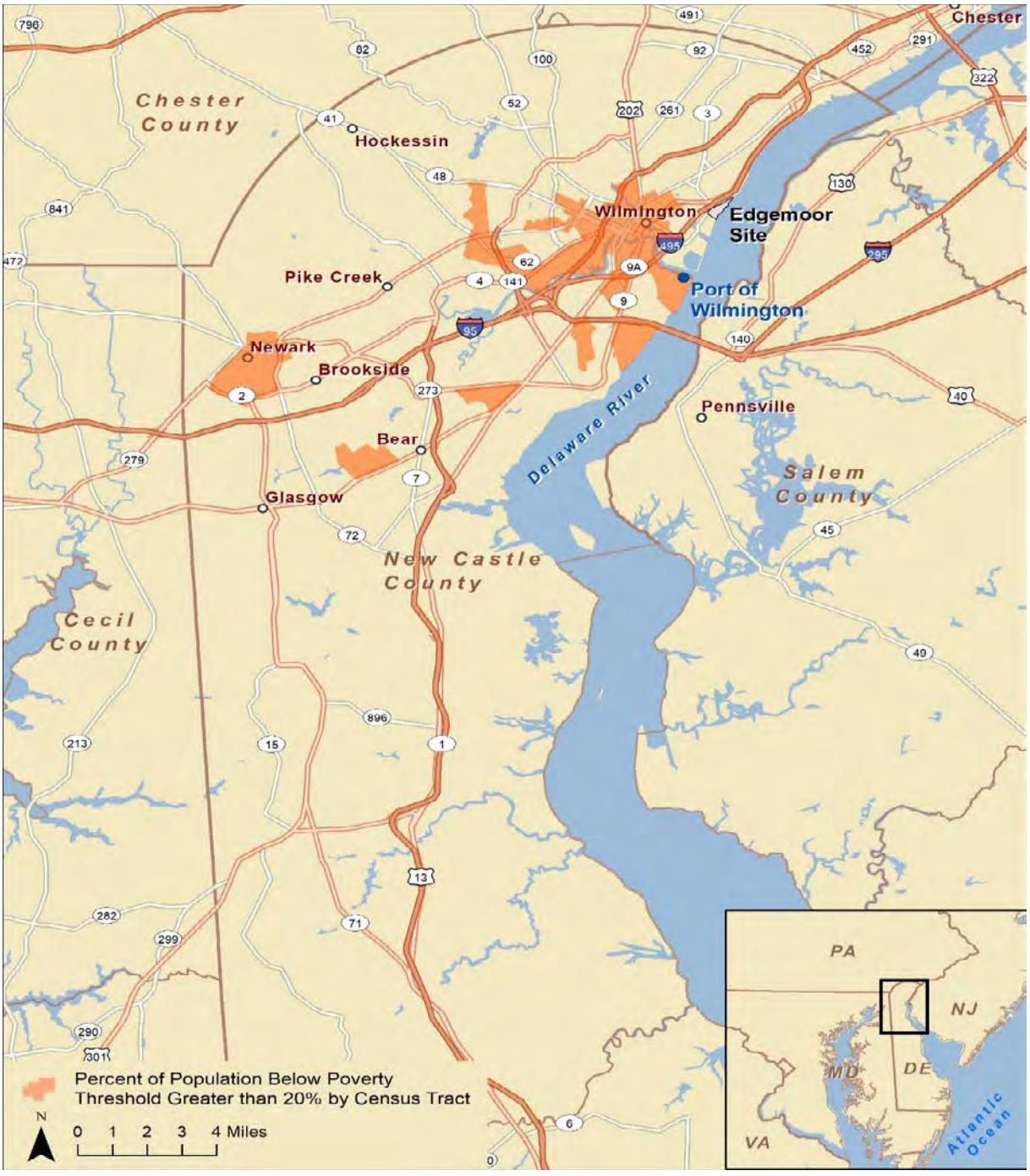


Figure 4.3.1.3-1 Areas Where Greater Than 20% of Population is below Poverty Threshold by Greater than 20% by Census Tract in New Castle County, Delaware

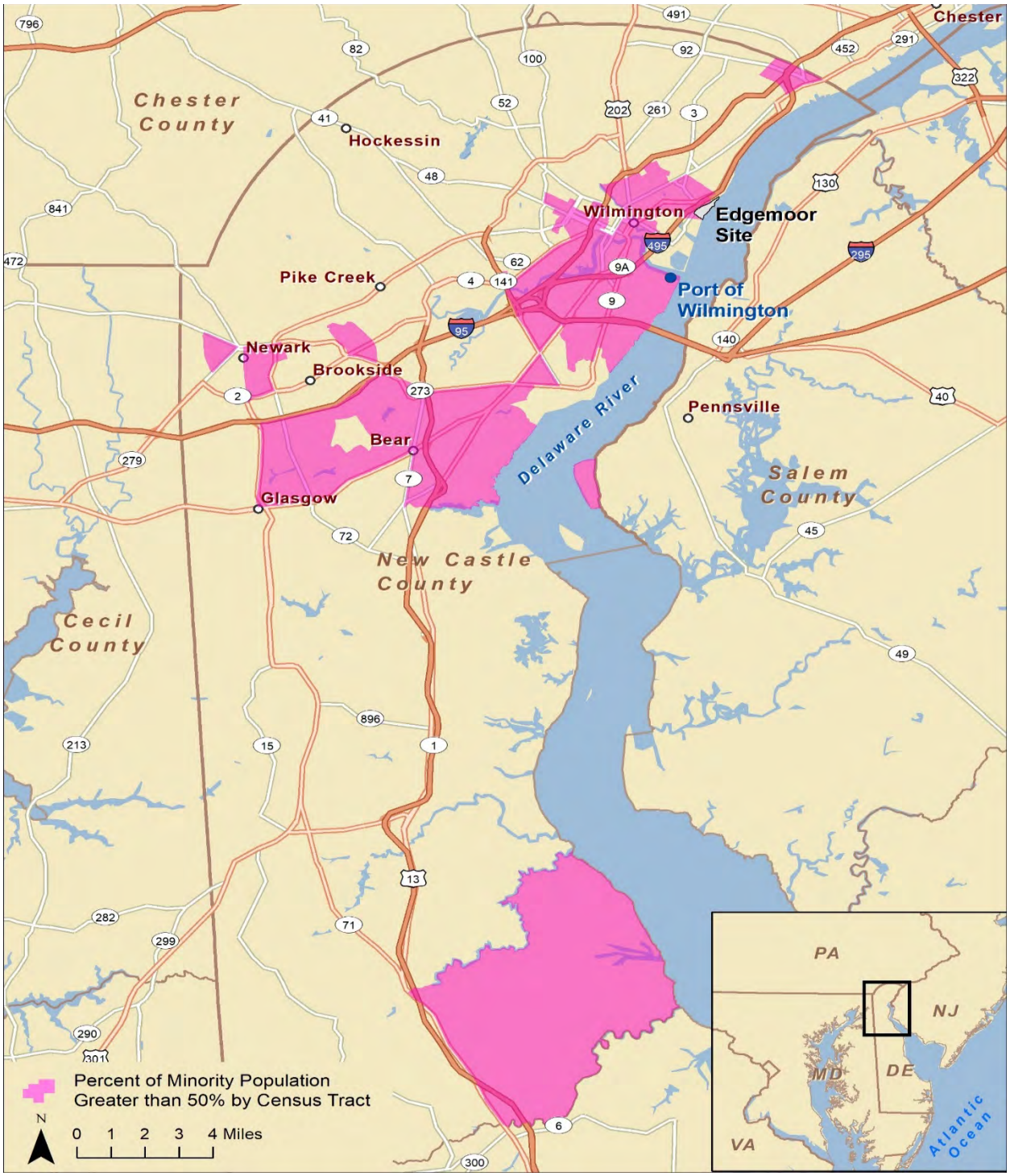


Figure 4.3.1.3-2 Area of Minority Populations Greater than 50% of Total Population by Census Tract in New Castle County, Delaware

4.3.2 Socioeconomics

4.3.2.1 Existing Conditions

The "Port Performance, Freight Statistics Program, Annual Report to Congress, 2017," prepared by the U.S. Department of Transportation, Bureau of Transportation Statistics listed the Port of Wilmington, Delaware as the 24th largest container port in the United States of America, as measured by the throughput of TEU, a common means of quantifying containerized cargos and container ships.

According to the Port of Wilmington Economic Impact Study provided in Appendix 19, the Port of Wilmington cargo handling has been increasing approximately 5.4% per year since 2010. However, containerized cargos have been increasing at an average rate of 7.7% annually since 2010. In fiscal year 2017, the Port handled a total of 5,802,000 short tons of cargo. Cargoes were categorized as follows:

Containerized	2.5 million short tons
Dry Bulk	1.4 million short tons
Liquid Bulk	1.4 million short tons
Non-Containerized	0.45 million short tons

Cargos passing through the Port of Wilmington generated approximately $463 million or $79.78 per cargo ton in value-added for the State of Delaware and approximately $4.61 per cargo ton in tax revenue or $26.7 million. Per the Port of Wilmington Economic Impact Study, the value of overseas shipments originating in Delaware range between 0.3 and 0.4 percent of all US export shipments in value while Delaware's population is just under 0.3 percent of the total US population. The study also indicates that the Port of Wilmington contributes $508.8 million in value-added to the regional economy, or $87.70 per ton of cargo moving through the port.

Per Table 10. of the Port of Wilmington Economic Impact Study, the Port generated approximately 5,390 total jobs for the State of Delaware, broken-down as 2,951 direct and 2,439 indirect and induced jobs. These figures translate to 0.93 jobs per thousand cargo tons and $330.0 million in payments to labor or $56.88 per ton of cargo.

Wages, including fringe benefits associated with port related jobs, are estimated as $62.65 per ton of cargo, with an average annual salary of $63,592, yielding $30.57 per hour. For comparison, the average hourly wage for Port of Wilmington related jobs is 7.3 percent higher than the average hourly wage within the Philadelphia – Wilmington – Camden Metropolitan Statistical Area (MSA) which is $28.49 per hour. In general, direct jobs associated with the port pay 22.3 percent and indirect jobs pay approximately 12.6 percent more than the statewide average, while induced jobs pay approximately 13.2 percent less than the statewide average. These statistics point to the importance of increasing the throughput of the Port of Wilmington as a means of improving local socioeconomic conditions.

Containerized cargo handling generated approximately 24% of the direct jobs at the Port of Wilmington in fiscal year 2017, indicating that approximately 708 of the current direct jobs at the Port of Wilmington are associated with containerized cargo. Those jobs paid approximately $29.44 per hour, yielding an average annual salary exclusive of fringe benefits of $61,230. These jobs include truck drivers, longshoremen, port operations workers, and rail crews among others. Containerized cargo handling requires approximately 0.28 jobs per thousand tons of cargo.

Within the region, defined as being the Philadelphia – Wilmington – Camden MSA, the Port generated approximately 5,717 total jobs, broken down as 2,951 direct and 2,766 indirect and induced jobs. The regional benefits of the Port included:

- $508.8 million or $87.70 per cargo ton in value-added
- $922.2 million or $158.94 per cargo ton in total output/final demand
- $35.6 million or $6.13 per cargo ton in tax revenue

4.3.2.2 Forecast Conditions

According to the Port of Wilmington Economic Impact Study (Appendix 19), economic studies have indicated a strong correlation between U.S. port operations and economic benefits. The more cargo that moves in or out of a U.S. port, the greater the economic impact to a locale and region in the forms of income, employment, output, and tax revenue. The Port of Wilmington Economic Impact Study used the IMPLAN economic model to forecast the economic impacts that can be expected to result from an expansion of the containerized cargo passing through the Port of Wilmington. In general, the model uses input such as the number of direct jobs to generate predictions regarding direct, indirect, induced employment, income, economic output and tax revenue. Based on research conducted by the modelers, direct employment at the existing Port of Wilmington tied to containerized cargo is 0.28 jobs per thousand cargo tons.

Based on the U.S. Department of Transportation report titled, "Port Performance, Freight Statistics Program, Annual Report to Congress 2017", 157 container vessels call on the Port of Wilmington annually, bringing 181,000 twenty-foot equivalent units (TEU) inbound loaded cargo containers and 80,000 TEU outbound loaded cargo containers, for a total of 261,000 TEU of loaded containers. GT USA Wilmington is predicting that the expansion of the Port to Edgemoor will promote vessel traffic to increase 55% over current traffic, leading to a forecast of approximately 244 container vessels annually calling at Edgemoor and a throughput of 1,182,600 TEU of loaded containers. These increases are based on 87 more vessel calls per year than in 2016.

According to the Port of Wilmington Economic Impact Study, 2,337,000 short tons of containerize cargo moved through the Port of Wilmington in 2016. Using the number of loaded containers that passed through the Port

that year yields an estimated 8.95 tons of cargo per TEU, based on current Port of Wilmington cargos. This conversion value is used to estimate the future economic benefits that are anticipated to be derived from the expansion of containerized cargo throughput associated with the preferred port expansion at Edgemoor.

The expansion of containerized cargo is anticipated to require 2,965 direct and indirect jobs, based on 0.28 jobs per thousand tons of cargo handled and an expansion of cargo tonnage to approximately 10,600,000 tons per annum. Subtracting the estimates of existing jobs associated with containerized cargo handling from this future estimate, suggests that approximately 2,260 jobs would result from the expansion in annual containerized cargo throughput. These jobs, with benefits are anticipated to pay on average $30.57 per hour in 2017 dollars.

The total added value to the State of Delaware economy is forecasted to be approximately $846 million per annum. Compared to the existing estimate of $463 million per annum, the additional containerized cargo throughput would provide a net value added of approximately $383 million per annum.

State and local taxes derived from the expanded containerized cargo throughput would be approximately $48.9 million per annum. This figure represents an approximate $22.2 million annum increase in income to the State of Delaware and local governments.

Regionally, the value added associated with the expansion of containerized cargo throughput is forecasted to be approximately $930 million for the Philadelphia – Wilmington – Camden MSA per annum. This value added is an approximate annual increase of $421 million to the MSA over the current yield from the Port of Wilmington.

The benefits of the increased jobs, wages, and taxes are expected to directly improve unemployment and reduce poverty in the City of Wilmington. The types of jobs generated by the expansion of containerized cargo throughput are expected to include truck drivers, longshoremen, port operations workers, and rail crews, all of whom could be recruited from the local population, including the unemployed. The City of Wilmington and New Castle County have reported 2017 populations of approximately 71,276. About 70% of the population of Wilmington are minorities (approximately 50,071 people) and more than 20% of the population or 19,245 people have incomes below the poverty level. The jobs being added due to the project are local to the population of Wilmington, suggesting that much of the job recruitment could come from the City. The 2,260 new jobs forecasted to result from the containerized cargo expansion represent an opportunity for approximately 3% of the population of the City of Wilmington, 5% of the minority population in Wilmington, and 12% of the population living below the poverty level in Wilmington.

4.3.3 Community and Recreational Resources

4.3.3.1 Community Facilities

The proposed project is being constructed adjacent to a site that formerly employed large numbers of fulltime workers. The former facility operated 24 hours per day and 7 days per week, all year. Within the action area, housing, emergency services, schools, hospitals and similar community facilities were developed to handle the needs of the former Chemours Edge Moor Plant work force.

The proposed project will not directly affect the existing community facilities, as it is limited to dredging and wharf construction. However, there is an indirect effect of the project on community facilities that is associated with the work force that will be hired to staff the future port. This work force will be similar to, but larger than the work force previously present at the former Chemours Edge Moor Plant. This work force is anticipated to restore and support the community facilities in the action area that were adversely impacted by the closure of the former Chemours Edge Moor Plant.

4.3.3.2 Recreational Facilities

Recreational facilities within the project area are associated with pleasure boating and fishing. Restricted access to the water from the land adjacent to the project site currently limits recreational fishing opportunities. The close proximity of the project site to portions of the Delaware River that are heavily traveled by large commercial vessels and the relative absence of nearby shelter, boat ramps and other amenities that would be attractive to recreational boaters tends to limit recreational use of the project site to transient passage of recreational boaters. Swimming currently is prohibited in this reach of the Delaware River due to poor water quality.

Lands upriver from the project site are part of Fox Point State Park. Fox Point State Part was created as part of a State of Delaware Brownfield Program project which covered a former area of landfill that posed unacceptable human health and environmental risks prior to being remedied. According to the Division of Parks and Recreation website, Fox Point State Part currently supports “watching the river at work. With the shipping channel a scant hundred yards away, the view of tugs and tankers will truly be up close and personal. Interactive displays describe the functions of the various watercraft plying the river.” Other activities are listed as biking on paved trails, horseshoes, kite flying, picnicking, volleyball, walking, and jogging.

The proposed project will directly impact and enhance the primary purpose of Fox Point State Park by bringing container ships, support vessels, such as tugs, and a working port within easy and safe viewing distance of park visitors. Other park activities will not be impaired by the project. Potential impacts of the project on park visitors are discussed in sections 4.3.4 and 4.3.10.

4.3.4 Visual and Aesthetic Resources

The project area is located along the Delaware River and adjoins an industrial zone. The property adjoining the project area is the former location of the Chemours Edge Moor Plant and the site proposed for landside operations of the new container port.

Photograph 1: Southern portion of the Edgemoor Property along Hay Road.

The property was previously an active chemical manufacturing plant since the 1930s and is currently not in operation. Much of the above grade plant infrastructure has been demolished. Pavements and capping systems cover much of the Edgemoor property. Landside, the Edgemoor property is bounded by local roadways, I-495, and industrial properties. This area of Edgemoor, Delaware, historically has been used for industrial purposes. Figure 4.3.4-1 depicts the project area and the adjoining industrial areas.

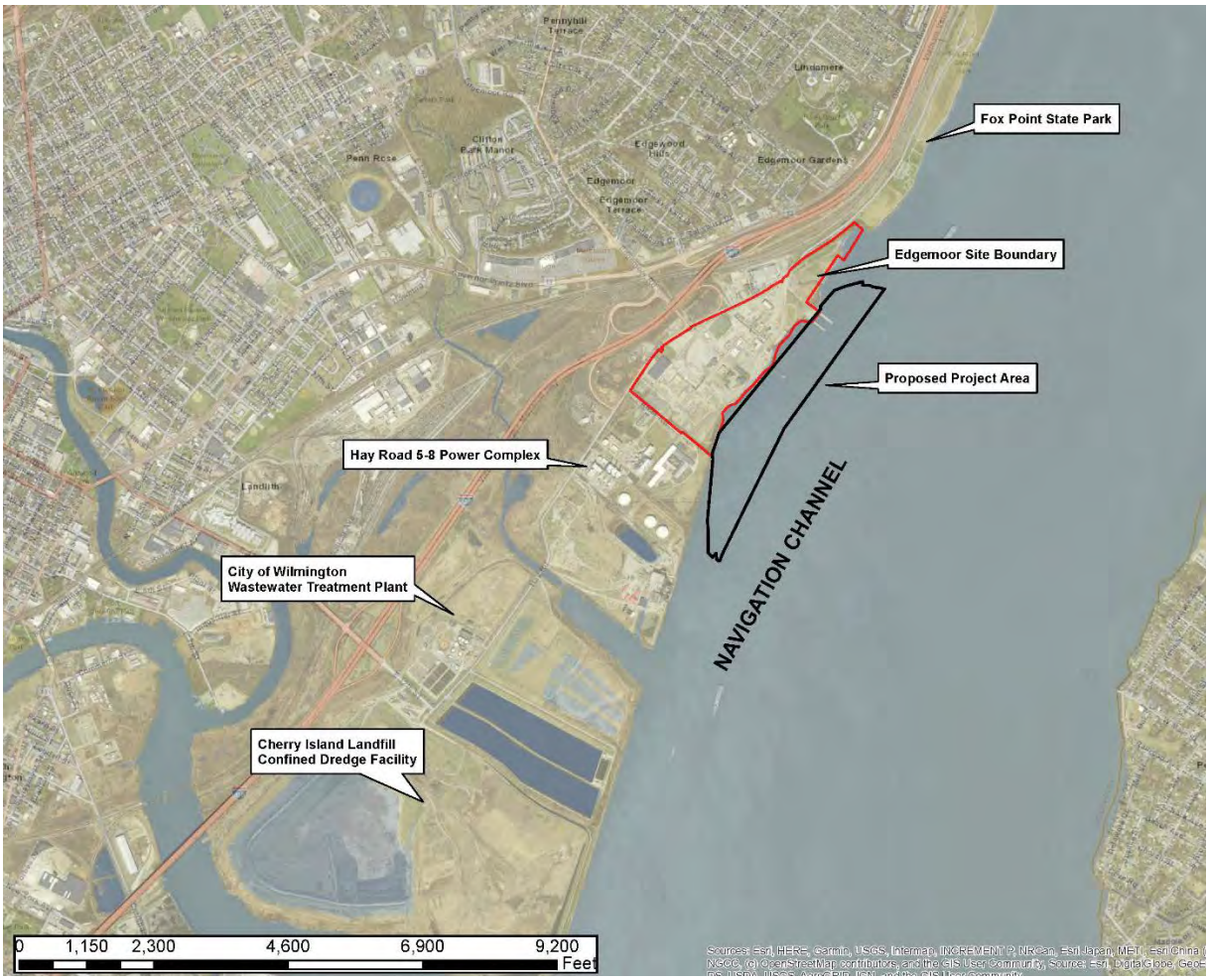
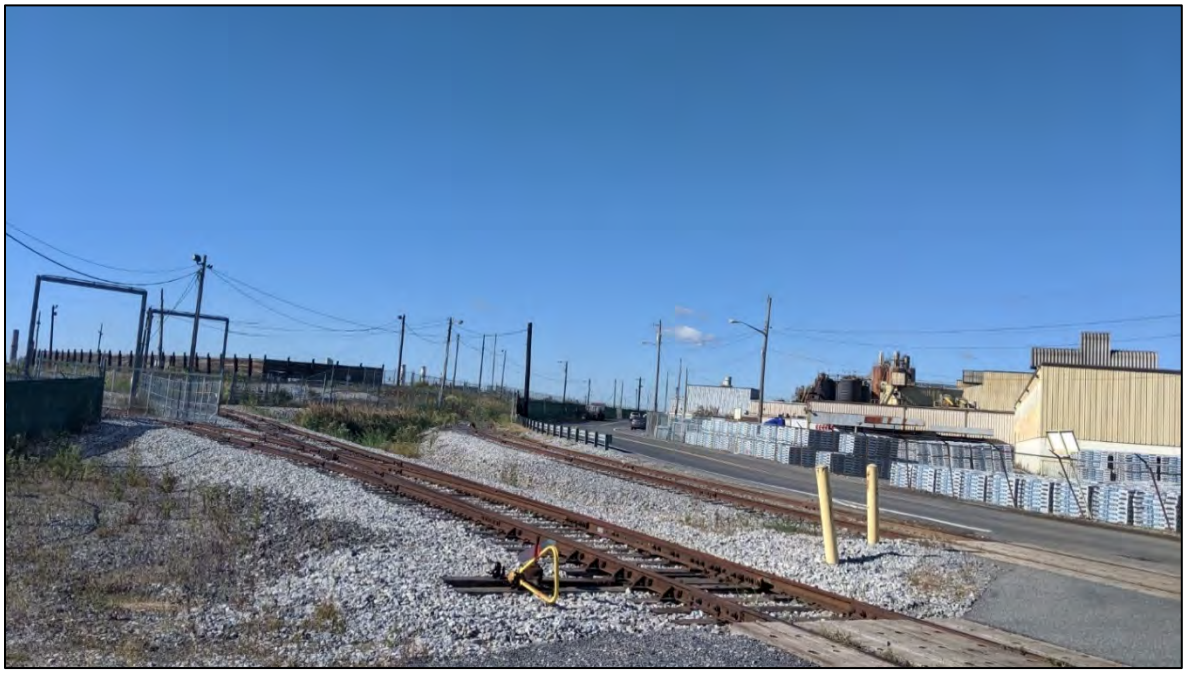


Figure 4.3.3.2-1 Visual Impacts Assessment: Site Location Map

North of the project area is Fox Point State Park. The park was previously a landfill and has been redeveloped for recreational use. The state park extends approximately one mile along the Delaware River and is comprised of walking trails, open grass space, playgrounds, and recreational structures. Visitors of Fox Point State Park have a wide view of the Delaware River. Looking south down the river, recreational users of Fox Point State Park are able to see the project area in the river and the adjacent upland Edgemoor property. Further south past the project area, visitors can see smoke stacks and industrial infrastructure located along the river.

Photograph 2: View of the project area and industrial infrastructure south of the Edgemoor Property from Fox Point State Park.

Visitors also are able to view an existing manufacturing facility located adjacent to the park entrance and the property.



Photograph 3: View of manufacturing facility looking from the entrance of Fox Point State Park.

Park visitors travel along Lighthouse Road which separates the manufacturing facility and the Edgemoor property before entering the Park.

Downriver from the Edgemoor property to the Delaware Memorial Bridge, shoreline properties are used exclusively for industrial, municipal waste disposal, municipal waste treatment and transportation purposes. Immediately adjacent to the property to the south are electricity generating facilities, identified as Hay Road 5-8 Power Complex and an industrial park.

The City of Wilmington Wastewater Treatment Plant (WWTP) is located south of the Power Complex. Continuing south and adjacent to the WWTP is the Cherry Island Landfill operated by the Delaware Solid Waste Authority. The Wilmington Harbor South Confined Dredge Facility (WHS CDF) owned by the U.S. Army Corps of Engineers and used for storage of dredged sediments from the Christina River is also in the area. The WHS CDF is adjacent to Cherry Island Landfill. The entire area is bounded to the west by Interstate-495 (I-495).

To the west of the Edgemoor property is I-495; the Northeast Corridor Railroad, which serves Amtrak, SEPTA and Norfolk Southern passenger and freight trains; and U.S. Highway 13. I-495 and U.S. Highway 13 are heavily traveled roadways. There are commercial properties located along U.S. Highway 13. To the west of the commercial properties are residential developments along Governor Printz Boulevard. Residential communities are located to the north and northwest of U.S. Highway 13 and commercial development is located along the roadway. The closest residential properties are approximately 0.41 miles from the project site. The residential developments situated north of the project area, in the Bellefonte community, and northwest of the project area along Edgemoor Road, are at a higher elevation than the project site according to USGS topographic maps of Edgemoor, Delaware and the surrounding area. Residents in these areas have a view of the existing manufacturing facilities and the Edgemoor property when looking southeast across I-495 towards the project area.

Photograph 4: View southeast towards the project area from Edgemoor Road.

Looking further south, smoke stacks and industrial infrastructure located at the Hay Road 5-8 Power Complex are visible.

Photograph 5: View of industrial infrastructure south of the project area from Edgemoor Road.

Directly to the east of the project area, across the Delaware River, is the residential community of Penns Grove, New Jersey. Northeast from the project area, north of Penns Grove, USACE dredged material disposal areas are located along the shoreline of the Delaware River. Further southeast from the property on the eastern shoreline is Carneys Point, New Jersey as well as the Chemours Chambers Works chemical plant located adjacent to the Delaware Memorial Bridge. Residents in Penns Grove and Carneys Point along the shoreline of the Delaware River have a clear view of the project area and the adjacent industrial sites when looking northwest across the river. Industrial infrastructure remaining at the Edgemoor property and the dock are visible from the opposite side of the river. Buildings, industrial infrastructure and smoke stacks located on the adjacent Hay Road 5-8 Power Complex and the City of Wilmington WWTP are also distinguishable on the skyline above the western shoreline.

4.3.4.1 Direct Impacts to Visual and Aesthetic Resources

Construction of the project is expected to involve the use of a dredge, barges, and several support vessels for the dredging portion of the project. The project also involves construction of the wharf which will require the use of up to two cranes working concurrently. Cranes will be utilized to drive support piling and lay decking during construction of the wharf.

Wharf construction and dredging of the project area will be most viewable from the southern-most portion of Fox Point State Park. The dredge,

barges, and supporting vessels will be visible when looking south towards the project area. The dredging operations are temporary and the views of the Delaware River will not be obstructed since the dredging activities are located along the shoreline south of the state park. Therefore, the dredging of the project area is not anticipated to negatively impact the visual and aesthetic resources of Fox Point State Park. Wharf construction operations and the cranes will be viewable from the park when looking south. However, the views of the Delaware River will not be obstructed since construction is located along the shoreline south of the park and will only be most visible when looking south from the southern portion of the park. The view of the cranes during the wharf construction will be a temporary impact to the view of the southern skyline for visitors and will not have an impact the expansive view of the Delaware River at Fox Point State Park.

The area south of the project area from the Edgemoor property to the Cherry Island Landfill is used for heavy industrial purposes and is bounded to the west by I-495. The dredging operations and wharf construction are not anticipated to have an impact on the visual and aesthetic resources of these areas. The project activities are consistent with the historic industrial land use of the project location and adjacent areas.

Residents in the area west of the project site on Governor Printz Boulevard are not anticipated to be able to view dredging of the project area or the wharf construction due to the distance from the site and because the line-of-sight looking southeast towards the project site will be blocked by I-495 as well as commercial and industrial infrastructure in the area. Residential communities located to the north and northwest of the project area are not anticipated to be able to view the dredging operations at the project site due to the presence of U.S. Highway 13, commercial development along the roadway, and I-495 located between the residential communities and the project site. The dredging of the project area is not anticipated to impact the visual and aesthetic resources for the nearby residential communities. The nearby residents to the north and northwest will likely be able to see the top portion of the cranes during construction of the wharf. The wharf construction and view of the cranes will be a temporary impact to the viewpoints of the neighboring residential communities. Additionally, it is not anticipated to be a significant impact given the historic industrial land use of the area surrounding the project site and the current visual-state of the abandoned industrial facility at the Edgemoor property.

The dredge vessel, supporting vessels, and cranes are likely to be visible for residents in New Jersey looking west and northwest across the Delaware River. The dredging and wharf construction are taking place along the shoreline on the opposite side of the river, with the closest New Jersey residents located approximately 1.45 miles east of the project area. At this distance, the dredge and supporting vessels will have a minimal impact on the view of the Delaware River. The cranes and wharf construction activities are also anticipated to have a minimal impact to the view of the Delaware River.

The dredging and wharf construction are taking place in an area of heavy industrial use that spans approximately 2.60 miles of the western shoreline visible to residents in New Jersey along the Delaware River. The former Chemours Edge Moor plant, along with the adjacent industrial sites, have historically had vertical infrastructure, including a water tower and smoke stacks, which comprised the western skyline above the shoreline. The proposed dredging and wharf construction are consistent with the current and historic visual and aesthetic resources of the area and are not anticipated to adversely impact the view-scape of the western shoreline for New Jersey residents.

4.3.4.2 Indirect Impacts to Visual and Aesthetic Resources

Following the dredging and construction of the wharf, a state-of-the-art port facility will be constructed upland of the project area on the upland property. Construction equipment, truck traffic, and support vessels will be on-site during construction activities. Ship traffic traveling along the Delaware River navigational channel is anticipated to increase with large cargo vessels coming into and out of the port at Edgemoor. During the construction of the port and subsequent operation, there are expected to be five cranes implemented on the wharf for loading and offloading docked ships.

Visitors of the Fox Point State Park will be able to see the construction of the port facility and subsequent operation of the port. The construction activities will be most viewable from the southern portion of the park looking south. The port cranes will be visible to visitors of the park when looking south. However, the expansive views of the Delaware River from Fox Point State Park will not be obstructed since the port will be located along the shoreline south of the park. When the port is in full operation, ship traffic of large cargo vessels is expected to increase. Viewers at Fox Point State Park will be able to see ship traffic coming into the port facility and traveling along the main navigational channel. This is not anticipated to negatively impact the visual experience from Fox Point State Park since the port ships will be docking south of the park and not hindering the viewpoints of the Delaware River. Fox Point State Park is a popular location for viewing maritime activity on the Delaware River and implementing a port facility south of the park is not anticipated to negatively impact the visual aesthetic and opportunities at the park. According to the Delaware Division of Parks and Recreation, “The Delaware River has long been a working river, and Fox Point State Park provides front row seats for watching the river at work. With the shipping channel a scant hundred yards away, the view of tugs and tankers will truly be up close and personal. Interpretive displays describe the functions of the various watercraft plying the river.”

The areas located adjacent to the project area and along the Delaware River to the Christina River is used exclusively for industrial purposes. Historically, this area of Edgemoor, Delaware has been used for industrial

purposes. Converting the former Chemours Edge Moor Plant site into an operational port facility will be consistent with the industrial use of the area. The construction and operation of the port facility and the increased ship traffic along the Delaware River navigational channel are not anticipated to have an impact on the visual and aesthetic resources of the area downriver from the project site.

During the construction of the port and subsequent operation, there will be cranes located on the berth. It is anticipated that the nearby residential communities will be able to see the port cranes during construction and operation of the port facility. Residents closest the U.S. Highway 13 such as on Paladin Drive, Salisbury Drive, and Edgemoor Road will likely have the most direct viewpoint of the top portion of the port cranes when looking towards the project site. The residential communities situated north of the project area, in the Bellefonte community, as well as northwest along Edgemoor Road, are at a higher elevation than the project site according to USGS topographic maps of Edgemoor, Delaware and the surrounding area. Residents in this area will likely have a clearer view of the port construction and operation when looking down towards the project site. The view of the top portion of the port cranes above I-495 and the commercial development along U.S. Highway 13 will be the most noticeable change to the skyline for these residents. It is not anticipated that the ship traffic coming in and out of the port will be visible for residents nearby U.S. Highway 13 and I-495. The ship traffic will likely not be high enough to be viewable over I-495 and other viewpoint obstructions between the project site and the nearby residents. However, the residents located at higher elevations near the project site, typically northwest of the project area, may be able to see ship traffic more clearly during high-tide and port operations looking down into the project area and the upland property.

New Jersey residents are anticipated to be able to view the construction of the port from across the Delaware River looking northwest. What will be most visible to New Jersey receptors, mainly residents along the Delaware River in Penns Grove and Carneys Point, will be the supporting vessels docked along the wharf and the cranes supporting the construction of the port infrastructure on the upland property. The construction activities will be a temporary impact and minimally intrusive on the expansive view of the Delaware River from the eastern shoreline. The port cranes will be viewable on the western skyline and will likely be the most noticeable change to the view-scape of the project area for receptors in New Jersey. Once the port facility is in full operation, New Jersey residents located along the shoreline are expected to see the ships navigating the main channel on the west side of the Delaware River and coming into and out of the port at Edgemoor. From the opposite side of the river, residents will be able to see the operation of the port cranes during loading and unloading of the large cargo vessels. It is anticipated that port operations on the wharf, cranes, and ship traffic in the navigational channel will be the extent of the visible operations for New Jersey receptors. The development of the upland property into an operational port facility is consistent with the

current and historical land use of the area and is not anticipated to negatively impact the visual and aesthetic resources for receptors in New Jersey along the river.

Currently, the state-of-view of the project area and the upland property is an abandoned, demolished industrial facility with industrial infrastructure and smoke stacks visible on the skyline adjacent to the site. Historically, the land along the Delaware River between Fox Point State Park and the Christina River and bounded to the west by I-495 has been utilized for industrial purposes. Rather than remaining a demolished remnant of the former chemical manufacturing plant, the project area and the upland property will be repurposed into a state-of-the-art port facility accommodating large cargo vessels travelling up the Delaware River. Converting the project area and the upland property into an active, state-of-the-art port facility is consistent with the historic land use of this area of Edgemoor, Delaware. Port construction and operation are not anticipated to negatively impact the visual and aesthetic resources of the nearby residential communities, Fox Point State Park, and the surrounding area.

4.3.5 Existing Infrastructure

The project area is located along the Delaware River and adjoins an industrial zone. The property adjoining the project area is the former location of the Chemours Edge Moor Plant. Infrastructure that remains in the project area from the former Chemours Edge Moor Plant includes a pier and pipeline structure, a submerged wastewater discharge pipeline, a wood and concrete pier, and a range light. Figure 4.3.5-1 depicts the location of the existing infrastructure within the project area.

Figure 4.3.4.2-1 Existing Infrastructure Impacts Assessment: Site Location Map

4.3.5.1 irect Impacts to Existing Infrastructure

The pier and pipeline structure is located in the approximate center of the project area and previously served as the cooling water intake and discharge conveyance system from the former Chemours Edge Moor Plant. It consists of a small steel pathway with concrete supports which connects from a concrete platform to the shoreline of the upland property. The structure extends approximately 350 feet into the river perpendicular from the shoreline. A pipeline sits on top of the metal trusses and connects to a small operations building on the concrete platform. Prior to dredging and wharf construction, the structure will be demolished.

A submerged pipeline that served as the wastewater discharge from the former Chemours Edge Moor Plant extends from the shoreline perpendicularly into the river. The pipeline is located to the north of the pier. The proposed container port will be served by a central wastewater

collection system that connects to the New Castle County sanitary sewage collection system. A wastewater discharge to the Delaware River will not be required for the container port. The pipeline is located north of the project area and is not anticipated to be impacted by dredging or wharf construction.

A pier is located on the northern end of the project area. The main concrete slab on the shoreline connects to two docks comprised of concrete and wood structures. The two docks extend into the river approximately 315 feet perpendicularly from the concrete slab towards the navigation channel. The pier will be demolished prior to dredging and wharf construction activities in the project area.

A range light is located adjacent to the pier on the north end of the project area. The range light is located in the river approximately 200 feet from the shoreline and is situated in the area that is designated to be developed into the wharf. The range light is used actively for ship navigation on the Delaware River. Prior to project activities, the range light is expected to be relocated to a spot along the navigational channel deemed effective by the appropriate organizations including the U.S. Coast Guard. The applicant will cooperate with regulatory agencies to relocate the range light to the appropriate location.

4.3.5.2 Indirect Impacts to Existing Infrastructure

The submerged wastewater discharge pipeline is not anticipated to interfere with the construction of the port facility on the Edgemoor property. Demolition of the submerged pipeline may not be required and the pipeline may be left in place. Therefore, construction and operation of the port facility are not expected to indirectly impact the submerged pipeline.

Some above-grade structures remain on the upland property from the former Chemours Edge Moor Plant. Curbing, concrete foundations and supports, utility poles, and demolition debris are found throughout the upland property. Few buildings remain. The remaining above-grade infrastructure likely will be demolished or buried by construction of the new port facility.

4.3.6 Landside Transportation Infrastructure

On the right descending bank of the Delaware River and about two miles north of the confluence with the Christina River, the former Chemours Edge Moor Plant is bordered by Hay Road on the northwestern side, which provides direct access to northbound I-495. The southbound lanes of I- 495 are accessed via Delaware State Highway 3 (Edgemoor Road) at a distance of about 800 feet from the intersection of Hay and Edgemoor Roads. Average Annual Daily Traffic (AADT) counts Hay Road

and Edgemoor Road in 2018 were 331 and 9,129 respectively, as reported by the Delaware Department of Transportation[4].

The Port of Wilmington accesses the Interstate Highway System by I-495 at a distance of about 0.5 miles away from the Port entrance via Delaware State Highway 9A (Terminal Ave.). Average Annual Daily Traffic (AADT) counts for Terminal Avenue in 2018 was 5,762.

I- 495 provides access to Interstate Highway 95 (I-95), the major north/south corridor on the US east coast, Interstate Highway 295 (I-295), providing access to New Jersey and the New Jersey Turnpike, and Delaware State Highway 1, which provides access to the southern portion of Delaware (Figure 4.3.6-1). Population centers along I- 95 are Philadelphia, Pennsylvania and Newark, New Jersey to the north and Baltimore, Maryland, Washington, D.C., and Richmond, Virginia to the south.

As depicted in Figure 4.3.6-1, regional rail service to the former Chemours Edge Moor Plant is provided by local rail spurs from Norfolk Southern, which connect to Amtrak's Northeast Corridor (NEC). Both CSXT and Norfolk Southern provides freight rail service from the north using the NEC from Philadelphia, PA. Norfolk Southern can provide rail services from the south. The Port of Wilmington is also serviced using local rail spurs off Amtrak's NEC. The Shellpot Secondary rail line provides Norfolk Southern rail access to the local tracks and access to the Port of Wilmington. The NEC imposes height restrictions on rail service from a maximum height above top of rail of 15 feet and eight inches to 19 feet, depending on the routes used. Single stack containers cars, typical box cars, tank and hopper cars meet these height restrictions. Multilevel automotive rail service is provided by Norfolk Southern from the south because sufficient overhead clearance is available (DSPC, 2016).

[4] https://deldot.gov/Publications/manuals/traffic_counts/pdfs/2018/2018NewCastleCounty.pdf?060419

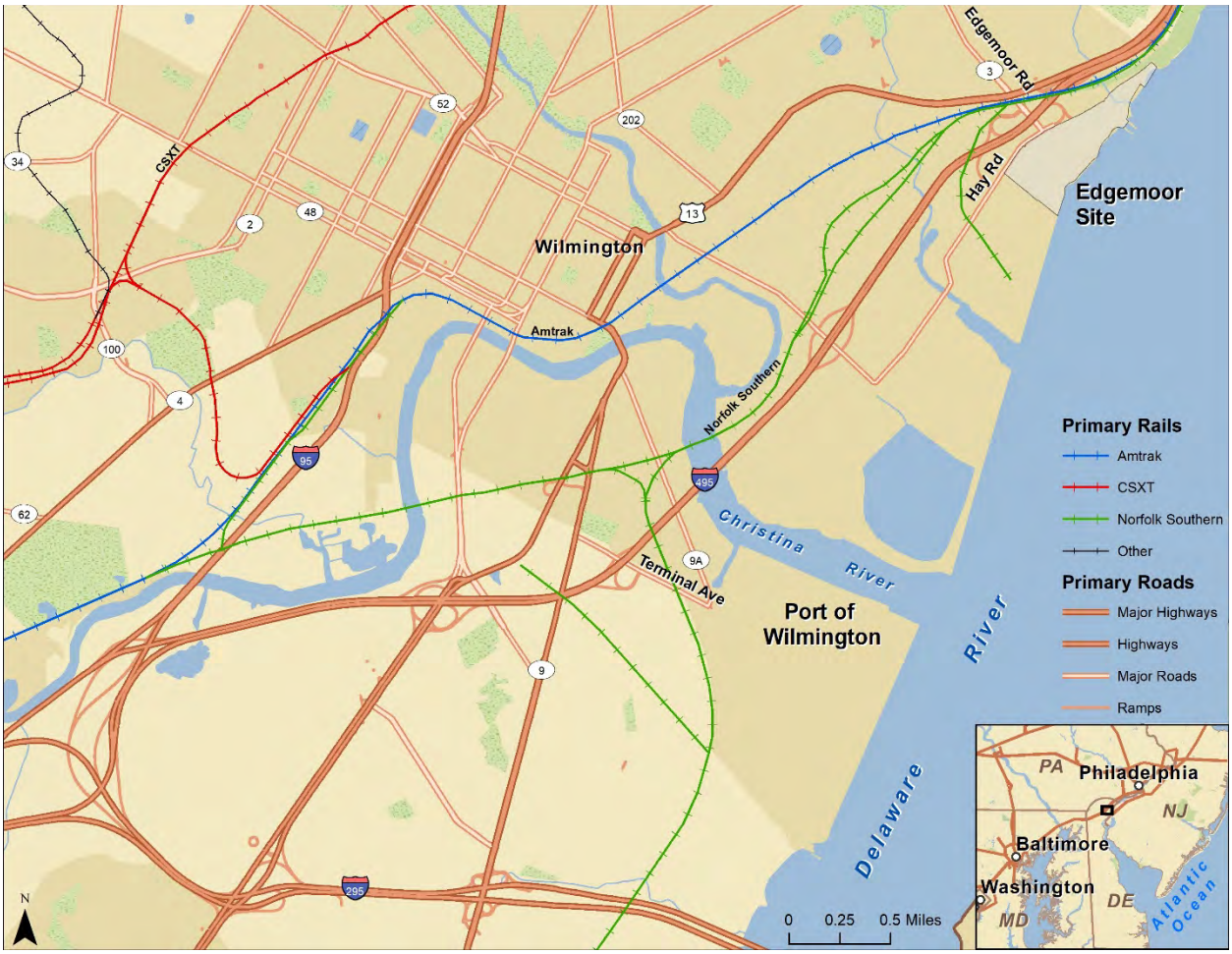


Figure 4.3.5.2-1 Primary Rail and Road Infrastructure Providing Access to the Port of Wilmington and the Former Chemours Edge Moor Plant

4.3.7 Waterborne Transportation Infrastructure

The Delaware River provides a commercial navigation route from Trenton, New Jersey to the Atlantic Ocean. The federal navigation channel extends from the mouth of Delaware Bay to the marine terminal at Trenton, New Jersey for a total distance of about 133 miles. Waterborne freight transportation on the Delaware River is primarily conducted at the Port of Philadelphia, Port of Camden, and the Port of Wilmington (Table 4.3.7-1). Smaller commercial navigation facilities are also found along the river. The USACE, in partnership with the Philadelphia Regional Port Authority, currently is deepening the main channel from Philadelphia to the Atlantic Ocean from 40 to 45 feet.

The Port of Philadelphia, located on the right descending bank of the Delaware River, is about 79 miles from the beginning of the 45-foot deep federal navigation channel in Delaware Bay. Vessel berth depth is 45 feet. The air draft of the port is 150 feet,

restricted by the Walt Whitman Bridge. The port has container, refrigerated, roll-on/roll-off (RO/RO), bulk, breakbulk and liquid bulk facilities[5].

Across from the Port of Philadelphia, on the left descending bank of the Delaware River, near the mouth of Newton Creek, is the Port of Camden in southern New Jersey. Also about 79 miles from the beginning of the federal navigation channel, the Port of Camden has a berth depth of 45 feet and is restricted to an air draft of 150 feet by the Walt Whitman Bridge. The port has facilities for handling containerized, bulk, and breakbulk cargo[6].

Located at the confluence of the Christina River and the Delaware River, the Port of Wilmington is located approximately 57 miles from the beginning of the federal navigation channel in Delaware Bay. Berth depths along the Christina River are a maximum of 38 feet. Typically, these berths are used to handle container, refrigerated, petroleum, bulk, and breakbulk cargos[7]. A berth along the Delaware River has a usable draft of approximately 42 feet for ships carrying RO/RO and break-bulk cargos. The port has an air draft of 188 feet, as restricted by the Delaware Memorial Bridge.

Table 4.3.5.2-1 Comparison of Major Ports on the Delaware River

Port	Distance from Atlantic (miles)	Port Draft Depth (feet)	Air Draft[8] (feet)
Philadelphia	79	45	150
Camden	79	45	150
Wilmington	57	38	188

4.3.7.1 Channels and Turning Basin

The existing navigation channel to the Port of Wilmington and project area is approximately 60 miles from the Delaware Capes, referring to a line across Delaware Bay from the Cape May Light in New Jersey to the tip of Cape Henlopen in Delaware, near the pilot boarding area. The pilot station is located in Lewes, Delaware and a pilot watch tower is present on Cape Henlopen. Relevant NOAA nautical charts include chart numbers 12304, 12311, and 12312.

A summary of the existing channel ranges between the Atlantic Ocean and the Port of Wilmington and project area is provided in Table 4.3.7-1. Beginning at the Delaware Capes, the channel is 1,000 feet wide and accommodates two-way traffic. In an inbound direction through the next

[5] http://www.philaport.com/wp-content/uploads/2017/10/PhilaPort-2017-Brochure-Web.pdf

[6] http://southjerseyport.com/facilities/

[7] https://www.portofwilmington.com/facilities-map.html

[8] http://phl.ports.moranshipping.com/Lists/Documents/Port%20of%20philadelphia%20Information.pdf

several ranges, the channel remains at 1,000 feet wide and narrows from 1,000 feet to 800 feet through the Liston-Above Ship John Light range. The entrance to the Christina River and the Port of Wilmington is located approximately three miles from the southern end of the Cherry Island range. The project area is located at the southern end of the Bellevue range, where it intersects the Cherry Island range.

Along the Christina River at the upriver end of the Port of Wilmington is a turning basin 2,050 feet long and 640 feet wide and 38 feet deep. A 45-foot deep vessel turning basin is being designed into the access channel for the project area. The turning basin will extend into the existing navigation channel.

Table 4.3.7.1-1 Summary of Channel Ranges

Range Name	Begin Mile	End Mile	Approximate Length (mi.)	Channel Width (ft.)	Depth (ft.)
Delaware River and Bay					
Brandywine	0	10.94	10.94	1000	45
Miah Maull	10.94	17.96	7.02	1000	45
Cross Ledge	17.96	21.35	3.39	1000	45
Liston (Below Ship John Light)	21.35	26.92	5.57	1000	45
Liston (Above Ship John Light)	26.92	39.34	12.42	1000 - 800	45
Baker	39.34	40.99	1.65	800	45
Reedy Island	40.99	45.27	4.28	800	45
New Castle	45.27	49.67	4.34	800	45
Bulkhead Bar	49.67	50.23	0.56	1600	45
Deepwater Point	50.23	53.99	3.76	800	45
Cherry Island	53.99	58.32	4.33	800	45
Bellevue	58.32	61.37	3.05	800	45
Christina River					
Delaware River to Upper End of the Turning Basin	0	0.7	0.7	500 - 340	38
Thence to Lobdell Canal	0.7	1.03	0.33	400	35

4.3.7.2 Channel Maintenance

Navigation improvements to the Delaware River were first authorized by Congress in 1836. The deep-draft navigation projects in the estuary include:

- Delaware River, Philadelphia, Pennsylvania to Trenton, New Jersey;
- Delaware River, Philadelphia to the Sea;
- Delaware River at Camden, New Jersey;
- Schuylkill River, Philadelphia; and
- Wilmington Harbor, Christina River, Delaware.

Maintaining the federal navigation channels, anchorages, and turning basins is the responsibility of the USACE. Maintenance dredging removes accumulated sediment that reduces available depth and hinders navigation within authorized projects.

4.3.7.3 Dredged Material Placement Areas

Locally generated dredged materials from the federally maintained portions of the Christina and Delaware Rivers are placed at several local CDF: Wilmington Harbor South, Pedricktown North, Pedricktown South, Oldmans, and Killcohook Cells 1, 2, or 3. (Figure 4.3.7.3-1).

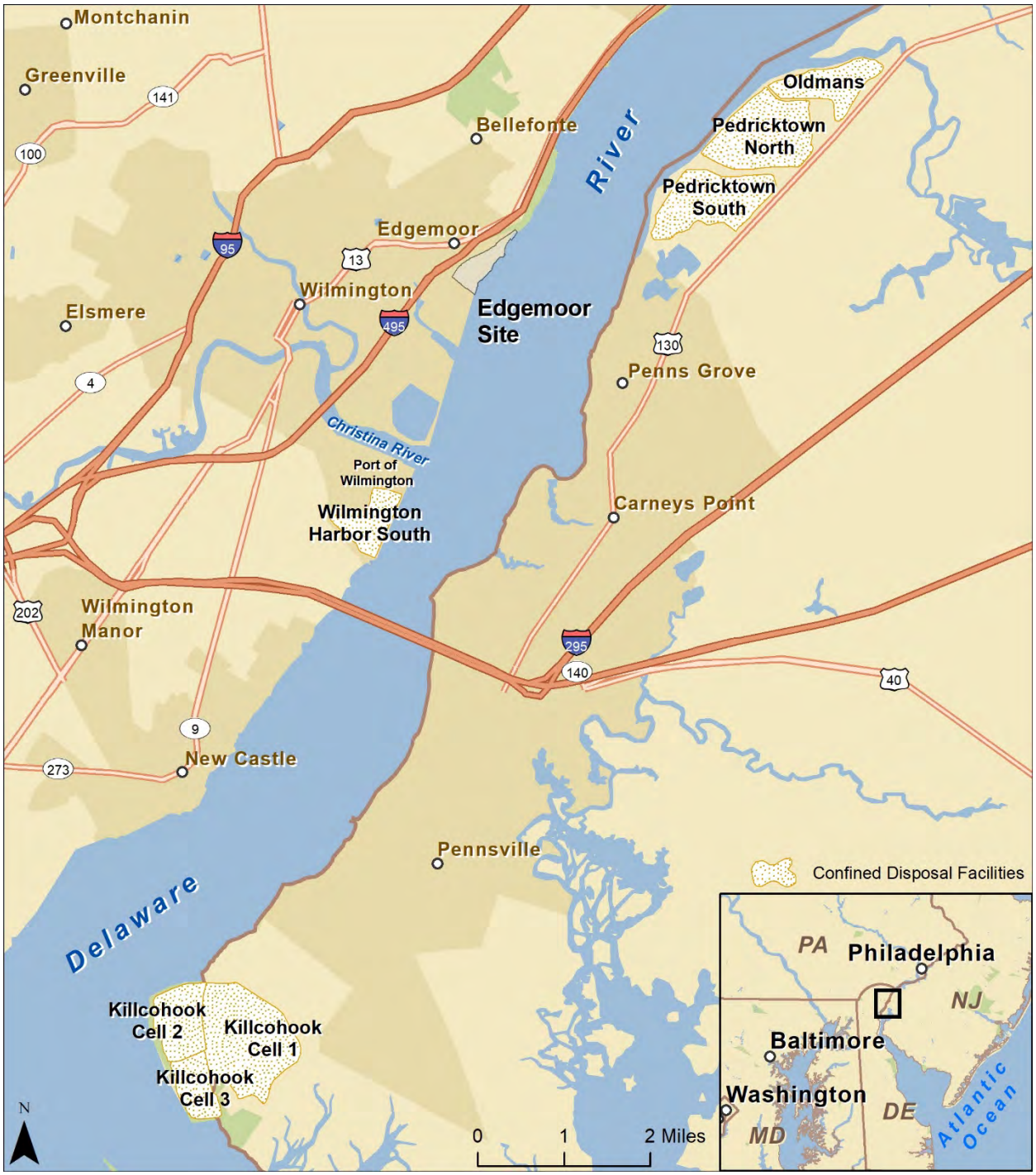


Figure 4.3.7.3-1 USACE Confined Disposal Facilities Near the Edgemoor Site

4.3.8 Hazardous, Toxic and Radioactive Waste

Environmental conditions on the Edgemoor property were assessed and addressed by E.I. DuPont de Nemours (DuPont) and its successor The Chemours Company FC, LLC (Chemours) as part of the closure process prescribed by the Resource Conservation and Recovery Act (RCRA). Additional due diligence assessment of the upland property was performed in 2016 prior to the purchase of the property by the State of Delaware through DSPC. Copies of the Phase I Environmental Site Assessment is provided in Appendix 8 with other documents summarized below.

4.3.8.1 RCRA Closure

DuPont submitted an application for a RCRA Closure Permit to the DNREC. DuPont, Chemours, and their respective consultants developed plans for the investigation of site conditions associated with DuPont's operations on the upland property at locations identified as Solid Waste Management Units (SWMUs). These plans and the ensuing reports were submitted to DNREC for review and approval. The following provides a brief listing of the RCRA reports prepared for the former Chemours Edge Moor Plant:

- April 2009 Phase I RCRA Facility Investigation (Phase I RFI);
- March 2010 Post-Closure Care Plan – Addendum 1, Revised Monitoring and Maintenance Plan, Closed Surface Impoundments (PCCP);
- July 2010 Investigation Summary Letter Report, Holland Mulch Site (Baseline Investigation);
- March 2011 Phase II RCRA Facility Investigation (Phase II RFI);
- June 2013 Risk Analysis (RA); and
- August 2013 Corrective Measures Study Report (CMS).

Holland Mulch Site is referred to as the "2-Acre Outparcel," which is located along the western side of Hay Road and is not connected directly to the larger 112-acre former Chemours Edge Moor Facility.

During review of the reports identified above, the following SWMUs were identified:

SWMU-1:	Wastewater Treatment System
SWMU-2:	Pond E (Effluent Holding Basin)
SWMU-3:	Waste Mixing Area and Split Box
SWMU-4:	Former Trash Landfill/Old Landfill
SWMU-5:	Waste Settling Area
SWMU-6:	Internally Partitioned Ponds (A, B, C, and D)
SWMU-7A:	Building 23 PCB Storage Area

SWMU-7B: Kiln 2 PCB Storage Area

SWMU-8: Former Less Than 90-Day Hazardous Waste Accumulation Area

SWMU-9: Hazardous Waste Accumulation Pad

SWMU-10: Eastern Shore Area

SWMU-11: Drainage Culvert

SWMU-12: Emergency Overflow Basin

SWMU-13: Process Sewers

SWMU-14: Underground Pipelines

SWMU-15: Unpaved Ditch

SWMU-16: Scrap Metal Area

SWMU-17: Truck Refueling Area (2 USTs)

SWMU-17A: Underground Storage Tank #s 1, 2, 3, 4, B, C, F, & G

SWMU-17B: Underground Storage Tank #s 6, 7, 8, 9, A, I, J, K and L

SWMU-18: Iron-Rich Staging Area

SWMU-19 Iron-Rich Filter Press Building

SWMU-20: Former Oil Aboveground Storage Tanks

SWMU-21: Copper Vanadium Sludge Pad

SWMU-22: Ferric Chloride Tank Truck Loading Spot

SWMU-23: Recovered Ore Storage Area

SWMU-24: Oil-Water Separator/Skimmer

SWMU-25: Ferric Chloride Railcar Loading Area

SWMU-26: TiO_2 Railcar Loading Area

SWMU-27: Fuel Oil Stained Soil

SWMU-28: Caustic Storage Area

SWMU-29: Southland Tank (added at the conclusion of Phase I RFI)

Site-wide Groundwater

As defined by RCRA, the SWMUs are discernable units at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

DNREC determined that the following SWMUs required no further action: 7A, 7B, 9, 10, 11, 12, 14, 19, 22, and 26. This determination was based on the definition of a SMWU and review of the historical records of those areas.

April 2009 Phase I RCRA Facility Investigation (Phase I RFI)

Sixteen SWMUs were addressed during the Phase I RFI. Based on analytical results of soil sampling during the Phase I RFI, the subcontractor requested no further action for SWMUs 8, 15, 21, and 24. Additionally, no further investigation was requested for four SWMUs 16, 18, 27, and 28. Eleven SWMUs were recommended for further investigation in the Phase II RFI.

Groundwater was evaluated on a site-wide basis rather than by SWMU. Thirty-two monitoring wells were installed on the 112-acre property. Twenty-two monitoring wells were installed with eleven wells intercepting shallow water-bearing soils and eleven wells intercepting the deep water-bearing soils. Ten monitoring wells are installed around the surface impoundments (SWMU 6). Groundwater analytical results were inconclusive and further investigation was recommended in the Phase II RFI, based on a SWMU-specific basis.

March 2011 Phase II RCRA Facility Investigation (Phase II RFI)

Nine SWMUs were investigated during the Phase II RFI. Semi-volatile organic compounds and metals in soil samples were reported as the primary substances of concern. Additionally, shallow soil samples were collected and field-tested for pH from SWMU-29. The findings resulted in requests for no further action for three SWMUs: 17B, 28, and 29.

Groundwater monitoring wells on the property were sampled for a second time during the Phase II RFI. Soil boring logs for the installed groundwater monitoring wells indicated that a clay layer is present below the ground surface, no distinct aquifer was identified, and encountered water-bearing soil units had low yields and were not interconnected. The groundwater analytical results from collected samples reported metals as the primary substances of concern. No further investigation was recommended for groundwater. Groundwater analytical results were to be assessed in the Risk Analysis (RA).

June 2013 Risk Analysis (RA)

Following completion of the Phase I and Phase II RFIs, a risk analysis was performed on the SWMUs identified as needing “no further investigation.” Those SWMU’s were identified as 1 & 3, 4, 5, 13A, 13B, 16, 17B (tanks 9 & A), 18, 20, 23, 25, and 27. The risk analysis was performed to evaluate the human health and ecological impacts of the SWMUs. The exposure scenarios considered were industrial workers, construction workers, and off-site recreational users.

The human health risk analysis reported that with the exception of SWMU 1&3, the total excess cancer and non-cancer risks for industrial and construction worker scenarios were below the target cancer risk. The cancer risk for SWMU 1&3's did not meet target cancer risk due to the concentration of benzo(a)pyrene in soil. The results of the RA indicated that eleven of the SWMUs reviewed had acceptable risk with respect to human health based on the exposure scenarios assessed.

August 2013 Corrective Measures Study Report (CMS)

The 2013 CMS was developed to evaluate the appropriate remedial actions for the SWMUs investigated. The CMS identified 12 SWMUs (1 & 3, 4, 5, 13A, 13B, 16, 17B [tanks 9 & A], 18, 20, 23, 25, and 27) requiring evaluation by the RA, which was discussed in the CMS. The other SWMUs were not evaluated in the CMS due to:

- Being designated as requiring "no further action" (SWMU 15, 17A, 17B[tanks 6, 7, 8, I, J, K & L], 21, 24, 28, and 29), or
- Not being included in the Corrective Action Order (SWMU 2, 6, 7A, 7B, 9, 10, 11, 12, 14, 17, 19, 22, and 26).

Although SWMU 8 received "no further action," specific regulatory closure was required. Therefore, it was included in the CMS report.

Based on the RA results, active remedial action was not recommended for the 12 SWMUs addressed in the CMS. Instead, institutional actions including filing an environmental covenant with the property deed to ensure the site use remains non-residential and preparing a contaminated materials management plan was proposed to ensure that site soils are handled properly.

Groundwater impact was observed on the former Chemours Edge Moor Facility, but the groundwater impact appears to be limited in extent. Reportedly, impacted groundwater had not migrated off-site, and had no current exposure pathway to construction or industrial workers existed.

The SWMU-2 was the effluent holding basin for the wastewater treatment system on-site. It was investigated and closed as a last step in the demolition and decommissioning of the processing systems of the former plant.

March 2010 Post-Closure Care Plan (PCCP) – Addendum 1, Revised Monitoring and Maintenance Plan, Closed Surface Impoundments

SWMU 6 has been closed, but requires long-term semi-annual groundwater monitoring and quarterly maintenance inspections of the engineered cap system. The PCCP for SWMU 6 discusses maintenance and monitoring requirements for the closed ponds that previously handled wastes from chloride and sulfur processes. The PCCP describes the monitoring well network, analyses, sampling methods, and schedule for monitoring. A

monitoring network of ten wells was installed for long-term monitoring of SWMU 6. Analyses of semi-annual groundwater samples include antimony, arsenic, manganese, thallium, hexachlorobenzene, hexachlorobutidiene, octochlorostyrene, and pentachlorobenzene. Collection of groundwater samples for analysis of PCBs by EPA SW-846 Method 1668 as well as dioxins and furans by EPA SW-846 Method 1613 is only required for two monitoring wells and only once annually. Monitoring and annual reporting of site conditions in accordance with the approved PCCP is ongoing. Caps will need to remain in place and monitoring will need to continue during and after the development of the former Chemours Edge Moor Facility as a port.

4.3.8.2 Other Local Sites

Several sites in northern New Castle County proximate to the project site may have contributed to historic water quality conditions and may have affected sediment quality in the project area. Immediately upriver of the project site is Fox Point State Park. The park formerly was a landfill used by the railroads (and others) to dispose of materials from their operations. Conditions at that site were assessed and remedied by the State of Delaware through its Brownfields Program under the auspices of HSCA. The remedy included the installation of clean, stabilized cover that should minimize the potential for erosion of substances of concern from the site and transportation of those substances to the Delaware River. Similarly the remedial system should minimize the potential for substances of concern to enter the Delaware River by way of groundwater flow.

The former EVRAZ Steel Mill site is located further upriver. Site conditions have been assessed or are being assessed under the State of Delaware Voluntary Cleanup Program through an agreement between the site owner/developer and the State of Delaware. Plans for remedial action are being developed, have been approved, or in some cases are being implemented currently. These actions, where applicable, are intended to reduce the migration or discharge of hazardous substances and PCBs to the Delaware River.

The former General Chemical facility is located upriver from the former EVRAZ facility. The former General Chemical facility is being addressed by USEPA under RCRA. Remedial Actions being implemented are intended to minimize the migration and discharge of hazardous substances from the site to the Delaware River. Remedial Actions are being planned to include the removal or entombment of river sediments adjacent to a portion of the former General Chemical facility.

Downriver from the project site, and proximate to it, are Fox Point Industrial Park, Hay Road 5-8 Power Complex, former DuPont iron rich waste storage area, City of Wilmington wastewater treatment plant, and Cherry Island Landfill, that may have contributed hazardous substances to the Delaware River. Stormwater is discharged to the Delaware River from Fox Point Industrial Park and Hay Road 5-8 Power Complex. Both of those

sites are located adjacent to the project site. The discharges from those sites are permitted and monitored in accordance with permit requirements. The Hay Road 5-8 Power Complex recently was converted from being coal and petroleum fired to being all gas fired. At the time of conversion, the plant was also modified to operate in combined cycle, which significantly reduced the plant demand for cooling water. The conversion from coal significantly reduced the potential for substances of concern such as metals and PAH compounds from being introduced to the Delaware River.

The DuPont iron rich waste storage site was addressed under RCRA. The site is located between the Hay Road 5-8 Power Complex and the City of Wilmington wastewater treatment plant. The waste piles at that location were capped. The site is being monitored by Chemours and the results are reported to DNREC. Future migration of substances of concern from the waste piles by stormwater runoff or groundwater to the Delaware River is unlikely, based on this information.

The City of Wilmington discharges treated combined wastewater (sanitary sewage and stormwater) to the Delaware River. The discharge is permitted and monitored. Monitoring results are reported in accordance with permit requirements. The discharge from the wastewater treatment plant would be unlikely to significantly affect the concentration of substances of environmental concern in the Delaware River sediments, provided that it continues to operate in accordance with the permit limitations and those permit limitations reflect the Total Daily Discharge Limits (TMDL) that have been established for the Delaware River.

Cherry Island Landfill is an active solid waste storage facility operated by the Delaware Solid Waste Administration (DSWA). The landfill was developed with a leachate collection system and has a groundwater monitoring network. The landfill has a perimeter stormwater management system that impedes a direct discharge of stormwater from the site to the Delaware River. Wastes deposited at the landfill receive daily cover and more permanent landfill covers are constructed on the landfill side slopes as the landfill progresses vertically. As long as the landfill continues to be operated and maintained in accordance with the State of Delaware issued operating permit, it would be unlikely for the landfill to contribute hazardous substances to the Delaware River in amounts that would significantly affect the quality of sediments.

4.3.9 Air Quality

The proposed construction of a new container terminal access channel, berth and wharf at Edgemoor, Delaware, will require the use of commercial marine vessels and land-based equipment that generate air emissions. Because the project requires federal Clean Water Act and Rivers and Harbors Act permits, the project must comply with State of Delaware Implementation Plans for compliance with the Clean Air Act (42 U.S.C. 7401et seq.) NEPA also requires that the project applicant assess

temporary construction and transportation related air emissions and the effect of those emissions on air quality.

To comply, the applicant has estimated Criteria Air Pollutants (CAPs) emissions from the machinery that might be used for construction and that might be used by construction workers (vehicles) commuting to the project site, and compared such emissions to quantities allocated (budgeted) for similar activities in the federally-approved 2014 National Emissions Inventory (NEI) and to threshold values established per 7 DE Admin. Code 1132, paragraph 3.2.1 (rates applicable to marginal ozone nonattainment area). In consultation, DNREC recommended using the 2014 NEI budgets for the comparative purposes of the conformity assessment. CAPs include nitrogen dioxide (NO_2), sulfur dioxide (SO_2) carbon monoxide (CO), ground-level ozone (O_3), particulate matter (PM) and lead. Ground-level ozone concentrations commonly are linked to emissions of nitrogen oxides (NOx) and volatile organic compounds (VOC) and regulations focus on the emissions of those substances as a means of controlling ozone concentrations. Construction related emission estimations are detailed in Appendix 24.

The construction emission estimates for this project were calculated using the following equipment categories: commercial marine, non-road construction equipment, and on-road vehicles. The dredging and wharf construction work were included in the commercial marine category and are expected to require three years to complete, due to limitations that will be placed in the federal permit to avoid in-water work (dredging and pile driving) during the annual anadromous fish migration and spawning season (March through July) and the capacity of the dredge storage facility that will be used to contain, decant and dry dredge slurry. Dredging during the first year of construction is anticipated to be limited to approximately 90 days. The duration of dredging in the second and third years are anticipated to be 75 days and 60 days, respectively.

The initial, conservative assessment scenario assumed that the commercial marine category equipment used would be powered by Tier 0 (pre-2000) engines, due to the longevity of marine vessels, the perceived availability of marine equipment powered by newer Tier II engines, and the limited use of ancillary equipment when compared to land-based construction equipment. Non-road construction equipment (land-based) was assumed to be equipped with newer engines designed to meet Tier III exhaust emission standards, reflecting engines built after the mid-2000s. Emissions from heavy duty on road vehicles (dump trucks) were estimated assuming that Tier II diesel engines were in use. Emissions from construction worker vehicles were estimated based on gasoline powered engines in light trucks. In this scenario NO_x emissions would exceed the *de minimis* marginal ozone nonattainment area threshold of 100 tons per year (TPY). However, when compared to the State of Delaware NO_x emission budget of 2014 NEI, total first year NO_x emissions of commercial marine sources would only represent approximately 3.4 percent of the budget established by the State of Delaware for marine emission sources category of emissions. Further, the project construction emissions in total would comprise 0.78 percent of the budget

established for transportation sources within the State of Delaware. Subsequent year construction related emissions are anticipated to be lower than those of the first year, and would represent smaller portions of the marine and overall transportation budgets.

A second assessment scenario, designed to explore a means of minimizing emissions, was performed and assumed that commercial marine engines meeting Tier II standards (constructed post 2006) would be utilized, while the non-road construction engines would continue to meet Tier III specifications. Emissions from heavy duty on road vehicles (dump trucks) were estimated assuming that Tier II diesel engines were in use. Emissions from construction worker vehicles were estimated based on gasoline powered engines in light trucks. Under these circumstances, the analysis indicated that none of the *de minimis* thresholds for CAPs would be exceeded. The use of Tier II and III engines as estimates are identified as best practices to minimize emissions. Used in conjunction with an anti-idling provision in contract documents, these practices would help to minimize criteria emissions to air during project construction.

Both analyses suggest that the project conforms to State of Delaware and federal requirements. In the scenario where commercial marine engines are Tier 0, NO_x emissions represent a very small portion of the State NO_x budget for transportation related NO_x emissions and are not anticipated to cause or contribute significantly to ozone concentrations in excess of the National Ambient Air Quality Standards (NAAQS); increase the frequency or severity of ozone concentrations exceeding NAAQS; or delay timely attainment of the ozone NAAQS, interim emission reductions, or other milestones. In the second scenario, where best practices are utilized, NO_x emissions do not exceed *de minimis* thresholds and no further mitigation would be required. Contract bidding documents for the project will encourage the provision and the use of Tier II engines in marine equipment, Tier III engines in land-based construction equipment, and Tier II engines in heavy duty trucks used to haul fill materials. Contract specifications will contain an anti-idling provision.

4.3.10 Noise

In the human environment, noise is characterized as unwanted or excessive sound levels that disrupts or distracts humans at excessive intensities. The berth and port construction is expected to generate noise which will contribute to the sound environment of the area nearby the project site. The direct and indirect impacts of the generated noise on the surrounding environment is analyzed in this section of the EA. This section of the EA aims to analyze the impact of noise generated from construction activities to sensitive human receptors.

More broadly, the environment subject to noise impact includes the estuary environmental (maritime noise). The increased impacts from construction and operations on the estuary environment are anticipated to be insignificant and are more completely addressed in the BA and in the Appendix 13. Therefore, this section of the EA offers a brief summary of the assessment of noise impacts to the estuary that

may result from the project, but focuses on the impacts of generated noise on human receptors.

Sound intensity is measured in decibels (dB) and environmental sound levels are typically expressed in terms of time-weighted averages. The average sound levels can then be expressed over a continuous sound level. To quantify the noise generation and analyze the effect on human receptors, a weighting is applied to the sound level known as "A-weighting". Sound is measured across a spectrum of frequencies and the "A-weighting" is applied to individual decibel values of each frequency interval. The logarithmic sum of A-weighted decibel values is expressed as dBA.

Noise-sensitive receptors are humans that may be disrupted from normal activity due to excessive noise levels. Noise-sensitive land uses nearby the project area include residential, medical, educational, religious, and recreational facilities. New Castle County has a noise ordinance in place that regulates the allowable noise levels based on land zoning. Residential areas are considered Class A receptors, businesses and commercial areas are Class B receptors, and industrial land use is considered Class C. The maximum noise level that a Class C emitter can generate as measured at the property line of a Class A or B receptor is 65 dBA during the daytime and 55 dBA during the nighttime. The project actions will be required to comply with these regulatory levels.

Maritime noise generated as a result of construction and operation of the port includes pile driving and underwater noise from shoaling prevention fans and ships. The noise generated by pile driving will be minimized by using a "soft" start (i.e., vibration) method and by the placement of cushioned pads on the pile heads. In addition, it is expected that a moratorium on pile driving during the spring spawning season (typically March 1st – June 30th) will be issued for the project as to minimize the impact on migratory fish species. The effects of pile driving on ESA-listed species, specifically sturgeon, is briefly discussed in section 3.2.3 of the EATD and in greater detail in the BA included in Appendix 13. Based on a 2012 underwater noise survey intended to compare noise generated by shoaling prevention fan operation to ambient noise conditions at the mouth of the Christina river (adjacent to the Port of Wilmington), the results indicated that the sound dissipates quickly with distance and would be relatively undetectable at a distance of 1,800 feet. A small increase in the number of vessels traversing the federal navigational channel as a result of the new port facility is predicted to occur. The increase in underwater noise generated from ship traffic will be an insignificant change, given that the Delaware River is frequently traversed by large commercial vessels.

The following table summarizes the closest noise-sensitive human receptors nearby the project area.

Table 4.3.8.2-1 Noise-sensitive Receptor Locations

	Residential	*School*	*Health Care*	*Religious*	*Recreational*
Name	Residence	Fiske Academy at Camelot	WHW Treatment Services	Anglican Church of the Pentecost	Fox Point State Park
Street Address	E Salisbury Dr.	1413 Lore Ave	6 Denny Rd #106	4825 Governor Printz Blvd.	Lighthouse Rd
Approx. Distance from Project Area (ft.)	2,800	3,050	4,250	2,950	3,500
Approx. Distance from Project Area (mi.)	0.53	0.58	0.80	0.56	0.66

The distances were determined using the closest approximate distance from the project area to each receptor. The location of the noise source will vary throughout the construction of the berth. However, the distances used in calculating noise levels represent the maximum noise levels that each receptor may be exposed to throughout the lifetime of the project. The closest residence to the project area is located approximately 0.53 miles northwest of the project area on East Salisbury Drive. The closest school is the Fiske Academy at Camelot which is located approximately 0.58 miles north of the project area. WHW Treatment Services is the closest medical facility and is located approximately 0.80 miles northwest of the project area. The closest religious facility to the project area is the Anglican Church of the Pentecost located approximately 0.56 miles northwest on the opposite side of I-495 and U.S. Highway 13. The closest recreational facility is the Fox Point State Park which is located north of the project area along the Delaware River. The distance from the northwest end of the project area to the pavilion and playground area at Fox Point State Park was used in the calculation of sound levels, based on the premise that most recreational users of the park likely would congregate there and their activities potentially would be most susceptible to the noise generated at the project area.

The proposed project area is located in an area of heavy industrial and commercial use, with those facilities being located along the Delaware River, U.S. Highway 13 and I-495. The Northeast Corridor Railroad as well as I-495 and U.S. Highway 13 are situated in-between the project area and the nearby noise-sensitive receptors, with the exception of Fox Point State Park. The existing sound environment in the vicinity of the project area currently is affected by transportation noise from roadways, the river, the railroad, as well as from the nearby industrial and commercial facilities.

According to the United States Department of Transportation, Federal Highway Administration, the average sound level from vehicular traffic is between 70 and 80 dBA measured at 50 feet from the highway (U.S. DOT, Federal Highway Administration). For the purposes of calculating the ambient sound level, an average of 75 dBA from traffic is assumed. The typical sound level of a freight train measured at 50 feet from the tracks is 80 dBA (IAC Acoustics). The noise generated

from roadway traffic and trains is assumed to propagate in a cylindrical pattern. Therefore, the standard sound level propagation equation for a line source is used. The following table summarizes the closest distances from U.S. Highway 13 (from I-495 for Recreational) and the railroad to each sensitive receiver located in the vicinity of the project area.

Table 4.3.8.2-2 Noise-sensitive Receptor Distances from Roadway and Railroad

	Residential	***School***	***Health Care***	***Religious***	***Recreational***
Name	Residence	Fiske Academy at Camelot	WHW Treatment Services	Anglican Church of the Pentecost	Fox Point State Park
Street Address	E Salisbury Dr.	1413 Lore Ave	6 Denny Rd #106	4825 Governor Printz Blvd	Lighthouse Rd
Approx. Distance from U.S. Highway 13 / I-495 (ft.)	200	225	465	65	650
Approx. Distance from Railroad (ft.)	665	665	600	420	500

To calculate the existing sound environment at the locations of the nearby sensitive receptors, the following calculations of traffic noise and train noise were made.

From the Inverse Square Law: $L = L_{max} - 10 * \text{Log}\,(D/D_0)$ [line source]

$$\mathbf{L_{ambient} = 10*Log\,(\sum_{i=1}^{n} 10^{(\frac{Li}{10})})}$$

L = The A-weighted ambient sound level measured
L_{max} at 50 feet = The highest A-weighted sound level generated from roadway and railroad traffic
$L_{ambient}$ = The combined A-weighted ambient sound level
D = The distance from the noise source to the receptor
D_0 = The reference measurement distance (50 feet in this case)

Table 4.3.8.2-3 Ambient Sound Level Calculations

Noise-Sensitive Receptor	**Noise Source**	**L_{max} (dBA)**	**D (ft)**	**D0(ft)**	**L (dBA)**	**$L_{ambient}$ (dBA)**
Residental	U.S. Highway 13	75	200	50	69	72
	Railroad	80	665	50	69	
School	U.S. Highway 13	75	225	50	68	72
	Railroad	80	665	50	69	
Health Care	U.S. Highway 13	75	465	50	65	71
	Railroad	80	600	50	69	
Religious	U.S. Highway 13	75	65	50	74	76
	Railroad	80	420	50	71	
Recreational	I-495	75	650	50	64	72
	Railroad	80	340	50	72	

The ambient sound environment typically experienced at the closest residence is 72 dBA. The closest school experiences an ambient sound level of 72 dBA. The closest healthcare facility experiences an ambient sound level of 71 dBA. The closest religious establishment, which is located along U.S. Highway 13, experiences the loudest ambient sound level at 76 dBA compared to the other noise-sensitive receptors. Visitors of Fox Point State Park at the central pavilion and parking area experience an ambient sound level of 72 dBA.

4.3.10.1 Direct Impacts to Noise

To determine the maximum noise generation due to project construction activities, the highest intensity sound was chosen for the calculations. According to the State of Washington, Biological Assessment Preparation Manual, the average maximum noise level of an impact pile driver is 110 dBA measured 50 feet away from the source. The noise generated from the impact pile driver will be the loudest source of construction noise during the construction of the wharf. The piles will be installed from a barge using a combination of vibration and cushioned impact driving. A vibratory hammer will be used to drive the piles to refusal and then a cushioned impact hammer will be used to drive the piles to their final design depth. By using the cushioning pads, the emitted sound from the impact pile driver is reduced. Using noise control techniques to reduce the sound emitted from the pile driver can typically reduce the noise levels by approximately 10 dB (USEPA Office of Noise Abatement and Control). Therefore, a maximum noise level of 100 dBA will be used for the purposes of this noise impacts analysis. This maximum noise level is used to be conservative with the noise level calculations, given that the dredge machine, ships, and other construction equipment are expected to have noise levels less than 100 dBA. Using these assumptions and the distances to the nearest sensitive receptors, the following calculations were made to determine the maximum sound levels (L_{max}) that might be experienced by each sensitive receptor:

L_{max} = Construction L_{max} at 50 feet – 20 * Log (D/D_0) [point source]

L_{max} = Highest A-weighted sound level measured
Construction L_{max} at 50 feet = The highest A-weighted sound level generated from the cushioned impact pile driver at the reference measurement distance (standard is 50 feet)
D = The distance from the noise source to the receptor
D_0 = The reference measurement distance (50 feet in this case)

Table 4.3.10.1-4 Comparison of Maximum Pile Driver Noise and Ambient Sound Level

Noise-Sensitive Receptor	Construction Lmax at 50 ft (dBA)	D (ft)	D0(ft)	L_{max} (dBA)	$L_{ambient}$ (dBA)
Residental	100	2800	50	65	72
School	100	3050	50	64	72
Health Care	100	4250	50	61	71
Religious	100	2,950	50	65	76
Recreational	100	3,500	50	63	72

The maximum noise level that the closest resident may experience from pile driving is calculated to be 65 dBA. The calculated maximum noise level at the closest school 64 dBA. The calculated maximum noise level at the closest health care facility is 61 dBA. The closest religious facility may experience a maximum noise level of 65 dBA and recreational users of Fox Point State Park may experience a maximum noise level of 63 dBA, based on the calculations. Therefore, the maximum noise levels generated from the project construction activities are anticipated to be less than the ambient sound environment in the vicinity of the sensitive receptors.

For comparative purposes, the sound level of a typical conversation between two people 3 feet apart ranges between 60 and 65 dBA (U.S. FHWA). The maximum sound levels from project activities are anticipated to be within this comparative range. The difference between the L_{max} and conversation sound level is likely to be discernable to human receptors. Additionally, average sound levels from dredging and construction activities over the life of the project are expected to be less than the calculated L_{max}.

The New Castle County noise ordinance for daytime hours has a maximum noise level of 65 dBA, as measured at a receiving Class A and Class B receptor (residential and commercial), between the hours of 7 A.M. and 10 P.M. Based on the above noise level estimates, the maximum noise levels generated from the project actions are anticipated to comply with the New Castle County noise ordinance.

Given the results of these calculations and comparisons to ambient and ordinance required conditions, noise monitoring is recommended. Noise levels should be measured and recorded prior to the start of construction to capture ambient conditions and during the initial phase of construction while pile driving and other noise producing activities are in progress. If construction noise levels do in fact exceed the New Castle County noise ordinance, additional noise reduction measures will need to be implemented, such as additional pile driver muffling or sound barriers.

It is possible that the dredging and pile driving actions will operate 24-hours a day for limited periods of time given the limited time frame for the proposed actions. For this reason, the noise levels generated from the project actions need to be assessed for compliance with both daytime and nighttime regulatory levels for New Castle County. The New Castle County noise ordinance for nighttime hours has a maximum noise level of 55 dBA, as measured at a receiving Class A and B receptor (residential and commercial), between the hours of 10 P.M. and 7 A.M. The estimated maximum sound levels at the closest Class A and B receptors are exceeding 55 dBA by between 7 and 11 dBA, with the largest exceedance occurring at the closest residence and religious facility. To comply with the New Castle County Noise Ordinance during nighttime operations, the noise calculations indicate that pile driving should be curtailed or additional noise control measures should be implemented to decrease the maximum noise emissions to a sound level below 55 dBA.

If nighttime pile driving operations are pursued, noise monitoring should be performed at the start of construction to check the accuracy of the calculated maximum noise levels. A potential noise control measure that might be employed to support night operations would be a sound-absorbent acoustic barrier constructed between the project area and the nearby Class A and Class B receptors. Similarly, acoustic shielding might potentially be constructed around the pile driver.

The noise disturbance from the dredging and the wharf construction are anticipated to be minimal and temporary. Dredging and wharf construction are only temporary impacts to the environment and noise generated is not anticipated to be harmful to nearby sensitive receptors and consistent with the ambient sound environment of the area. Noise from construction and dredging activities is expected to be in compliance with the New Castle County Noise Ordinance governing the control of noise, the State of Delaware construction noise regulations, and all other applicable USEPA construction noise standards.

4.3.10.2 Indirect Impacts to Noise

Noise generated from port operation must also meet New Castle County's regulation governing the control of noise. According to a July 2011 report titled, "Study of the Noise Pollution at Container Terminals and The Surroundings," the maximum noise emitted from the Port of Los Angeles, the largest container port in the US, was measured at approximately 76 dBA, with the highest concentrations of noise being emitted from the truck traffic. The new port at Edgemoor is anticipated to operate at a similar or lesser noise level.

Based on the study, the new port facility is anticipated to operate with noise levels below the Delaware Class C regulatory level of 85 dBA. The closest Class A receptor (residential) is approximately 1,300 feet northwest of the project area boundary. Based on the inverse square law, emitted noise at a maximum of 76 dBA at the property boundary will have an

estimated sound level of approximately 48 dBA at the closest Class A receptor 1,300 feet away. The estimated value is below New Castle County's regulatory sound level of 65 dBA between the hours of 7 A.M. and 10 P.M. as well as 55 dBA between 10 P.M. and 7 A.M.

The proposed port operation noise most likely will have minimal impact on nearby residents and visitors of Fox Point State Park because of the considerable distance between the project area and the nearest sensitive receptors, the effect of traffic noise generated by nearby highways contributing to the existing sound environment, and because the project site is located in an industrial zone. Heavy equipment such as rubber-tired gantries and cranes at the port will utilize electric motors and will generate minimal noise.

4.3.11 Cultural Resources

A Phase I survey was performed to search for potential submerged historical and cultural resources within the project area. The survey was performed by R. Christopher Goodwin & Associates, Inc. (RCG&A) in accordance with the requirements of Section 106 of the National Historic Preservation Act of 1966, as well as other applicable acts and regulations, during the summer of 2018. The survey was documented in a report titled, "Geophysical/Cultural Resource Survey Supporting the Edgemoor Container Port Project, Port of Wilmington, Delaware State Waters," dated May 3, 2019. A copy of the report is provided in Appendix 21.

The investigations performed by RCG&A resulted in approximately 130 acres surveyed. The investigation included research of literature and use of remote sensing devices within the Area of Potential Effect (APE). Review of remote sensing data identified 19 side scan sonar contacts and 12 magnetic anomalies. None of the identified targets or anomalies were indicative of submerged cultural resources, resulting in a recommendation to the State Historic Preservation Office (SHPO) for a determination of "No historic properties affected."

A copy of the draft report, dated March 27, 2019, was submitted to SHPO for review and concurrence. In a letter dated April 25, 2019, SHPO responded that they concurred that the proposed project would result in "No Historic Properties Affected." A copy of the letter is provided in Appendix 22.

In their letter, SHPO suggested that the draft report be revised to reflect the style guidelines of *American Antiquity* and references for the archeological survey guidelines be updated to reflect the guidelines published in 2015. SHPO offered a preference for Edgemoor to be one word unless copying historical nomenclature, as well as a few other minor editorial comments. In response, RCG&A revised their report and issued the final version found in Appendix 21.

4.3.12 Safety and Security

There are no anticipated impacts to national security from the proposed dredging of the project area or construction of the wharf. Dredging operations and wharf construction will be performed in compliance with Occupational Safety and Health

Administration (OSHA) safety regulations to protect workers and the public. Responsible parties will use open communication and comply with safety regulations during port construction, maintenance dredging, and operation of the port facilities to support the safety and wellbeing of workers and the public.

Domestic and international security at U.S. Ports has increased over the past decades and is considered paramount to our national security. Currently, the Port of Wilmington follows stringent regulations to ensure the safety and security of domestic and international commerce and to protect U.S. citizens from threats to national security. The new port at Edgemoor will follow federal, State of Delaware and local security requirements. The port owners and operators will uphold security standards and communicate with U.S. Customs and Border Protection, the U.S. Coast Guard, Homeland Security, and other law enforcement and regulatory agencies at the federal, State, and local levels.

To identify navigational issues and assess the suitability of the former Chemours Edge Moor Facility as a container port, a full-mission ship navigation study was conducted by the Marine Institute of Technology and Graduate Studies (MITAGS) during the period August 22 to 24, 2018. The study was performed in conjunction with the USACE and DSPC utilizing pilots from The Pilot's Association for the Bay and River Delaware in order to:

- Demonstrate that the port will have minimal adverse impact on vessels transiting inbound and outbound on the Delaware River;
- Validate that the turning basin is effective for the handling of containerships up to 9,300 TEUs on a routine basis under the existing river traffic operating conditions;
- Provide suggestions on ways to facilitate vessel movement in and out of the port; and,
- Provide preliminary feedback regarding the feasibility of a 12,000 TEU vessel to call on the port.

The simulated exercise considered bathymetry and environmental parameters including wind, currents, tides, waves as well as visibility and time of day. Pilot recommendations included deepening an area in the southern portion of the berth in order to provide additional maneuvering space as inbound vessels turn in the turning basin. The simulation results indicated that the proposed Edgemoor terminal would have minimal impact on ships as they transit the existing navigation channel in the River.

5.0 CUMULATIVE IMPACTS

This chapter addresses the cumulative impacts (effects) anticipated to result from the proposed action, including impacts that have already occurred or are expected to occur, and are reasonably foreseeable, in the project area due to development activities relevant to the impacts. A summary of the cumulative effects analysis is provided in the subsequent sections. The purpose of assessing cumulative impacts is to prevent, minimize, and mitigate the possible adverse impacts as a result of the proposed action.

5.1 Introduction

The President's Council on Environmental Quality (CEQ) regulations defines cumulative effects as:

> *"…the impact on the environment which result from the incremental impact of the action (project) when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 CFR 1508.7).

Direct and indirect cumulative effects can result from individually minor, but collectively significant actions taking place over a period of time. Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action but are further removed in distance and/or time, and are reasonably foreseeable. The cumulative effects analysis considers the magnitude of the indirect and direct cumulative effect on the proposed resource health. Laws, regulations, policies, or other factors were evaluated in order to assess whether the resource trend, either a positive, neutral, or adverse cumulative impact, is likely to change in the foreseeable future.

For purposes of this environmental assessment (EA), cumulative impacts were discussed in further detail if the direct and indirect impacts have more than insignificant temporary adverse or positive impacts to the specific resource. In addition, the health of the resource was taken into consideration. A 'resource' for the purpose of Chapter 5 of this report refers to a subject, such as aquatic life, that could be impacted cumulatively by the proposed action. Health refers to the general overall condition or vitality of the resource and the trend of that condition.

The proposed project would have incremental direct and indirect cumulative effects on the Delaware River and New Castle County area in the context of other past, present, and reasonably foreseeable future impacts on the resource from unrelated activities. Cumulative effects may also occur when disturbances are within overlapping timeframes or locations.

5.2 Methodology

An adequate cumulative effects analysis involves the following four steps:

1. Identify the primary cumulative effects associated with the proposed action and define the assessment goals;

2. Establish the geographic scope for the analysis;

3. Establish the time frame for the analysis; and

4. Identify other actions affecting the resources, ecosystems, and human communities of concern.

Steps 1 through 4 are addressed in Section 5.3 including a summary of the direct and indirect effects, the effects carried forward in the cumulative impact analysis, the geographic scopes, the other actions affecting the resources, and the time frame during which the actions have been analyzed.

After addressing steps 1 through 4, the significance of each cumulative impact was evaluated in Section 5.4 using the following steps:

- Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities; and
- Determine the magnitude and significance of cumulative effects.
  Quantitative analysis was used in the cumulative impact analysis, if practical and reasonably available or estimable for the past, present, and reasonably foreseeable actions. Otherwise, the discussion of the magnitude and significance of the effects was qualitative. Qualitative information was acquired using knowledge of the scale of projects, resources, and impacting agents (i.e. air or water emitters, size of development, etc.) to provide perspective, background information, and context for the effects on the resources.

5.3 Cumulative effects scoping and summary of direct and indirect impacts

The first step in scoping cumulative effects involves identifying the significant cumulative effects associated with the proposed action and defining the assessment goals. This step includes defining the direct and the indirect effects of the proposed action, the resources that are affected by the proposed action, and the importance of each effect from a cumulative perspective. As a result, the analysis is focused on meaningful impacts relevant to the effects of the proposed action, and not on those effects that are irrelevant or inconsequential to decisions about the proposed action and alternatives. This section summarizes and discusses the direct and indirect effects associated with the proposed action as well as the geographic scope of the effects carried forward in the cumulative impact analysis.

Table 5.3-1 lists the resource areas examined, summarizes the direct and indirect impacts, and indicates if the resource was carried forward in the cumulative impact analysis. Generally, if a more-than-insubstantial temporary positive or adverse direct or indirect impact was identified, considering the status or health of the resource, then the resource discussion was carried forward to the cumulative impact analysis section.

Table 5.3-1 Summary of Cumulative Impacts

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
PHYSICAL RESOURCES			
Topography, Soils, Geology, Bathymetry			
Dredging and related activities in the project area have been limited, historically, to the construction of the following: piers, water intake structures, wastewater outfall structures, shoreline bulkheads and retaining walls as well as maintenance of those structures. Additionally, a navigational range light was installed. The site was an industrial facility. The land surface was and generally is covered by pavements, building slabs, equipment slabs, capped solid waste management units and a wastewater lagoon. Relatively small portions of the site are covered by lawn or landscaping.	The proposed activity will dredge the berthing and access area to -45 feet mean lower low water (MLLW) to match the dredged depth of the federal navigation channel of the Delaware River. Changes to the topography and bathymetry from initial construction and maintenance are expected to be permanent impacts to the project area. The Biological Assessment (BA) and Essential Fish Habitat (EFH) Assessment address these situations and are provided in Appendices 13 and 11, respectively. The findings of those assessments are summarized in Section 4.2 of this report.	The Former Chemours Edge Moor Facility will be regraded and paved to support storage and movement of shipping containers. Railroad sidings and internal roads will be reconfigured to support shipping container movement. Adjacent land areas will be regraded and developed to support port operations.	No

Bathymetric surveys indicate that a subtidal flat extends water-ward from the low tide line to approximately 450 feet in the northern (upriver) portion of the site and approximately 550 feet in the southern portion of the site. This flat is characterized by gradually deepening water (slopes between 1.8% and 2%) to a depth of approximately -10 feet MLLW. Between the edge of the flat and the federal navigation channel, the side slope of the river bottom steepens, dropping approximately 35 feet across a horizontal distance of approximately 350 feet (10% slope) in the upriver portion of the site and 250 feet (14% slope) in the southern portion of the site. The project site is located in the turbidity maximum of the Delaware River Estuary. Deepening the river at this location might locally reduce tidal current velocities. The turbidity and reduced current velocities might yield a high sedimentation rate within the proposed berth and access channel.	Deepening the river is expected to slow floodtide and ebbtide velocities within the berth and access channel. Lower velocities are likely to promote settling of sediment that are similar to stratum A within the dredge area.	Shoaling prevention fans are being considered for the project design to reduce the sedimentation rate within the dredged berth area by keeping sediments from settling. The sediments are then passed to higher velocity currents in the access channel, where they are distributed along the river in a manner similar to current (non-dredged) conditions. The use of shoaling prevention fans is expected to minimize future maintenance dredging requirements. See Sheet 11 of the Permit Plans in Appendix 7 for a conceptual view of the shoaling prevention fans.	Yes
Site Hydrogeology			
Groundwater beneath the upland property adjacent to the project area is anticipated to flow east towards the Delaware River. Groundwater is located in isolated lenses within the general clayey matrix of site soils. As indicated by the Phase I RFI report, the Former Chemours Edge Moor Facility appears to have two permeable units separated by fine-grained material (predominantly red clay of the Cretaceous-age Potomac Formation). Fill material, designated as Zone A, is present under much of the Former Chemours Edge Moor Facility with varying thickness and grain size depending on the location. The Delaware River has tidal influence on groundwater elevations which is laterally consistent, lens to lens. A detailed discussion of site hydrogeology is provided in Section 4.1.4 of this report.	No significant direct impacts to site hydrogeology are anticipated to result from implementation of the project.	No significant indirect impacts to site hydrogeologic conditions are anticipated to result from implementation of the project.	No

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
PHYSICAL RESOURCES			
Physical Oceanography			
The Delaware River extends through the proposed dredge area and is influenced tidally. Based on Marcus Hook, Pennsylvania tide gauge records (NOAA monitoring station 8540433), the normal tidal range at the site is approximately 5.6 feet. Assuming the historic rate of global mean sea level (GMSL) change is equal to the globally averaged rate of 0.00561 feet per year, the resulting estimated observed subsidence rate for the project area would be 0.00558 feet per year. Using this estimated local subsidence rate for the project area, changes in relative mean sea level in the project area over the 50-year period of analysis would be: • 0.83 feet using the historic rate of GMSL change, • 1.31 feet using the intermediate rate of accelerated GMSL change, and • 2.86 feet using the high or the accelerated rate of GMSL change.	No significant impacts to tidal water levels, or salinity are expected to result from dredging or wharf construction. Ebb and flood tide currents are anticipated to be slower within the project area after construction. This change will be limited to the project site, and there are no anticipated changes to ebb and flood tide magnitudes or currents outside the limits of the project area.	No significant indirect impacts to tides, water levels, or salinity are anticipated to result from implementation of the project. The forecast change in currents may increase sedimentation within the project site, which would necessitate maintenance dredging or the use of shoaling prevention fans and a corresponding increase in the demand for dredged material dewatering and storage, if shoaling prevention fans are not used.	No
Sediment and Water Quality			
The project area is located in Zone 5 of the Delaware River for which a Total Maximum Daily Load (TMDL) and Pollution Minimization Plans are in place for Polychlorinated Biphenyls (PCBs) along with fish consumption advisories for certain species of fish.	Discharge to the Delaware River waters from a confined disposal facility (CDF) is expected to meet Delaware River Basin Commission (DRBC) standards. Temporary and localized impacts to water quality are expected during dredging and dredge slurry dewatering activities.	Temporary and indirect impacts to water quality (outside of excavation and placement area) and immediate project vicinity may occur as a result of the low level increase of dissolved and suspended solids during dredging and during the return of water from the CDF to the Delaware River during the drying of the dredged material.	Yes

Surface water sampling results for samples collected within the project area show the presence of substances of potential regulatory concern. Total concentrations of PCBs were greater than surface water quality standards for human health. Aluminum was reported at a concentration higher than DRBC freshwater screening level for aquatic life.	Discharge to Delaware River waters from a CDF is expected to meet DRBC standards. Temporary and localized impacts to water quality are expected during dredging and disposal activities, primarily due to the current quality of Delaware River water.	Temporary and indirect impacts to water quality (outside of excavation and placement area) and immediate project vicinity could occur as a result of increased turbidity, sedimentation and vessel activity during construction and operation of the port.	Yes
Sediment sampling results showed multiple substances at concentrations above DNREC HSCA human health and ecological screening levels. Excavator and recreator risk results for EPA's RAIS model were acceptable for carcinogenic risk and HI limits for the planned dredged materials. Risk assessments also were performed to support reuse decisions should dredged sediment material from the site be repurposed. Both strata A and B produced acceptable risk values for the composite worker and outdoor worker exposure scenarios. Sediment material from the site should not be reused in areas where human exposure is equivalent to or greater than the resident risk assessment scenario.	Temporary, localized dispersal of sediments is expected during construction and maintenance dredging. Relocating existing sediments from the open system of the River to a CDF has the benefit of removing bio-accumulating substances of ecological concern from the food chain of the Delaware River.	Removal of environmentally-poor quality sediments from the river bottom will help improve overall water quality in the project area. Removing substances of potential concern from the aquatic environment is expected to limit bio magnification of substances such as chlorinated organic compounds (i.e., PCBs, dioxins, furans) which should, in turn, help to reduce impacts on the food chain and bring the Delaware River closer to the Clean Water Act goal of edible fish and reduced restrictions on recreational fishing in the Delaware River.	Yes

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
BIOLOGICAL RESOURCES			
Terrestrial Vegetation and Wildlife			
The project footprint is located in open water and no terrestrial vegetation is present. Vegetation on the upland property adjacent to the project site is typical of those found on a disturbed industrial landscape. No vegetation with significant habitat value is present on the upland property. Fencing completely encloses the upland property and likely prevents or minimizes the migration and/or movement of wildlife onto the property.	No direct impacts are expected.	No indirect impacts are expected.	No
Wetlands			
The project area is located in open water and no wetlands are present. The dredged material will be disposed at a preexisting CDF or reused on the property. The upland property adjacent to the project area where construction of the new port is expected has been assessed and no jurisdictional wetlands were found on the upland property.	No direct impacts are expected. No direct impacts are expected. No direct impacts are expected.	No indirect impacts are expected. No indirect impacts are expected. No direct impacts are expected.	No

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
Aquatic Wildlife and Essential Fish Habitat (EFH)			
A portion of the project area consists of shallow water (Intertidal to approximately 12 feet). The remainder of the project area is considered a deep water environment (greater than 12 feet in depth). Existing manmade structures may provide some cover habitat for fish species and resting locations for avian predators. Based on the definition and criteria of the EFH, the project site is not essential habitat. The Delaware River supports productive commercial and recreational finfish and shellfish fisheries. No submerged aquatic vegetation (SAV) was identified within the dredging or construction areas. The Delaware River, including the project area, is identified as Critical Habitat associated with two endangered species of sturgeon. A Biological Assessment (BA) has been prepared and submitted to NMFS for consultation. The findings of the BA indicate that the project is not likely to adversely affect the continued existence of the endangered sturgeon species (see Appendix 13).	Permanent deepening of the central portion of the project area will occur. New side slopes will partially replace existing gradual slopes to steep river bank slopes, similar to those currently existing along the navigation channel. New and more extensive manmade structures will be constructed and are expected to provide cover habitat for fish species and resting locations for avian predators. The project is not expected to impact spawning of locally important anadromous fish species or remove available fishing grounds. Dredging is not expected to have a significant impact on sturgeon feeding opportunities associated with changes in the benthic sediment composition, water depth and currently minimally available food biota. Temporary effects to benthic species in the project area from dredging are expected, but recovery of the benthic community within a few months to a few years is expected. Temporary effects to finfish species from dredging would be avoided due to their mobility and time of year restrictions that are expected to be attached to dredging and pile driving activities.	Temporary and indirect impacts to aquatic life could occur in the immediate project vicinity as a result of turbidity, sedimentation, noise, light, and vessel activity during construction. Temporary and indirect impacts to species that feed on benthic organisms or other fish could be temporarily impacted, but those species likely would migrate to other areas to seek food. Shoaling prevention fans are being considered to reduce sedimentation rates within the berth area. It is unlikely that the operation of the shoaling prevention fans would affect sturgeon or other post larval finfish due to the midwater column location of the inlets to the shoaling prevention fans, the use of inlet screens and the low velocity of water flowing to the inlets.	Yes

Threatened and Endangered Species			
The BA was prepared to evaluate the potential impacts of the project actions on species protected by the Endangered Species Act, provided in Appendix 13. Atlantic and shortnose sturgeon are both listed as species of primary concern and are most likely to occur within the project area due to the location and habitat. Species of sea turtles and whales were considered species of secondary concern because they do not occur within the immediate vicinity of the project area, but may occur within the federal navigation channel of the Delaware River and Bay downriver from the project area.	According to the BA, the direct impacts to Atlantic and Shortnose sturgeon from dredging and wharf construction are anticipated to be insignificant.	According to the BA, the construction and operation of the proposed Edgemoor port is not anticipated to significantly impact populations of threatened or endangered species. The effect of increased vessel traffic on the navigational channel and potential increase in ship strikes is anticipated to be insignificant or discountable. Ship strikes of Atlantic sturgeon may adversely impact the populations, but it is not significant enough to jeopardize the continued existence of the species.	Yes
Invasive Species			
Corbiculidae, commonly known as basket clams, were identified within the proposed dredge area during the Essential Fish Habitat assessment. Various species of Corbiculidae are known to reproduce rapidly and be tolerant of cold temperatures. This leads to uncontrolled growth in population sizes.	Removing the sediment via dredging will remove some of invasive species from the aquatic ecosystem.	Removing the sediment containing invasive species from the project area may allow for endemic species to re-populate the affected aquatic ecosystem. No other significant impacts are anticipated.	No
Coastal Zone Management Resources			
The project area is located within the federal Coastal Management Zone.	The project is not expected to significantly degrade natural resources or water quality and is expected to be consistent with the Delaware Coastal Management Program (DCMP) state requirements.	No indirect impacts are expected. The new container port facility is not regulated under the Delaware Coastal Zone Act. The expansion of the port at Edgemoor is consistent with land use and goals of the Federal Coastal Zone Management Act Consistency Policy. The project repurposes a former industrial facility to a new port facility.	No

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
HUMAN ENVIRONMENT			
Socioeconomics			
The proposed project area is in the Delaware River, but is located adjacent to a former industrial site now planned for development of a new container port. The project site is located near the communities of Edgemoor, Bellefonte, and Wilmington. In 2017, the Port of Wilmington (POW) handled approximately 5.8 million short tons of cargo, of which 2.5 million short tons was containerized cargo. This generated $463 million in added value for the State of Delaware and approximately $26.7 million in tax revenue. The POW contributes $508.8 million in value-added to the regional economy. Current POW operations generate approximately 5,390 direct and indirect jobs with an average annual salary of $63,592 including fringe benefits associated with port jobs. In general, direct jobs associated with the port pay 22.3% and indirect jobs pay approximately 12.6% more than the statewide average, while induced jobs pay approximately 13.2% less than the statewide average.	Impact on the local job market from dredging and wharf construction is expected to be minor.	The new port at Edgemoor is expected to increase vessel traffic by 55% over current traffic, forecasting an increase of approximately 244 container vessels calling at Edgemoor and a throughput of 1,182,600 Twenty-Foot Equivalent Units (TEUs) of loaded containers. Operations at the newly constructed port is anticipated to generate 2,965 direct and indirect jobs. Approximately 2,260 of these jobs are associated with the expansion in annual container cargo throughput. The jobs are anticipated to pay on average $30.57 per hour with benefits. The expansion of cargo throughput is anticipated to significantly benefit statewide and regional economy.	Yes
Environmental Justice			
According to the CEQ's guidance on Environmental Justice (EJ) populations, a minority population and a population with more than 20% living below the poverty level are represented in the City of Wilmington. Wilmington's estimated population in 2017 was 71,276 with 70.6% of the population considered a minority and 27.0% of the total population below the poverty threshold. Compared to the surrounding region, unemployment in Wilmington has been consistently higher historically. In 2017, the City's unemployment was 6.4%, which decreased from 11.3% in 2010.	No direct impacts are expected.	The new port facility at Edgemoor is expected to increase jobs, wages, and tax revenue opportunities for the City of Wilmington, and the socioeconomic region. This is expected to directly contribute to reduced unemployment and poverty in the City of Wilmington and the socioeconomic region. These changes are expected to benefit the quality-of-life for many residents.	Yes

Community and Recreational Resources			
There are neither terrestrial community nor recreational resources in the project area which is in the open water of the Delaware River.	No direct impacts are expected.	No indirect impacts are expected.	No
The former Chemours Edge Moor Facility formerly employed a large number of fulltime workers. Community facilities within the vicinity of the former chemical manufacturing plant were developed to accommodate the needs of the work force. These facilities include housing, emergency services, schools, hospitals, and other community facilities.	No direct impacts to community facilities located within the surrounding communities are expected.	Once in full operation, the port facility will have employed a larger work force than previously employed at the former Chemours Edge Moor Facility. This work force is anticipated to restore and support the community facilities in the surrounding communities that were adversely impacted by the closure of the former Chemours Edge Moor Facility.	
The vicinity of the project area includes some recreational boating activity on the Delaware River. Recreational fishing in the project area and the adjacent land is currently limited due to restricted access to the river. Use of the project area for recreational boating purposes is limited to transient passage of recreational boaters outside of the main navigational channel, which is heavily traveled by large commercial vessels. Swimming currently is prohibited in this portion of the Delaware River due to poor water quality.	Most recreational boating traffic in the vicinity of the project area is limited to the main channel of the Delaware River. Direct impacts to recreational boating are expected to be minimal during project construction.	Construction of the berthing area and new container port will eliminate the use of the project area for recreational boating and fishing. This is not anticipated to be significant, given the restricted access to the water and limited recreational boating use currently.	
Fox Point State Park is north of the project area. The state park adjoins the Delaware River and is a popular destination for joggers, hikers and visitors who enjoy observing maritime activity on the River.	Construction of the berthing area and new container port is expected to have temporary impacts to Fox Point Park.	One of the intended uses for Fox Point State Park was visitor enjoyment of marine activity on the Delaware River. The new port adjacent to the park will enhance visitor experiences.	

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
Visual and Aesthetic Resources			
Areas assessed for visual and aesthetic resources consist of viewsheds within the project area looking out from the existing shoreline towards residential areas and adjoining sites, as well as viewsheds from residential areas and adjacent sites looking towards the project area. Areas considered include Fox Point State Park, adjoining industrial facilities to the west and south of the project site, residential areas on the western side of I-495 and U.S. Highway 13, and Penns Grove, New Jersey.	Visible impacts during construction in the project area will be limited to the dredge, cranes to support wharf construction, and supporting vessels and infrastructure. The proposed dredging and wharf construction are consistent with the current and historic visual and aesthetic resources of the area and are not anticipated to impact adversely the view-scape of the western shoreline for residents and visitors in Edgemoor, Delaware and New Jersey.	Long-term visible impacts to horizon view of the project area will include cranes and ships while approaching, exiting or docked at the Port. This view replaces that of the former chemical manufacturing facility located adjacent to the project area, which is consistent with the historic and current visual and aesthetic resources of the industrial area bounded by Fox Point State Park, the Christina River, and I-495. It is not anticipated that the port construction and operation will negatively impact the visual and aesthetic resources of the nearby residential communities, Fox Point State Park, and the surrounding area.	No
Existing Infrastructure			
The upland property adjacent to the project area is the site of a former chemical manufacturing facility that has been demolished. Two abandoned piers and a water/wastewater intake/discharge structure remain. A navigation range light also is located approximately 200 feet offshore.	The piers and water intake will be demolished in anticipation of the construction of the new port. Coordination with the Coast Guard and other regulatory agencies will be required to relocate the range light.	No indirect impacts are expected.	No
Traffic and Transportation			
There is no surface transportation located in the project area. Primary surface transportation in the vicinity of the project area and former Chemours Edge Moor Facility is provided by I-495 and by rail (Conrail/Norfolk Southern). The Delaware River is utilized for a variety of commercial shipping activity including container transport. The project area will be used by container ships accessing the port for loading and unloading cargo.	No direct impacts from dredging or wharf construction in the project area are expected. No direct impacts to surface transportation from construction in the project area are expected. There may be temporary impacts to commercial shipping during dredging, mobilization and project construction.	No indirect impacts are expected. Possible indirect, temporary impacts are expected during port construction. The construction of the port and operation of the port facility is anticipated to increase truck and rail traffic in the vicinity of the former Chemours Edge Moor Facility. Commercial shipping activity is expected to increase in the project area upon completion of the new container port facility.	Yes

Hazardous Toxic and Radioactive Waste (HTRW)			
No unaddressed sites have been identified in the project area.	No direct impacts are expected.	No indirect impacts are expected.	No
The project area is adjacent to the former Chemours Edge Moor chemical manufacturing facility that contained a number of solid waste management units (SWMUs) and was closed under Resource Conservation and Recovery Act (RCRA). Long-term monitoring of groundwater and engineered caps on SWMUs is ongoing.	No direct impacts from dredging or wharf construction within the project area are expected.	Port construction and future port operations will manage hazardous substances and other recognized environmental conditions identified within the project area, which will be a beneficial impact of project development, adequately. Any modifications to the SWMU caps or proposed relocation of monitoring wells as a result of construction of the new port will require approval by DNREC.	No
There are a number of HTRW sites in the vicinity of the project area associated with large industrial and small service/manufacturing facilities or historic fill material. These sites are being addressed through regulatory clean-up and closure programs administered by the State of Delaware or the United States Environmental Protection Agency (US EPA).	No direct impacts on or from HTRW sites are expected.	No indirect impacts on or from HTRW sites are expected.	No
Noise			
The project area is adjacent to the main navigation channel of the Delaware River and is subject to noise generated in the vicinity by the following: vessels in the Delaware River, vehicle noise from I-495, U.S. Route 13 and Edgemoor Road, as well as from passenger and freight trains traveling the Northeast Corridor Railroad.	Temporary impacts may result from dredging activities that are similar to noise levels generated during maintenance dredging activity in the main navigation channel of the Delaware River. The maximum sound levels generated from pile driving are temporary and not anticipated to adversely impact the nearby human receptors.	Noise generated from the construction and operation of the port facility is expected to be in compliance with New Castle County Noise regulations and is not anticipated to significantly impact local residents, businesses, or visitors of Fox Point State Park adversely.	No
Air Quality			
The project area is in the Greater Philadelphia region currently classified as “Marginal Non-Attainment” for ground level ozone standard. Air quality in the region has been improving steadily. Delaware’s air quality is impacted by upwind sources according to annual reports prepared by DNREC. Emissions from marine vessels are expected to improve as a result of newer, more efficient, national and international standards for engines and as older ships are replaced.	The Clean Air Act requires conformity analysis of emissions from dredges and other fuel burning equipment anticipated to be used in project construction. That analysis has indicated that construction-related emissions to air fall within the State of Delaware budget for transportation related emissions. Incorporation of recommended practices regarding construction equipment engines will limit annual construction emissions of criteria pollutants to de minimis levels.	Ship emissions are expected to decrease long term as a result of newer, larger, cleaner and more efficient ships utilizing the new container port. Equipment such as electric cranes and drayage (vehicles used to move cargo within the port) at the new port are expected to minimize air emissions associated with port activities.	Yes

Current Status and/or Health of Resources	Direct Impacts	Indirect Impacts	Resource/Issue to be included in Cumulative Effects Analysis
Cultural Resources			
No known cultural or historical resources have been identified in the project area based on historical research and remote sensing devices in patterned searches.	No direct impacts are expected.	No indirect impacts are expected.	No
Safety and Security			
The upland former Chemours Edge Moor Facility is enclosed completely by fencing and is patrolled by security personnel.	No direct impacts are expected. Dredging and construction activities will be performed in compliance with Occupational Safety and Health Administration (OSHA) and other applicable safety regulations to support the safety and wellbeing of workers and the public.	No indirect impacts are expected. The port owners and operators are expected uphold the required security standards and communicate effectively with U.S. Customs and Border Protection, the U.S. Coast Guard, Homeland Security, and other law enforcement and regulatory agencies at the Federal, State, and local levels.	No

The subsections below summarize the reasoning for focusing on the effects carried forward in the cumulative impact analysis relative to the direct and indirect impacts to the physical, human, and biological environments.

5.4 Cumulative Effects Analysis

Relevant Past and Present Actions

In considering the potential cumulative impacts from past and present actions, a review of the current infrastructure and access to the Delaware River in the area around the project is warranted. Past and present actions that should be considered are those associated with the use of the Delaware River, particularly for maritime transportation.

Navigation improvements to the Delaware River were first authorized by Congress in 1836. The federal deep-draft navigation projects in the estuary include:

- Delaware River, Philadelphia, Pennsylvania to Trenton, New Jersey;
- Delaware River, Philadelphia to the Sea;
- Delaware River at Camden, New Jersey;
- Schuylkill River, Philadelphia; and
- Wilmington Harbor, Christina River, Delaware.

New maritime commerce and related infrastructure will result from the deepening of the main channel of the Delaware River to 45-feet MLLW that is being completed by the United States Army Corps of Engineers (USACE). Projects that are in the development stage include:

- PhilaPort – Expansion of Philadelphia's Southport Marine Terminal
- South Jersey Port Corporation (SJPC) – Construction of new Paulsboro Terminal
- Gibbstown (NJ) Logistics Center (former DuPont Company Repauno site)

These facilities are expected to require dredging for berth areas and access to new and/or expanded terminal operations.

Reasonably Foreseeable Actions

Reasonably foreseeable actions that should be considered are those associated with the use of the Delaware River, particularly for maritime transportation. New maritime commerce and related infrastructure likely will come from the deepening of the main channel of the Delaware River that is being completed by USACE.

PhilaPort, SJPC and Gulftainer operate existing ports along the Delaware River. SJPC operates ports in Camden and Salem including the Balzano Marine Terminal, Broadway Terminal and Salem Terminal. The advertised depth of the existing ports is 40 feet MLW. PhilaPort operates numerous port facilities in the Greater Philadelphia area. Gulftainer operates the existing Port of Wilmington (POW) under agreement with the Diamond State

Port Corporation. POW maintains berths on the Christina and Delaware Rivers. The majority of berths associated with these facilities require maintenance dredging at some regular frequency.

Other reasonably foreseeable actions include ongoing maintenance of the main channel of the Delaware River by the USACE.

Opportunity for development of other new river-dependent infrastructure in the project area that would generate cumulative impacts would appear limited due to the location of existing facilities located along the Delaware River. Immediately to the south of the proposed port is the Hay Road Power Complex energy generating facility with the City of Wilmington Wastewater Treatment Plant immediately south of the Hay Road facility. The Cherry Island landfill operated by the Delaware Solid Waste Authority is adjacent to the treatment plant and adjoins Wilmington Harbor South (WHS), a CDF owned and operated by the USACE.

To the north of the proposed port is Fox Point State Park. Potential land for redevelopment is located to the north in Claymont, a site owned by First State Crossing that is expected to be utilized for an industrial park and the site of a new Claymont passenger rail station. Immediately north is Oceanport, a privately owned commercial pier, adjoined by the former General Chemical site that currently is being remediated and redeveloped. The site does have an existing pier that is out of use. To the north, at Marcus Hook, Pennsylvania, is the Energy Transfer Partners natural gas liquids facility and ship terminal that also includes a pier.

Facilities with current access to commercial shipping could seek to maintain their berths through maintenance dredging or to deepen their existing berths in order to accommodate larger ships that will be able to navigate the Delaware River once the deepening of the main channel is completed.

5.4.1 Aquatic Life and EFH

The primary aquatic life of concern associated with the proposed action, and carried forward in the analysis with respect to cumulative effects, is the removal of benthic habitat for shortnose sturgeon and Atlantic sturgeon caused by dredging and placement. The past actions would not continue to have effects on the foraging grounds of the shortnose and Atlantic sturgeon since dredging has long since ceased, though periodic maintenance dredging for these projects would. The present projects that still require dredging would have effects on the benthic habitat of these endangered sturgeon.

The permanent direct impacts include the change of the water depths and the removal of benthic habitat. The Delaware River extends approximately 102.5 miles from Philadelphia to deep-water in the Delaware Bay, providing a variety of water depths, and most of the river bottom providing potential benthic habitat. The cumulative projects impact water depth and benthic habitat in two principle ways: by deepening the river bottom when navigation channel, berths, and turning basins are excavated, and by filling as terminal facilities are built. The following are estimated volumes of dredge material in cubic yards (CY) that are to be removed from the cumulative projects.

- Paulsboro Dredge Material: 334,000 CY
- Southport Dredge Material: 1,008,000 CY (Maybe additional 298,000 CY)
- Gibbstown Logistics Center Dredge Material: 457,000 CY

Additionally, sediment sampling results, discussed in Section 4.1.6, and risk analysis determined that the current river bottom at the project area has concentrations of metals that may pose risk to benthic organisms according to National Oceanic and Atmospheric Administration Screening Quick Reference Table (NOAA SQuiRT) levels. While the current benthic habitat will be removed, the removal of the current river bottom sediments may benefit the surrounding ecosystem by removing potentially harmful substances. The reasonably foreseeable actions, involving maintenance dredging of the project area and cumulative projects, would continue to remove harmful substances adhered to sediment and potentially benefit the ecological health of the benthic organisms associated with the Delaware River sediment. Removal of substances of potential impact to ecological health with sediments might also reduce exposures to aquatic life throughout the food chain as some of these substances bio-accumulate.

Each of the past, present, and reasonably foreseeable actions that continue to have dredging or placement activity associated with it would have the same type of localized short-term effects to the sturgeon. These short-term effects include impingement, burial, and increased turbidity. Typically, the temporary effects of dredging last a few hours and extend a few thousand feet. Therefore, the most important cause-and-effect relationship of concern to the sturgeon is the timing and spacing of the projects and whether their effects would spatially or temporally overlap. The Port of Paulsboro project, the PhilaPort Southport Marine Terminal project, and the Gibbstown Logistics Center projects do not spatially overlap. Given that the effects of dredging from these projects would not overlap, due to distance, it is expected that the temporary effects to the sturgeon would also not overlap. Dredging operations are seasonal due to the sturgeon migrating in early spring for spawning. In coordination with the National Marine Fisheries Service (NMFS), dredging and pile driving will not occur during the spawning window between March 1st and July 15th. Therefore, the proposed action's temporary localized effects to sturgeon likely would not have significant cumulative effects with the past, present, or reasonably foreseeable actions due to either timing or distance. Since maintenance dredging would occur once every few years, the same dredge distance and time of year limitations would apply and the same effects during those activities would also be expected to be temporary in nature, and not cumulative.

The use of shoaling fans is being considered to minimize sedimentation within the berth area at Edgemoor. This action is intended to decrease the frequency of maintenance dredging within the project area. This is anticipated to reduce the volume of dredge material stored in a CDF. The operation of shoaling fans is not anticipated to have a cumulative effect on the reasonably foreseeable dredging operations. The shoaling fans are not expected to negatively impact listed species discussed in the EFH assessment. It is reasonably foreseeable that the reduction in disturbance frequency may allow colonization of beneficial benthic organisms in the

newly exposed and cleaner river bottom. There are no cumulative impacts anticipated from the implementation of the shoaling fans.

5.4.2 Sediment and Water Quality

Sediment

As discussed in Section 4.1.6 of this report and further analyzed in the Sediment and Surface Water Quality Assessment provided in Appendix 20, preliminary sediment analysis in 2016 and additional analysis in 2019 of sediments at the project area indicated that several substances are present at concentrations above human health and ecological screening levels. The analysis determined that the poor environmental quality of the sediment is consistent with that of the zone of the Delaware River where the cumulative projects are located (Zone 5). The direct cumulative impact of the dredging would be temporary and localized removal of river bottom sediments into separate pre-existing CDF(s). Removal of the impacted sediments, through the initial dredging, maintenance dredging, and placement of the dredged material into upland CDF(s) has been determined to be in compliance with both human and ecological health standards for the project area.

Sedimentation within the berth area is expected, which would require frequent maintenance dredging to retain the proper depth of the berth. The Applicant is considering the use of shoaling fans to minimize sedimentation within the berth area. The use of shoaling fans is anticipated to decrease the frequency of maintenance dredging within the berth area. It is reasonably foreseeable that the use of shoaling fans would decrease the volume of dredged sediment removed from the river bottom and placed in the CDF(s). No cumulative effects on sediment quality are anticipated from the use of shoaling fans along the berth area.

The main cause-and-effect concern of the proposed cumulative dredging projects would be the further dispersal of the substances reported at concentrations of potential concern to portions of the Delaware River that are not impacted by such substances. The resuspension of sediment and increase in turbidity from dredging is temporary and localized, lasting a few hours and ranging a few thousand feet. As discussed above, the dredging activities within the area being considered for cumulative impacts are spatially separated, and the increase in turbidity would not overlap. It is reasonably foreseeable that this impact would continue to occur periodically at the project area, main navigational channel, and other cited projects. However, this effect is temporary and localized to the individual dredge areas. Initial dredge activity is expected to occur for a period of one to two months per year over the course of three years and will not occur continuously. Maintenance dredging events are anticipated to require less time to complete. No cumulative effect is expected from the temporary, localized dispersal of sediments from dredging. The cumulative action of removing contaminated sediments from the river and placing them in CDF(s) where substances of concern can be sequestered reduces the potential exposures to aquatic life and human health.

Water

Based on surface water sampling results, there are compounds of concern that are elevated above Delaware River Basin Commission's Stream Quality Objectives (DRBC's SQOs) for human health exposure to carcinogens and systemic toxicants through ingestion of fish. Additionally, metals and PCBs were detected above DRBC SQOs for acute and chronic exposure for aquatic life in a freshwater environment. The surface water quality analytical results present at the project area are believed to be reflective of the current conditions of the Delaware River. A reasonably foreseeable impact to water quality from the continued removal of sediment through maintenance dredging is the removal of compounds of potential concern to human health and aquatic life. This removal may benefit water quality in the vicinity of the project area. An enhancement in water quality could limit further bio accumulation in the aquatic food chain of persistent, chlorinate, organic substances, such as PCBs, dioxins and furans in the Delaware River and bring overall water quality closer to the long-term goal of edible fish.

The primary concern to water quality from the proposed action with respect to cumulative effects is the temporary increase in turbidity during dredging and placement of dredge material in the CDF(s). The present cumulative projects and the reasonably foreseeable projects include dredging of the berth areas and periodic maintenance dredging of berths, access channels and the Federal navigation projects. During dredging, the temporary increase in turbidity only lasts a few hours and may extend a few thousand feet from the action area. Initial dredging is expected to occur two to three months at a time over the course of three years and is not expected to be continuous. As discussed above, the cumulative projects do not spatially or temporally overlap. The effluent water quality resulting from the initial and reasonably foreseeable maintenance dredge material placed in the CDF(s) is anticipated to meet DRBC SQOs, and Delaware Surface Water Quality Standards (DE SWQS) where DRBC SQOs are not provided, when ambient water quality in the river currently meets the same standards. The effluent quality from the CDF is anticipated to comply with surface water discharge regulations. Effluent from other cumulative sites are also expected to meet similar standards. The past, present, and reasonably foreseeable cumulative actions associated with placement of the dredge materials are also required to meet surface water discharge regulations. Therefore, the cumulative temporary, localized effects on turbidity from the proposed action would not have cumulative adverse effects on water quality.

5.4.3 Socioeconomics and Environmental Justice

The regional socioeconomic beneficial implications of the cumulative projects and the proposed action would include business revenue impacts, employment impacts, personal earnings impact, and tax revenue impacts. The proposed action alone is anticipated to employ relatively few people from the local area. Port construction and dredging operations will be carried out by contractors and the impact on the local labor market is therefore expected to be minor. The creation of skilled-labor jobs would likely increase regionally as a result of the cumulative dredging projects and

the proposed action. The indirect cumulative impacts to Wilmington, New Castle County and the surrounding region come as the result of a new container port becoming operational at the Edgemoor site. Additionally, operation of a new container port is anticipated to generate approximately 2,260 new direct and indirect jobs that would pay well above the poverty level. Those jobs may be filled by workers from this labor pool.

New Castle County's estimated population in 2017 was 555,036. According to the U.S. Census Bureau, 40.0% of the population is considered a minority and 11.9% of the total population resides in poverty. Additionally, the City of Wilmington's estimated population in 2017 was 71,276 with 70.6 % of the population considered a minority and 27.0% of the total population below the poverty threshold. An estimated 10.4% of Delaware County, Pennsylvania and 7.9% of Gloucester County, New Jersey fall below the poverty threshold. Therefore, growth in construction industry employment may indirectly increase jobs and wages regionally, which is beneficial to reducing the poverty levels of the geographical area of the cumulative projects. Additionally, operation of a new container port is anticipated to generate approximately 2,260 new direct and indirect jobs that would pay well above the poverty level. Those jobs may be filled by workers from this labor pool.

The Port of Wilmington is a major asset and economic engine of the State of Delaware as it annually produces $463 million in value-added for the State of Delaware and $26.7 million in tax revenue in fiscal 2017. The Port of Wilmington is responsible for 5,390 jobs, broken-down as 2,951 direct and 2,439 indirect and induced jobs. Expanding the containerized cargo throughput at the new port is expected to require 2,260 direct and indirect jobs, based on an expansion of annual cargo tonnage to approximately 10 million tons per annum with 0.28 jobs per thousand tons of containerized cargo handled. The total estimated added value to the State of Delaware would increase from $463 million per annum to $846 million per annum. State and local taxes derived from the expanded containerized cargo throughput would be approximately $48.9 million per annum. This figure represents an approximate $22.2 million annum increase in income to the State of Delaware and local governments. Regionally, the value added associated with the expansion of containerized cargo throughput is forecasted to be approximately $930 million for the Philadelphia – Wilmington – Camden MSA per annum. This value added is an approximate annual increase of $421 million to the MSA over the current yield from the Port of Wilmington.

The expansion of the cargo throughput through the new port facility at Edgemoor is anticipated to greatly benefit the local and regional economy by increasing jobs, wages, and taxes. This has the potential to directly reduce poverty and unemployment in the immediate geographical area, specifically in the City of Wilmington, since the jobs at the Edgemoor port will be local and much of the job recruitment may come from the city. The 2,260 new jobs forecast to result from the containerized cargo expansion represent an opportunity for approximately 3% of the population of the City of Wilmington, 5% of the minority population in Wilmington, and 12% of the population living below the poverty level in Wilmington. Providing well-paying jobs to residents may help to reduce unemployment and the number of residents living below the poverty level, which will greatly benefit the quality of life

for those people. Increasing wages, providing jobs, and the increase in tax revenue for the region would promote economic growth locally and regionally, which will likely benefit local businesses and services (accommodation, entertainment, food service etc.) in the region. Each of the past, present, and reasonably foreseeable actions associated with the Project are expected to have a cumulative beneficial impact on the socioeconomic status of the geographical area.

5.4.4 Traffic and Transportation

Land based traffic and marine traffic associated with the project and the proposed action would impact the northeastern New Castle County area. Workforce and commuter traffic generated by the waterside construction and dredging activities are considered minimal temporary impacts. Additionally, dredging vessels, ocean going vessels (OGVs), and dredging equipment create a potential temporary increase for marine traffic. Once at the project site and operating, the marine equipment should not have an impact on marine traffic.

A secondary impact of the project will also occur during the construction of the port through the increase of land-based vehicles to and from the site. This traffic will include construction equipment being mobilized, heavy trucks hauling material to and from the location and an on-site construction workforce that will be commuting from the region. These secondary impacts will be temporary during the construction period and are not expected to be significant.

The operation of the new container port is expected to increase the use of trains and trucks to transport containers to and from the port. Train and truck traffic at the site has been reduced since the closing of the former Chemours Edge Moor chemical manufacturing Facility. The volume of truck traffic that may utilize the new container port is unknown at this time, but will be quantified as part of a future traffic analysis by the Delaware Department of Transportation (DelDOT). Similarly, it is difficult to quantify the increase in rail traffic that may be utilized to transport cargo affiliated with the proposed port.

There is existing traffic data and projections for intersections near the proposed port location that do not include estimated traffic impacts from the project or port operations. The proposed action area can be accessed via four routes, which will likely be used for past, present, and reasonably foreseeable future transportation requirements. In 2017, the annual average daily traffic (AADT) was determined in the vicinity of the proposed action area by DelDOT. The AADT of four intersections of interest is approximately:

- 6,472 vehicles per day (8% truck AADT) at the intersection of 12th Street and Hay Road
- 628 vehicles per day (4% truck AADT) at the intersection of Hay Road and Interstate-495 (I-495)
- 9,084 vehicles per day (14% truck AADT) at the intersection of Edgemoor Road and U.S. Highway 13 (U.S. 13)

- 13,506 vehicles per day (8% truck AADT) at the intersection of U.S. 13/Philadelphia Pike and I-495

To account for regional and local traffic growth from developments outside and in the vicinity of the proposed action area, the existing traffic volumes were increased by an annual traffic growth rate of 1.009 for traffic pattern group (TPG) 2 and by an annual growth rate of 1.029 for TPG 3, as recommended by DelDOT. Table 5.4-1 and Table 5.4-2 summarize the regional and local traffic growth without the development of the project area. No significant traffic impacts are anticipated during the construction of the berth and wharf and landside activities related to the construction of the port. Cumulative impacts from other potential projects in the area including First State Crossing in Claymont, Delaware and the planned new Claymont rail station will also be evaluated according to appropriate local and state standards.

Table 5.4-1 Regional and Local Expected Traffic Growth

Intersection	2017 Average Annual Daily Traffic (AADT)	Percent Truck AADT (%)	Traffic Pattern Group (TPG)	Growth Factor	2022 (5 year) Projected AADT	2032 (15 year) Projected AADT
12th St. & Hay Rd.	6472	8%	2	1.009	6769	7403
Hay Rd. & I-495	628	4%	3	1.029	724	964
Edgemoor Rd. & U.S. 13	9084	14%	2	1.009	9500	10391
U.S. 13/Philadelphia Pike & I-495	13506	8%	2	1.009	14125	15449

Table 5.4-2 Average Weekday Traffic Peak Hour Periods

Intersection	Avg. Weekday Hourly Distribution of AADT(%)			TPG
	6AM - 9AM	10AM - 2PM	3PM - 6PM	
12th St. & Hay Rd.	5.38	6.01	7.35	2
Hay Rd. & I-495	5.35	6.17	7.61	3
Edgemoor Rd. & U.S. 13	5.38	6.01	7.35	2
U.S. 13/Philadelphia Pike & I-495	5.38	6.01	7.35	2

Current annual vessel traffic on the Delaware River is estimated to be 2,427 ships (maritimedelriv.com, 2017). GT USA Wilmington has predicted that the new port at Edgemoor will promote vessel traffic increase of 55% over the current annual vessel traffic at the Port of Wilmington, which forecasts an increase in annual vessel traffic to 244 container vessels from 157 container vessels. Container ship traffic on the Delaware River is expected to increase to an estimated 648 vessels annually from 418 vessels currently; an increase of 230 additional vessels, in part attributable to the additional port capacity being developed in Philadelphia and New Jersey. Once the cumulative projects and proposed action are completed, there will likely be a further

increase in vessel traffic. Furthermore, the ongoing navigation improvements to the main channel in the Delaware River will ensure the continued safe navigation to the terminals along the river and will provide increased efficiencies for arriving vessels.

Dredging operations will directly impact the proposed action area. Typically, pipelines will extend from dredges to the area where the material is to be relocated. A floating pipeline will trail immediately behind the dredge. However, the project is anticipated to use sunken pipelines for sections of the pipeline route in areas of navigation channels or recreational boating extents of the pipeline route. Sections of floating pipeline are only utilized along sections of the river without boating activity and are highly visible and marked with lights at night. Sunken pipeline routes should be chosen to enable reasonably free movement of OGVs and to minimize crossing of the navigation channels that are present in tributaries to the Delaware River. Currently, the dredged material from construction primarily is planned for disposal at the Reedy Point Complex, located on the eastern shoreline of the Delaware River near the eastern terminus of the Chesapeake and Delaware Canal. There potential alternatives are also located along the State of Delaware side of the River. The extended dredge pipeline will not be placed within the main navigation channel and is not anticipated to significantly impact vessel traffic navigating in the Delaware River. Traffic to and from the existing Port of Wilmington Christina River berths would need to account for a sunken pipeline near the harbor entrance during active dredging operations. Further, sunken pipelines would need to accommodate vessels traveling to berths at the Delaware City Refinery, vessels using the Branch Canal in Delaware City, and if the Reedy Point South CDF is used, vessels transiting the Chesapeake and Delaware Canal. Small craft have greater mobility around dredging equipment. Therefore, the restriction on small craft is unlikely and insignificant.

Dredging operations associated with the cumulative projects is not expected to significantly impact shipping traffic and is unlikely to inhibit marine transportation in the Delaware River. The Port of Paulsboro project, the PhilaPort Southport Marine Terminal project, and the Gibbstown Logistics Center projects do not spatially overlap. Dredging and maintenance dredging activities in the River are subject to regulatory restrictions including the time of year when dredging may occur. Depending on the timing of dredging and location of CDFs for storage of material, there may be cumulative impacts to OGVs navigating the River from dredging at Southport, Gibbstown and/or Paulsboro. These considerations may include additional dredge pipeline in the Delaware and Schuylkill Rivers along with dredges and support vessels. Given the distances between the cumulative projects, impacts to vessel traffic would not have a reasonably foreseeable adverse cumulative impact on those projects. Dredging operations and equipment from past, present, and reasonably foreseeable actions are not anticipated to have an adverse cumulative effect on marine transportation.

5.4.5 Air Quality

The cumulative projects and the proposed action would produce air emissions including NO_x, VOCs, SO_x, CO, and particulates, during dredging activities to create and maintain channels, dredge berths and channel improvements and build terminals. These emissions would be temporary and intermittent.

Based on the geographic scope selected for this resource being in New Castle County, consideration of actions within this area would include projects and activity beyond the individual dredge projects associated with the proposed action. These activities would include projects associated with transportation improvement, industrial facilities, commercial development, municipal infrastructure improvement, and other forms of construction occurring in the geographical area. While it is not practical to list, discuss, and analyze individual actions across all these categories, a discussion of the trend in air quality and the regulatory framework in place that addresses these categories provides an indication of the expected cumulative effect of these actions.

The Clean Air Act (CAA) has resulted in a variety of regulations promulgated through the U.S. EPA, which address control or reduction of emissions from the mobile on-road and non-road sources, stationary industrial sources, and residential and nonresidential construction sources. Delaware's Division of Air Quality is responsible for planning regulation of emissions and assessing compliance with federal and state air quality standards. Delaware's regulation of various source emissions (conformity, mobile on-road, non-road etc.) include some form of regulation for either ozone, or its precursors, which include NO_x and VOCs. On October 1, 2015, the primary and secondary National Ambient Air Quality Standards (NAAQS) were strengthened for ground-level ozone from the 2008 NAAQS of 0.075 parts per million (ppm) over an 8-hour period to 0.070 ppm.

All of the aforementioned types of projects and sources producing emissions in New Castle County have been occurring under the framework of Delaware's Division of Air Quality. On November 16, 2017, the U.S. EPA declared New Castle County a marginal nonattainment area for ozone. In 2017, there were seven days in New Castle County that exceeded the current standard. As measured by the air quality index (AQI), all pollutants except ozone were below the NAAQS in 2017. Continuing recent trends, the number of days with good air quality continues to increase. Concentrations of air toxics in Wilmington continue to show generally low or declining levels.

Despite nonattainment for ozone in 2017, Delaware ozone levels in the 1990's were lower than in the 1980's, with continued improvement into the 2000's. This decreasing ozone trend suggests that the cumulative effect of past and present actions has not compromised the ability for air quality to improve in New Castle County. The trend would be expected to continue with more stringent standards being phased in for multiple categories of regulated sources. The proposed action could have meaningful positive impact on regional marine NO_x emissions. The NO_x -limited nature of ozone formation would increase the significance of any measureable positive contribution towards further reducing NO_x emissions. Emissions from construction equipment include dredges, cranes, bulldozers and non-road sources are not expected to have a significant negative impact on Delaware's air quality as demonstrated through the General Conformity Analysis found in Appendix 24. In addition, other cumulative projects that are determined to be federal actions must also demonstrate conformity with the CAA. Therefore, the dredging emissions from past, present, and reasonably foreseeable actions, and the proposed actions are not expected to have an adverse cumulative effect on air quality

6.0 COMPLIANCE WITH STATUTES AND REGULATIONS

FEDERAL REGULATIONS

6.1 National Environmental Policy Act (NEPA)

Regulations set forth by the Council of Environmental Quality (CEQ) were followed in preparation of this EATD in order to comply with NEPA. The environmental and socioeconomic impacts of the project and the proposed alternatives have been analyzed in accordance with NEPA and are presented in this report.

6.2 Magnuson-Stevens Fishery Conservation and Management Act (Public Law 104-297) .

The Magnuson-Stevens Fishery Management and Conservation Act (MSFCMA) requires that Essential Fish Habitat (EFH) be delineated for all managed species to minimize, to the extent practicable, the adverse effects on EFH and identify other actions to encourage the conservation and enhancement of EFH. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (16 U.S.C. 1802(10)).

Habitat and benthic resource sampling was conducted in the project area that included beach seine, bottom trawl and benthos/sediment sampling. A search for submerged aquatic vegetation (SAV) was also conducted. None of the species identified in the seine and trawl surveys are Federally-managed species and do not have EFH mapped within the vicinity of the proposed project. Additionally no wetlands or SAV are present in the project area. Based on the absence of resources suitable for fish spawning, breeding, feeding and growth within the dredging and construction areas, no habitat of value was identified within the affected environments. Therefore, no habitat of value is present.

6.3 Endangered Species Act

The Endangered Species Act (ESA) aims to conserve the population of threatened and endangered (T&E) species and protect the habitats in which they live. Section 7(a) (2) of the federal ESA requires that each federal agency, in consultation with the USFWS and/or NMFS, ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of an endangered or threatened species, or result in the destruction or adverse modification of critical habitat. In response to a NEPA scoping request from the USACE, NMFS (2019) requested that the potential impacts of the project be addressed for T&E species. The BA addresses the potential impacts to T&E species from the proposed project actions and was provided to NMFS for review. NMFS will review the BA and offer comments for USACE to consider in the form of a Biological Opinion. NMFS did not provide any additional comments regarding ESA or EFH.

The USFWS performed an online Information for Planning and Consultation (IPaC) environmental review process and concluded that no threatened or endangered species under

USFWS' jurisdiction are present within the dredge area, construction area, or the Delaware River federal navigational channel. A certification letter provided by the USFWS is included in Appendix 15. USFWS also provided a consultation letter, dated May 13, 2019, discussing the identified T&E species that may be present in the proposed project area and may be affected by the proposed actions. The USFWS identified one additional threatened species, the Northern Long-eared Bat, that may occur at the project area or the adjacent Chemours Edge Moor Plant property. Consultation with the DNREC Division of Fish & Wildlife did not identify any terrestrial T&E species that could occur on the adjacent Chemours site, and it was determined that the bat species is likely not present on the adjacent site. There are no critical habitats identified in the project area. The USFWS had no additional comments regarding species protected by the ESA.

6.4 Fish and Wildlife Coordination Act of 1958

The Fish and Wildlife Coordination Act (FWCA) requires Federal agencies to coordinate with the U.S. Fish & Wildlife Service (USFWS) and State fish and wildlife agencies when proposed project actions have the potential to impact fish and wildlife resources. The FWCA ensures that measures are developed to protect the health and supply of fish and wildlife. The Applicant has coordinated with the USFWS, National Marine Fisheries Service (NMFS), and the Delaware Department of Natural Resources and Environmental Control (DNREC) Wildlife Species Conservation and Research Program (DNREC-WSCRP) through the Biological Assessment (BA) and additional correspondence and consultation.

The BA identified impacts to species protected under the Endangered Species Act (ESA). A copy of the BA has been submitted to the NMFS for review and issuance of a Biological Opinion. The USFWS performed an online Information for Planning and Consultation (IPaC) environmental review process and concluded that no threatened or endangered species under USFWS' jurisdiction are present within the dredge area, construction area, or the Delaware River federal navigational channel. A certification letter provided by the USFWS is included in Appendix 15. An environmental review request was submitted to DNREC's Wildlife Species Conservation and Research Program (DNREC-WSCRP) to obtain information regarding rare plant and animal species as well as vegetation communities that may be present within the project/action area. The results of the review indicated that no state or federally listed species (different from those identified by NMFS) existed within the project area. A copy of the environmental review response letter is included in Appendix 16.

The BA was prepared in conjunction with the EATD and discusses the impacts to T&E species and other wildlife concerns within the project area. Impacts to the fish and wildlife resources within the project area and the cumulative impacts to fish and wildlife resource are anticipated to be insignificant as discussed in Sections 4.2 of this EA. Section 6.8 below further discusses the consultation and correspondence with NMFS and Marine Mammal Protection Act of 1972

6.5 Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 establishes a moratorium on the taking and importation of marine mammals and products. The moratorium is intended to conserve and

protect marine mammal life while also making it illegal to harass, hunt, capture, feed, or kill any marine mammal or their parts. This Act gave rise to the Marine Mammal Commission, the International Dolphin Conservation Program, and a Marine Mammal Health and Stranding Response Program. The Marine Mammal Health and Stranding Response Program is intended to improve responses to unusual mortality events and protect the wellness of marine mammals. Two endangered whale species, the fin whale and the right whale, may potentially occur within the very lowest portion of the Action Area near the mouth of Delaware Bay (NMFS, 2019). As discussed in the BA, the risk to fin and right whales from vessels bound to or from the Edgemoor project is insignificant considering the extreme rarity of the whales in the Action Area, the small increase in vessel traffic relative to baseline vessel activity, and the protection afforded by the mid-Atlantic SMA. The proposed project actions are not expected to significantly impact marine mammals within the Delaware River ecosystem. Therefore, the proposed project complies with the Marine Mammal Protection Act of 1972.

6.6 Executive Order 13186, the Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA), first enacted over 100 year ago and amended multiple times since to broaden its international scope, was designed to protect the populations of migratory birds and their resources. Federal agencies are encouraged to increase their efforts to avoid or minimize impacts on migratory bird resources. According to the USFWS, "The MBTA provides that it is unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird, unless authorized under a permit issued by the Secretary of the Interior. Some regulatory exceptions apply. Take is defined in regulations as: 'pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect."

Correspondence with the USFWS did not indicate the likelihood of migratory bird or water nesting birds being present in the project area. Therefore, there are no negative impacts to migratory bird populations, or their resources, anticipated from the proposed dredging, wharf construction, or port construction and operation.

6.7 National Historic Preservation Act of 1966

In compliance with the National Historic Preservation Act (NHPA) of 1966, as amended, Duffield's subconsultant R. Christopher Goodwin & Associates, Inc. (RCG&A) conducted a submerged cultural resources survey of the project area in accordance with Section 106 of the NHPA to provide a historical analysis of the project area and identify any National Register of Historic Places (NRHP) – listed or eligible properties as well as any cultural resource located within the proposed dredging and construction areas. The report prepared by RCG&A is provided in Appendix 21. RCG&A's investigation concluded that there are no terrestrial archeological sites or submerged cultural resources identified within or in the immediate vicinity of the Edgemoor site. The potential to discover significant, intact cultural resources within the project area is considerably low. In accordance with regulations in 36 CFR 800.2 put into effect for section 106 of the NHPA, the Advisory Council on Historic Preservation (ACHP) consults with agency officials on projects and programs that affect

cultural resources and historic properties. However, no consultation with the ACHP is required for this project because there are no historic properties or cultural resources located in the project area.

6.8 Clean Water Act

The Clean Water Act (CWA) was originally passed in 1972 and was designed to regulate the discharge of the pollutants into the nation's surface waters, wetlands, and coastal areas. Section 404 of the CWA specifically regulates the discharge of dredge and fill material into the water bodies and wetlands of the United States. The proposed project actions include dredging of a U.S. water body. The CWA requires that the Applicant achieves a goal of "no net loss" of wetlands. The applicant must make every effort to avoid or minimize potential impacts to wetlands and other aquatic resources, and provide compensation for any unavoidable impacts. This EATD was prepared in support of the permit application using guidance developed under CWA Section 404 to discuss the impacts of the proposed actions.

There are no wetlands present in the project area, confined disposal facility (CDF), or the adjacent upland former Chemours site. The proposed project actions are not anticipated to impact any wetlands, which is compliant with the goal of "no net loss" of wetlands set forth by the CWA.

Section 4.1.6 of the EATD summarizes the sediment and water quality of the project area and references a sediment quality and water quality report prepared in conjunction with the EATD. The report discusses current quality of the sediments and surface water located in the project area based on sediment and surface water sample analytical results and is included in Appendix 20. The report also discusses the anticipated human health and ecological risks associated with the quality of sediment and water in the project area during the proposed dredging activities, the quality of soil exposed by dredging (new river bottom), the quality of dredged material stored in the WHS CDF, the quality of effluent water from the WHS CDF, and the quality of dredged materials for productive reuse.

The water quality in the area of dredging and the water quality associated with the effluent discharge from the CDF are regulated under standards established through the CWA. The estimated concentrations of substances in the surface water during dredging and in the effluent discharged from the CDF generally are compliant with applicable Delaware River Basin Commission Surface Water Quality Standards (DRBC SWQS) and to the State of Delaware Surface Water Quality Standards (DE SWQS) where DRBC SWQS are not provided. According to surface water analytical results for surface water samples, the current Delaware River water quality has concentrations of aluminum, lead, benzo(a)pyrene, dioxins, furans, and PCBs that exceed the DRBC SQOs and DE SWQS. In situations where water quality of the Delaware River are elevated above the DRBC SQOs and DE SWQS, concentrations in the CDF effluent discharge were compared to current Delaware River concentrations.

Limits have been placed on the concentration of total suspended solids (TSS) in the effluent from WHS CDF. During the dewatering of project dredged sediments placed into WHS CDF, TSS will be monitored to comply with those limits. At these TSS limits, the concentrations of aluminum and total PCBs in the river mixing zone for the effluent are expected to be above the DRBC SQOs, due to the ambient water quality of the Delaware

River, not due to the CDF discharge quality. Discharge from the CDF is expected to be limited to a flowrate of approximately 1.7 cubic feet per second (cfs). Aluminum and total PCB concentrations are expected to contribute minimally to the ambient concentrations in the Delaware River at that discharge rate. See Section 4.1.6.2 and Appendix 20 of this report for additional information regarding water quality assessment.

6.9 Rivers and Harbors Act

The Rivers and Harbors Act was developed to protect the nation's navigable waters and govern construction or development activities located on or below the Ordinary High Water (OHW) elevation. Regulated actions under Section 10 of the Rivers and Harbors Act of 1899 include any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water. The law also applies to the construction of any structure in or over a navigable water body of the U.S. These actions on a navigable water body require authorization from the USACE and issuance of a permit. The Applicant has submitted a permit application to the USACE.

The proposed project actions include the dredging of the sediments located adjacent to the main navigational channel and the disposal of the dredged material in a preexisting CDF. As discussed in the sediment and water quality report provided in Appendix 20, the discharge of dredged material into the CDF is anticipated to be compliant with the DE SWQS by implementing discharge flowrate constraints during the dredge cycles. Additionally, the ecological and human health risks associated with the quality of sediment and water in the project area during the proposed dredging activities, the quality of soil exposed by dredging (new river bottom), and the quality of dredged material stored in the WHS CDF were determined to be below the State of Delaware's *Regulations Governing Hazardous Substance Cleanup* ecological and human health risk guidelines.

The use of fill material and construction of the wharf on the shoreline of the Delaware River within the project area are also regulated under the Rivers and Harbors Act. The Applicant has submitted the final construction plans to the USACE along with the permit application for review and approval.

6.10 Clean Air Act

The Clean Air Act (CAA) was enacted to protect the health and welfare of the public by requiring the EPA to establish National Ambient Air Quality Standards (NAAQS) for widespread air pollutants. Under this act is the General Conformity rule, which plays a crucial role in helping states and tribes improve air quality to meet the NAAQS. The General Conformity rule requires federal agencies to work with state, tribal and local governments in a nonattainment or maintenance area to ensure that federal actions conform to the air quality plans established in the applicable state or tribal implementation plan.

Section 4.3.9 of the EATD discusses the requirements set forth under the General Conformity rule in more detail and provided a discussion on the estimated construction emissions from the project actions. The construction emissions assessment was conducted in order to determine if the de minimis thresholds for NO_x and VOCs would be exceeded. The Assessment is provided in Appendix 24. The assessment concludes that the project actions

are expected to conform with federal Clean Air Act and State requirements with the implementation of best practices and use of air emission control equipment to reduce emissions from commercial marine vessels and construction equipment.

6.11 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972 was enacted to protect the coastal environments of the United States from the growing demand of development in coastal areas and to protect the resources of the nation's coastal zones. The guidelines in the CZMA help State regulatory agencies develop coastal management programs. Federal agencies proposing project actions within or outside of the coastal zone, which may impact natural resources within the coastal zone, are required to comply with the approved State coastal management program. The Delaware Coastal Management Program (DCMP) is the State program which cooperates with the Federal government under the CZMA and governs the management of the State's coastal areas. The DCMP designates the coastal areas and its natural resources within the State and manages the Delaware's Coastal Zone Management Federal Consistency review. Review of the Federal actions is to ensure that the proposed actions are consistent with the Federal objectives of the CZMA. Federal Consistency requires that projects conducted by a federal agency, authorized by a federal permit, or implemented with federal funds be consistent with Delaware's Coastal Zone Management policies.

The project area and the adjacent Chemours Edge Moor Plant property are located within the State coastal zone. Section 6.18 below discusses that Applicant's compliance with the State of Delaware policies under the DCMP.

6.12 Executive Order 11990, Protection of Wetlands

This Executive Order (EO) deters Federal agencies from assisting in new construction that would impact wetlands unless there are no practical alternatives available. The proposed project must include all practical measures to minimize impact to wetlands. As discussed in Section 6.8, the CWA Section 404 program is responsible for ensuring "no net loss" of wetlands. The CWA Section 404 program in conjunction with this EO strongly promotes the commitment for Federally-implemented and permitted projects to achieve no net loss of wetlands. Therefore, avoiding impacts to wetlands and achieving no net loss of wetlands are important factors in complying with this EO.

Channel dredging, berth construction, and operation of the new port will not occur on wetlands. Dredging and berth construction take place on the Delaware River while the new port is being constructed in an area zoned for industrial use. Therefore, compliance with Executive Order 11990 is met in regards to the project actions.

Large amounts of sediment material will be removed during dredging and will be placed in a CDF. According to the Dredge Management Plan (DMP), the dredged material from the initial and maintenance dredging will be placed in WHS CDF, located south of the port of Wilmington adjoining the Delaware River. The DMP specifies that existing CDFs will be used for the dredge material placement. Utilizing existing CDFs negates the need to

construct a new CDF and potentially impact wetlands. Therefore, no impacts to wetlands from the initial and maintenance dredge disposal are expected.

6.13 Executive Order 11988, Floodplain Management

Under this EO, Federal agencies are required to identify possible impacts or modifications to floodplains that could occur from proposed actions and to support practical alternatives to floodplain development. A portion of the project site is located within the 100-year tidal flood plain of the Delaware River Estuary. A 100-year flood means that there is a one percent annual chance that an area will be flooded. Tidal flooding is associated with storm surge, not excessive precipitation like fluvial flooding. As such, changes in the volume of a tidal flood plain have minimal impacts on the elevation of water within the flood plain. The project will require the placement of fill in a portion of the tidal flood plain. However, the volume of that fill, estimated to be approximately 145,000 cubic yards is more than offset by the volume increase in the flood plain that will result from the excavation of approximately 3.3 million cubic yards for sediments and soil from the river. Impacts will require approval by New Castle County as described in Section 6.24.

6.14 Executive Order 12898, Environmental Justice in Minority Populations and Low Income Populations

This EO was established to ensure that Federal agencies determine whether programs, policies, and activities have disproportionately high and adverse human health or environmental impacts on minority and/or low-income populations within the project area. Section 4.3.1. of this report discusses Environmental Justice (EJ) in detail. Dredging and berth construction will likely have no disproportionate impacts to minority and low-income populations because these actions are temporary. Port construction and operations will be required to comply with state and local regulations including air quality standards. The new port facility is expected to generate jobs, increase wages, and increase tax revenue for the region which is expected to directly improve unemployment and reduce poverty in the City of Wilmington. Therefore, adverse impact to minority or low income populations due to port construction or operations is unlikely.

6.15 Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)

CERCLA provides a Federal superfund for the cleanup of hazardous waste sites and the liability, compensation, cleanup, and emergency response for releases of hazardous substances into the environment. The HTRW investigation provided in Section 4.3.8 of this EATD references a Phase I Environmental Site Assessment prepared by Duffield Associates for the project area in August of 2016. The investigation found multiple sites within both the State and Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database associated with the project footprint. The Chemours site was listed under the Federal CERCLIS No Further Remedial Action Planned database. Nearby sites listed under the State CERCLIS database included the Fox Point Park Phase I, Delmarva Power & Light – Edgemoor, Amer Industrial Technologies, and the Conectiv Edgemoor Power Plant. The Delmarva Power & Light – Edgemoor site and the Conectiv Edgemoor Power Plant were collectively part of the Calpine Mid-Atlantic

Generation site according to the Phase I report. The investigation concluded that none of these sites listed under the State CERCLIS database are of environmental concern regarding the proposed project actions.

6.16 Resource Conservation and Recovery Act (RCRA)

RCRA regulates management and disposal of hazardous waste and non-hazardous solid wastes. Based on the Phase I ESA discussed in the HTRW in Section 4.3.8 of this report, the property is managed under RCRA. DNREC has delegated authority from USEPA to administer RCRA. There are 32 solid waste management units (SWMU) located on the property that have been identified and addressed. Port construction and future port operations will be required to manage site conditions in accordance with a DNREC-approved RCRA closure plan. See Appendix 8 for additional information regarding RCRA compliance activities that have occurred at the project site.

6.17 Toxics Substances Control Act (TSCA)

TSCA provides several options for clean-up and disposal of polychlorinated biphenyls (PCBs) regulated under the law. One option is performance-based disposal which allows the management or disposal of material containing <50ppm polychlorinated bi-phenyls (PCBs) that have been dredged or excavated from Waters of the United States in accordance with a permit that has been issued under Section 404 of the Clean Water Act. DSPC is seeking an individual permit under Section 404 of the Clean Water Act in order to dredge sediments from the berth area of the proposed project at Edgemoor and will manage the sediments containing PCB in accordance with the permit.

6.18 Farmland Protection Policy Act of 1981 and Prime or Unique Farmlands

The Farmland Protection Policy Act of 1981 was created to protect farmlands from being adversely impacted or unnecessarily converted to nonagricultural land by Federal programs. It is required that agencies identify the negative impacts of Federal programs on prime and unique farmlands and consider any alternatives that could lessen the impacts. Port construction and operations are occurring in an industrial zone and project activities are water-based. Therefore, no farmlands are anticipated to be impacted by the project.

6.19 Noise Control Act

The Noise Control Act of 1972 established a national policy to promote an environment free from unwanted noise that damages hearing and impacts the welfare of Americans. The Act promoted coordination of Federal research and efforts in noise control which led to the establishment of Federal noise pollution standards for commercial products. Noise levels, noise reduction, and safety information is labeled and provided for noise-generating products. Under the Act, any Federal agency that develops noise control standards or regulations must consult with the USEPA. Also, a Federal agency that is involved with noise-emitting activity must comply with Federal, State, interstate, and local requirements regarding environmental noise control. However, project planning, permitting, or NEPA analysis have no established

requirements under the Noise Control Act. There are no other relevant requirements under the Noise Control Act that apply to this report aside from following existing Federal, state, interstate, and local noise regulations.

As discussed in Section 4.3.10, noise emissions from the proposed project actions are not expected to have considerable impact to the project area or its vicinity during construction. The primary source of noise emissions will be the impact pile driving. The estimated maximum noise levels from pile driving are expected to be below the New Castle County Noise Ordinance regulatory level of 65 dBA during daytime operations. The estimated maximum noise levels are above the New Castle County Noise Ordinance regulatory level of 55 dBA during nighttime operations. To meet compliance with the noise ordinance, it is suggested that pile driving be curtailed during nighttime operations or that practical noise control measures, be implemented to reduce noise... Vibratory hammers that vibrate rather than utilize direct impact are expected to be used to reduce noise.. In addition, impact absorption materials are expected to be used with impact hammers to also reduce noise.

STATE OF DELAWARE REGULATIONS

6.20 State of Delaware Coastal Zone Management Program

The DCMP governs the management and protection of the State's coastal zone through its policies. The DCMP's Federal Consistency review of the federal actions is intended to ensure that the proposed actions are consistent with the federal objectives of the CZMA.

The State of Delaware Federal Consistency has policies and procedures in place regarding the Port of Wilmington. Section 5.8.1 of the Federal Consistency policy advises that the long-term economic viability and competitiveness of the Port of Wilmington should be encouraged and supported. Additionally, the policy encourages the expansion of the Port of Wilmington along the Delaware River to meet future national and regional transshipment needs. The new port at Edgemoor will be an auxiliary expansion of the Port of Wilmington and is expected to significantly benefit the regional economy. The project actions will allow the new port facility to be constructed which is in-line with the goals of the State of Delaware Federal Consistency policies.

6.21 State of Delaware Coastal Zone Act 7 Del. C. §70

The project site and adjoining upland area are located within Delaware's Coastal Zone as it is defined by the Coastal Zone Act (CZA). The CZA regulates heavy industry, manufacturing and bulk product transfer facilities located within the Coastal Zone. The CZA does not regulate dredging or the placement of dredged materials. Containerized cargo is not considered bulk cargo and is not subject to regulation under the Act. Therefore, the proposed project and the proposed container port at the Edgemoor site is not regulated by the CZA.

6.22 State of Delaware Wetlands Regulations, 7 Del C. §7502

DNREC upholds regulations to preserve the tidal wetlands of Delaware and protect them from destruction or damage from unpermitted dumping, filling, and similar activities.

Wetlands play a substantial role in the State's economic and ecological value. The State has set regulations in place to preserve and protect the productive public and private tidal wetlands in Delaware.

Channel dredging, berth construction, and operation of the new port will not occur on State of Delaware tidal wetlands. Therefore, the project will not impact State of Delaware tidal wetlands adversely.

As discussed in section 6.10, the dredge material from both initial and maintenance dredging will be disposed of in existing CDFs. As such, no adverse impacts to existing State of Delaware tidal wetlands are anticipated from these dredging activities.

6.23 State of Delaware Regulations Governing the Use of Subaqueous Lands, 7 Del C. §7504

DNREC is responsible for upholding regulations that protect the public interest against potentially impairing uses or changes to subaqueous lands. The proposed dredging, filling and constructing associated with the project constitute uses or changes to Delaware's subaqueous lands and are regulated by the State. To comply with the State regulations governing the use of subaqueous lands, the Applicant submitted a permit application to DNREC.

6.24 Clean Water Act Section 401 Clean Water Quality Certification

DNREC is responsible for utilizing the 401 water quality certification in coordination with state regulations of subaqueous lands, tidal wetlands, and regulations under the Coastal Zone Management program. Section 4.1.6 of the report discusses the impacts to water quality in the project area and CDF following the completion of the initial dredging and maintenance dredging. The proposed impacts to water quality of Delaware waters and wetlands is in compliance with the water quality standards set forth in the Delaware River Basin Commission Surface Water Quality Standards, the State of Delaware Surface Water Quality Standards, and Chapter 5 of the Water Pollution Control regulations. These regulatory standards for water quality are what govern the review of the 401 permit application. The 401 permit application is being submitted to DNREC.

NEW CASTLE COUNTY REGULATIONS

6.25 Land Use Approval

The New Castle County (NCC) Department Of Land Use is responsible for overseeing the review of proposed development plans to ensure that they meet all applicable legal requirements. Development plans for the wharf and container port facility were shared with the NCC Department of Land Use and all applicable permits will be acquired prior to construction of the wharf and container port. A copy of the New Castle County Zoning Determination has been include in Appendix 25.

6.26 Flood Plain Management

Based on FEMA floodplain management maps of New Castle County, Delaware, it was determined that the project area and a portion of the upland property is in an area mapped by the Federal Emergency Management Agency (FEMA) as subject to inundation by the one percent annual chance event, identified on the FEMA flood map as a coastal high hazard area. However, the dredging is located in open water and would deepen and widen the channel. A portion of the floodplain along the shoreline will be filled for wharf construction. Additionally, the dredged material placement option is located outside of any area mapped as a one percent floodplain.

Fill material will be used to construct the wharf on portions of the shoreline where the wharf will connect to the upland former Chemours property. A clean fill material will be used and will be properly compacted and stabilized to prevent erosion. The Applicant will be required to have a permit from NCC for backfilling into the floodplain. The fill placement and construction of the wharf will be performed in compliance with the New Castle County Unified Development Code, NCC Drainage Code, NCC Comprehensive Development Plan and all other governing regulations for development in the one percent annual chance event flood zone. A flood plain development permit will be acquired prior to construction of the wharf.

DELAWARE RIVER BASIN COMMISSION (DRBC)

6.27 Water Quality Regulations and Comprehensive Plan

DRBC's Compact requires any project having a substantial effect on the water resources of the Basin to be approved by the Commission before it is undertaken by any person, corporation or governmental authority. The Commission must approve a project whenever it finds and determines that such project would not substantially impair or conflict with the Comprehensive Plan and may modify and approve as modified, or may disapprove any project whenever it finds and determines that the project would substantially impair or conflict with the Plan.

The DRBC also has regulations in place that govern any discharge into waters within the Delaware River basin. As stated in Section 6.8, the estimated concentrations of compounds of potential concern during dredging and the effluent discharge from the CDF are required to be below the applicable DRBC SWQS, and below the DE SWQS where DRBC SWQS are not provided. As discussed in the sediment and water quality assessment report in Appendix 20, the water quality during the project actions is expected to be in compliance with both the DRBC and DE SWQS. By complying with the DRBC and DE SWQS, the project actions are expected to be compliant with the CWA.

7.0. CONCLUSIONS

This chapter summarizes the beneficial and adverse environmental impacts of the proposed action. Where unavoidable potential adverse impacts have been identified as possibly resulting from the proposed action, specific actions have been proposed to minimize or mitigate the potential adverse impacts. No irretrievable or irreversible adverse impacts that cannot be avoided, minimized or mitigated have been identified by this document.

7.1. Summary of Impacts

The proposed action includes dredging to create a berth and access channel for a new container port at Edgemoor, Delaware on lands owned by the Diamond State Port Corporation. The action also includes the construction of a new wharf and supports the redevelopment of the Edgemoor Site into a multi-user containerized cargo port. The project proposes to dredge an area of approximately 85 acres, producing an estimated 3.3 million cubic yards of material. The primary location identified for the storage of the bulk of dredged material is the Reedy Point Complex consisting of Reedy Point North and Reed Point South Confined Disposal Facilities. Wilmington Harbor South CDF near the Port of Wilmington was also studied and found to have sufficient air "capacity" to accommodate the dredged material over multiple dredging events with an increase in dike height. Construction of the project is not anticipated to result in substantial direct, indirect and cumulative impacts to the environment. The following summarizes the findings of this Environmental Assessment regarding those impacts.

7.1.1 Physical environment and climate

- The proposed project will produce temporary emissions of greenhouse gases during construction which are not expected to have a significant impact on the climate of the action area.
- Construction of the project will include dredging in open water and construction of a wharf to accommodate ships. While there will be some filling of the tidal floodplain there will be no direct adverse impacts to the adjacent terrestrial environment. The fill in the tidal floodplain will have a negligible effect on flooding in the Delaware Estuary. There are no wetlands in the project area. Indirect impacts will involve redevelopment of the adjacent upland site from a former chemical manufacturing plant to a container port.

7.1.2 Topography and Bathymetry, Sediments

- Bathymetry in the project area will be altered permanently through the deepening of the river and removal of the existing shallow water shelf.
- The deepening of the river is expected to lower floodtide and ebbtide velocities within the created berth and perhaps the access channel and potentially increase sedimentation in the nearshore portion of the project area. Installation of anti-sedimentation technology will serve to minimize this impact.

7.1.3 Geology

- No direct or indirect impacts to geology in the area are expected to result from the project.

7.1.4 Hydrogeology

- No significant direct or indirect impacts to local hydrogeology are expected to result from construction of the project. Local groundwater is expected to continue to flow to the Delaware River. Groundwater within the permeable zones of the Potomac Formation will continue to interact with tidal conditions in the Delaware River.

7.1.5 Physical oceanography

- No significant direct or indirect impacts are expected on tides, currents, water levels or salinity as a result of dredging of the berth and construction of the wharf. Velocity of ebb and flood tide currents reductions may result in the project area, but will be unaffected in the larger action area.

7.1.6 Sediments and water quality

- There does not appear to be risks to human health from short-term exposure to sediments during dredging and during the placement and drying of materials in a CDF.
    - Stratum A (fluvial silt) sediments have been evaluated using screening levels developed under the Delaware Hazardous Substances Cleanup Act and contain benzo[a]pyrene, PCB-126, total PCBs, TEQ dioxin, arsenic, and thallium at concentrations above human health screening levels,
    - Generally, Stratum B (sandy) sediments contained total PCBs, TEQ dioxin, arsenic and thallium concentrations above human health screening levels based on reported analytical testing results of samples.
    - Stratum C (Potomac Formation soils) sample analytical results were reported above the human health screening levels for arsenic and vanadium. Stratum C consists of previously undisturbed soils and assessment of environmental conditions associated with the adjacent former industrial site have indicated that the arsenic and vanadium concentrations in the Potomac Formation soils are not the result of releases of hazardous substances.
- When placed in a CDF, sediments from the proposed construction are indicated to pose acceptable risks for human exposure.
- Removing contaminated sediments from the River as part of the project provides a positive benefit to the local ecosystem due to the removal of potentially harmful organic substances and reductions in the concentration of inorganic substances. The removal of sediment from the project area ultimately will bring the sediment and water quality of the River closer to the long-term goal of producing edible fish.

- Dredging and effluent discharged from the CDF are evaluated for water quality impacts and standards adopted by the State of Delaware or Delaware River Basin Commission (DRBC). Existing conditions in the Delaware River indicate that levels of aluminum, lead, benzo(a)pyrene, dioxins, furans, exceed both Delaware and DRBC standards for human health and or ecological health, based on analytic testing results for surface water samples. Water quality in the area of the dredging is expected to remain below acute toxicity levels in the water column when dredging is in progress. Under limitations for Total Suspended Solids (TSS), concentrations of PCBs and aluminum in the mixing zone adjacent to the CDF discharge are expected to be above DRBC standards, primarily due to the existing water quality. Treatment (settling) within the CDF is forecast to reduce aluminum and PCB concentrations by better than 99% between influent and effluent concentrations. The additions of aluminum and PCBs to the river water due to the CDF discharge is insignificant and temporary. In contrast, dredging of the sediments from the project is expected to remove approximately 2.7 tons of sediments containing PCBs from the aquatic environment, which should help support the recreation goal of the CWA for the Delaware River.

7.1.7 Biological Resources

Threatened and Endangered Species

The Biological Assessment, performed in accordance with the Endangered Species Act (ESA), establishes that the project is not likely to adversely affect the continued existence of endangered species at the project site or in the action area. Species of primary concern analyzed as part of the Biological Assessment were Atlantic and shortnose sturgeon which are both listed as endangered and are known to occur in the project area. Sea turtles and whales were addressed as secondary species as they are not known to occur in the project area but are found in the action area. Impacts assessed included, but were not limited to, dredging, pile driving, placement of dredged material, placement of fill and ship traffic.

- The Biological Assessment concluded that no or insignificant direct impacts would result from dredging and construction.
- Indirect impacts from increased vessel traffic of port operations, specifically the addition of an estimated 261 vessels per year (87 container ships and 174 tugs operated in support of the container ships) within the Delaware River federal navigation channel may adversely affect, but will not jeopardize the continued existence, of Atlantic sturgeon. Specifically, operation of the Edgemoor port may result in one additional Atlantic sturgeon mortality every 5.5 years, when compared to existing river vessel traffic. The potential effect of increased vessel traffic on shortnose sturgeon was considered discountable with one additional mortality every 85 years.
- The use of anti-sedimentation technology such as shoaling fans to minimize the impacts of sedimentation in the berth area was also analyzed as part of the Biological Assessment and determined not to pose a significant threat to sturgeon.

7.1.8 Critical Habitat

- The Delaware River system has been designated as critical habitat for the New York Bight distinct population segment (DPS) of Atlantic Sturgeon. The proposed project will not have a significant direct or indirect impact on the four habitat units identified as Critical Habitat.
- There is no hard rock bottom in the project area to serve as a spawning area. The project area does contain soft substrate habitat of silt and sand that might serve as foraging areas, which will be removed by dredging. However, benthic sampling has indicated a poor abundance and low diversity of pollution tolerant invertebrates are present in the project area, indicating that the project area unlikely is a critical foraging area for sturgeon. The project is not expected to impede movement of sturgeon or alter temperature or salinity of the River. Dissolved oxygen levels may be impacted by increased turbidity in the project area during dredging, but those impacts will be temporary.

7.1.9 Essential Fish Habitat

A benthic resource assessment involving benthos sampling and beach seine surveys coupled with a literature review of fisheries data from the Delaware River did not identify Essential Fish Habitat as part of the project area.

- The benthic resource assessment did not locate any submerged aquatic vegetation in the project area.
- Benthic organisms identified within the affected environments do not represent a diverse assemblage, primarily are pollution tolerant species and readily are available within adjacent areas of the river; and
- Three fish species, with low individual counts, were collected during the beach seining effort. Of 50 total fish caught, 34 were bay anchovy.
- No difference between shallow (defined as less than six feet in depth) and deep water with respect to benthic resources was identified.

7.1.10 Commercial and Recreational Species

- The proposed project is not expected to have significant direct or indirect impacts on commercial or recreational species, most notably herring, alewife and striped bass. No EFH or habitat of value is located within the affected environments. Benthic organisms (i.e., food sources) identified within the dredging and construction areas are pollution tolerant species that are not diverse and can be found throughout the estuary. The project site is located in the turbidity maximum of the estuary and the potential increases in turbidity associated with construction activities are unlikely to adversely affect fish species that are adapted to the prevailing turbid conditions. Dredging and pile driving activities are anticipated to occur outside the spawning window (typically March 1st – July 15th), minimizing the impact to fish movement/migration during spawning runs and occurring when the majority of key species are not present. The project does not include construction of waterway obstructions.

7.1.11 Vegetation, Wildlife and Invasive Species

- There is no known submerged aquatic vegetation in the project area. Vegetation in the upland portion of the adjacent property, where infrastructure to support port operations is planned, is limited to remnant landscaping vegetation associated with a former industrial site and vegetated caps over closed RCRA Solid Waste Management Units.
- The upland site is fenced and does not provide habitat for diverse wildlife populations. Basket clams, a species native to Asia, were found in the project area benthos. These mollusks and the habitat they are colonizing will be removed by the project, which may allow native species to repopulate the area after construction. There are not expected to be significant direct or indirect impacts to vegetation, wildlife or invasive species as a result of the project.
- One invasive organism was identified during the benthic resource assessment within the dredging and construction areas. Corbiculidae, commonly known as basket clams, are a family of bivalve mollusk originating in Asia. Of the total 648 organisms found in the 14 benthic resource assessment sediment samples, 12 Corbiculidae were identified. Various species within this family are known to reproduce rapidly and be tolerant of cold temperatures, resulting in uncontrolled growth of population sizes.

  The removal of sediment (via dredging) that contains invasive species may allow endemic species to re-establish within the aquatic ecosystem. No other invasive species are known to be present within the dredging or construction areas or the adjacent uplands.

7.1.12 Human Environment

No significant long term direct or indirect impacts from the project are expected to impact the population of the area, although localized increased job opportunities may be created for the local population.

7.1.13 Economy

Median age decline is notable in the City of Wilmington where the inflation-adjusted median household income has dropped from $50,400 in 2000 to $40,200 in 2017 – a decline of more than 20%. New Castle County, which includes the City of Wilmington, also showed a drop in median household income. The New Castle County income levels of $75,200 in 2000 and $68,300 in 2017 are higher than the City of Wilmington and greater than the overall median household income for the State of Delaware, revealing a disparity between urban and suburban household incomes in the region. The jobs created by the project may help this situation – they are expected to pay better than the median City of Wilmington income and are on a par with the New Castle County median. As such, there is expected to be a positive economic benefit to the City of Wilmington, New Castle County, State of Delaware and the region.

7.1.14 Environmental Justice

According to the Council on Environmental Quality guidance on EJ populations, the conditions necessary to define both a minority population and a population with more than 20 percent below the poverty level are present in the City of Wilmington. Based on analyses conducted as part of this assessment, there do not appear to be adverse human health or environmental impacts to the population of Wilmington and New Castle County, including minority and low income populations.

7.1.15 Socioeconomics

Direct and indirect impacts are expected from the construction of the project and the construction of a new container port at the former Chemours Edge Moor chemical plant.

- The expansion of containerized cargo is anticipated to require 2,965 direct and indirect jobs
- These jobs, with benefits are anticipated to pay on average $30.57 per hour in 2017 dollars.
- The total added value to the State of Delaware economy is forecasted to be approximately $846 million per annum. Compared to the existing estimate of $463 million per annum, the additional containerized cargo throughput would provide a net value added of approximately $383 million per annum.
- State and local taxes derived from the expanded containerized cargo throughput would be approximately $48.9 million per annum. This figure represents an approximate $22.2 million annum increase in income to the State of Delaware and local governments.
- Regionally, the value added associated with the expansion of containerized cargo throughput is forecasted to be approximately $930 million for the Philadelphia – Wilmington – Camden MSA per annum. This value added is an approximate annual increase of $421 million to the MSA over the current yield from the Port of Wilmington.
- The 2,260 new jobs forecast to result from the containerized cargo expansion represent an opportunity for approximately: 3% of the population of the City of Wilmington, 5% of the minority population in Wilmington, and 12% of the population living below the poverty level in Wilmington.

7.1.16 Community and Recreational Resources

- There are not expected to be direct or indirect impacts to local community and recreational resources from the construction of the project. Visitors to Fox Point State Park to the north of the project area proposed port will have an opportunity to view the “river at work” with the addition of new port operations nearby, which is one of the stated reasons for the park.

7.1.17 Visual and Aesthetic Resources

- There are not expected to be significant long-term direct impacts to visual and aesthetic resources in the area due to the project construction. Activities associated with construction including a dredge, cranes and support vessels may be temporarily visible during project construction.
- Indirect impacts from the construction and operation of a new container port at the adjacent upland site will include cargo cranes and construction equipment. Post construction, infrastructure such as cargo cranes, administrative buildings and warehouses, and stored containers will be visible at the site. This new infrastructure replaces the buildings, tanks, piping rack systems, processing equipment and smokestacks that were associated with the former chemical facility that was located at the site.

7.1.18 Existing Infrastructure

- There will be direct impacts to existing abandoned infrastructure in the project area. A U-shaped wood and concrete pier associated with the former Chemours chemical plant will be removed as will an existing pier that supports non-functioning water intake and discharge pipes for the former chemical plant. An existing range light that supports navigation of the Delaware River will be relocated.
- Indirect impacts to the adjoining upland parcel will include removal of former building slabs, existing pavements, existing foundations and underground utility appurtenances as necessary to support regrading and redevelopment of the site.

7.1.19 Transportation Infrastructure

- There are not expected to be significant direct impacts to landside transportation infrastructure associated with the construction of the project. Temporary and minimal impacts that may affect Hay and Edgemoor Roads and I-495 are limited to mobilization and movement of construction equipment and workers who may be commuting to the site. The number of site construction workers is anticipated to be small in comparison to the number of workers commuting to the site when it was an active industrial facility and when decommissioning and demolition were occurring. The roadways in the project area were developed to handle the traffic associated with the former industrial plant operations. No direct impacts are expected to rail transport.
- No significant direct impacts to wasterside transportation are expected from the construction of the project. Equipment will be mobilized to the site and will operate outside the bounds of the federal navigation channel.
- No significant indirect impacts to local roads, interstate highways and rail infrastructure from the construction of the new container port are expected.
- Train and truck traffic at the site has been reduced since the closing of the former Chemours Edge Moor chemical plant. The volume of truck traffic that may utilize the new container port is unknown at this time, but will be quantified as part of a

future traffic analysis by the Delaware Department of Transportation. Similarly it is difficult to estimate the volume of rail traffic until the actual tenants of the landside operations and the types of cargo they will be transporting are identified. For instance perishable cargo such as fruit may move locally by truck, but regionally or cross-country by rail. Nonperishable cargo, such as clothing or hard goods destined for regional and inland outlets likely would move by train.

7.1.20 Hazardous, Toxic and Radioactive Waste

- Any hazardous or toxic materials in the project area will be managed based on analysis of sediments and water quality included in this Environmental Assessment. There are not expected to be significant direct impacts from the dredging and placement of sediments in the Wilmington Harbor South CDF.
- There are not expected to be significant indirect impacts regarding hazardous, toxic and radioactive wastes on the adjoining upland property from redevelopment of the former Chemours chemical plant into a new container port.
- Extensive site characterization including groundwater and soil sampling was performed by both DuPont and Chemours with additional due diligence performed by the Diamond State Port Corporation prior to acquiring the site. The former plant site was closed under a Resource Conservation Recovery Act permit issued by the Delaware Department of Natural Resources and Environmental Control.
- Protective caps that were installed in several Solid Waste Management Units will remain in place or be modified to accommodate port development. Monitoring of those units and general site conditions will continue in accordance with approved RCRA plans during construction and after construction when the port is operational.
- Additionally, other industrial sites proximate to the project site and that may have been discharging or releasing hazardous substances to the estuarine environment have shut down and are in the process of being remedied, such as the former EVRAZ steel mill site under the State of Delaware Voluntary Cleanup Program and the former General Chemical site under US EPA administered RCRA Corrective Action, or have been remedied, such as the neighboring Fox Point State Park through the State of Delaware Brownfield Program.

7.1.21 Air Quality

- Air emissions from project construction are expected from the dredge, cranes, support vessels, excavators, bulldozers and vehicles, including worker vehicles that will be used for commuting to and from the project location. The Federal Clean Air Act and State of Delaware regulations require an analysis to determine if the project emissions shall be subjected to a General Conformity Analysis.
- New Castle County's ozone attainment status is categorized as Marginal by the US EPA. As such, the regulations require a determination as to whether project emissions for criteria pollutants of nitrogen oxides, volatile organic compounds,

carbon monoxide, sulfur oxides and particulate matter exceed de minimis levels established according to Delaware's ozone attainment status.

- The initial assessment assumed that commercial marine category equipment would be equipped by Tier 0 engines while non-road construction equipment would be equipped with engines that meet Tier III emissions standards and on-road truck emissions were estimated from engines meeting Tier II standards. In this scenario it was estimated that the project would exceed the de minimis threshold for NOx for year one of the project. However, NOx emissions for the first year of the project would represent only about 3.4 percent of the budget established by the State of Delaware.
- A second assessment scenario was developed to explore minimizing emissions and assumed that commercial marine engines would meet Tier II standards. In this scenario, de minimis thresholds were not exceeded. Both analyses suggest that the project conforms to State of Delaware and federal requirements.

7.1.22 Noise

- There is not expected to be significant direct impacts to noise in either the human or marine environment from the construction of the project. Increased noises due to the use of construction equipment will be temporary, the loudest of which in water likely will be the engine of the dredge and loudest of which in air likely will be the pile drivers used to install piling for the wharf.
- Noise from pile driving will be minimized by the use of vibratory and cushioned impact techniques as discussed in the Biological Assessment to protect endangered species. Those same measures will reduce noises in air, and based on calculations, are expected to be consistent with ambient noise levels in the area resulting from traffic on local roadways including I-495 and Route 13 and the Northeast Corridor rail line.
- In addition, the moratorium on pile driving during the spring spawning season (typically March – June) is expected to apply to this project and will be issued as a condition of State and federal permits. The intent of the moratorium is to minimize the potential for impacts to migratory (anadromous) fish species spawning runs.
- Indirect noise impacts from port operations at the new container facility are not expected to be significant. In air, large equipment at the port such as cranes and rubber-tired gantries will utilize electric motors that are much quieter than diesel engines. Noise from the port, including that from trucks, is expected to be within ranges for compliance with New Castle County requirements. In water, sound studies of shoaling fans have indicated that they are much quieter than ships and that the noises produced by the equipment are not in frequency bands that would affect adversely fish responses to other threats in the environment.

7.1.23 Cultural and Historic Resources

- A 2019 cultural resources assessment that included the use of multi-beam sonars, side scan sonar, magnitometor, and literature review did not identify significant cultural and historic resources within approximately 130 acres at the site

including the project area. As a result there are not expected to be direct or indirect impacts to cultural resources. The State Historic Preservation Office has concurred with the findings of the assessment.

7.1.24 Safety and Security

- The Maritime Institute of Technology and Graduate Studies (MITAGS) conducted a desktop and Full Mission Bridge Navigation Simulation Study to determine the navigation feasibility for a new terminal container port at Edgemoor. The purpose of the study was to evaluate the design of the terminal and turning basin and ensure that container ships are able to safely transit to the Edgemoor terminal on a regular basis with minimum impact to existing vessel traffic in the main channel of the Delaware River. The simulations were conducted under a variety of weather and tidal conditions and ship traffic scenarios. The evaluation resulted in Pilots identifying design considerations to deepen a portion of the berth approach to provide additional maneuvering space for inbound vessels. Modifications to the design were made to address the issue.
- There are not expected to be any significant direct or indirect impacts to safety and security.

7.2. Adverse Environmental Impacts That Cannot Be Avoided

The Applicant's proposed project would result in the following minor, localized, and temporary impacts during dredging and dredged material placement:

- Impacts to benthos, fish and existing habit) from turbidity and other more minor water quality changes within the dredge footprint.
- Impacts to fish, unvegetated river bottom benthic organisms, and existing habitat from entrainment, impingement, and burial within the dredge and placement footprint.

Because the organism populations are common throughout the river and would be expected to recover quickly, or the organisms would avoid these effects through their mobility, and considering the small percentage of likely habitat affected, the effect would be considered minor and temporary. These effects cannot be avoided because dredging is necessary to excavate below water.

The Applicant's proposed action would result in the following permanent impacts:

- Conversion of approximately 85 acres of natural shallow unvegetated river bottom to deeper, berth and access channel bottom and side slopes subject to vessel activity and periodic maintenance dredging.

The conversion of shallow unvegetated river bottom to berth and access areas are minor given the amount of unvegetated river bottom throughout the Delaware River estuary. The cumulative effects of this type of impact were not shown to be significant. Although the river bottom would be altered permanently by dredging, the permanent beneficial impact is the removal of a significant amount of sediments that are contaminated with bio accumulative

toxins and other pollutants whose removal will have a long-term benefit to the estuary and support the goal of ultimately removing advisories on human consumption of fish taken from the Delaware River.

7.3. Conclusion of Impacts to the Environment

Implementation of the preferred alternative of dredging the Edgemoor site to 45 feet MLLW is recommended. The project proposes the removal of an estimated 3.3 MCY of silt, sand and clay material from approximately 85 acres of subaqueous lands of the Delaware River. The dredging is required to create a berth and access area to support construction of a proposed new container port that represents an expansion of the existing Port of Wilmington. The preferred site for storage of the bulk of dredged material would be the Reedy Point Complex, an existing, federally owned and managed confined disposal area in Delaware. This alternative is recommended based on meeting the purpose and need for the proposed action and the criteria used to identify it. The selection of the preferred alternative is also based on the detailed environmental analysis contained in this document which concludes that the proposed action would have no significant social, economic or environmental impacts that would necessitate an Environmental Impact Statement.

8.0 LIST OF PREPARERS

Duffield Associates prepared this Technical Document on behalf of the Diamond State Port Corporation with key personnel responsible for review and preparation of the document listed below. Contractors and subconsultants used on the project and their respective roles are also identified.

8.1 List of Preparers

Brian Devine. P.E. Duffield Associates – Project management, quality assurance review

David Small, Duffield Associates - Project evaluation, Sediment and water quality analysis, human health impacts analysis, cumulative impacts analysis

Rick Beringer, P.E. Duffield Associates – Sediment and water quality analysis, HTRW monitoring, economic forecast conditions, quality assurance review

Rebecca Harris, Project Scientist, Duffield Associates – Aquatic and upland habitat analysis, affected biological resources analysis

Ralph Downard, Senior scientist, Duffield Associates – Section 404 wetlands assessment

Jessica Fedetz, Staff Engineer, Duffield Associates – Sediment and water quality analysis, human health impacts analysis, cumulative impacts analysis

Bryan Moriarty, Staff Engineer, Duffield Associates – Alternatives analysis, noise, aesthetic, community and recreational resources analysis, cumulative impacts analysis,

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Dr. Jerry Diamentedes, David Miller Associates – Economics, Employment, Socio-Economics, Transportation

Charlii Miller, Environmental Consulting Services, Inc. – Habitat and benthic sampling and characterization, and fish population survey

The Maritime Institute of Technology and Graduate Studies (MITAGS)

Mott MacDonald – Hydrodynamic modeling and analysis

R. Christopher Goodwin and Associates – Cultural resources and marine archaeology

Gahagan & Bryant Associates, Inc. – Bathymetric survey and submarine remote sensing

SedCon Technologies, Inc. – Anti-sedimentation technology

S.T. Hudson Engineers, Inc. – Dredge planning and logistics

Landmark Engineering - Surveying

Aqua Survey, Inc. - Vibracoring

CGC Geoservices, LLC. – Geotechnical Test Borings

Test America – Laboratory analysis for sediment and water quality sampling

University of Delaware -- Nobuhisa Kobayashi, PhD, Center for Applied Coastal Research, University of Delaware. Independent reviewer.

8.2 Listing of Agencies and Persons Consulted

Federal Agencies

U.S. Army Corps of Engineers Philadelphia District
- Michael Landis, Chief of Operations
- Peter Blum, Chief of Planning
- Edward Bonner, Chief, Regulatory Branch
- Dan Kelly, Operations Section
- Timothy Kelly, Operations Section
- Timothy Rooney, Operations Section
- Daniel Caprioli, Planning Section
- Barbara Conlin, Planning Section
- John Brundage, Regulatory Branch

U.S. Army Corps of Engineers, Deep Draft Navigation Planning Center

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Services
- Keith Hanson, Marine Habitat Resource Specialist
- Peter Johnsen, Fisheries Biologist

U.S. Department of Interior, U.S. Fish and Wildlife Service
- Kathleen Cullen

U.S. Environmental Protection Agency

State Agencies

Delaware Department of Natural Resources and Environmental Control
- Steve Smailer, Program Administrator, Division of Water
- John Cargill, Hydrologist, Division of Waste and Hazardous Substances, Division of Watershed Stewardship

Tyler Brown, Wetlands and Subaqueous Lands Section Program Manager, Division of Water

Michael Stangl, Program Manager, Division of Fish and Wildlife
David Fees, Director, Division of Air Quality
Valerie Gray, Planning Supervisor, Division of Air Quality

Delaware Department of State Division of Historical and Cultural Affairs
Craig Lukezic, State Historic Preservation Office

Persons Consulted

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