US Army Corps
of Engineers
Philadelphia District

DELAWARE COAST PROTECTION
INDIAN RIVER INLET SAND BYPASS PROJECT
NORTH BEACH SUPPLEMENTAL SAND NOURISHMENT
SUSSEX COUNTY, DELAWARE

ENVIRONMENTAL ASSESSMENT (EA)

NEPA Unique ID: EAXX-202-00-E5P-1742316597

JULY 2025

PREPARED BY:

U.S. ARMY CORPS OF ENGINEERS, PHILADELPHIA DISTRICT

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FINDING OF NO SIGNIFICANT IMPACT
DELAWARE COAST PROTECTION
INDIAN RIVER INLET SAND BYPASS PROJECT
NORTH BEACH SUPPLEMENTAL SAND NOURISHMENT
SUSSEX COUNTY, DELAWARE

The U.S. Army Corps of Engineers, Philadelphia District (USACE) has conducted an environmental analysis in accordance with the National Environmental Policy Act of 1969, as amended. The Environmental Assessment (EA) dated 16 June 2025 and titled *Delaware Coast Protection – Indian River Inlet Sand Bypass Project- North Beach Supplemental Sand Nourishment* evaluates existing environmental, cultural, and socio-economic conditions and the effects of the project on existing resources at the proposed project site. The EA also evaluates alternative sand sources and the effects on existing resources of no action.

The plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the North Beach shoreline. The Delaware Department of Natural Resources and Environmental Control completed an initial phase of the restoration of the beach by dredging from the interior Indian River Inlet Flood Shoal and placing approximately 480,000 cubic yards of sand on the North Beach shoreline. This phase is identified as "Phase 1", which was constructed to address severe erosion of the North Beach and dune. Phase 1 was completed March 1, 2025. The next phase (Phase 2) is the USACE component, which will complement the Phase 1 portion. For the completion of the Phase 2 berm and dune restoration, approximately 500,000 cubic yards of sand would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 5H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes. The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted by the State of Delaware. A staging area will be needed for the contractor and a site designated approximately 2,300 ft north of the north jetty has been identified and will be used in conjunction with two areas located under the IRI bridge. The Phase 2 sand would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A).

The selected plan also includes the periodic nourishment of the North Beach on an as needed basis to supplement the Indian River Inlet sand bypass plant operations to maintain the Phase 2 berm and dune template. The required sand quantities may be variable but could be as high as 800,000 cubic yards at the time of need. The sand sources include the Indian River Inlet Ebb Shoal (Ebb-A) and the existing Indian River Inlet Flood Shoal Sand Source. Additionally, the Indian River Inlet Ebb Shoal (Ebb-B) portion including the proposed southern lobe expansion area is considered for future use but requires supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources.

A summary assessment of the potential effects of the recommended plan are listed in Table 1:

Table 1: Summary of Potential Effects of the Recommended Plan

	Insignificant effects	Insignificant effects as a result of mitigation*	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☒	☐	☐
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☒	☐	☐
Public infrastructure	☒	☐	☐
Socio-economics	☒	☐	☐
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the recommended plan. Best management practices (BMPs), as applicable, will be implemented to minimize effects.[1] In consultation with the NOAA Fisheries, pursuant to the Magnuson Stevens Fishery Conservation and Management Act (MSA) for the protection of Essential Fish Habitat (EFH) and federally managed fish species, USACE will adhere to NOAA Fisheries recommended seasonal restricted period for dredging and placement activities. Pursuant to Section 7 of the Endangered Species Act of 1973, as amended,

[1] 40 CFR 1505.2(C) all practicable means to avoid and minimize environmental harm are adopted.

a determination that the project may affect, but is not likely to adversely affect (NLAA) listed species or critical habitat was submitted to NOAA Fisheries Greater Atlantic Regional Field Office (GARFO) for review. A GARFO concurrence with this determination is being requested. A determination that the action is not likely to adversely affect the piping plover, red knot and seabeach amaranth plant was submitted to the U.S. Fish and Wildlife Service for review. A USFWS concurrence with this determination is being requested. All terms and conditions of the Section 7 consultation with NOAA Fisheries and USFWS shall be implemented in order to minimize take or jeopardizing endangered species.

Public review of the draft EA was initiated 20 March and was completed on 21 April 2025. All comments submitted during the public review period were addressed in the Final EA and included in the Correspondence Appendix. Comments from state and federal agency review did not result in any significant changes to the final EA. All state and federally mandated approvals have been received.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, USACE determined that no historic properties will be adversely affected by the recommended plan. The Delaware State Historic Preservation Office concurred with our determination on 11 July 2025.

Pursuant to the Clean Water Act of 1972, as amended, the discharge of dredged or fill material associated with the recommended plan has been found to be compliant with Section 404(b)(1) Guidelines (40 CFR 230). The Clean Water Act Section 404(b)(1) Guidelines evaluation is included in the EA.

Water Quality Certification pursuant to Section 401 of the Clean Water Act was obtained from the Delaware Department of Natural Resources and Environmental Control. All conditions of the Water Quality Certification shall be implemented in order to minimize adverse effects to water quality.

A determination of consistency with the Delaware Coastal Zone Management Program pursuant to the Coastal Zone Management Act of 1972 was obtained from the Delaware Coastal Management Program. All conditions of the consistency determination shall be implemented in order to minimize adverse effects to the coastal zone.

All applicable environmental laws have been considered and coordination with appropriate agencies and officials has been completed. Based on this document, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the recommended plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

_7/14/2025__________
Date

/Electronically Signed/
Jeffrey M. Beeman
Lieutenant Colonel, Corps of Engineers
District Commander

Table of Contents

LIST OF TABLES

LIST OF FIGURES

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1.0 INTRODUCTION

This document is being issued pursuant to the National Environmental Policy Act (NEPA) for the purpose of evaluating alternate sources of sand and construction methods to complete the restoration of the Delaware Coast - Cape Henlopen to Fenwick Island Project ("Delaware Coast Protection") - also known as the Indian River Inlet Sand Bypass Plant Project. Additionally, this assessment evaluates the use of long-term use of alternate sand sources to supplement the operation of the Indian River Inlet Sand Bypass Plant on an as needed basis for periodic nourishment and/or emergency repairs. This document supplements previous NEPA documents referenced as:

- Final Environmental Impact Statement (USACE, 1971),
- Environmental Impact Statement – Draft Supplement (USACE, 1975a),
- Final Environmental Impact Statement – Indian River Inlet Project Maintenance (USACE, 1975b),
- Environmental Assessment/Finding of No Significant Impact (FONSI) – Indian River Inlet Sand Bypass Plant (USACE, 1984),
- Environmental Assessment/FONSI – Indian River Inlet and Bay Maintenance Dredging and Beneficial Use of Dredged Material Section 104, Navigation (USACE, 2009),
- Environmental Assessment/FONSI – Flood Control and Coastal Emergency Repair – Indian River Inlet North Shore (USACE, 2013).

The restoration of the Delaware Coast Protection Project, the first phase of which is currently being undertaken by the Delaware Department of Natural Resources and Environmental Control, is being funded under the Infrastructure Investment and Jobs Act (IIJA). This project activities described in this assessment affect two overlapping Federal projects: the Delaware Coast Protection Project and the Indian River Inlet and Bay Navigation Project.

1.1 Delaware Coast Protection Project

The Delaware Coast Protection project is a Flood and Coastal Storm Damage Reduction project authorized by the Flood Control Act of 1968 and modified by the Water Resources Development Act of 1986 (P.L. 99-662). This project was authorized to address chronic beach erosion along the North Beach of the Indian River Inlet caused by the inlet jetties. Here, the jetties interrupt the northward longshore transport of sand resulting in a deficiency of sand on the north side of the inlet. The authorized plan, as modified, consists of constructing a sand bypass plant and operating said plant to periodically nourish (approximately 100,000 cubic yards of sand, annually) approximately 3,500 feet of feeder beach on the north side of the inlet (North Beach) to protect the Delaware Route 1 highway (Figure 1). Initial construction was completed in 1990, and the sand bypass plant has been subsequently operated and maintained by the non-Federal sponsor, the Delaware Department of Natural Resources and Environmental Control. In 2013, USACE conducted a major emergency repair of the Delaware Coast Protection Project in response to a disaster declaration from Hurricane Sandy under the

P.L. 84-99 (Flood Control and Coastal Emergencies), using approximately 520,000 cubic yards of sand dredged from the interior flood shoal to restore a 5,000-foot segment of beach and dune north of the inlet.

The sand bypass plant is currently being converted from the original diesel motors to an electric system and has been taken temporarily offline. The work also includes the installation of electric motor controls and an enclosed HVAC control room. The bypass plant is expected to resume operations by the fall of 2025.

1.2 Indian River Inlet and Bay Federal Navigation Project

The Indian River Inlet and Bay Navigation Project is in proximity to the Delaware Coast Protection Project and overlaps it along both jetties. The purpose of this project is to provide a safe navigation channel for commercial, recreational and U.S. Coast Guard use. Indian River Inlet is the only water access point into the Delaware Inland Bay area that includes Indian River Bay and Rehoboth Bay. This project was authorized by the Rivers and Harbors Act of 1937, Pub.L. 75-392, 50 Stat. 844in 1937 and modified in the Rivers and Harbors Act of 1945, Pub.L. 79-14, 59 Stat. 10. The project authorization and modification includes stabilizing the inlet by construction of parallel jetties 500 ft apart; the dredging of a channel generally 200 ft wide and 15 ft deep from the inner ends of the jetties to a point in the Bay substantially 7,000 ft from the ocean shoreline; dredging a channel 9 ft deep, 100 ft wide in the Bay and 80 ft wide in the River, from that depth in the existing channel in Indian River Bay to and including a turning basin 9 ft deep, 175 ft wide and 300 ft long at Old Landing; then about 8,200 ft to highway bridge at Millsboro, 60 ft wide, 4 ft deep (Figure 2).

Maintenance activities such as maintenance dredging, shoreline stabilization along the interior inlet shorelines, and repairs to the jetties have occurred numerous times since the construction of the inlet and navigation channels. Most recently, USACE awarded a contract to repair a failed bulkhead area along a popular recreational area and sand tighten a portion of the south jetty. This work was funded through the Infrastructure Investment and Jobs Act. Construction began in the Spring 2023 and is expected to be completed in 2025.

1.3 Location

The project is located in Sussex County, Delaware, along the Atlantic Ocean coast at Indian River Inlet (Figure 1). The project area includes a portion of the intertidal beach, supratidal beach and dune, pumphouse, and parking lot along the south Atlantic Ocean Coast shoreline of the Indian River Inlet. The north side (North Beach) of Indian River Inlet consists of the intertidal beach, supratidal beach, and dune areas extending approximately 5,200 feet to the north from the north jetty (Figure 1 thru Figure 3). The North Beach is the location of severe beach erosion and is the focus of this action.

The project area also includes the following in-water areas for consideration as alternative sand sources for beachfill: the Indian River Inlet Ebb Shoal located approximately 0.25 miles offshore from the inlet jetties, the Indian River Inlet Flood Shoal (IRI Flood Shoal) located in the interior inlet area immediately west of the Charles W. Cullen Memorial Bridge, and two shoal areas (Burton Island Shoal and Middle Island Shoal) within Indian River Bay (Figure 3).

2.0 PURPOSE AND NEED

The purpose of the Project is to restore the severely eroded berm and dune system of the North Beach as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

The North Beach has a long history of erosion due to the interruption of the northward flow of sand caused by the construction of the inlet jetties. This erosion has made critical infrastructure, such as SR-1 and the Indian River Inlet Bridge (currently the Charles W. Cullen Memorial (Inlet) Bridge), more vulnerable to storm damages. To mitigate risk and provide a consistent source of sand to North Beach, a sand bypass facility was constructed in 1990 by USACE south of the south jetty and is operated and maintained by the State of Delaware. The sand bypass system mimics the natural flow of sand from south to north by pumping sand from the southside beach fillet across the inlet to the North Beach. Sand pumping rates are variable and average 100,000 cy of sand per year.

Prior to the construction of the sand bypass system, sand was periodically obtained from the interior IRI Flood Shoal and placed on the North Beach. From 1957 to 1990, over 2 million cy of sand was dredged from the Inlet interior to maintain the Federal navigation channel and to obtain beach fill for the eroding shoreline north of the Inlet (USACE 2014). Once the sand bypass system was operational in 1990, dredging within the Inlet was only necessary in 2010 to fill scour holes located near the USCG facility. Otherwise, no additional dredging of the interior Inlet was performed to obtain beach fill or maintain the channel until Hurricane Sandy hit in October 2012.

Hurricane Sandy eroded hundreds of thousands of cy of sand from the North Beach, resulting in overwash from the storm surge that flooded SR-1 and the approach to the newly constructed Inlet Bridge. Overwash forced the closure of this critical highway and evacuation route for several days until State crews could remove sand from the roadway and make the necessary repairs. Following Hurricane Sandy, over 500,000 cy of sand was required to rebuild the beach template, which is a far greater volume than the sand bypass system could accommodate. Therefore in 2013 under the Flood Control and Coastal Emergencies program, the USACE dredged sand from the Indian River Inlet Flood Shoal borrow area to repair the berm and dune system at North Beach.

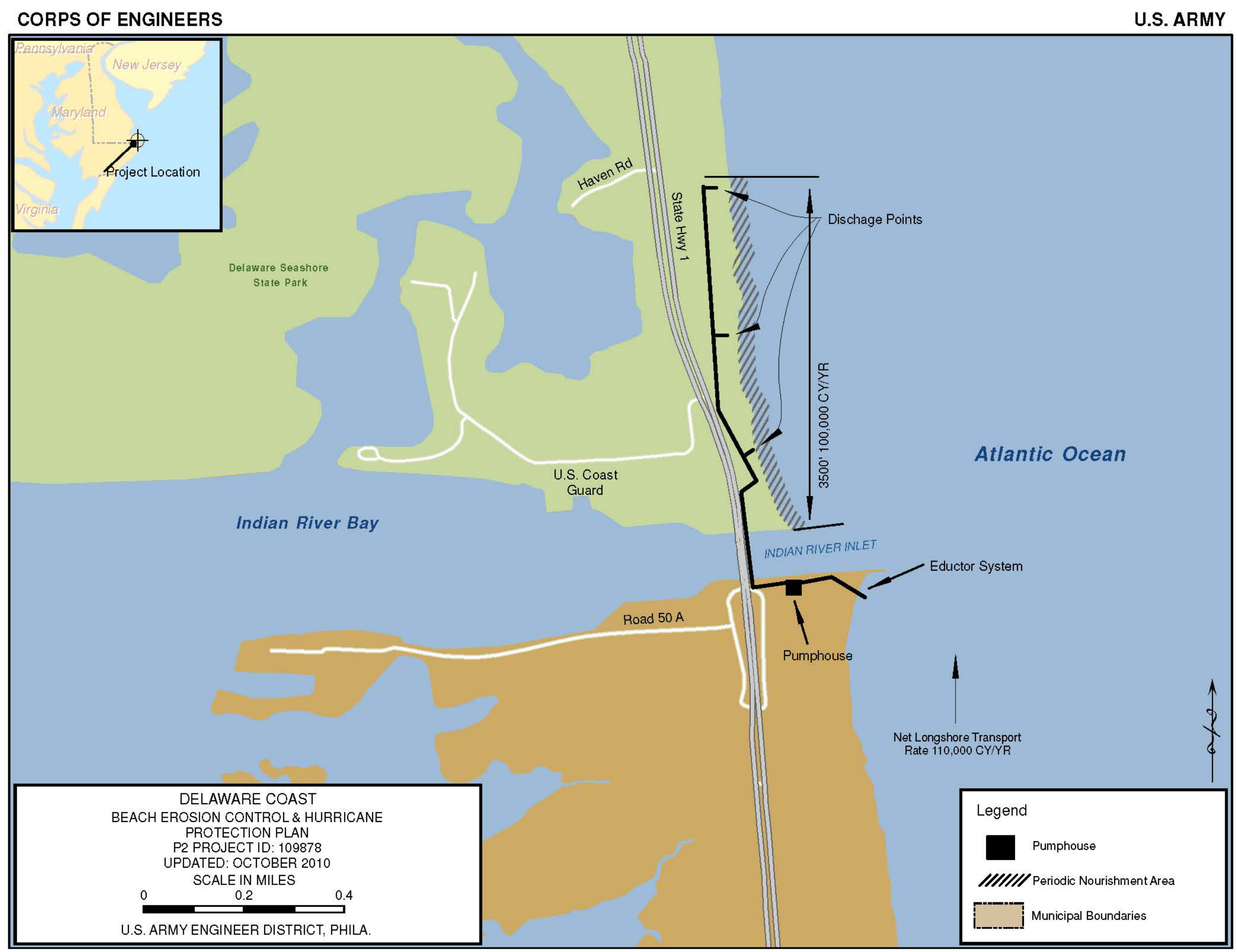
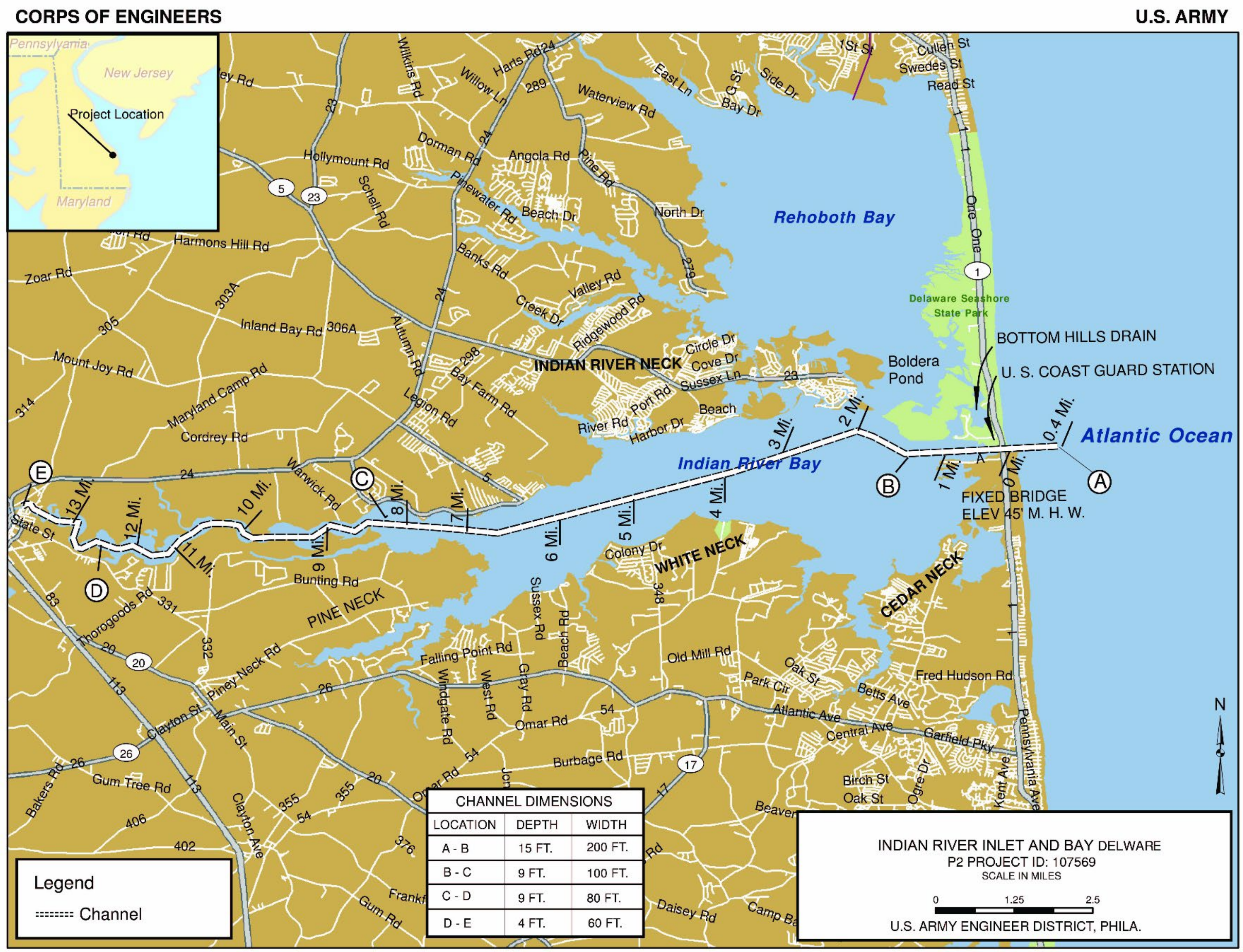


Figure 1. Delaware Coast Protection - Indian River Inlet Sand Bypass Plant and North Beach Beachfill Placement Area



LOCATION	DEPTH	WIDTH
A - B	15 FT.	200 FT.
B - C	9 FT.	100 FT.
C - D	9 FT.	80 FT.
D - E	4 FT.	60 FT.

Figure 2. Indian River Inlet and Bay Federal Navigation Project.

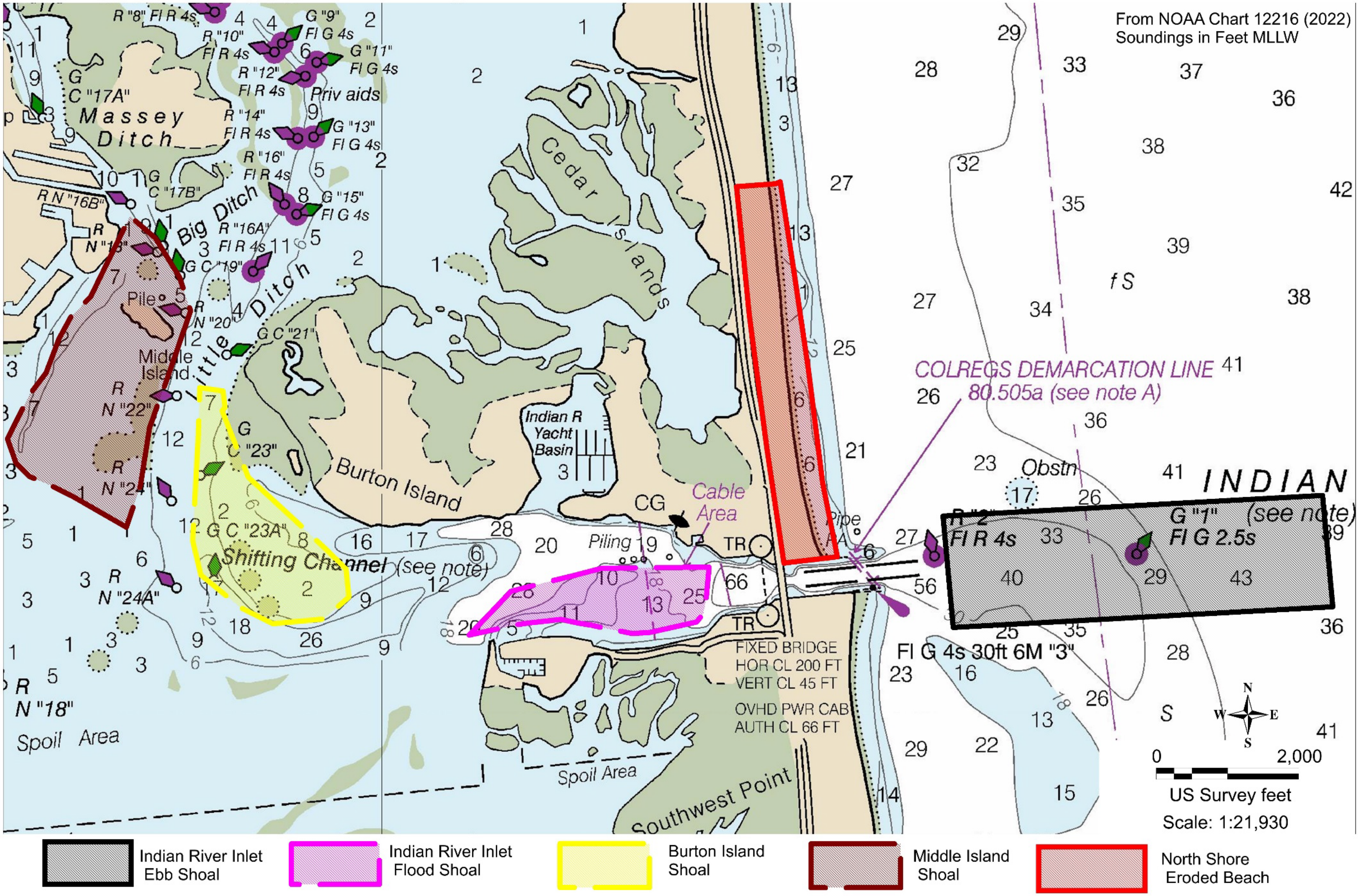


Figure 3. Shoal Areas Considered Initially for Alternative Sand Sources and North Beach Indian River Inlet

For several years the sand bypass system periodically nourished the Delaware Coast Protection Project at North Beach; however, in 2020 the system became inoperable. Since then, DNREC Shoreline and Waterway Management Section has judiciously added sand to North Beach via truck haul which has been ineffective for mitigating risk. Due to the inadequate periodic nourishment, the dune system at North Beach is severely eroded and prone to scour from direct wave energy on a regular high tide.

The current condition (as of September 2024) of North Beach is such that a minor storm surge or swell event is very likely to breach the dune. This has the potential to flood Delaware State Route 1 (SR-1), an evacuation route, and erode the existing Inlet Bridge. A dune breach on August 17, 2024 forced the closure of SR-1 for several hours as ocean water, sand and debris flooded the roadway (Figure 4 and Figure 5).

Severe erosion at North Beach has also exposed hazardous debris from historical roads that had previously washed out to the intertidal zone (Figure 6). There have been extensive clean-up efforts among DNREC and local volunteers, but as the beach erodes further, additional debris becomes exposed. The debris is now more difficult to remove since the beach elevation has lowered, leaving no dry beach above the intertidal zone during high tide (Figure 7). In response, beachgoers are walking and sitting on the dune face and crest, which is an additional stressor to the dune complex. During low tide at North Beach, beachgoers sit in the intertidal zone among the large pieces of hazardous road debris that are now exposed and washing ashore. In addition, swimmers and waders may be unaware of the hazards posed by debris and the currents driven by wave energy.

Despite repeated attempts to patch the areas of high erosion by truck haul sand, the volume and rate of sand delivery became inadequate such that sand placed on the beach gets washed out within one tidal cycle. Therefore, a truck haul method in this capacity is insufficient to restore and maintain the beach profile.

In response to the urgent need to protect critical infrastructure, DNREC proposed dredging approximately 480,000 cubic yards of sand to partially restore the Delaware Coast Protection Project at North Beach (this is referred to as “Phase 1”). Phase commenced in late November 2024 (under Department of the Army Permit NAP-2024-00438-85) utilizing the interior IRI Flood Shoal as the sand source and is expected to be completed in March 2025.

Phase 1 includes the following key components:

- Dredge up to 480,000 cy of sediment from the Indian River Inlet Flood Shoal, consistent with the permitted depth of -24 ft NAVD with 1 ft of allowable over-dredge and approximately 640 ft wide.

Figure 4. Aerial view of the dune breach at Delaware Seashore State Park (looking north) on August 17, 2024 (Photo Courtesy of DNREC)

Figure 5. View of the dune breach at Delaware Seashore State Park (looking south) on August 17, 2024 (Photo Courtesy of DNREC).

Figure 6. View (looking south) of Hazardous Debris Exposed on North Beach Due to Erosion (April 2024) (Photo Courtesy of DNREC)

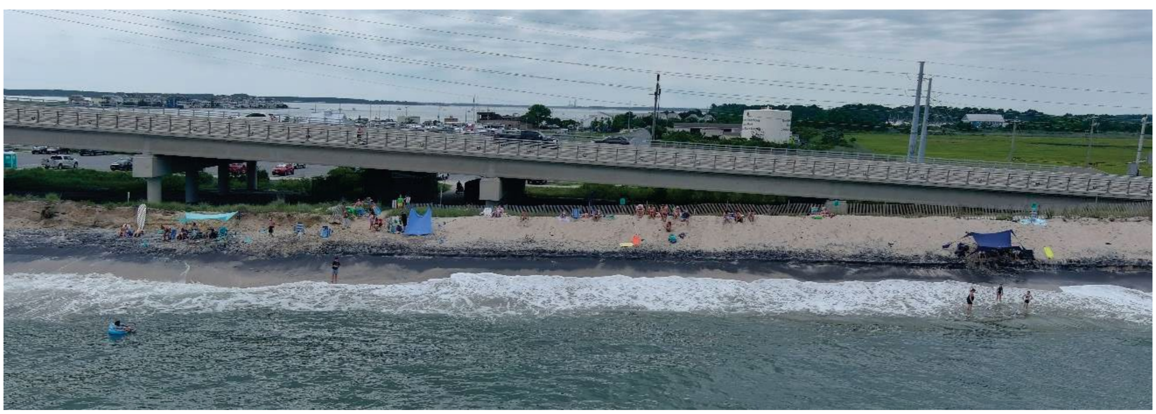


Figure 7. View of North Beach from Atlantic Ocean During Hight Tide. No Observable Dry Beach Above the Intertidal Zone (July 26, 2024) (Photo Courtesy of DNREC)

- Transport dredged material, via pipeline, to the placement site at North Beach.
- Spread and grade dredged material to restore the berm to an elevation of +9.0 ft NAVD and a width of 100 to 150-ft and dune system to an overall elevation of +16.0 ft NAVD and a width of 25-ft. Placement will begin at the north jetty and extend northward for approximately 5,200 ft (between 0+00 and 55+0).

Phase 2 of this effort is the additional placement of sand by USACE. Approximately 500,000 cubic yards of sand are required to complete repairs of the berm and dune that provide sufficient protection for the critical infrastructure.

For Phase 2, the additional 500,000 cubic yards would be placed anywhere it is needed to complete the North Beach repairs to achieve the final dimensions of a berm 250 ft. wide and an elevation of +9.0 ft. NAVD and a dune system to an overall crest elevation of +16.0 ft. NAVD and 25-ft. in width (Phase 1 is likely to have completed the dune prior to Phase 2). The placement locations would be determined based on pre-placement topographical surveys following Phase 1. However, the IRI Flood Shoal sand source is expected to become depleted from the Phase 1 dredging and would not have an adequate quantity of sand to complete restoration of the project. Therefore, a need exists to utilize another (alternate) sand source to supplement the flood shoal sand source during Phase 2.

It is expected that the sand bypass plant would become operational in late 2025 after Phase 2 is completed, and that it will periodically nourish the North Beach with sand from the southside beach fillet as intended. However, there is a need to develop a long-term alternate sand source for periodic nourishment of the project during mechanical shutdowns of the sand bypass plant and/or for emergency repairs after a qualifying storm event on an “as needed” basis. Additionally, a long-term alternate sand source is needed to manage sand resources and provide regional sediment management of the Indian River Inlet shoal complex.

3.0 ALTERNATIVES CONSIDERED

The impacts of the sand bypass plant and placement of sand on the North Beach were previously evaluated in USACE (1971, 1975a, 1984, and 2013). To meet the purpose and needs as discussed in 2.0, this assessment only focuses on alternate borrow sources to complete restoration of the project and for periodic nourishment or emergency repairs of the project area at North Beach on an as needed basis. Three alternatives are available for consideration: 1) no action; 2) dredging from offshore borrow areas and 3) local commercial sand quarry and truck haul delivery.

3.1 No Action

No action assumes the completion of Phase 1 and the expected resumption of the operations of the sand bypass plant later in 2025. The completion of Phase 1 will provide much needed protection by restoring the most vulnerable portions of the beach and dune system on the North Beach. However, no action will not restore the berm and dune on North Beach and the existing beach will remain vulnerable to continued erosion leaving critical infrastructure at risk to damages from storm waves and overwash. Even if the sand bypass plant became operable now, it does not have the capacity to pump an additional 300,000 cubic yards of sand needed now to complete restoration of the dune and berm.

The no action alternative also does not provide a long-term alternate sand source needed to complement the operations of the sand bypass plant on an “as needed” basis. An “as needed” basis would result either from a significant storm event or a series of storms that erode the project at North Beach beyond the capability of the sand bypass plant. Additionally, unscheduled repairs of the sand bypass plant may be required that can result in delays in periodically nourishing the project at North Beach. As is the case with the Phase 1, the IRI Flood Shoal has periodically been used as a supplemental sand source for the North Beach, but the quantity of sand is limited, and may not supply future needs.

All of these factors combined would increase the vulnerability of the North Beach shoreline and adjacent infrastructure. If no action is taken to fully restore the berm and dune, continued erosion will occur particularly during storm events until such a time that the roadway and newly constructed bridge will be endangered and or impassable. Loss of the inlet crossing is unacceptable as it is the only means of reaching the other side of the inlet versus driving the long way around, which can increase travel times by as much as 20 more minutes. First responders and emergency personnel rely on the bridge and road network in the State Park to access areas in and around the Indian River area by land. Loss of the road during recent storm events led to extended response and travel times involving first responders, complicating patient delivery to medical facilities in a timely manner and economic interruptions.

3.2 Dredging and Beachfill Placement

Hydraulic cutter-suction dredges (CSDs) and trailing suction hopper dredges (TSDs) provide an efficient means of delivering sand to the project location on the North Beach to restore the berm and dune. The project area extends for approximately 5,000 ft. north of the north Indian River Inlet jetty (Figure 3). CSDs and TSDs can move massive quantities of sand from the source to the receiving beach in a short amount of time (up to 10,000 cubic yards/day, depending on dredge size and pumping distance). Cost effectiveness for using dredges for delivering sand as beachfill is realized for large projects. The average cost per cubic yard of sand can be relatively low; however, a significant cost item for dredging is found in mobilization and de-mobilization costs for a dredge. In the case of a 30,000 cubic yard beachfill, the mobilization and demobilization cost can be up to 8 times the cost of the actual dredging and placement costs (cost/cy). However, in a larger scale project, such as 150,000 cubic yards (or greater), the mobilization/de-mobilization costs may be only 2 times the cost of the actual dredging/placement costs.

Cutter suction or hydraulic cutterhead dredges are floating platforms equipped with a rotating cutter that excavates the sea floor, feeding the loosened material into a pipe (generally 30" diameter) and pump system that transports the material and water slurry up to typical distances of five miles by pipeline. Transport distances can be extended by the addition of booster pumps in the pipeline route. Cutter suction dredges will typically be anchored into the bottom with a spud and remain in a fixed spot and will excavate uniform deep pits along the arc of the cutterhead. CSDs can be very efficient dredges that can pump 2,000 cubic yards per hour or greater. The limitations for CSDs are that they require booster pumps for pumping distances greater than five miles, and they typically require calmer sea conditions than what a hopper dredge requires. Problems with clays clogging intake screens have been reported in instances when MEC screens are employed. CSDs are not very mobile and not easy to relocate within a borrow area to find optimal sand if suboptimal sand is encountered. A typical operation of a CSD for a beach nourishment project is provided in Figure 8.

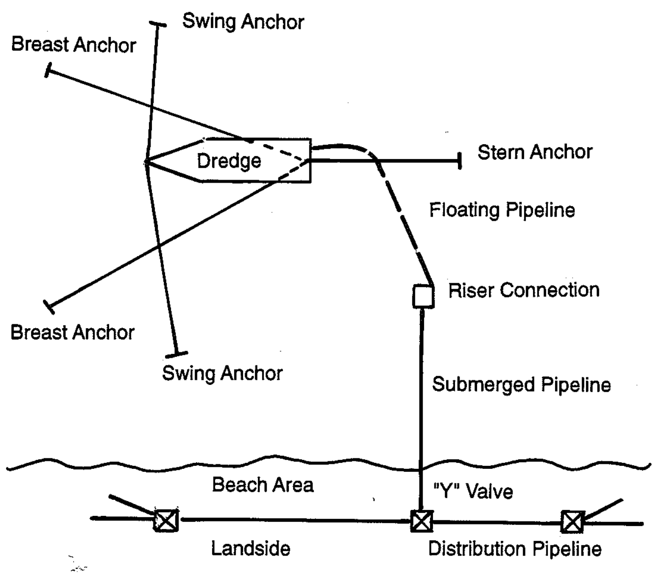


Figure 8. Typical Cutter-Suction Dredge Operation for Beach Nourishment (Source: National Research Council, 1995).

Trailing suction hopper dredges (TSHDs) are designed to vacuum material from the sea floor through drag arms that load the material into the hold (hopper) of the vessel (3,600 CY to 6,500 CY). The cargo of sand is then sailed to a pump-out location within the nearshore zone where the material is pumped ashore by the ship (or the pump-out station). TSHDs have been used for initial construction and periodic nourishments at Rehoboth Beach/Dewey Beach, Bethany Beach/South Bethany, and Fenwick Island. TSHDs are most beneficial for mining sand from sources that are at far distances from the destination beaches where the vessel can transit between sand source and pump-out location. TSHDs are moving vessels during dredging operations, and typically create shallow furrows within the affected portions after each pass within a borrow area. A typical result would be a broader shallow pit with some uneven furrows within it. Because TSHDs are vessels in motion, they have a higher potential for entraining mobile sea life including threatened and endangered sea turtles and Atlantic sturgeon that may be found along the sea floor. A typical operation of a trailing suction hopper dredge for a beach nourishment project is provided in Figure 9.

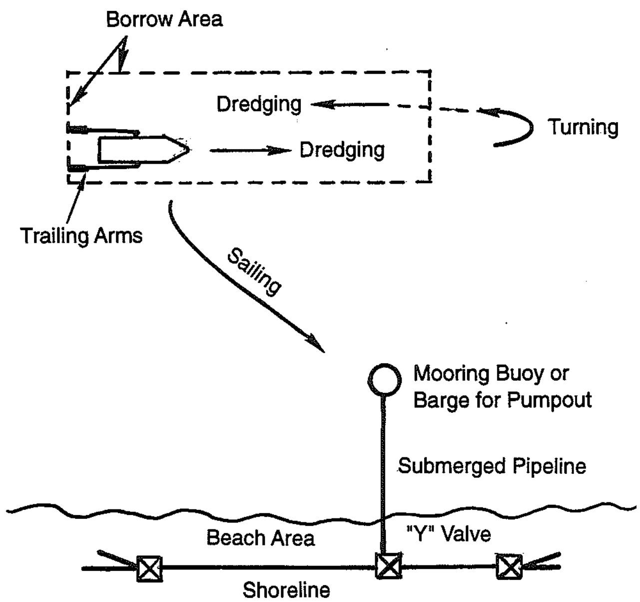


Figure 9. Trailing Suction Hopper Dredge Operation for Beach Nourishment (Source: National Research Council, 1995).

Once the sandy material is dredged from the ocean or bay floor, it is transported/pumped through a submerged pipeline, which rises to the shore at a location that is in the center of the section of beach to be filled. At this point, sand is delivered via a “Y” valve that distributes the sand along the beach in the preferred direction (see Figure 8, Figure 9 and Figure 10). Pipeline is added as the beachfill progresses along the beach. The sand is pumped on the beach into a basket to screen potential MEC (Munitions and Explosives of Concern) (Figure 11), the excess water runs off, then the sand is moved around with a bulldozer to the shape of the template. This is typically done with a small, temporary "training" berm (not to be confused with the beach berm template) constructed along the beach to direct flow and allow sands to settle out as it is de-watered. The water in the slurry is allowed to flow freely back into the ocean. This operation usually occupies up to about 1,000-foot sections of beach at a time. Public access is prohibited within these segments during ongoing operations, which can usually last from several days to a week depending on work progress.

Figure 10. A Typical Beachfill Operation along the Delaware Atlantic Coast.
(Source: Great Lakes Dredge and Dock Company website accessed at:
http://www.gldd.com/company/projects/coastal-protection/ on 5/7/2015)

Figure 11. Sand Being Pumped Through a 3/4-inch MEC Screen Basket from a Hopper Dredge. Training berms surround pump-out area to allow for sand retention.

Within these segments, the project template is achieved through filling and manipulating the sand with dozers to the required elevations and widths. The design template berm width is the minimum berm width after the filled beach adjusts to wave action. The construction template (including a quantity of advanced (sacrificial) nourishment) will result in a significantly wider berm than the design template berm because the beach will be initially "overbuilt". The advanced nourishment is usually the quantity required for periodic nourishment unless more fill is required to address erosion of the design template berm/dune. The inclusion of the advanced nourishment and construction template enables the economic use of standard earth-moving equipment for the distribution of the fill and minimizes relocation of the discharge point. The result is a beach berm that is initially considerably wider (up to two to three times) than the authorized design width. After the first storm season, the berm is expected to adjust landward becoming considerably smaller as the subaqueous beachfill material moves seaward (USACE, 2003). See Figure 12 for a cross section of a typical beach nourishment construction template.

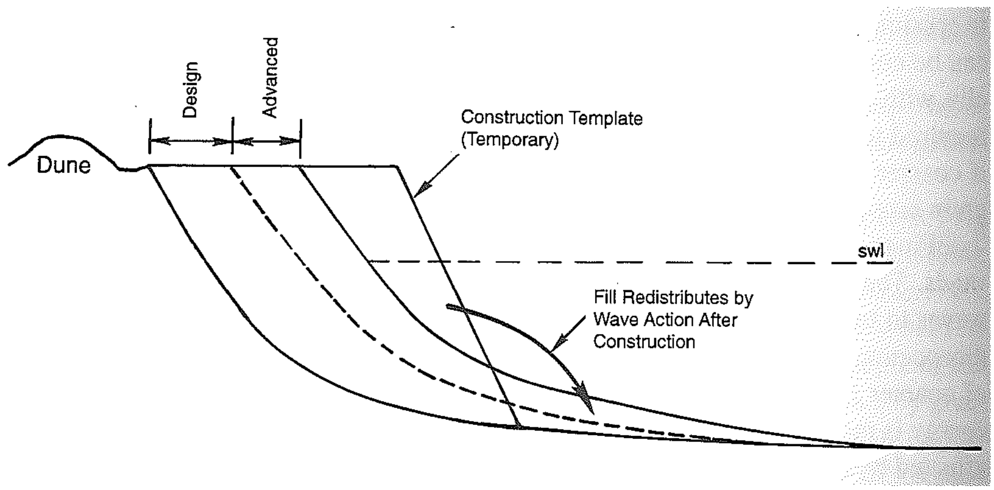


Figure 12. A Typical Profile of a Beachfill Construction Template. (Source: National Research Council, 1995).

The environmental effects of dredging and placement of sand on the beach would result in a temporary removal of the benthic community within the sand source, but re-colonization is expected. The recolonization and recovery of the benthic community is dependent on the regime it is in. High energy areas may have benthic fauna adapted to frequent disturbance whereas, quiescent areas may have more stable benthic communities that are sensitive to disturbance. The benthic community along the nearshore and intertidal beach would experience a temporary adverse impact from fill placement by smothering of the less mobile organisms. Dredging would temporarily increase turbidity in the sand source locations and the beachfill placement areas but would subside upon cessation of dredging due to the coarse nature of the sediments. Effects on fisheries are adverse by impacting benthic food prey items in the borrow area and placement areas. Turbidity could inhibit sight feeding and respiration, but these effects are expected to be minor and temporary.

Five dredging sand sources were considered for Phase 2 and as long-term alternate sources on an "as needed" basis.

3.2.1 Indian River Inlet Flood Shoal

The IRI Flood Shoal occurs immediately west of the Charles W. Cullen Bridge (Figure 3, Figure 13, and Figure 14) and has been used several times as a renewable sand source for the North Beach. From 1957 to 1990, over 2 million cy of sand was dredged from this shoal to maintain the Federal navigation channel and to obtain beachfill for the eroding shoreline north of the Inlet (USACE 2013). Once the sand bypass system was operational in 1990, dredging within the Inlet was used in 2010 to fill scour holes located near the USCG facility, to repair the North Beach berm and dune following Hurricane Sandy in 2014, and currently is being used to provide approximately 480,000 cubic yards of sand for Phase 1 of restoring the berm and dune at North Beach (to be completed by the Delaware Department of Natural Resources and Environmental Control in March 2025).

The flood shoal sand source is about 50 acres in size with depths ranging from -5 ft to -28 ft MLLW (-3.2 ft to -26.2 ft NAVD). This alternative is to dredge the flood shoal to a depth of -25.8 ft MLLW (-24 ft. NAVD). This site is the nearest location from the North Beach with an average distance of about 0.6 miles to the north jetty. Dredging the flood shoal has advantages in that it provides advance maintenance of the navigation channel by reducing infilling of adjacent sediments. The material is renewable as this area frequently shoals in with high quality clean sand (>90%). Because this location is interior of the inlet, a smaller dredge plant can be used with easy access to the shorelines.

This site is an important migratory fish passageway to the Indian River Bay estuarine system and to the Atlantic Ocean. Utilization of this site would require a Time of Year restriction (TOYR) for dredging from March 1 to June 30th to avoid obstructing fish migrations and a TOYR from December 1 and January 31 to minimize entrainment of larval summer flounder.

Because the IRI Flood Shoal is already being utilized for the Phase 1, there would be little or no sand resources left following completion of the Phase I for Phase 2 until the shoal naturally replenishes, which may take a few years. Therefore, this area is not the preferred sand source for Phase 2. This shoal would be considered for future use on an “as needed” basis since it

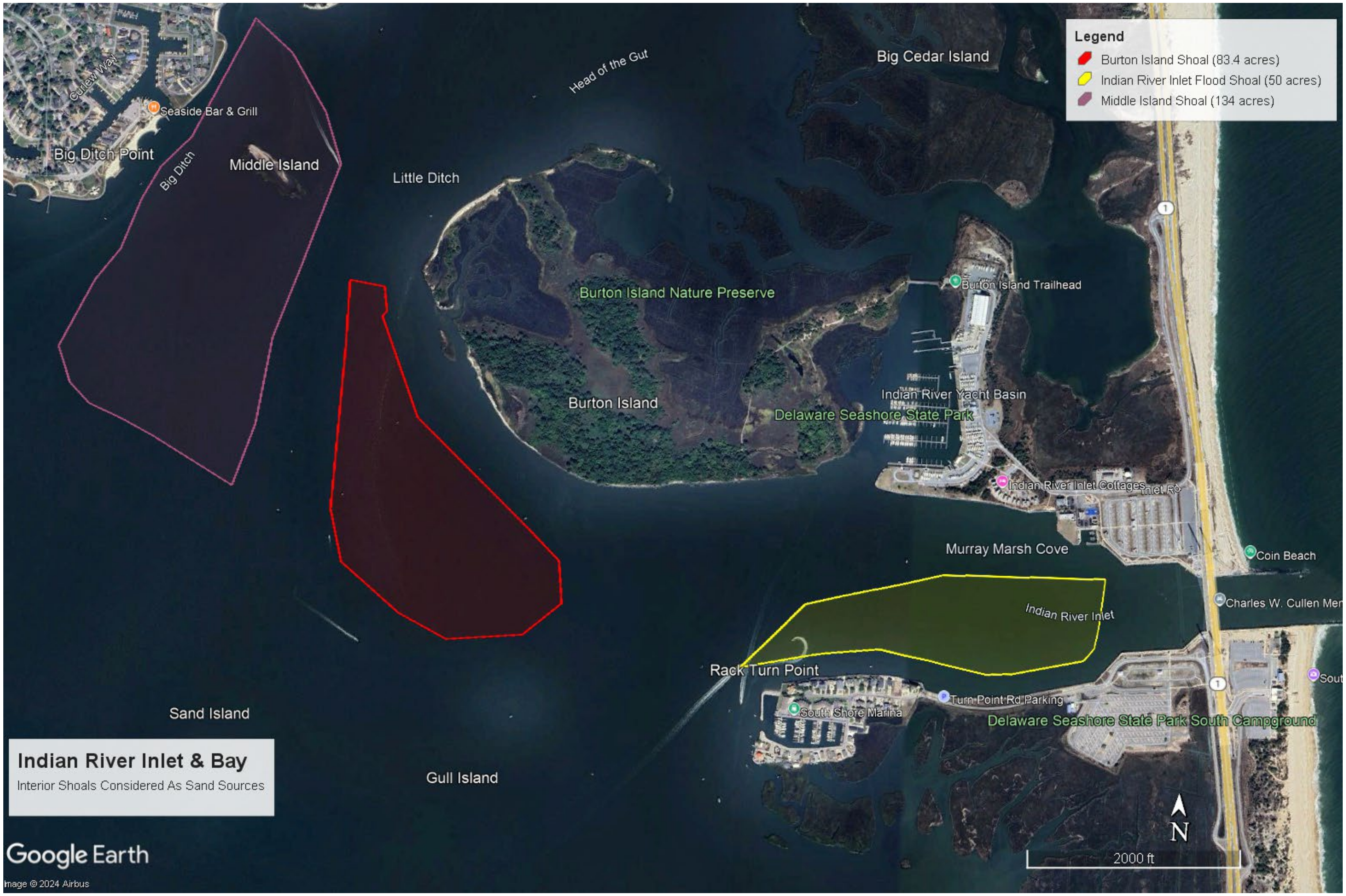


Figure 13. Indian River Inlet and Bay Interior Shoals Considered as Sand Sources

has been demonstrated to provide quality sand resources for the North Beach and can be feasibly used with smaller dredge equipment. Additionally, future shoaling patterns may require maintenance dredging of the Federal navigation channel. The material from this site could be used beneficially to periodically nourish the project.

3.2.2 Burton Island Shoal

The Burton Island Shoal lies southwest of Burton Island adjacent to where the “Little Ditch” confluences with the Indian River Bay (Figure 3 and Figure 13). This site is intermediate in distance from the North Beach with an average distance of about 1.4 miles to the north jetty. This shoal area was initially considered by the Delaware DNREC to supplement the IRI Flood Shoal for Phase 1 based on the sand quality (>90% sand). However, subsequent coordination with the Delaware State Historic Preservation Office has revealed concerns that this shoal area is likely part of a prehistoric landform that could potentially contain prehistoric archaeological resources. This is supported by the presence of nearby known prehistoric sites on Burton Island. Use of this site would require a significant archaeological research effort to clear it for use, and therefore, it was subsequently withdrawn from consideration.

3.2.3 Middle Island Shoal

The Middle Island Shoal area is located at the eastern end of Long Neck at “Big Ditch Point” near the confluence of Massey Ditch, Big Ditch and Little Ditch within Indian River Bay (Figure 3 and Figure 13). This area is a shallow shoal area encompassing Middle Island and has depths ranging from 0 ft to -7 ft MLLW. A sand composite sample was collected, and it was found to contain 31% fine-grained sediments (silts and clays). This site is the furthest location from North Beach with an average distance of about 2 miles to the north jetty. Like the Burton Island Shoal, this site was withdrawn from further consideration due to the potential for prehistoric archaeological sites and associated submerged landforms. Use of this site would require a significant archaeological research effort to clear it for use, and therefore, it was subsequently withdrawn from consideration. Additionally, further characterization of the sand would be required as the 31% fines would not be optimal beachfill quality sand.

3.2.4 Indian River Inlet Ebb Shoal

The Indian River Inlet Ebb Shoal is a shoal complex formed from outgoing ebb tides exiting through the inlet that deposit sand offshore of the inlet on the Atlantic Ocean side. This shoal is characterized as a high-energy area with heterogenous bathymetry characterized by waves, swift currents and shifting sands. Sand is of excellent quality with >90% sand content. A rectangular shaped 192-acre sized portion (IRI-Ebb A) of the ebb shoal complex is available for use for Phase 2 based on existing investigations for shipwrecks, benthic macroinvertebrates and sediment quality data (Figure 14).

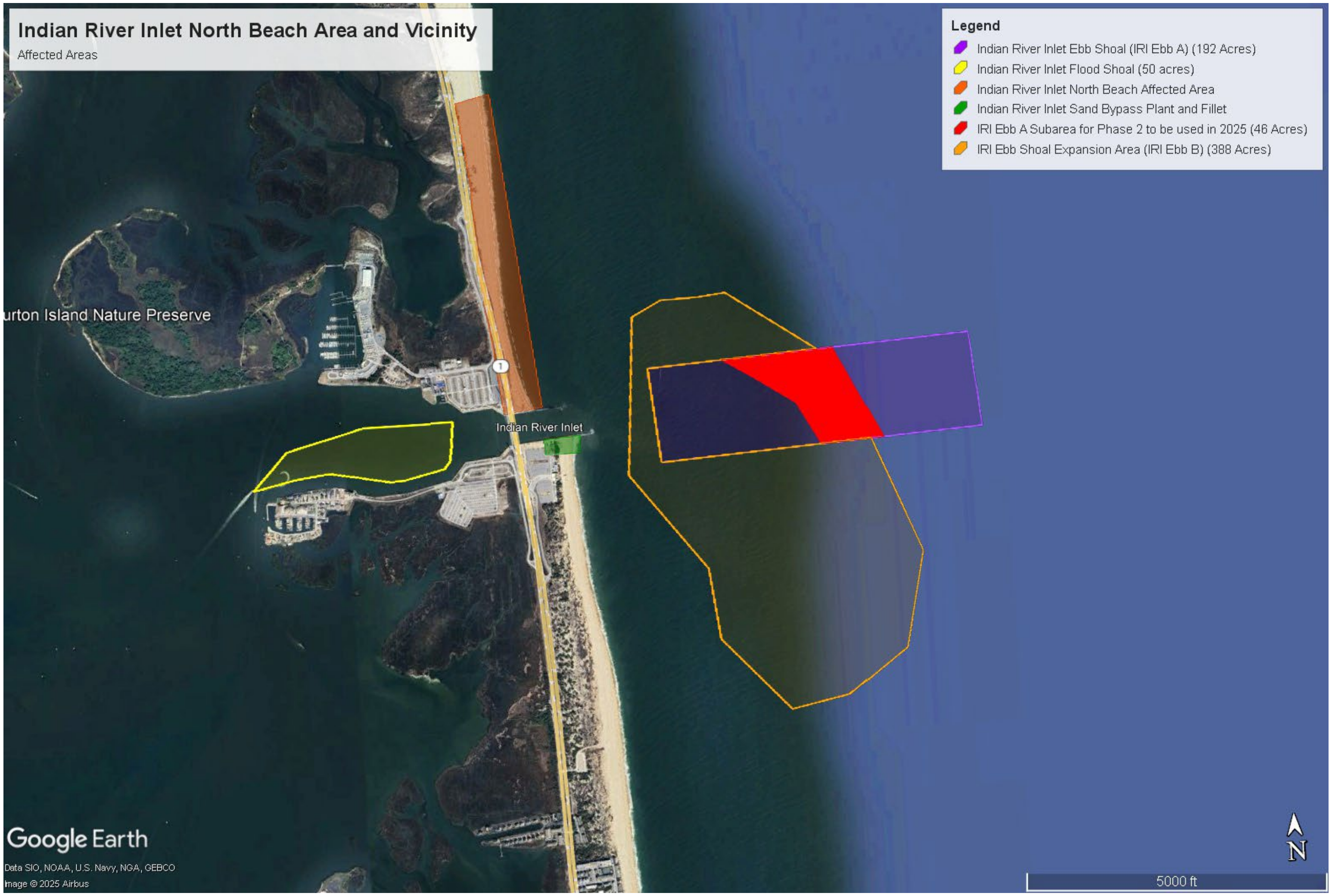


Figure 14. Indian River Inlet Flood and Ebb Shoal Complexes Identified Sand Sources

The existing bathymetry within IRI-Ebb A varies from -28 ft. to -41 ft. MLLW. A smaller area (approximately 46 acres) of IRI-Ebb A is needed to complete Phase 2. Because of the high ocean energy in this location, a large hydraulic cutter suction dredge or a trailing suction hopper dredge would be required.

In IRI-Ebb A, investigations for benthic resources reveal a benthic macroinvertebrate community that is adaptable to high energy environments and would be capable of recovering after dredging is completed. Sediment quality data have indicated that the material would meet sediment quality guidelines for ecological and human health, and water quality standards would not be exceeded. A magnetometer investigation did not reveal any potential for submerged cultural resources such as shipwrecks within this area.

Figure 14 also shows a larger area that was identified as an “expansion area” (IRI-Ebb B) for future use based on vibracore data showing extensive sand deposits to the north and south of IRI-Ebb A. Bathymetry is also highly variable with depths ranging from -13 ft. to -30 ft. MLLW. This expansion area would supplement IRI-Ebb A and provide additional sand resources to be applied as a complete regional sediment management of the Indian River Inlet area of the Delaware Atlantic Coast. This expansion area would require additional investigations for shipwrecks, benthic resources, and sediment quality prior as well as the appropriate environmental approvals prior to its use.

Based on the characteristics of the high-quality sand, high energy nature of the site, and no detectable shipwrecks, the Indian River Inlet Ebb Shoal (IRI-Ebb A) is the preferred sand source for Phase 2. It is also preferred as an alternate sand source for future needs. The Indian River Inlet Ebb Shoal expansion area (IRI-Ebb B) would supplement the IRI-Ebb A on an as needed basis but requires additional investigations prior to its use.

3.2.5 Beneficial Use of Dredged Material

Beneficial Use of Dredged Material (BUDM) is typically associated with the maintenance dredging of a navigation channel. In this case, the Federal navigation channel is located within the Indian River Inlet and Bay (Figure 2). Sand removed from a shoal in the navigation channel during maintenance dredging can be placed in an upland confined dredged material placement facility (DMPF) or beneficially used as beachfill either directly on the beach or in the nearshore as an offshore feeder berm. At present, there is no Federal maintenance dredging project in the vicinity of the North Beach requiring disposal or the beneficial use of dredged material. Therefore, BUDM (associated with maintenance dredging) was not considered for Phase 2. However, there may be future opportunities for BUDM along the North Beach particularly where a split-hull hopper dredge is used to remove smaller spot shoals of sand. In this type of operation, the dredging quantities are typically less than 20,000 cubic yards. A split-hull hopper dredge would remove sand and transport it to a shallow subtidal area (~-8 ft. MLLW) in the nearshore zone of an eroding beach such as the North Beach. Once the hopper is filled with sand, it would exit through the inlet and the material would be placed along the shallow bottom along the North Beach. Figure 15 shows the sequence of a split-hull dredge operation. Once the sand is placed, natural waves and longshore currents would re-distribute the sand along the shoreline. This technique would not replace normal sand bypass operations or other methods described here but would be an effective supplement if this type of dredge is available and there is a need for maintenance dredging. Therefore, this alternative is not considered for the completion of Phase 2 but may be considered for future sand supplementation for the North Beach.

3.3 Truck Haul Method

The truck haul method would utilize dump trucks to deliver the sand obtained from a local commercial sand quarry. The quarry sand would be delivered along state, county and local roads to the project location on the beach. The specifications would require that the delivered sand be de-watered and be composed of predominantly fine to medium sands with no more than 3% fines (silts and clays) and 3% gravels. The sand would also closely match existing sand colors. Delivery routes may be variable due to source location, but the trucks would be required to meet all Delaware Department of Transportation (DelDot) requirements. The trucks would enter the project location through the public parking lot located on the north side (If there is a dune breach, the trucks could enter directly from S.R.1). From there, the trucks would access the upper beach from under the bridge to dump the sand on the upper beach. Dozers and graders would distribute the dumped sand along the beach and across the beach (including the intertidal and nearshore areas) to attain the authorized project berm and dune template. Delivery and construction hours would be limited to weekdays during daylight hours during the construction period. It is estimated that based on the quantities required, there could be as much as 20 truckloads delivered per hour (approximately 240 truckloads per day).

Figure 15. The Dredge *Murden* with a Capacity of 518 Cubic Yards is In-Filling (left), Laden with Sand in Transport (right), and Split-Hull Bottom Dumping (bottom). Photos are from Wilmington District USACE (upper left) and Philadelphia District USACE (right and bottom).

The need to use the truck haul method is based on cost. Beachfill projects that generally require less than 100,000 cubic yards of sand may be more cost effective using a truck fill over dredging. Many variables would need to be considered for the costs; however, a significant variable is that a truck fill avoids the large mobilization costs that a dredge would require.

The truck haul method would avoid adverse effects on the aquatic ecosystem in the Indian River Inlet Ebb and Flood Shoals. However, effects to the terrestrial, intertidal and nearshore placement areas would be similar to dredging as fewer mobile organisms would be buried in the filled areas. Turbidity would be minimal since the material is coarse-grained, and will not require de-watering, as dredged sands would require. The trucks would be required to be Delaware Department of Transportation highway certified and would be operated in accordance with appropriate state and local laws. Adverse effects on the community would be temporary during the daylight hours based on additional traffic on local roads, wear and tear on local roads, noise, and air quality. Additionally, the duration of the overall construction may be considerably longer with a truck haul, which does not deliver sand as efficiently as the dredging method would. These effects are somewhat minimized in that the work would be limited to the tourist offseason (primarily fall and winter months) when there would be less activity and congestion on local roads. The truck haul method is not expected to have adverse effects on cultural resources.

The Delaware DNREC utilized the truck haul method in the summer and fall of 2024 for the North Beach to implement urgent repairs. This method proved to be inefficient for the large volume of sand required to repair the breaches in the berm and dune system that were experienced in August and September. DNREC had reported that oftentimes the truck fill would be washed out within a day after placement. This was due to the prevailing high wind and tides coupled with the depleted condition of the beach template encountered during this time. These conditions exacerbated the loss of the placed truck fill sand, which could not keep pace with the sand losses being experienced.

Based on the quantities of sand (approximately 300,000 cubic yards) required to complete Phase 2, the truck haul method is not considered for completion of Phase 2 due to the inefficiencies associated with the large number of truckloads (approximately 15,000). However, this method is recommended for smaller quantities (100,000 cubic yards or less) if urgent beach and dune repairs are needed following a storm.

3.4 Alternative Selection

Table 1 presents a summary of the alternatives and decision rationales for selecting a method to obtain and deliver sand to the project area for Phase 2 and for periodic nourishment of the project at North Beach in the future on an as needed basis.

Table 1. Decision Rationale for North Beach Berm and Dune Restoration

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
No Action	None	-Continued North Beach erosion -Increases of dune breaches & over-wash of S.R. 1 -Significant infrastructure losses -Loss of critical emergency evacuation route -Exposure of hazardous debris on beach -Reduced recreational opportunities	None	-Adverse effects on land use -Adverse effects on aesthetics of the beach -Continue loss of beach and dune habitats -No effects on aquatic habitats -No effects on air quality -No effects on cultural resources	This alternative would not fulfill the purpose and need for action and is not preferred or recommended.
Dredging and Beachfill Placement	-Meets purpose and need requirements of restoring the North Beach berm/dune -Protection of critical infrastructure -Fast, efficient method for delivering sand -Cost effective for large sand quantity -Beachfill can mimic a natural beach and dune system -Maintain compatible recreation	-High mobilization and demobilization costs	-Approx. 1,000 ft. beach closure segments -Equipment breakdowns and weather delays -Time of Year Restrictions for migratory fish	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area and beach -Long-term restoration of habitat for beach nesting birds -Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction -Potential adverse effects on cultural resources can be avoided -Long-term benefit to recreation -Environmentally acceptable	As part of Phase 2, dredging and beachfill placement are the preferred method for restoring the North Beach berm and dune. Once the sand bypass plant is operational, dredging and beachfill placement may be required on an as needed basis and is a preferred method when large quantities of sand are needed. Therefore, this alternative is preferred and recommended.

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
Truck Haul of Sand	-Can be rapidly deployed -Cost effective for small quantities	-Increased truck traffic on roads -Increased wear and tear on roads -Truck fill would not be as effective in a highly dynamic and erosive environ. -Construction duration would be longer than dredging.	-Requires land-based access -Requires commercial sand pit/quarry	-Water quality effects are avoided or very minimal as sand would be delivered in a de-watered state -Minor, temporary adverse effects on wildlife habitat on beach during placement -Long-term restoration of habitat for beach nesting birds -No Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction -Truck transport would increase noise in communities of haul routes -Sand color may not match existing beach sand causing adverse effects on aesthetics -No adverse effects on cultural resources -Long-term benefit to recreation -Environmentally acceptable	This alternative is not a preferred method to complete Phase 2 due to the significant quantity of sand required to restore the North Beach berm and dune to full template. However, this method is viable for circumstances where smaller quantities are required to repair the beach/dune on an “as needed” basis.

Table 2. Decision Rationale for Dredging Sand Source Alternatives

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
Indian River Inlet Flood Shoal	-Contains beachfill quality sand -A sand source that replenishes itself periodically -Close proximity to North Beach -A small or large dredge plant could be used -Beneficial use of dredged material from navigation channel	-Sand quantity limited to approximately 550,000 cy at a time -Cannot be used (depleted) for Phase 2	-Permitted to dredge to -24 ft. NAVD	--Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area due to disturbance (50 acres shallow estuarine soft bottom) -Time of Year Restrictions for migratory fish (March 1 to June 30) -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access) -No effects on cultural resources	This alternative sand source would not fulfill the purpose and need for Phase 2 completion in 2025 because it would be depleted but is proposed as an alternate sand source for future use, as needed. **This site is preferred for future use.**
Burton Island Shoal	-Contains beachfill quality sand -A sand source that replenishes itself periodically	**-**Greater pumping distance required to beach locations -Only a small dredge plant could be used -Concerns with potential for encountering prehistoric cultural resources	-Dredge depth limited to -10 ft. NAVD	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area (83.4 acres shallow estuarine soft bottom habitat) and nearby wetlands -Time of Year Restrictions for migratory fish -Air quality effects temporary --Short-term loss of recreation during construction (boat and fishing access) -Potential adverse effects on cultural resources	The potential for encountering prehistoric cultural resources is high based on known nearby land-based sites. Utilization of this site would require a significant investigation effort to fully characterize the area to avoid or mitigate potential effects. **This site is not recommended at this time for use.**
Middle Island Shoal	-Contains beachfill quality sand*	**-***A composited sample from several cores resulted in	-Dredge depth limited to -10 ft. NAVD	-Water quality effects are minor and temporary with sand	The potential for encountering prehistoric cultural resources is high

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
	-A sand source that replenishes itself periodically	approximately 30% fine-grained silts-clays, which is not optimal for beachfill -Greater pumping distance required to beach locations -Only a small dredge plant could be used -Concerns with potential for encountering prehistoric cultural resources	-Avoid Middle Island and other intertidal areas	-Minor, temporary adverse effects on fish and wildlife habitat in borrow area (134 acres shallow estuarine soft bottom habitat) and nearby wetlands -Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access) -Potential for adverse effects on cultural resources	based on known nearby land-based sites. Utilization of this site would require a significant investigation effort to fully characterize the area to avoid or mitigate potential effects. Additional sediment characterization would be required to delineate optimal sand for beachfill. **This site is not recommended at this time for use.**
Indian River Inlet Ebb Shoal	-Contains beachfill quality sand -IRI Ebb A contains adequate quantity of sand for Phase 2 -A sand source that replenishes itself periodically -Site can be expanded (IRI-Ebb B) to accommodate greater sand needs in the future -Close proximity to North Beach	-"IRI-Ebb A" portion has limited sand quantity based on existing deep scour holes and would need expansion to "IRI-Ebb B" for future larger beachfill projects -"IRI-Ebb B" expansion requires additional environmental and cultural resources investigations and approvals -High energy marine environment would require larger ocean-going dredge plants	-Post dredge depths would be variable but would not exceed a cut deeper than 10 feet from existing bottom depth in depth ranging from -20 ft to -40 ft. -areas deeper than -40 feet would need to be avoided	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish habitat in borrow area due to disturbance (192 acres marine soft bottom) -High energy area with benthic fauna adapted (less sensitive) to disturbance -Open ocean dredging would not constrict migratory fish passage -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access)	The "IRI Ebb A" portion of the shoal complex contains a sufficient quantity of beachfill quality sand to complete Phase 2 of the restoration of the North Beach. **This area is preferred for this purpose.** Future uses may require an expansion ("IRI-Ebb B") for larger quantities of sand needed for large beach restorations.
Beneficial Use of Dredged Material	-Benefits both navigation and CSRM for the North Beach	-Sand quantities may be limited and may not be sufficient for any significant beach repairs	-Sand placement in nearshore and not directly on beach	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish habitat in navigation channel due to disturbance	This alternative sand source would not fulfill the purpose and need for Phase 2 completion in 2025 because there

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
	-Supplemental sand source for IRI Sand bypass operation -Will not disturb bottom beyond navigation channel boundaries	-"Federal standard" may be exceeded -Availability of a split-hull type of dredge may be limited		-Time of Year Restrictions for migratory fish at dredging location -Placement within a high energy area with benthic fauna adapted (less sensitive) to disturbance -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access)	are no navigation dredging projects currently proposed in the vicinity of the North Beach and sand quantities would be very limited; but is proposed as an alternate sand source for future use, as needed to supplement the IRI sand bypass operations. **This site is preferred for future use for supplemental sand.**

3.5 Selected Plan (Preferred Alternative)

The selected plan is to complete Phase 2 using sand dredged from the Indian River Inlet Ebb Shoal (IRI-EBB A) (Figure 14). The dredging would affect approximately 46 acres of bottom in the IRI-Ebb A borrow area. Phase 2 will complete the restoration of the berm and dune at North Beach started by Phase 1. For the completion of the Phase 2, approximately 500,000 cubic yards of sand would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 10H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes (Figure 16 through Figure 19). The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted. An access and staging area will be needed for the contractor. Access will be gained from the existing Phase 1 construction entrance at Inlet Road along the east side of the parking lot and staging will extend under the SR1 bridge approach through an opening in the dune along the North Beach. Phase 2 is expected to occur over a two to three month period.

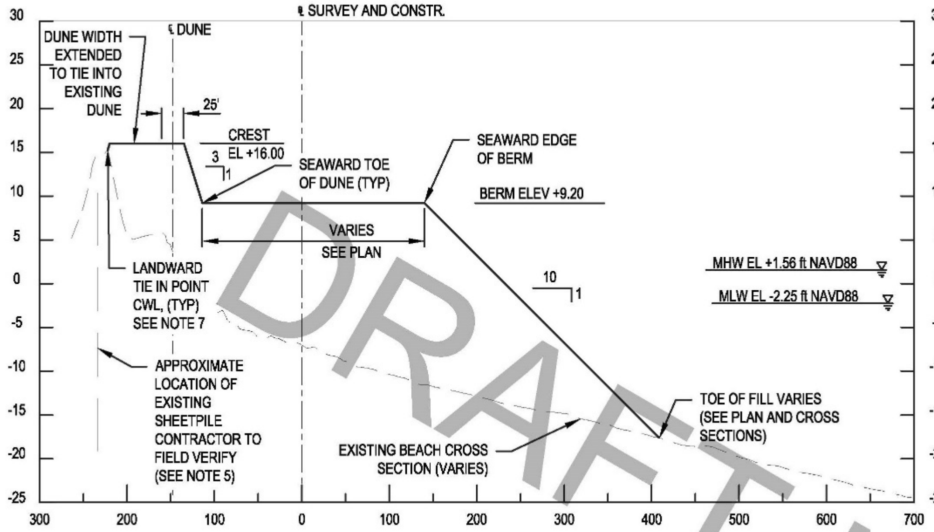
The selected plan also includes use of IRI Ebb-A and the IRI Flood Shoal (Figure 14) on an as needed basis for periodic nourishment of the North Beach when the sand bypass plant is. The required sand quantities may be variable but could be as high as 800,000 cubic yards. Additionally, the portion IRI Ebb-B including the proposed southern lobe expansion area is considered for future use but requires supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources (Figure 14).

4.0 AFFECTED ENVIRONMENT

4.1 Physical Environment

4.1.1 Floodplains

Through Executive Order (EO) 11988, Federal agencies are required to evaluate all proposed actions within the 1% annual exceedance probability (AEP)(100-year) floodplain. Actions include any Federal activity involving 1) acquiring, managing, and disposing of Federal land and facilities, 2) providing Federally undertaken, financed, or assisted construction and improvements, and 3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, and licensing activities. In addition, the 0.2% AEP (500-year) floodplain should be evaluated for critical actions or facilities, such as storage of hazardous materials or construction of a hospital. The EO provides an eight-step process to evaluate activities in the floodplain that generally includes 1) determine if the proposed action is in the floodplain, 2) provide public review, 3) identify and evaluate practicable alternatives to locating in the 1% AEP floodplain, 4) identify the impacts of the proposed action, 5) minimize threats to life and property and to natural and beneficial



G1 TYPICAL SECTION - STA. 0+60 TO STA. 15+00 & STA. 18+00 TO STA. 50+

SCALE IN FEET

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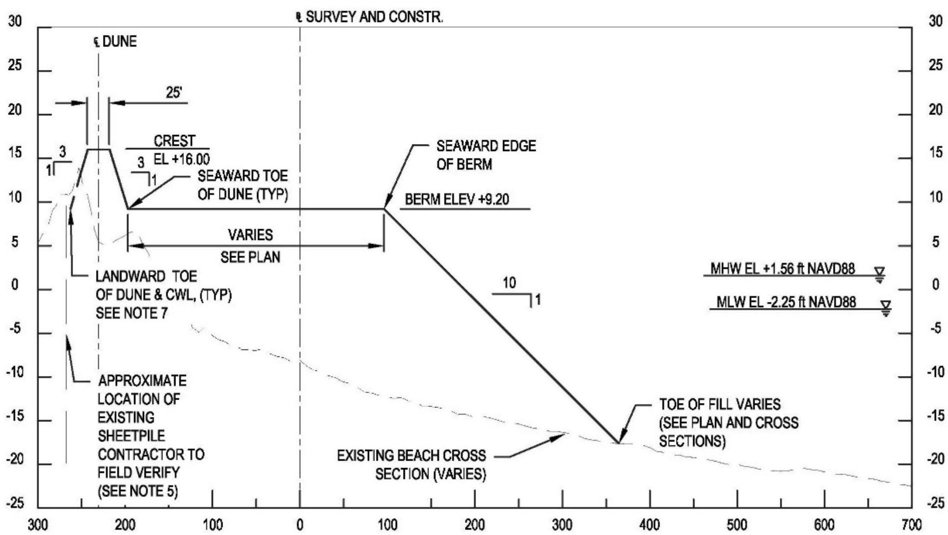
V: 0 10



D1 TYPICAL SECTION - STA. 15+00 TO STA. 18+00

SCALE IN FEET

H: 0 100 200

V: 0 10 20

Figure 16. Indian River Inlet North Beach Typical Beachfill Construction Template Cross Sections

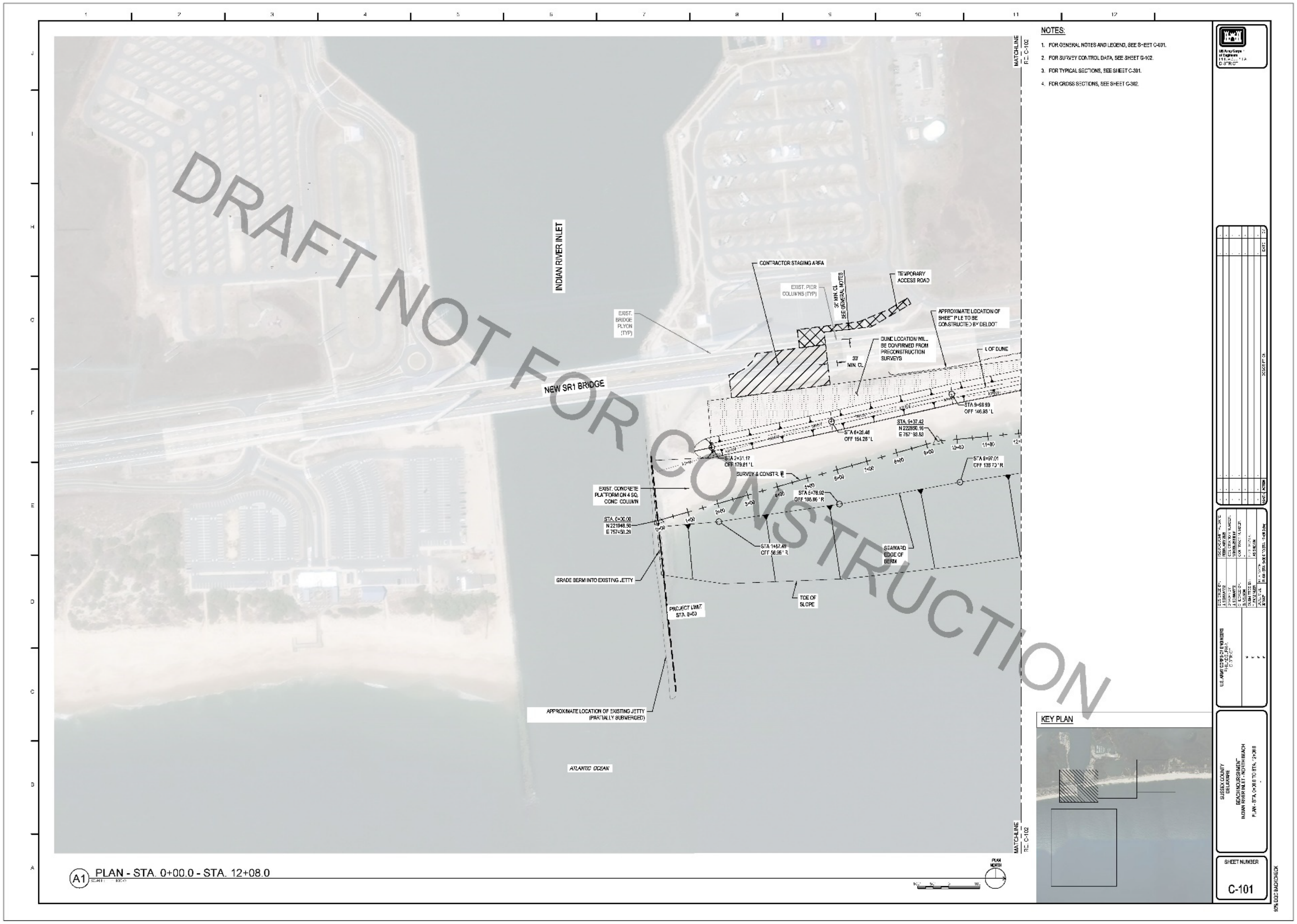


Figure 17. Indian River Inlet North Beach Beachfill Template and Staging and Access Areas

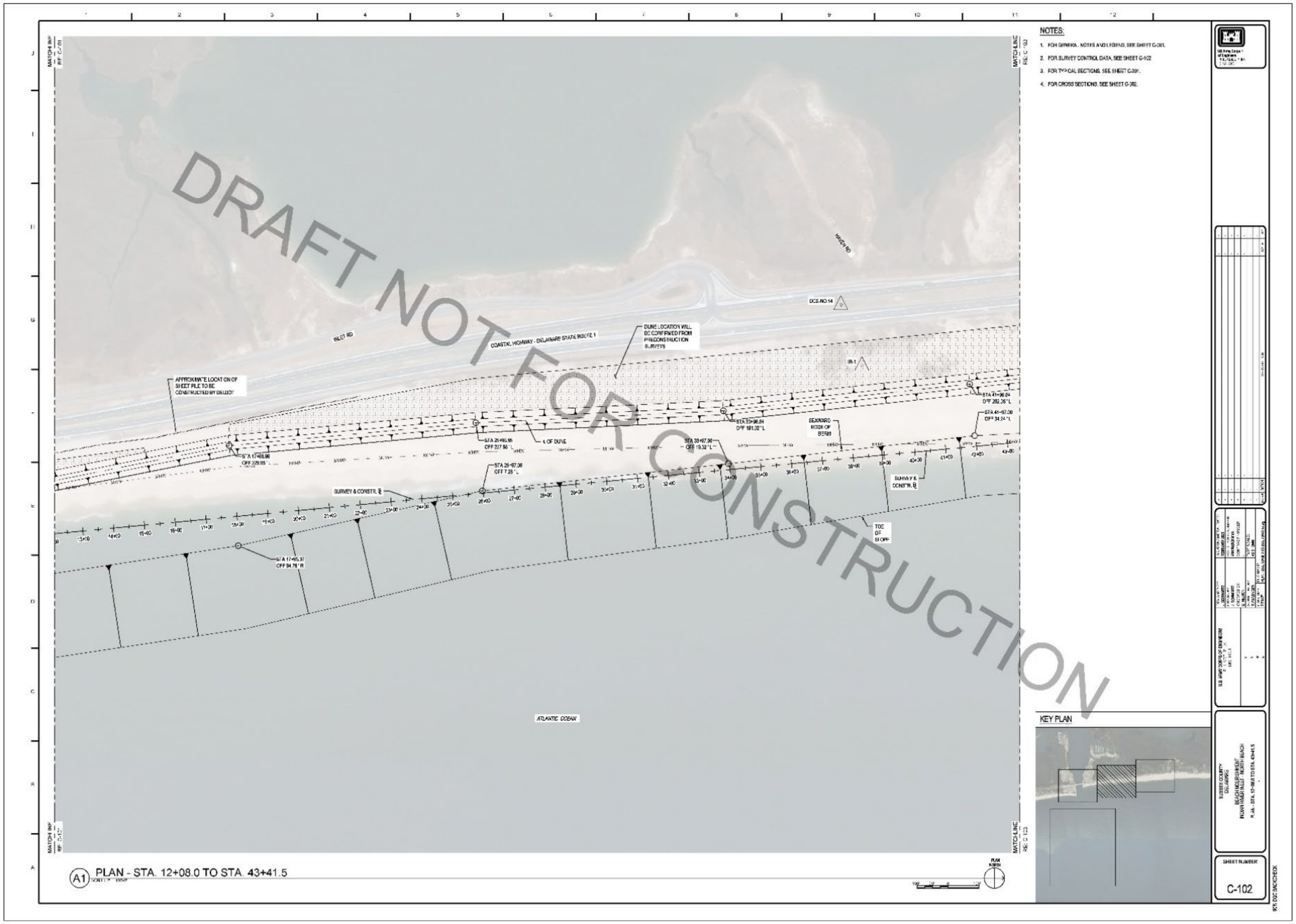


Figure 18. Indian River Inlet North Beach Beachfill Template

Figure 19. Indian River Inlet North Beach Beachfill Template and Northern Terminus of Project

floodplain values and restore and preserve natural and beneficial floodplain values, 6) reevaluate alternatives, 7) issue findings and a public explanation, and 8) implement the action. Proposed actions may have limited effects such that the eight-step process may vary or be reduced in application, which is the case for this project. Federal Emergency Management Agency (FEMA) defined Flood Zones are predominantly high-risk areas, which are within and adjacent to the affected areas. All affected areas and adjacent areas are within the 100-year floodplain and are in zones designated as either “VE” or “AE” (Figure 20). The affected area of the North Beach is predominantly a high-risk coastal area that carry an additional hazard associated with storm waves and is designated by Zone VE. Portions of the dunes and State Route 1 are within the zone designated as “AE”, which are high risk areas within the 100-year floodplain adjacent to a body of water, but do not cover the same level of risk as those areas in a VE Zone. The properties adjacent to the interior inlet on both the north and south sides carry an AE designation.

4.1.2 Climate

4.1.2.1 Temperature and Precipitation

The Delaware Bay and Atlantic Ocean coastal region experiences a moderate climate associated with the low elevations of the Coastal Plain and the presence of the large water bodies. A moderate winter season results from winds which are heated by warmer water temperatures of the ocean and bays and blown inland. Summer temperatures are in turn moderated by locally generated winds or sea breezes. The warmest period of the year is normally during late July when maximum afternoon temperatures average 89°F. Temperatures exceeding 90°F occur an average of 31 days per year. The coldest period of the year is during late January and early February when early morning temperatures average 24°F. A minimum temperature of 32°F or lower occurs on an average of 90 days per year. Lewes, Delaware has an average annual temperature of 56°F. Lewes experiences an average temperature of 35°F in January and a July average of 75°F. The average winter frost penetration ranges from 12 to 24 inches. Daily temperature variations along the shore range from 10°F to 20°F throughout the year and are generally much less over the water (Maurer et al. 1974).

4.1.2.2 Wind

Prevailing winds at Breakwater Harbor are from the southwest, however, winds from other direction are nearly as frequent. The average annual wind speed along the Delaware Coast is 14.6 mph. In the 5-degree quadrangle nearest the Delaware Coast, the winds over the offshore areas are distributed with respect to direction as follows: onshore (northeast, east and southeast) 27 percent; (south) 11 percent; offshore (southwest, west and northwest) 44 percent; and (north) 15 percent. Weather data from Atlantic City, New Jersey, which is approximately 50 miles northeast of the study area, but considered valid as a regional source of data, determined that prevailing winds measured at Atlantic City are from the south and of moderate velocities between 14 to 28 mph. Winds from the northeast have the greatest average velocity of approximately 20 mph. The wind data also show that winds in excess of 28 miles per hour occur from the northeast more than twice as frequently as from any other direction. Winds of 50 mph or more may accompany severe thunderstorms, hurricanes, and general winter storms.

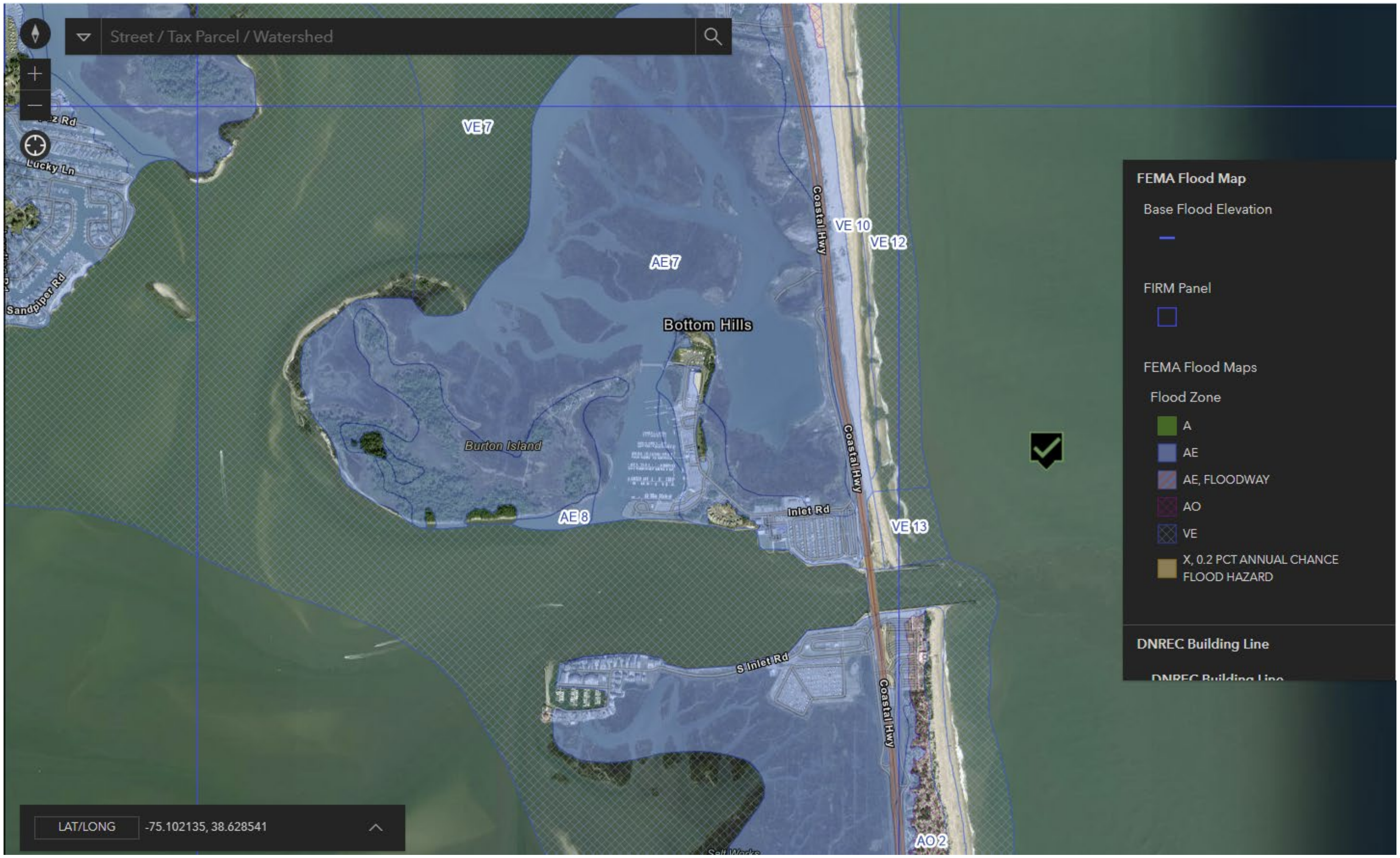


Figure 20. Indian River Inlet Area FEMA Flood Zones (Source: Delaware Flood Planning Tool accessed on 2/7/2025 at https://floodplanning.dnrec.delaware.gov/#pills-details)

4.1.2.3 Storms

There are two major types of damaging storms, which affect the Delaware coast. They are known as “tropical” (hurricanes and tropical storms) and “extra-tropical” (northeasters) storms. Hurricanes usually diminish in intensity by the time they reach the Delaware coast during their usual northward movement. No hurricane has made landfall along the Delaware coast since records have been kept (1871); however, several tropical storms and hurricanes have passed near the Delaware coastline in this period. Recently, the Delaware coast has experienced damages from the Nor’Ida Storm (“Nor’Ida” refers to a coastal nor’easter storm that combined with the elements of Hurricane Ida in November 2009.), Hurricane Irene (in 2011), and Hurricane Sandy (in 2012). Hurricane Sandy was designated an “extraordinary” storm that exhibited a unique combination of elevated ocean water levels (storm surge plus spring astronomical tides); continuous gale force or higher winds; and significant ocean wave heights at NDBC buoys that attained 33 feet). Hurricane Sandy inflicted significant damages to the beaches and communities along the Delaware coast. Of particular note was the beach erosion and washover on the north side of Indian River Inlet and significant damages sustained to the State Route 1 approach to the Charles W. Cullen Bridge over the Indian River Inlet.

The most damaging storm to affect the project areas in the last 100 years was the northeaster of March 6-8, 1962. Two low-pressure areas joined in the ocean off the Mid-Atlantic coast and remained stationary for several days. The sustained high winds over the long fetch produced large waves and a storm surge which lasted over five consecutive high tides. The storm occurred during a period of unusually high astronomical tides. The combined storm tide elevation of 8.1 feet NGVD was the highest recorded in the period of record at Breakwater Harbor, Delaware (USACE, 1996).

4.1.2.4 Climate Effects and Sea Level Change

According to Delaware’s Climate Action Plan (DNREC, 2021), average temperatures in Delaware have increased approximately 2 °F since 1895, and temperatures are projected to continue increasing. It is projected that Delaware’s average temperatures could be 2.5 to 4.5°F warmer by midcentury and 3.5 to 8°F warmer by 2100. It is also projected that the number of days above 95°F in would increase from an average of 5 to more than 10 days per year over the next two decades. With projected long-term changes in weather patterns, it is also expected to result in increases in precipitation with projected increases by 10% by 2100. Also, the number of very wet days (periods with 2 inches or more of rainfall in 24 hours) is also projected to increase.

The direct and indirect effects of increased temperatures and precipitation are variable and far reaching. Increased temperatures and high heat events can impact human health, natural resources and agriculture by shifting growing seasons, and infrastructure due to heat damage and potential overloading of the electrical grid. Increased precipitation can result in more flooding events, which are further amplified by sea level rise. These effects affect human health due to potential increased mold production, exposure to more waterborne diseases and contamination, and risk of septic failure. Changes in precipitation, including more intense rainstorms, can also affect the quality of water resources, agricultural crop yields and natural habitat for wildlife. Additionally, infrastructure can be impacted due to increased pressure on water control structures and a greater potential for erosion of banks, pavements and structural supports (DNREC, 2021).

Sea level change (SLC) has been predicted to be greater in the Mid-Atlantic Region than points north and south on the eastern seaboard. Since 1900, Delaware has experienced a rise in sea levels of over 1 foot at the Lewes tide gauge since 1900. By midcentury, sea levels are projected to rise another 9 to 23 inches and, by 2100, up to an additional 5 feet (DNREC, 2021).

It is anticipated that the global mean sea level will continue to rise over the next 100 years. To include the direct and indirect physical effects of projected future SLC on design, construction, operation and maintenance of coastal projects, USACE follows guidance provided in the form of Engineering Regulation (ER) 1100-2-8161 (developed with assistance of coastal scientists from the NOAA National Ocean Service and the U.S. Geological Survey) and Engineering Technical Letter (ETL) 1100-2-1 Procedures to Evaluate Sea Level Change: Impacts, Responses and Adaptation. Three estimates are required by the guidance; a Baseline (or "Low") estimate, which is based on historic sea level rise and represents the minimum expected SLC, an intermediate estimate, and a high estimate representing the maximum expected SLC.

4.1.3 Coastal Hydraulics and Hydrodynamics

The Delaware coastal hydraulics are mainly influenced by tides, waves and currents. The tides are semidiurnal with two high tides and two low tides daily with an average tidal period of 24 hours and 50 minutes. The mean tide range at the Lewes tide station is 4.1 feet, and the great diurnal tide range is 4.6 feet.

Waves are measured in significant wave height, wave period, and wave direction. These factors are influenced by the energy of the wave source, wind direction and fetch, bathymetry, shoreline stabilization structures, and tidal currents from the Delaware Bay and Indian River Inlet. Two stations along the Delaware Atlantic Coast have produced wave statistics generated over a 20-year period. Waves approach the coast from NNE, NE, E, SE and S with the most frequent occurrence from the E and SE directions. The highest significant wave heights were recorded during the 1962 Northeaster at 25 feet and 16.5 feet. In 2012, two NOAA buoys recorded the significant wave heights during Hurricane Sandy at 24 feet (Buoy 4409 off of southern DE) and at 33 feet (Buoy 44065 off of northern NJ) (USACE, 2012).

Three types of currents influence the shoreline stability along the Delaware Atlantic Coast: tidal currents, cross shore currents and longshore currents. Tidal currents are generated by hydraulic head differences between water levels in the oceans and back-bay areas (through Indian River Inlet). Cross-shore currents move sand perpendicularly across the shore and offshore on a daily and seasonal basis. Longshore currents are caused by waves breaking at an angle relative to the shore alignment. The turbulence created in the breaker zone suspends the sediments which are transported in the longshore direction. The result is longshore transport of sand along Delaware's beaches. The net longshore transport of sand from Indian River Inlet and north (including Rehoboth Beach and Dewey Beach is in a northward direction. South of Indian River Inlet there is an area where there is no predominant longshore sand transport and is described as a “nodal” zone. This zone includes the Bethany Beach and South Bethany area. Further south (Fenwick Island), the net transport is in a southern direction. Figure 21 provides a map of the longshore transport zones along the Delaware Atlantic Coast (McKenna and Ramsey, 2002).

Indian River Inlet is located approximately half-way between Cape Henlopen at the entrance to Delaware Bay and the state line of Maryland. The inlet is the only opening to the Atlantic for the two - bay system of Indian River Bay and Rehoboth Bay. Both bays are shallow with an average depth of approximately seven feet. The inlet is stabilized by two rubble mound jetties and is spanned by a state highway bridge. These jetties were first constructed by USACE in 1939 for the purpose of 1) improving navigation through the inlet, 2) increasing bay salinity and reducing stagnation (to improve the fishing industry), and 3) increasing the tide range for mosquito control (Anders et. al 1990; Thompson and Dalrymple, 1976). Prior to the Federal navigation project, the inlet was ephemeral, typically breaking through the beach during periods of heavy rainfall and migrating alongshore until closed by littoral processes (Howell 1931).

The currents in Indian River Inlet are important in moving sediment and affecting navigation. The ocean tides generate strong tidal currents in the inlet which frequently exceed six feet/second (3.6 knots). During ebb tide, ocean waves approach the inlet channel and interact with the strong tidal current. Upon encountering the current between the seaward ends of the jetties, the apparent wave speed decreases and consequently the waves steepen (USACE, 1984b).

The waves can continue to the west, but they may also steepen to the point of breaking. Waves can sometimes be seen propagating westward past the highway bridge, but their heights are greatly reduced after they have broken in the chop. The maximum current recorded in the inlet during a 1975 study was 7.85 feet per second. At the time of the maximum flood current reading, there was a head drop of 1.2 feet from the ocean to the South Shore Marina. The velocity across the inlet throat was found to be nearly constant except near flow constrictions. The vertical velocity profile was not measured, but the study concluded that there was probably little variation except very near the bottom. This was due to the highly turbulent, non-stratified nature of the flow (USACE 1984b).

Current measurements were also made at three locations across the inlet throat over one spring tidal cycle in June 1983. The primary purpose of these measurements was to determine the inlet tidal prism, but the velocities observed were generally in the same range as those recorded in the 1975 study. Maximum flood velocities in 1983 were more than five feet per second and maximum ebb velocities exceeded 6 feet per second (USACE 1984b). In 2004, a comprehensive acoustic doppler current profiler (ADCP) study was completed. This study measured currents throughout the water column along five transects across the inlet over a 26-hour period during spring tide conditions. Maximum velocities in the 2004 study exceeded 9 feet per second for depth-averaged currents and approached 11 feet per second for point measurements in the water column.

The swift ebb and flood currents through the inlet have resulted in erosion on both the interior north and south sides requiring the construction of stone revetments that have propagated westward since the jetties were first constructed. Additionally, as discussed in Anders et. al (1990), deep scour holes have subsequently developed within the inlet near the eastern end of the north jetty and near the abutments of the former Indian River Inlet Bridge. To the west of the scour holes, the inlet widens out where tidal velocities decrease. This area tends to accumulate sediments (particularly from flood tides) and form a shoal interior of the inlet, which is the “flood shoal”.

The ocean currents seaward of Indian River Inlet are influenced by the tidal flows of Delaware Bay, and in turn have a significant effect on sediment transport patterns at Indian River Inlet. The cumulative effect of the interaction of the ocean and inlet tidal currents facilitated by the south jetty is an interruption in the net northerly littoral transport along the ocean shoreline adjacent to Indian River Inlet. The littoral sediments tend to be diverted to the south ocean shoal (ebb shoal) under ebb conditions, and into Indian River Inlet under flood conditions. Thus, natural sand bypassing from south to north across Indian River Inlet does not occur, and the ocean beach north of the inlet experiences a relatively high erosion rate.

As reported in CB&I Coastal Planning & Engineering, Inc (2017), the IRI ebb shoal is classified as a shore detached and asymmetric geomorphic feature that extends approximately 1 mile offshore. It is a dynamic feature that undergoes current-induced scouring at the mouth of the inlet and the deposition of sediments for up to a mile offshore of the inlet. This feature is formed by the influence of the Delaware Bay ebb tide on the “jet” of the inlet that results in an asymmetrically shaped ebb shoal with sediment accreting on the south side of the shoal. Any new sand that is added to the ebb shoal is entrained into the ebb jet and discharged offshore to the seaward limits of the ebb shoal. This process allows for this shoal feature to be detached with no direct (bar) connections to the beach. Also, the redistribution of sediment primarily occurs from within the ebb shoal feature rather than entraining new sand from the adjacent beaches.

4.1.4 Geology

Three types of physiographic regions exist along the Delaware Atlantic Coast: spit complex, headland, and baymouth barrier (Kraft, 1971). Rehoboth Beach is part of a headland-spit complex, which terminates in the north at Cape Henlopen. Dewey Beach primarily consists of a continuous, wide, sandy coastal barrier complex beginning in and extending south of Dewey Beach to the Indian River Inlet area with Rehoboth Bay and Indian River Bay to the west. Bethany Beach is part of another significant headland south of Indian River Inlet. South Bethany and Fenwick Island form another coastal barrier complex with Little Assawoman Bay to the West (Figure 21). The project location is part of the baymouth barrier, lagoon and highland complex, which is characterized by rapid erosion, predominantly coastal washover erosion. The barrier erodes at the beach face and nearshore area and accretes in a landward direction. The beach face is rather steep, and the berm is comprised of horizontally laminated coarse to medium sand. Generalized vertical sequences of sediments found at Dewey Beach and south indicate dune washover sands overlying back barrier marsh sediments (clayey sand and peat), which contain tree stumps from an ancient pine forest.

Below this are tidal delta sands and gravels followed by lagoonal sand and silt, and in some cases a small underlying pocket of beach sand.

Wells in Delaware's coastal communities draw groundwater from the unconfined water-table aquifer (Columbia), the unconfined Columbia-Pocomoke aquifer, the confined Pocomoke aquifer and the confined Manokin aquifer. The Columbia aquifer is the shallowest (occurs from 0 to -19 feet in the IRI area) and resides in the Pleistocene formations of the Sinepuxent, Scotts Corners, Omar and Lynch Heights formations. It also extends into the Pliocene Epoch deposits that contain the Beaverdam formation where it interfaces with the Pokomoke Aquifer. The confined Pokomoke Aquifer is in the deeper Bethany Formation (-100 to -110 ft.), which was formed in the Miocene. Below the Bethany Formation is the Cat Formation Hill (-200 to -249 ft.) that contains the confined Manokin aquifer (also Miocene).

USACE (1995a) and Field et.al. (1979) identify four major physiographic units on the shelf offshore from the Delmarva Peninsula, which are classified: (a) shoreface, (b) linear shoal field, (c) shoal retreat massif (geologic unit containing one or more summits surrounded by depressions), and (d) shelf transverse valleys. The linear shoals have been interpreted as Holocene features that formed in the submarine environment and were consequently stranded as sea level rose and the shore retreated. They consist primarily of sands and gravels and are the most likely to be suitable for beachfill material. These units are presented in Figure 22.

The Indian River Inlet Ebb Shoal complex is described in the "Geologic Map of the Bethany Beach and Assawoman Bay Quadrangles" as "pale-yellow to light-gray, cross-bedded coarse to fine sand with laminae of heavy minerals and granules to pebbles. Shells and shell fragments are a rare constituent of the sands. Ebb tidal delta deposits are found offshore of Indian River Inlet. The sediments are partly disturbed by dredging and influenced by the location of the jetties offshore of the inlet. Ebb tidal delta deposits range from 5 to over 25 ft in thickness. Holocene" (Ramsey and Tomlinson, 2012).

The Flood Shoal complex is described in Ramsey and Tomlinson (2012) as "light gray to gray, clean to silty, very fine to coarse sand. Sedimentary structures range from well-developed crossbedding to structureless where the deposit is completely bioturbated. Flood tidal delta deposits are found adjacent to Indian River Inlet in Indian River Bay and have been greatly modified by dredging. The deposits are up to 25 to 30 ft thick adjacent to the barrier and thin to the west in Indian River Bay (Chrastowski, 1986). Flood tidal delta deposits grade laterally into barrier washover deposits along the coast and into lagoon deposits in Indian River Bay. Holocene".

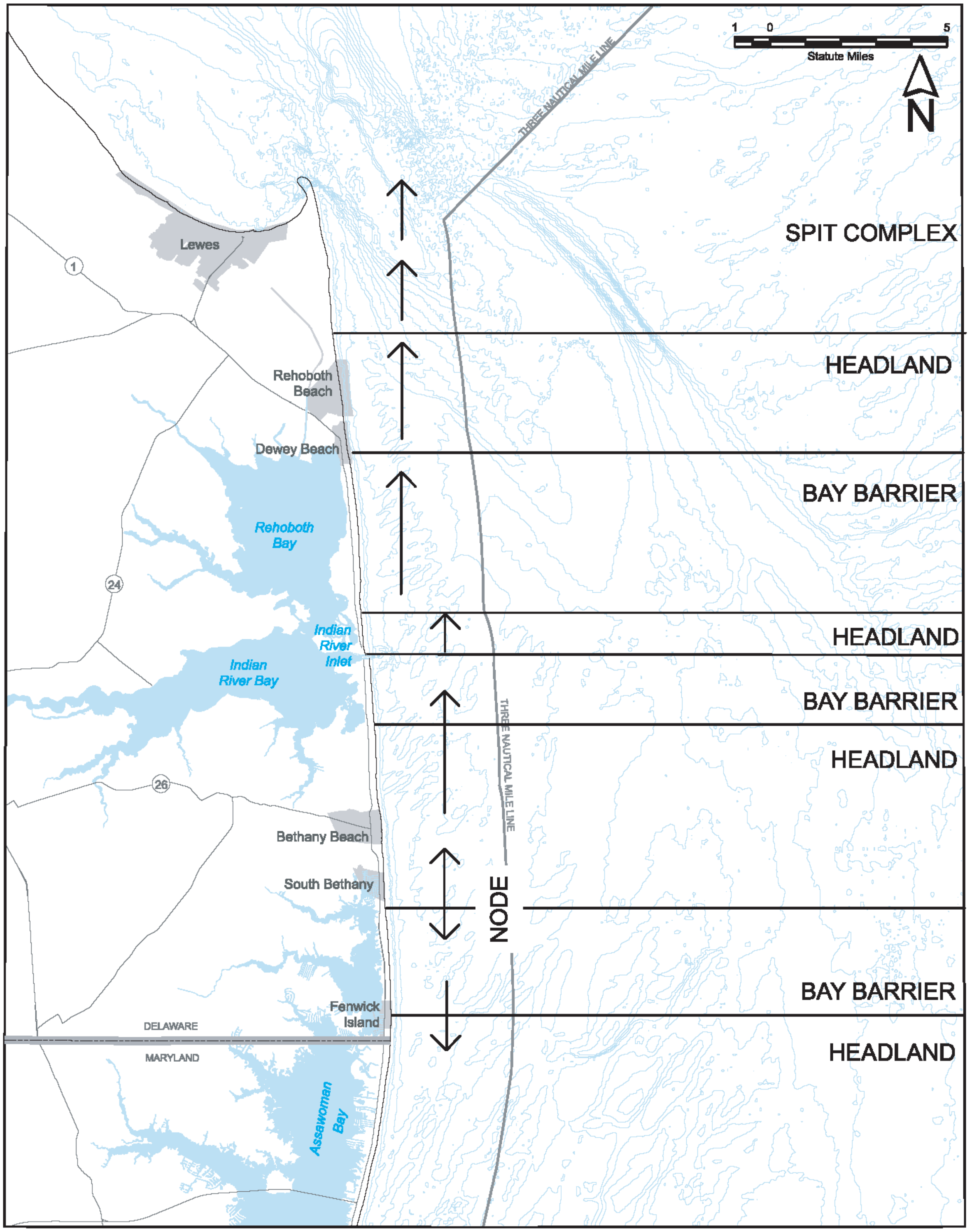


Figure 21. General Longshore Transport Directions and Coastal Physiographic Regions along the Delaware Atlantic Coast. (from McKenna and Ramsey, 2002).

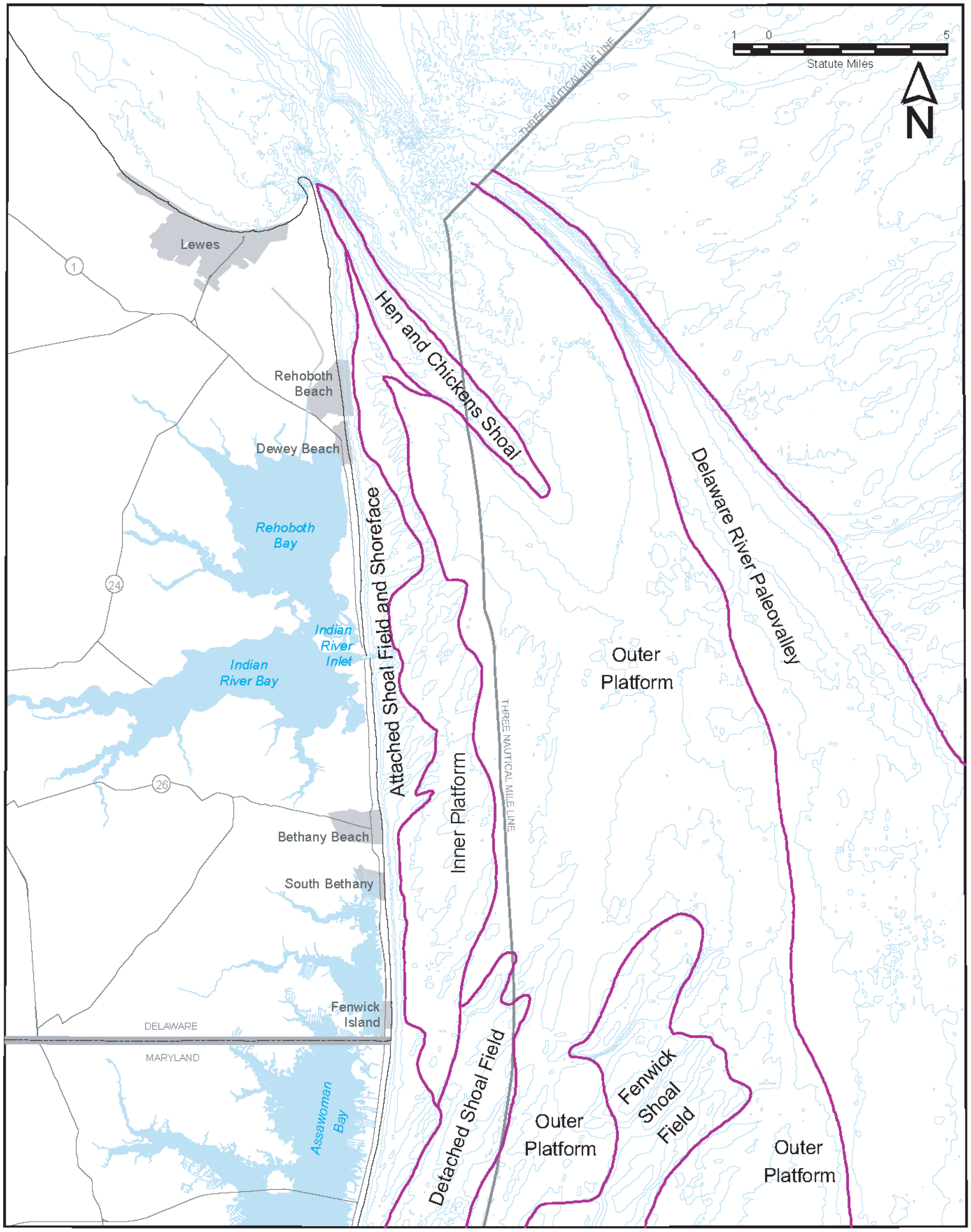


Figure 22. Delaware Atlantic Coast Offshore Geomorphic Regions (from Mckenna and Ramsey, 2002).

4.1.5 Topography and Bathymetry

Beach topography varies seasonally. Winter storms with high energy and high waves tend to deflate the beach profile as sands are eroded from the berm and foreshore resulting in a noticeably lower and narrower beach profile. The sand is typically deposited in the nearshore as sand bars. The spring and summer months tend to build beach elevations and widths as sediments accrete from low waves depositing sand from the nearshore bars that deposit and weld to the beach. The beach berm and foreshores are typically backed by a higher dune. At the North Shore, portions of the dune have been heavily impacted by erosion/breaching and have been flattened. This condition may be changed prior to the Phase 2 implementation where a continuous dune would be constructed with a crest elevation of +16 ft. NAVD (Mean High Water occurs at +1.3 ft. NAVD).

The IRI-Ebb Shoal A has variable bathymetry. The westernmost portion of this area near the inlet jetties has deep scour holes as deep as -60 ft MLLW. The bottom rises up to a depth of -29 feet in the center and then drops off on the eastern end to -43 ft. The IRI-Ebb Shoal B is a lobe of the shoal that extends towards the southern shore. This area is considerably shallower with minimum depths at -13 ft. and maximum depths at -30 ft.

4.1.6 Soils

A review of the web soil survey mapping provided on the Natural Resource Conservation Service (NRCS) website (accessed at https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx on 1/8/2025) revealed that the affected beach and dune areas along the North Beach are mapped as "Acquango 5-10 percent slopes" (AcC) and "Beaches – very frequently flooded" (Be). These soils are classified as mixed, mesic Typic Udipsamments formed from sandy eolian deposits and/or fluviomarine sediments. These soils are occasionally to frequently flooded beach sands consisting of non-coherent loose sand that has been worked and reworked by waves, tides, and wind, and is still subject to such action (USDA, 1974). Both soils have been modified with the addition of beachfill sand obtained from dredging from the IRI Flood Shoal, truck haul sand and from the South Beach fillet from the sand bypass facility. Other mapped soil units occurring along the western side of S.R. 1 include the salt marsh soils: "Saltpond mucky sand, very frequently flooded" (Sp) and "Purnell peat, very frequently flooded" (Pu). The "Brockatonorton-Urban land complex, 0 to 2 percent slopes" (BuA) is composed of sand with deeper peat deposits typically occurs along back-barrier beaches and is mapped along the western side of the S.R. 1 bridge approach adjacent to the inlet.

4.1.6.1 Beach Sand Texture

Ramsey (1999) conducted a review of mean beach textures along the Delaware Atlantic Coast (from Cape Henlopen south to the DE/MD state line in Fenwick Island) measured over a 55-year (1929-1984) period prior to any large beach nourishment projects along the coast. The review was broken up into 1-km increments, major geomorphic features, sand transport zones, and inlet locations. The yearly averages did not identify any significant trends through time. Despite some variability among beaches, locations on the beach, seasons and sample years, the sands along the coastal beaches generally fell within the coarse to medium sand size range and were well to moderately well sorted. The overall average sand size for the entire coast was 1.26 phi ($\pm$ 0.27 phi) (0.4 mm) with an average sorting of 0.46 phi (well sorted). Table 3 provides grain size averages and sorting data (in phi units) from data spanning from 1929 to 1984 along the Delaware Atlantic Coast from Ramsey (1999).

Table 3. Historic Average Grain Sizes (in PHI units) Distribution of Beach Sands along the Delaware Atlantic Coast from 1929 to 1984 (adapted from Ramsey, 1999)

KM SEGMENT (North to South)	AVG. GRAIN SIZE (PHI)	INLET SEGMENT	LONGSHORE TRANSPORT NODE	GEOMORPHIC REGION	FEDERAL PROJECT LOCATION
1	1.72 (med. sand)	North of Inlet 1.21 (med. sand) -0.21	North Transport Node 1.22 (med. sand) -0.23	Cape Henlopen Spit Complex 1.31 (med. sand) -0.25	
2	1.5 (med. sand)				
3	1.38 (med. sand)				
4	1.19 (med. sand)				
5	0.95 (crse. sand)				
6					
7	1.14 (med. sand)				
8	1.17 (med. sand)			Headland 1.16 (med. sand) -0.06	
9					
10	1.23 (med. sand)				Rehoboth Beach Dewey Beach
11	1.06 (med. sand)				
12	1.18 (med. sand)				
13					
14	1.07 (med. sand)			Bay Barrier 1.11(med. sand) -0.24	
15	0.85 (crse. sand)				
16	1 (med.-crse. sand)				
17					
18	1.5 (med. sand)				
19	1.26 (med. sand)				
20				Headland 1.24 (med. sand) -0.11	
21	1.1 (med. sand)				
22	1.35 (med. sand)				Indian River Inlet Sand Bypass
23	0.81(crse. sand)	South of Inlet 1.3 (med. sand) -0.32		Bay Barrier 1.09 (med. sand) (0.28)	
24	1.37 (med. sand)				
25	1.25 (med. sand)			Headland 1.27 (med. sand) -0.32	
26	0.88 (crse. sand)				
27	1.36 (med. sand)				
28	1.28 (med. sand)				
29	1.7 (med. sand)				
30	1.3 (med. sand)				Bethany Beach South Bethany
31	1.39 (med. sand)				
32	1.08 (med. sand)		South Transport Node 1.37 (med. sand) -0.35		
33	1.81 (med. sand)				
34	0.71 (crse. sand)				
35	1.49 (med. sand)			Bay Barrier 1.38 (med. sand) -0.17	
36					
37	1.14 (med. sand)				
38	1.52 (med. sand)				
39					Fenwick Island
40	1.82 (med. sand)			Headland 1.82 (med. sand) (0.40)	
Average: 1.26 (med. sand) Maximum: 1.82 (med. sand) Std. Dev.:0.27 Minimum: 0.71 (crse. sand) 33 sample Sta.					

4.1.7 Indian River Inlet Ebb Shoal Sediments

The geotechnical analysis of the IRI Ebb-A borrow area includes the evaluation of three vibracores (KHV-105, KHV-105EA, and KHV-230) collected within the borrow area. The predominant materials consist of light gray to gray, and tan to brown fine sand, with trace to some medium sand, and trace amounts of silt and clay, extending to a depth of approximately 15.6 feet below the seafloor. Vibracore KHV-230 encountered a seam of dark gray, clayey silt from 15.6 to 16.2 feet, followed by gray, poorly graded sand with silt from 16.2 feet to the termination depth of 19.62 feet. Vibracore KHV-105 encountered a seam of silty clay from 14.7 feet to its termination depth at 18.8 feet.

A maximum dredging depth of 10 feet was determined, and only the material at this depth was considered in the analysis. A statistical analysis of the Particle Size Distribution curves for the vibracores was conducted, and the results show that, on average, the sand content exceeds 98.5%. The fines content (clay and silt) is approximately 1.4%, while the gravel content is 0.07%. The average median diameter (D_{50}) is 0.235 mm, classifying the material as fine sand. A summary of the vibracores is provided in Table 4 below.

Table 4- Ebb Shoal Vibracore Summary

Vibracore ID	Depth (ft.)	% gravel	% sand	% fines	D_{50} (mm)	USCS
KHV-105	0-5'	0	99.4	0.6	0.25	SP
KHV-105	5-7.4'	0	98.4	1.6	0.25	SP
KHV-105	6.9-10'	0	98.4	1.6	0.21	SP
KHV-105EA	0-8.8'	0.4	98.2	1.4	0.25	SP
KHV-230	0-5'	0	99	1	0.261	SP
KHV-230	5-10'	0	98	2	0.191	SP
	Average	0.067	98.567	1.367	0.235	

4.1.8 Hazardous, Toxic, and Radioactive Wastes (HTRW)

A review of the Delaware Environmental Navigator (DEN) (https://den.dnrec.delaware.gov/) was conducted on January 8, 2025, to identify any areas of concern that may contain HTRW. This review identified three RS (Remediation Section) sites, leaking underground storage tanks (LUSTS), underground storage tanks (USTS), above ground storage tanks (ASTS) and an NPDES (National Pollution Discharge Elimination System) discharge.

Three sites are listed in the Delaware's RS database that are identified in the general vicinity of the project. One site is the discovery of a chlorine gas cylinder at Delaware Seashore State Park near Indian River Inlet (DE -026) in 1992. In a memo from DNREC dated April 21, 2010, the disposal action was completed in 1992, and the status is now inactive.

A second site, The Indian River Life Saving Station (IRLSS) property (DE-1349), is about 4,000 feet to the north of the beachfill project boundary. The IRLSS is a historical property that was once used by the United States Lifesaving Service, which was later changed to the U.S. Coast Guard. This property was later turned over to the DNREC Division of Soil and Water Conservation for offices and storage of heavy equipment, which vacated the site in the mid-1990's. The site now houses a museum and gift shop. Due to the presence of leaking underground storage tanks (LUSTS), this site was part of a preliminary assessment and site investigation. Remedial activities were conducted in 1998 where three USTs were removed along with 38 tons of petroleum-impacted soils from the site. This action included the backfilling of clean soil. Based on this, the Delaware UST Management Branch issued a "No Further Action Required" letter with a cautionary note requiring that a Contaminated Soil Management Plan be developed in the event of future intrusive activities at the site. Recent sample results show slightly elevated levels of arsenic, iron and some petroleum hydrocarbons within the location of the former USTs, but no widespread areas of contamination. Based on this information, the EPA does not anticipate any further action under the Federal Superfund Program unless new information or conditions change that warrant further Superfund consideration (letter from U.S. EPA Region III to DNREC dated 2/20/2008).

A third site is the North Artillery Range, which is part of the Formerly Used Defense Sites (FUDS) program (C03DE006402), is about 6,000 feet to the north of the beachfill project boundary. This site is approximately 364 acres in size and was used as an automatic weapons firing point for anti-aircraft target practice by the U.S. Army. This site is now part of Delaware Seashore State Park. A Site Inspection Report (USACE, 2010) investigated the potential for munitions and explosives of concern (MEC) and munitions constituents (MC) at the site. The types of munitions identified in this report that were likely used at this range include small arms, 40 mm HE (high explosive) HEI (high explosive incendiary), Mark II and 3.25 –inch target rockets, MK1. After a thorough inspection of the property, which included sampling the soils and sediments for explosives and explosive residues and metals, this investigation concluded that the land portion of this site has no reports of MEC or MD (munitions debris) that are known to exist; and surface soil, subsurface soil and sediment analyses yielded no explosive MC detections. This report further concluded that no Chemicals of Potential Concern (COPC) or Chemicals of Potential Ecological Concern (COPEC) were identified in any of the media at this site.

Two LUSTs were identified in the vicinity by the DEN. One of the LUSTs sites is at the Indian River Life Saving Station (discussed above) where three tanks were removed in 1998. The other LUST was identified at the U.S. Coast Guard Station (N9110231) in Indian River Inlet where an underground storage tank was removed in 1990. A letter from DNREC Division of Air and Waste Management (dated 10/10/91) concluded that residual "low levels of contamination near the tank location pose no threat to human health or the environment, and no further action is required at the present time".

Several existing underground storage tanks (USTs) in the general project vicinity were identified by the DEN at the Coast Guard Station, Indian River Life Saving Station, Old Inlet Bait and Tackle, South Shore Marina, and the DNREC sand bypass facility. Above ground storage tanks (ASTs) were identified at the Indian River Sand Bypass Facility, Indian River Inlet Delaware Seashore State Park, U.S. Coast Guard Station, the Indian River Inlet Bridge Area, and the Indian River Life Saving Station. No further information was available on the DEN for these AST or UST locations.

One historical NPDES wastewater discharge was located in the inlet area and was operated by the Delaware Seashore State Park. This discharge was discontinued in 2000 and is now treated through the Sussex County South Coastal Wastewater Treatment Facility.

Several potential environmental concerns associated with offshore areas were identified relating to HTRW, which may involve unknown hazardous waste sites, sunken ships (possibly with weapons), weaponry from WWII shooting ranges, and rubble piles (used to create artificial reefs). No known hazardous waste sites or major spills were identified within the State and Federal databases within 1 mile of the Delaware Coastline. However, the U.S. Coast Guard National Response Center reported several occurrences of unknown sheens in Delaware Coastal waters or tar-like substances washed up on Delaware beaches where the origin or substance is unknown (National Response Center, 2001). There are no known radioactive sites within three miles of the coast. One experimental stabilized coal waste fish reef lies approximately 1.5 miles southeast of Indian River Inlet. This reef contains 250 tons of stabilized coal waste blocks along with 90 tons of concrete control blocks that were placed within a 75-foot long by 60-foot-wide area (Eklund, 1988).

No known ocean dumpsites were identified within the immediate vicinity of the North Beach or sand borrow areas considered. However, a historic sewage sludge dump area existed approximately 16 miles off of the northern Delaware Coast. This site was used mainly by the City of Philadelphia for the disposal of municipal sewage sludge from 1961 to 1973. Dumping at this site was discontinued because it was determined to be a potential threat to existing commercial surfclam beds and shellfish beds located south and west of the site (Muir, 1983 and Buelow et al. 1968).

4.1.8.1 Munitions and Explosives of Concern (MEC)

Two former artillery-firing ranges have historically occupied tracts of land along the Delaware Atlantic Coast). One range occupied a 275-acre portion of beach area north of Indian River Inlet in the present Delaware Seashore State Park and was known as the North Firing Range. The second range occupied a 108-acre tract of land south of South Bethany in present day Fenwick Island State Park and was known as the South Firing Range. These ranges were associated with the former military installation of Fort Miles, which is now Cape Henlopen State Park. These areas have been the subjects of investigations conducted under the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS). Both ranges were utilized as artillery ranges by the Delaware National Guard from 1950 – 1959. In 1959, control of the Delaware National Guard was transferred from the Department of the Army to the State of Delaware. There were no indications of usage of the North Range after 1959. However, the South Range received continued use as an artillery range by the Delaware National Guard until 1970 and then as a small arms range until at least 1974. The South Firing Range was previously used to conduct surface-to-air firing at radio-controlled aerial targets by self-propelled 40-mm air defense artillery weapons. Also, the area was used for surface-to-surface firing with 40-mm artillery and for practice tests of target detection of high-performance aircraft.

The North Artillery Range, which is part of the Formerly Used Defense Sites (FUDS) program (C03DE006402), is about 6,000 feet to the north of the beachfill project boundary for IRI North Shore. This site is approximately 364 acres in size and was used as an automatic weapon firing point for anti-aircraft target practice by the U.S. Army. This site is now part of Delaware Seashore State Park. A Site Inspection Report (USACE, 2010) investigated the potential for munitions and explosives of concern (MEC) and munitions constituents (MC) at the site. The types of munitions identified in this report that were likely used at this range include small arms, 40 mm HE (high explosive) HEI (high explosive incendiary), Mark II and 3.25 –inch target rockets, MK1. After a thorough inspection of the property, which included sampling the soils and sediments for explosives and explosive residues and metals, this investigation concluded that the land portion of this site has no reports of MEC or MD (munitions debris) that are known to exist; and surface soil, subsurface soil and sediment analyses yielded no explosive MC detections. This report further concluded that no Chemicals of Potential Concern (COPC) or Chemicals of Potential Ecological Concern (COPEC) were identified in any of the media at this site.

The South Firing Range may also have been used as a firing range for M60 Machine guns, M79 Grenade Launchers, and 45 caliber submachine guns. A 1950 memorandum from the Department of the Army to the U.S. Coast and Geodetic Survey indicated that firing was conducted in the South Firing Range utilizing 90-mm and 120-mm projectiles, and the North Firing Range was used as an “Automatic Weapons Area” during the 1950s.

Although the sand sources considered are outside of any known boundary of a firing range, there exists a potential for encountering MEC’s when dredging within the borrow areas considered. Because MECs present a significant hazard to the public and beachfill crew, the Philadelphia District has required that screens be placed on intakes on all dredges and basket screens on the beach pump-out locations to minimize the potential for these items becoming entrained in the dredge and being pumped out on to the beaches. Additionally, crews trained in MEC monitoring and safety protocols provide 24-hour support during dredging operations. This has been the practice since 2005 on all beach nourishment projects along the Delaware Atlantic Coast.

4.1.9 Sediment Quality of Sand Source Areas

Physical and chemical analyses were performed on sediment composite cores and grab samples obtained from the interior shoal areas (IRI Flood Shoal, Burton Island Shoal and Middle Island Shoal) and the IRI Ebb-A (ebb shoal area) considered as potential sand sources to provide baseline data to screen for any potential contamination of these sites. The interior shoal areas were collected and analyzed by Anchor QEA (under contract with DNREC) in 2024 to characterize the sandy material proposed for Phase 1 and a single composite core was collected by USACE for IRI Ebb-A in 2000. These analyses included grain size, total organic carbon and bulk sediment chemistry analyses that were compared to human health and ecological criteria. Figure 23 provides core locations and their composite groupings.

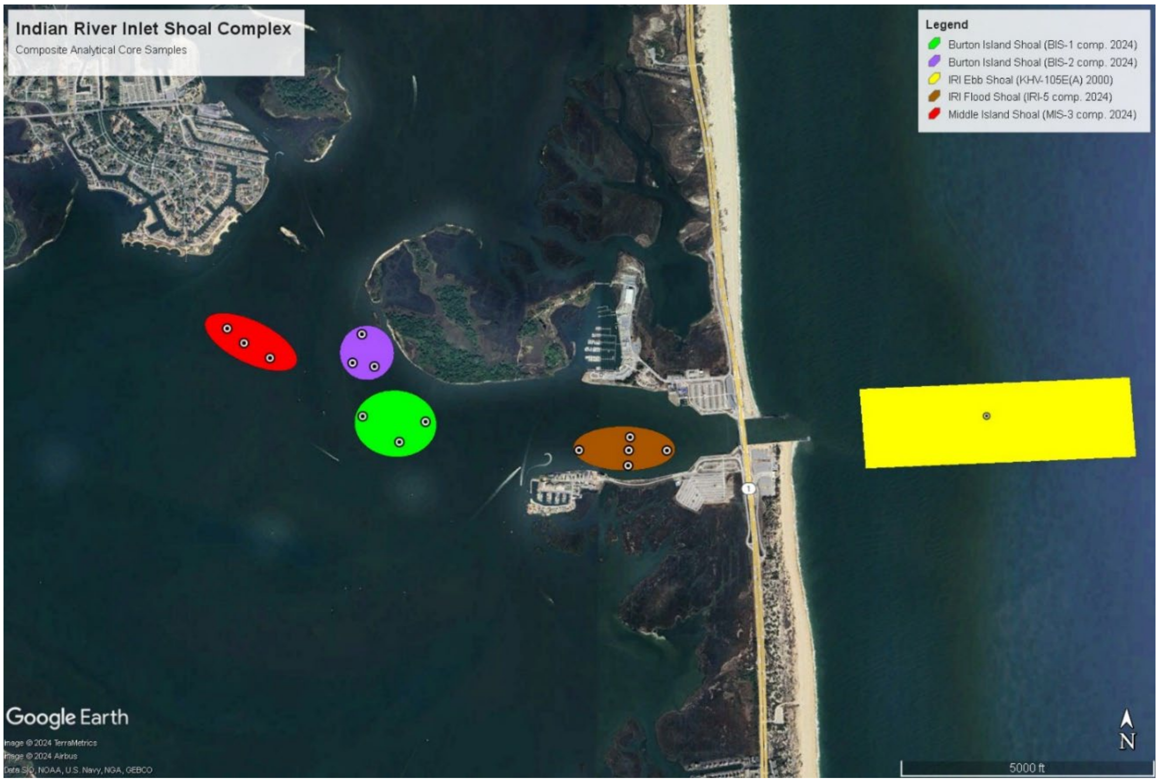


Figure 23. Indian River Inlet Shoal Complexes Analytical Composite Sample Locations.

4.1.9.1 Physical Sediment Quality

Sediment grain size distribution analyses and total organic carbon (Table 5) were conducted along with chemical analyses in cores obtained from the four shoal areas in the region that resulted in the analysis of 5 composites. With the exception of one of the composites (Middle Island Shoal – MIS-3), the sand content was greater than 90% for all composites. The Burton Island Composites, BIS-1 and BIS-2 had 100% and 90.1% sand content, respectively. These composites were dominated by fine to medium sands. The Indian River Inlet Flood Shoal (IRI-5) composite contained 98.1% fine to medium sands. The Indian River Inlet ebb shoal core (KHV-105E(A)) had a sand content of 98.6% and was predominantly fine sand with some medium sand. The total organic carbon (TOC) content of the cores were very low (two were undetectable) with the highest at the Middle Island Shoal containing 0.39%.

Table 5. Results of Grain Size and Total Organic Carbon (TOC) Analyses

SOIL CLASSIFICATION ASTM D422	COMPOSITES				
	BIS-1	BIS-2	MIS-3	IRI-5	KHV-105E(A)
Gravel (%)	0	2.3	0	1.9	0.4
Coarse Sand (%)	0	1.6	0.5	3.1	0
Medium Sand (%)	21.2	46.9	18.5	39.9	13.7
Fine Sand (%)	78.8	39.4	50.3	53.2	84.5
Fines (%)	0	9.9	30.7	1.9	1.4
TOC (%) (Lloyd Kahn)	*0.01*	0.091	0.39	*0.01*	0.021
TOC (mg/kg)	<120	910	3,900	<120	208

Values in italics =1/2 MDL

4.1.9.2 Inorganic and Organic Chemistry of Sediments

Metals: The five composites collected by DNREC and USACE analyzed 23 target analyte list (TAL) metals (Table 6), and were compared to the Delaware Hazardous Substances Clean Up Act (HSCA) screening levels for soils (DNREC, 2024) and the sediment effects levels on the concentrations effects on benthic organisms (Long et al 1995). The HSCA Human Health Screening Level Table combines background, risk-based and regulatory values for soil used to determine the contaminants of potential concern (COPCs) in the risk assessment process. Table 6 identified a number of detected TAL metals at trace levels. None of the detections exceeded either the HSCA screening levels or the NOAA ecological sediment effects levels.

Pesticides: Twenty-one target compound list (TCL) pesticides were analyzed among the five composite samples in the area (Table 7). Only one pesticide (Heptachlor) was detected in one of the samples (BIS-1) and was well below the HSCA human health soil screening level. No corresponding NOAA ecological sediment effects level is available.

Polynuclear Aromatic Hydrocarbons (PAHs) and SVOCs: Twenty PAHs were analyzed, and eleven detections were reported (Table 8). These detections were only in the Burton Island Shoal and Middle Island Shoal samples. No PAHs were detected in the IRI Flood or Ebb Shoal samples. The eleven detections did not exceed any corresponding HSCA human health soil screening or ecological sediment effects levels. Additionally, a target compound list of SVOCs (Semivolatile Organic Compounds) including the PAHs in Table 8 were all non-detectable in the IRI Ebb Shoal Sample (KHV-105E(A)).

Polychlorinated Biphenyls (PCBs): The interior shoals that include the IRI Flood Shoal, Burton Island Shoal and Middle Island Shoal analyzed PCBs via EPA Method 680, which measures PCB mono-deca homolog groups. The IRI Ebb Shoal utilized EPA Method 1668 and analyzed 75 different targeted congeners. The interior shoal areas did not report any detections of PCB homologs. Therefore, an estimate was provided that utilized ½ of the method detection limit. These values were summed to provide a total PCB value to compare to the corresponding HSCA human health soil and ecological sediment screening levels and

NOAA ecological sediment effects levels. The estimated concentrations were far below any of the corresponding screening levels. The same was done for the IRI Ebb Shoal sample for the 75 congeners. The total PCBs (including ½ of non-detected congener method detection levels) were far below the corresponding HSCA screening and NOAA sediment effects levels (Table 9).

Dioxins and Furans: Dioxins and furans were sampled for all composites using EPA Method 1613B in the parts per trillion range (ng/kg). Table 10 provides the data. Only a few detections were recorded. To evaluate the toxicity of the sediments, a relative toxicity was developed for each individual dioxin and furan analyzed relative to 2,3,7,8-TCDD dioxin as a toxicity equivalent (TEQ). 2,3,7,8-TCDD dioxins considered to have the greatest potential for adverse health effects and a toxicity equivalent factor (TEF) is assigned as a value of 1 for this compound. The other compounds were assigned TEF coefficients based on their physiochemical and toxicological properties relative to 2,3,7,8-TCDD dioxin. The TEQ was computed for compounds that were detected in the samples and compared to the HSCA human health soil screening level for 2,3,7,8-TCDD (dioxin), which has been established at a concentration of 4.8 ng/kg. All of the samples had summed values below this screening level. There are no ecological NOAA sediment effects levels or HSCA ecological sediment screening levels for marine sediment to compare the TEFs.

Volatile Organic Compounds (VOCs): No volatile organic compounds were sampled in the interior shoal areas. Two VOCs were detected in the IRI-Ebb Shoal sample taken in 2000 (Duffield Associates, 2000). Acetone, a common laboratory solvent, was detected at a concentration of 240 ug/kg but was below the HSCA human health soil screening level of 6,100 ug/kg. The likelihood of acetone's presence in marine sediments is improbable due to the fact that it is almost completely miscible in water and evaporates readily when exposed to air. The other VOC detected in the analyses was perchloroethylene (PCE) (also known as tetrachloroethene), was detected at a concentration 0f 7 ug/kg, which is below the HSCA human health soil screening level of 8,100 ug/kg. PCE is a common solvent associated with dry-cleaning facilities and commercial or industrial de-greasing operations. It has a density that is greater than water and is not very soluble in water. If released to a body of water in significant volume, PCE may settle to the bottom and pool as a separate liquid. There are no known likely sources of this compound, however, it is possible that vapors from dry cleaned garments of laboratory personnel could be a source (Duffield Associates, 2000a). Given the fact that these compounds were found in a sample obtained from the high-energy ocean floor, actual sediment contamination is less likely.

Table 6. Target Analyte Metals Analyzed in the Potential Sand Sources

	NOAA Sediment Effects Levels		HSCA HH Screening Level for Soil	Burton Island Shoal						Middle Island Shoal			IRI Flood Shoal			IRI Ebb Shoal		
	ER-L	ER-M		BIS-1			BIS-2			MIS-3			IRI-5			KHV-105E(A)		
Units	*mg/kg*	*mg/kg*	*mg/kg*		*mg/kg*			*mg/kg*			*mg/kg*			*mg/kg*			*mg/kg*	
Aluminum			51,200		1600			19000			8900			900			543	
Antimony			3.1	<	0.081		<	0.07		<	0.081		<	0.1		<	1.5	
Arsenic	8.3	70	11		0.53			0.75			3.0			0.82			0.34	J
Barium			1,500		4.9			24			16			4.7			1.51	J
Beryllium			16		0.051	J		0.20			0.32			0.035	J	<	0.13	
Cadmium	1.2	9.6	0.71	<	0.041		<	0.03			0.058	J	<	0.05		<	0.2	
Calcium			---		1500			440	^2		1200	^2		1400			1050	
Chromium	81	370	214		2.1			7.9			14			1.1			1.56	J
Cobalt			34		0.35			1.3			6.9			0.32		<	0.62	
Copper	34	270	310		0.35	J		1.3			2.8		<	0.22			0.49	J
Iron			74,767		910			2200			8400			630			619	
Lead	46.7	218	400		1.3			4.0			3.6			0.79			1.08	J
Magnesium			---		330			480	^2		2100	^2		260			378	
Manganese			2,100		10			10			66			8.8			6.0	
Mercury	0.15	0.7	0.94	<	0.022		<	0.02		<	0.026		<	0.02		<	0.015	
Nickel	20.9	51.6	15		0.84			5.7			7.5			0.50		<	1.7	
Potassium			---		200			450			1200			210			150	
Selenium			39	<	0.1		<	0.08			0.12	J	<	0.12		<	0.46	
Silver	1	3.7	39	<	0.041		<	0.03		<	0.041		<	0.05		<	0.23	
Sodium			---		1500			1700			3300			1500			2160	
Thallium			0.078	<	0.04			0.038	J		0.075	J	<	0.05		<	0.62	
Zinc	124	410	2,300	<	4.1			8.7	J		19	J	<	4.9			4.7	J
Vanadium			134		2.5			11			16			1.7			1.65	J

Table 7. Target Compound List of Pesticides Analyzed in Potential Sand Sources Considered

	NOAA Sediment Effects Levels		HSCA HH Screening Level for Soil	Burton Island Shoal		Middle Island Shoal	IRI Flood Shoal	IRI Ebb Shoal
	ER-L	ER-M		BIS-1	BIS-2	MIS-3	IRI-5	KHV-105E(A)
Units	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*
Aldrin	---	---	39	< 0.41	< 0.44	< 0.47	< 0.44	< 0.067
alpha-BHC	---	---	86	< 0.43	< 0.47	< 0.5	< 0.47	< 0.067
alpha-Chlordane	---	---	36000	< 0.19	< 0.21	< 0.22	< 0.21	< 0.067
beta-BHC	---	---	300	< 0.5	< 0.54	< 0.58	< 0.54	< 0.067
delta-BHC	---	---	---	< 0.51	< 0.56	< 0.59	< 0.55	0.6
Dieldrin	---	---	34	< 0.37	< 0.41	< 0.43	< 0.4	< 0.13
Endosulfan I	---	---	47000	< 0.25	< 0.27	< 0.29	< 0.27	< 0.067
Endosulfan II	---	---	47000	< 1.2	< 1.4	< 1.4	< 1.3	< 0.13
Endosulfan sulfate	---	---	38000	< 0.45	< 0.49	< 0.52	< 0.48	< 0.13
Endrin	---	---	1900	< 0.77	< 0.84	< 0.89	< 0.83	< 0.13
Endrin aldehyde	---	---	---	< 0.44	< 0.47	< 0.5	< 0.47	< 0.13
Endrin ketone	---	---	---	< 0.68	< 0.74	< 0.79	< 0.74	< 0.13
gamma-BHC (Lindane)	---	---	570	< 0.94 p	< 0.26	< 0.28	< 0.26	< 0.067
gamma-Chlordane	---	---	36000	< 0.28	< 0.31	< 0.33	< 0.31	< 0.067
Heptachlor	---	---	130	0.65 J	< 0.38	< 0.41	< 0.38	< 0.067
Heptachlor epoxide	---	---	70	< 0.4	< 0.43	< 0.46	< 0.43	< 0.067
Methoxychlor	---	---	32000	< 2.9	< 3.2	< 3.4	< 3.1	< 0.67
Toxaphene	---	---	490	< 16	< 17	< 18	< 17	< 6.7
p,p'-DDD	---	---	190	< 0.91	< 0.99	< 1	< 0.98	< 0.13
p,p'-DDE	2.2	27	2000	< 0.79	< 0.86	< 0.92	< 0.86	< 0.13

	NOAA Sediment Effects Levels		HSCA HH Screening Level for Soil	Burton Island Shoal						Middle Island Shoal			IRI Flood Shoal			IRI Ebb Shoal		
	ER-L	ER-M		BIS-1			BIS-2			MIS-3			IRI-5			KHV-105E(A)		
Units	*ug/kg*	*ug/kg*	*ug/kg*		*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*	
p,p'-DDT	1.58	46.1	1900	<	0.9		<	0.98		<	1		<	0.97		<	0.13	

Table 8. Polynuclear Aromatic Hydrocarbon Analyses for Potential Sand Sources Considered

	NOAA Sediment Effects Levels		HSCA HH Screening Level for Soil	Burton Island Shoal						Middle Island Shoal			IRI Flood Shoal			IRI Ebb Shoal		
	ER-L	ER-M		BIS-1			BIS-2			MIS-3			IRI-5			KHV-105E(A)		
Units	*ug/kg*	*ug/kg*	*ug/kg*		*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*	
Anthracene	85.3	1100	1,800,000		0.47	J	<	0.41			1.5	J	<	0.41		<	33	
Pyrene	665	2600	180,000	<	0.76		<	0.81			1.4	J	<	0.82		<	33	
Dibenzofuran	---	---	7,800	<	0.76		<	0.81		<	0.86	F1	<	0.82		<	33	
Benzo[g,h,i]perylene	---	---	---	<	0.76		<	0.81		<	0.86		<	0.82		<	33	
Benzo[e]pyrene			570	<	0.76		<	0.81		<	0.86		<	0.82			NS	
Indeno[1,2,3-cd]pyrene	---	---	1,300	<	0.76		<	0.81		<	0.86		<	0.82		<	33	
Perylene			540		0.82	J	<	0.81			11		<	0.82			NS	
Benzo[b]fluoranthene	---	---	1,100	<	0.76		<	0.81		<	0.86		<	0.82		<	33	
Fluoranthene	600	5100	240,000	<	0.76	*+ cn		0.82	J		2.1	J	<	0.82	*+	<	33	
Benzo[k]fluoranthene	---	---	11,000	<	0.76	*+	<	0.81	F1	<	0.86		<	0.82	*+	<	33	
Acenaphthylene	44	640	---	<	0.38		<	0.41			1.9	J	<	0.41		<	33	
Chrysene	384	2800	110,000	<	0.38		<	0.41			0.73	J	<	0.41		<	33	
Benzo[a]pyrene	430	1600	240	<	0.76		<	0.81		<	0.86		<	0.82		<	33	

	NOAA Sediment Effects Levels		HSCA HH Screening Level for Soil	Burton Island Shoal						Middle Island Shoal			IRI Flood Shoal			IRI Ebb Shoal	
	ER-L	ER-M		BIS-1			BIS-2			MIS-3			IRI-5			KHV-105E(A)	
Units	*ug/kg*	*ug/kg*	*ug/kg*		*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*			*ug/kg*
Dibenz(a,h)anthracene	63.4	260	170	<	0.76		<	0.81		<	0.86		<	0.82		<	33
Benzo[a]anthracene	261	1600	1,100	<	0.76		<	0.81		<	0.86		<	0.82		<	33
Acenaphthene	16	500	360,000	<	0.76		<	0.81		<	0.86		<	0.82		<	33
Phenanthrene	240	1500	180,000	<	0.76			0.94	J		2.0	J	<	0.82		<	33
Fluorene	19	540	240,000	<	0.76	cn	<	0.81		<	0.86		<	0.82	cn	<	33
Naphthalene	160	2100	2,000	<	1.5		<	1.6		<	1.7		<	1.6		<	33
2-Methylnaphthalne	70	670	24,000	<	1.1		<	1.2		<	1.3	cn	<	1.2		<	33

Table 9. Polychlorinated Biphenyls Analyzed in the Potential Sand Sources Considered

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.	Result		Est.	Result		Est.	Result		Est.	Result		Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*pg/g*		*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*
Total Monochlorobiphenyls							NM		NM	<	0.37	*0.185*	<	0.34	*0.17*	<	0.37	*0.185*	<	0.39	*0.195*
Di-CB	8	2,4'					72.8	B	0.0728												
Total Dichlorobiphenyls									0.0728	<	0.37	*0.185*	<	0.34	*0.17*	<	0.37	*0.185*	<	0.39	*0.195*
Tri-CB	18	2,2',5					55.8	B	0.0558												
Tri-CB	28	2,4,4'					47.4	B	0.0474												

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.	Result		Est.	Result		Est.	Result		Est.	Result		Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*pg/g*		*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*
Tri-CB	37	3,4,4'					17.7	B	0.0177												
Total Trichlorobiphenyls									0.1209	<	0.24	*0.12*	<	0.23	*0.115*	<	0.25	*0.125*	<	0.26	*0.13*
Tetra-CB	42	2,2',3,4'					15.9	B	0.0159												
Tetra-CB	44	2,2',3,5'					45.0	B	0.045												
Tetra-CB	47	2,2',4,4'					16.4	B	0.0164												
Tetra-CB	49	2,2',4,5'					42.5	B	0.0425												
Tetra-CB	52	2,2',5,5'					56.0	B	0.056												
Tetra-CB	60	2,3,4,4'					0.99	U	*0.0004945*												
Tetra-CB	64	2,3,4',6					26.0	B	0.026												
Tetra-CB	66	2,3',4,4'					29.9	B	0.0299												
Tetra-CB	70	2,3',4',5					0.98	U	*0.0004905*												
Tetra-CB	74	2,4,4',5					1.12	U	*0.00056*												
Tetra-CB	78	3,3′,4,5					1.36	U	*0.00068*												
Tetra-CB	79	3,3′,4,5′					1.39	U	*0.000695*												
Tetra-CB	80	3,3',5,5'					19.7		0.0197												
Tetra-CB	81	3,4,4',5					1.23	U	*0.000615*												
Tetra-CB	77	3,3',4,4'	38				7.65	B	0.00765												
Tetra-CB	81	3,4,4′,5	12				1.2	B	0.0012												
Total Tetrachlorobiphenyls									0.263785	<	0.49	*0.245*	<	0.46	*0.23*	<	0.49	*0.245*	<	0.52	*0.26*
Penta-CB	82	2,2',3,3',4					5.38	B	0.00538												

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.	Result		Est.	Result		Est.	Result		Est.	Result		Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*pg/g*		*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*
Penta-CB	84/101	2,2',3,3',6					24.1	B	0.0241												
Penta-CB	86	2,2',3,4,5					0.37	U	*0.0001865*												
Penta-CB	87	2,2',3,4,5'					12.6	B	0.0126												
Penta-CB	91	2,2',3,4',6					6.35	B	0.00635												
Penta-CB	92	2,2',3,5,5'					6.23	B	0.00623												
Penta-CB	95	2,2',3,5',6					28.7	B	0.0287												
Penta-CB	97	2,2',3',4,5					8.71	B	0.00871												
Penta-CB	99	2,2',4,4',5					22.9	B	0.0229												
Penta-CB	105	2,3,3',4,4'	120				3.84	B	0.00384												
Penta-CB	110	2,3,3',4',6					28.6	B	0.0286												
Penta-CB	114	2,3,4,4',5	120				0.42	U	*0.000211*												
Penta-CB	118	2,3',4,4',5	120				29.8	B	0.0298												
Penta-CB	119	2,3',4,4',6					1.36	B	0.00136												
Penta-CB	120	2,3',4,5,5'					0.27	U	*0.000135*												
Penta-CB	123	2',3,4,4',5	120				0.38	U	*0.000188*												
Penta-CB	126	3,3',4,4',5	0.036				0.33		0.000329												
Total Pentachlorobiphenyls									0.1796195	<	0.98	*0.49*	<	0.92	*0.46*	<	0.99	*0.495*	<	1	*0.5*
Hexa-CB	128/167	2,2',3,3',4,4'	120				2.37		0.00237												

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.	Result		Est.	Result		Est.	Result		Est.	Result		Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			ug/kg	ug/kg	ug/kg	ug/kg	pg/g		ug/kg		ug/kg	ug/kg		ug/kg	ug/kg		ug/kg	ug/kg		ug/kg	ug/kg
Hexa-CB	137	2,2',3,4,4',5					1.10	B	0.0011												
Hexa-CB	138	2,2',3,4,4',5'					29.2	B	0.0292												
Hexa-CB	141	2,2',3,4,5,5'					5.49	B	0.00549												
Hexa-CB	146	2,2',3,4',5,5'					8.22	B	0.0082												
Hexa-CB	149	2,2',3,4',5',6					34.6	B	0.0346												
Hexa-CB	151	2,2',3,5,5',6					12.5	B	0.0125												
Hexa-CB	153	2,2',4,4',5,5'					44.0	B	0.044												
Hexa-CB	156	2,3,3',4,4',5	120				2.42	B	0.0024												
Hexa-CB	157	2,3,3',4,4',5'	120				0.55		0.0005												
Hexa-CB	158	2,3,3',4,4',6					1.88	B	0.0018												
Hexa-CB	166	2,3,4,4',5,6					0.53	U	*0.0002*												
Hexa-CB	168	2,3',4,4',5',6					6.88	B	0.0068												
Hexa-CB	169	3,3′,4,4′,5,5′	0.12				0.17	U	*0.0001*												
Total Hexachlorobiphenyls									0.1496	<	0.49	*0.245*	<	0.46	*0.23*	<	0.49	*0.245*	<	0.52	*0.26*

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.		Result	Est.		Result	Est.		Result	Est.		Result	Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*pg/g*		*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*
Hepta-CB	170/190	2,2',3,3',4,4',5					7.19	B	0.0072												
Hepta-CB	171	2,2',3,3',4,4',6					2.77		0.0028												
Hepta-CB	174	2,2',3,3',4,5,6'					15.7	B	0.0157												
Hepta-CB	177	2,2',3,3',4',5,6					7.96	B	0.0080												
Hepta-CB	179	2,2',3,3',5,6,6'					13.7	B	0.0137												
Hepta-CB	180	2,2',3,4,4',5,5'					1.69	U	*0.0008*												
Hepta-CB	183	2,2',3,4,4',5',6					9.90	B	0.0099												
Hepta-CB	185	2,2',3,4,5,5',6					2.89		0.0029												
Hepta-CB	187	2,2',3,4',5,5',6					28.8	B	0.0288												
Hepta-CB	189	2,3,3',4,4',5,5'	130				0.27	U/EMPC	*0.0001*												
Hepta-CB	191	2,3,3',4,4',5',6					0.34		0.0003												
Total Heptachlorobiphenyls									0.0902	<	0.61	*0.305*	<	0.57	*0.285*	<	0.62	*0.31*	<	0.65	*0.325*
Octa-CB	194	2,2',3,3',4,4',5,5'					11.0	B	0.011												

			Delaware HSCA Screening Levels		NOAA Sediment Effects		IRI Ebb Shoal (2000)			IRI Flood Shoal Composite (2024)			Burton Island Shoal Composites (2024)						Middle Island Shoal Composite (2024)		
Sample ID:							KHV-105E(A)			IRI-5			BIS-1			BIS-2			MIS-3		
EPA METHOD:							EPA 1668			EPA 680			EPA 680			EPA 680			EPA 680		
Sample Date:			HH Soil	Ecological Sediment (marine)	ER-L	ER-M	Result	FLAG	Est.	Result		Est.	Result		Est.	Result		Est.	Result		Est.
PCB Homolog Group	PCB Congeners IUPAC	Isomer																			
Units			*ug/kg*	*ug/kg*	*ug/kg*	*ug/kg*	*pg/g*		*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*		*ug/kg*	*ug/kg*
Octa-CB	195	2,2',3,3',4,4',5,6					2.76	B	0.00276												
Octa-CB	196/203	2,2',3,3',4,4',5',6					9.77	B	0.00977												
Octa-CB	198	2,2',3,3',4,5,5',6					0.88	U/EMPC	*0.0004*												
Octa-CB	200	2,2',3,3',4,5',6,6'					3.86	B	0.0039												
Octa-CB	201	2,2',3,3',4',5,5',6					20.0	B	0.02												
Octa-CB	205	2,3,3',4,4',5,5',6					0.52	U/EMPC	*0.0003*												
Total Octachlorobiphenyls									0.0481	<	0.61	*0.305*	<	0.57	*0.285*	<	0.62	*0.31*	<	0.65	*0.325*
Nona-CB	206	2,2',3,3',4,4',5,5',6					7.64		0.0076												
Nona-CB	207	2,2',3,3',4,4',5,6,6'					1.01	B	0.0010												
Nona-CB	208	2,2',3,3',4,5,5',6,6'					4.42	B	0.0044												
Total Nonachlorobiphenyls									0.0130	<	0.61	*0.305*	<	0.57	*0.285*	<	0.62	*0.31*	<	0.65	*0.325*
Deca-CB	209	2,2',3,3',4,4',5,5',6,6'					8.19		0.0082												
DCB Decachlorobiphenyl									0.0082	<	0.61	*0.305*	<	0.57	*0.285*	<	0.62	*0.31*	<	0.65	*0.325*
Total PCB (Inclusive of blank masked values)			230	40	22.7	180	940	[redacted]	0.946	[redacted]		*2.51*	[redacted]		*2.35*	[redacted]		*2.54*	[redacted]		*2.65*
Total PCBs (Excluding blank masked values)							44.8														

Notes:
B = Substance detected at less than three times the concentration detected in the method blank analyzed by MRI. MRI dismissed these concentrations as "analytic background," meaning that MRI's analysis does not believe that the substance is present in the sample.
MDL = Method Detection Limit - Lower limit of detection for the analysis.
U= Undetected with a noise based detection limit given
EMPC= A peak was detected that did not meet ion ration criteria. The peaks were summed to calculate an Estimated Maximum Possible Concentration given as the detection limit in pg/g.
NM = Not Measured
pg/g= picograms per gram or parts per trillion
ug/kg= micrograms per kilogram or parts per billion
Values in Red= were undetected with an assumed value of 1/2 of the MDL
Yellow Highlight = Represents coplanar PCBs
Est.= Estimated based on sums including ½ the value of the MDL for undetected PCBs

Table 10. Dioxins and Furans Analyses for the Sand Sources Considered

		Delaware HSCA HH Screening Levels (soil)	Burton Island Shoal				Middle Island Shoal		IRI Flood Shoal		IRI Ebb Shoal	
			BIS-1		BIS-2		MIS-3		IRI-5		KHV-105E(A)	
EPA Method: 1613B												
	TEF (WHO 2005)		Result	TEQ	Result	TEQ	Result	TEQ	Result	TEQ	Result	TEQ
Units		*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*
DIOXINS												
2,3,7,8-TCDD	1	4.8	<2.3	0	<0.24	0	<0.26	0	<2.4	0	<0.255	0.000
1,2,3,7,8-PeCDD	1		<23	0	<2.4	0	<2.6	0	<24	0	<0.306	0.000
1,2,3,4,7,8-HxCDD	0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.299	0.000
1,2,3,6,7,8-HxCDD	0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.159	0.000
1,2,3,7,8,9-HxCDD	0.1		<23	0	3.8	0.38	<2.6	0	<24	0	<0.187	0.000
1,2,3,4,6,7,8-HpCDD	0.01		<23	0	40	0.4	56	0.56	<24	0	2.22	0.022
OCDD	0.0003		57	0.017	1900	0.57	1100	0.33	<24	0	31.1	0.009
FURANS												
2,3,7,8-TCDF	0.1		<2.3	0	<0.24	0	<0.26	0	<2.4	0	<0.272	0.000
1,2,3,7,8-PeCDF	0.03		<23	0	<2.4	0	<2.6	0	<24	0	<0.223	0.000
2,3,4,7,8-PeCDF	0.3		<23	0	<2.4	0	<2.6	0	<24	0	<0.192	0.000

			Delaware HSCA HH Screening Levels (soil)	Burton Island Shoal				Middle Island Shoal		IRI Flood Shoal		IRI Ebb Shoal	
				BIS-1		BIS-2		MIS-3		IRI-5		KHV-105E(A)	
EPA Method: 1613B													
		TEF (WHO 2005)		Result	TEQ	Result	TEQ	Result	TEQ	Result	TEQ	Result	TEQ
	Units		*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*	*ng/kg*
1,2,3,4,7,8-HxCDF		0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.188	0.000
1,2,3,6,7,8-HxCDF		0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.187	0.000
1,2,3,7,8,9-HxCDF		0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.499	0.000
2,3,4,6,7,8-HxCDF		0.1		<23	0	<2.4	0	<2.6	0	<24	0	<0.18	0.000
1,2,3,4,6,7,8-HpCDF		0.01		<23	0	<2.4	0	<2.6	0	<24	0	0.431	0.004
1,2,3,4,7,8,9-HpCDF		0.01		<23	0	<2.4	0	<2.6	0	<24	0	<0.241	0.000
OCDF		0.0003		<23	0	<2.4	0	<2.6	0	<24	0	<1.03	0.000
Toxicity Equivalent (Dioxins+Furans)			4.8		0.017		1.35		0.89		0		0.036

WHO 2005 = World Health Organization (WHO) International Program on Chemical Safety expert meeting. Toxicity Equivalence Factors (TEF) for dioxin-like compounds were re-evaluated and assigned.

4.1.10 Water Quality

The Delaware Department of Natural Resources and Environmental Control conducts beach water quality monitoring of recreational waters to ensure their quality for swimming. Point sources of pollution, and rainfall-driven runoff from the land (nonpoint source pollution), may introduce disease-causing organisms into swimming waters. However, because of improvements in wastewater treatment and the elimination of some discharges, Delaware's guarded beaches are no longer impacted by point sources of pollution. DNREC reports that efforts are also underway to control nonpoint source pollution by installing central wastewater collection and treatment systems to eliminate septic systems and by better managing agricultural, commercial and residential lands.

Bacteriological water quality can be affected by a number of factors, including human-induced contamination and a number of natural factors. For example, windy conditions create water turbulence. Naturally occurring bacteria that live on the bottom can be churned up into the water column by wind-induced waves. This will result in elevated levels of Enterococcus bacteria. If elevated levels are the result of natural conditions, and are presenting no threat to the public's health, an advisory will not be issued (source DNREC website: http://apps.dnrec.state.de.us/recwater/MoreInfo.aspx accessed on 5/4/2015).

Along Delaware's Atlantic coast, stormwater discharges are the primary sources of pollutants in recreational water. Rehoboth Beach currently has 6 stormwater ocean outfalls at Lake Avenue, Grenoble Place, Laurel Avenue, Maryland Avenue, Rehoboth Avenue and Delaware Avenue. DNREC monitors 19 water quality monitoring locations along Delaware's Atlantic Coast, which includes all of the guarded beaches in the State parks, and municipalities. Recreational water samples are analyzed to determine the levels of Enterococci bacteria. Enterococcus is one of several indicator organisms that signal the presence of potentially harmful bacteria and viruses. Currently, Delaware uses the following Enterococcus standards (colonies per 100 milliliters):

Table 11. Delaware Enterococcus Standards

Water Type	Geometric Mean (# colonies)	Instantaneous Value (# colonies)	Resample Value (# colonies)
Fresh	100	185	
Salt	35	104	104

The geometric mean is calculated to determine the long-term safety of a recreational beach for swimming. The instantaneous value allows DNREC to assess current water quality conditions. Results are available 24 hours after the sample is delivered to the laboratory. Standards that are exceeded are used (in addition to other factors) to make a decision as to the safety of the waterbody for swimming, which could result in the issuance of a "no swimming" advisory. (DNREC internet website http://apps.dnrec.state.de.us/RecWater/MoreInfo.aspx accessed on 5/4/2015).

Delaware's Atlantic Coast recreational beaches from Cape Henlopen to Fenwick Island historically have excellent water quality based on long term testing for enterococcus indicator bacteria conducted by the Delaware Shellfish and Recreational Water Programs. Bacterial sampling occurs annually from the first Monday in May through the third Monday in September to coincide with the summer swimming season. Bacterial results are available on the State's website, which is updated as new results are received.

In 2024, two water quality advisories for the Indian River Inlet North Shore were issued for bacterial contamination in July and August. Additionally, beach closings occurred along the entire Atlantic Coast of Delaware in mid-September of 2024 due to instances of medical waste washing ashore that triggered an emergency response from DNREC (Source: https://data.delaware.gov/Energy-and-Environment/Recreational-Water-Advisories/ever-58ni/data_preview retrieved on 1/17/2025).

For the Inland Bays, a permanent caution regarding swimming due to nutrient and bacterial pollutions that come from failing septic systems, fertilizers, and other sources. The slow flushing of the Indian River Bay, Rehoboth Bay and Little Assawoman Bay is a major factor that allows the pollutants to linger.

A review of the Draft State of Delaware 2024 Combined Watershed Assessment Report (305(b)) and Determination for the 303(d) List of Waters Needing TMDLs places the Indian River Assessment Unit (DE140-E01) on the 303(d) List of impaired waters for copper. However, the water quality monitoring station within the Indian River Inlet (Coast Guard Station – 306321) has met water quality thresholds and criteria for dissolved oxygen, nitrogen, total phosphorous, dissolved organic nitrogen, total suspended solids, zinc, marine copper, arsenic, lead, and enterococcus. The only parameter that did not meet the water quality criteria at this location was dissolved inorganic phosphorous.

Shellfish harvesting designations are based on water quality monitoring by DNREC and other factors. Within the affected area, there are two areas shellfish harvest prohibitions: 1) The Indian River Inlet from the eastern end of the jetties to Burton Island, and 2) The Atlantic Ocean from the northern most point at Cape Henlopen to the Delaware/Maryland State line and due east 3 nautical miles in the State of Delaware's jurisdictional waters (a "prohibited/unclassified growing area").

DNREC regularly monitors for harmful algal blooms. In 2007, a red tide was experienced along the Atlantic coast of Delaware. The red tide was caused by a dinoflagellate organism, *Karenia brevis*, which is normally found along the Gulf Coast of Florida. It was believed that this organism was brought to near shore waters by an eddy from the Gulf Stream. K. brevis produces a brevetoxin, which may become aerosolized when the organism is broke up in the surface. Its effects can cause respiratory irritation to the general public (DNREC internet website https://dnrec.delaware.gov/watershed-stewardship/assessment/recreational-water-monitoring/red-tide/ accessed on 1/17/2025).

4.1.11 Air Quality

The Environmental Protection Agency (EPA) adopts National Ambient Air Quality Standards (NAAQS) for the common air pollutants, and the states have the primary responsibility to attain and maintain those standards. Through the State Implementation Plan (SIP), the Delaware Department of Natural Resources and Environmental Control – Division of Air Quality manages and monitors air quality in the state. The goal of the SIP is to meet and enforce the primary and secondary national ambient air quality standards for pollutants. Criteria pollutants have primary ambient air quality standards designed to protect public health, including an adequate margin of safety to protect sensitive populations such as children and asthmatics. The criteria pollutants being monitored in Delaware are: ozone (O3), carbon monoxide (CO), nitrogen dioxide (NO2), sulfur dioxide (SO2), particulate matter (PM – PM2.5/PM10) and lead (DNREC, 2014). Delaware reports criteria pollutant concentrations from the statewide monitoring network on an hourly basis to the EPA AirNow website. AirNow uses Delaware's data to calculate an Air Quality Index (AQI) for each pollutant. The pollutant with the highest AQI determines the AQI category for the day. In 2019, only New Castle County had days in the Unhealthy for Sensitive Groups category, due to high ozone (DNREC, 2019).

Ground-level ozone is created when nitrogen oxides (NOx) and volatile organic compounds (VOC's) react in the presence of sunlight. NOx is primarily emitted by motor vehicles, power plants, and other sources of combustion. VOC's are emitted from sources such as motor vehicles, chemical plants, factories, consumer and commercial products, and even natural sources such as trees. Ozone and the pollutants that form ozone (precursor pollutants) can also be transported into an area from sources hundreds of miles upwind (DNREC, 2014).

The Clean Air Act requires that all areas of the country be evaluated and then classified as attainment or non-attainment areas for each of the National Ambient Air Quality Standards. Areas can also be found to be "unclassifiable" under certain circumstances. The 1990 amendments to the act required that areas be further classified based on the severity of non-attainment. The classifications range from "Marginal" to "Extreme" and are based on "design values". The design value is the value that actually determines whether an area meets the standard. In 2015, the U.S. Environmental Protection Agency (EPA) promulgated a revised National Ambient Air Quality Standard (NAAQS) for ground level ozone at a concentration of 0.071 ppm averaged over eight hours. The new standard supersedes the previous 8-hour ozone standard of 0.075 ppm. New Castle County exceeded the new 0.071 ppm and has been downgraded to "serious" non-attainment. However, Sussex County was not included and remains as "marginal" non-attainment for the 2008 NAAQS (https://www.epa.gov/green-book/ozone-designation-and-classification-information accessed on 1/17/2024) .

4.1.12 Noise

Noise is of environmental concern because it can cause annoyance and adverse health effects to humans and animal life. Noise can impact such activities as conversing, reading, recreation, listening to music, working, and sleeping. Wildlife behaviors can be disrupted by noises also, which can disrupt feeding and nesting activities. Because of the developed nature of the municipalities and resorts along the Delaware Atlantic Coast, noises are common and can come in the form of restaurant and entertainment facilities, automobiles, boats, and recreational visitors. The affected areas have little to no development and are not within any areas with noise restrictions.

4.2 Biological Environment

4.2.1 Terrestrial

The entire terrestrial portion of the affected area contains a high-energy coastal barrier sandy beach within Delaware Seashore State Park. This area includes a narrow beach and a fragmented dune area that has been subject to breaches and overwash. In this segment, back barrier flats are minimal on the east side of State Route 1 because of severe erosion. Here the North Beach dune and beach abut State Route 1. West of the highway, extensive overwash strand thickets and saltmarshes are present that transition into open tidal waters of Bottom Hills Drain and Stockley Gut. Except for the highway and Charles W. Cullen Memorial bridge, no other development occurs along the Atlantic coastline along the 1 mile stretch of the North Beach.

4.2.1.1 Dune and Upper Beach Flora and Fauna

The North Beach berm and dune system has been severely eroded extending from the north jetty approximately 2,000 feet with remnants of the original dunes. The dune system is more robust further north with greater vegetative cover. Typical of mid-Atlantic beaches, the predominant vegetation growing on the primary dune areas consist of American beachgrass (*Ammophila breviligulata*), sea rocket (*Cakile dentata*) and beach clotbur (*Xanthium echinatum*) and seaside goldenrod (*Solidago sempervirens*). The secondary dunes offer more vegetative diversity including: beach heather (*Hudsonia tomentosa*), saltmeadow hay (*Spartina patens*), broom sedge (*Andropogon virginicus*), beach plum (*Prunus matitima*), seabeach evening primrose (*Oenothera humifusa*), sand spur (*Cencrhus tribuloides*), seaside spurge (*Ephorbia polygonifolia*), joint-weed (*Polygonella articulate*), slender-leaved goldenrod (*Solidage tenuifolia*), and prickly pear (*Opuntia humifusa*). Some areas where depressions have formed between dunes have developed freshwater wetlands with bog-like characteristics. None of these wetlands occur within the North Beach affected area. The primary and secondary dunes typically transition into scrub-thicket habitat composed primarily of shrubs and small trees including: wax myrtle (*Myrica cerifera*), bayberry (*M. pensylvanica*), dwarf sumac (*Rhus copallina*), black cherry (*Prunus serotina*), American holly (*Ilex opaca*), groundsel bush (*Baccharis halimifolia*), beach plum, and the non-native Japanese black pine (*Pinus thunbergiana*).

Because most of the dune present within the affected area is a primary dune, fauna inhabiting the dune is scarce, but may include several species of passerine birds, and typical mammalian species such as the eastern cottontail (*Sylvilagus floridanus*). Some of the plants found on the dune may also be found on the upper beach, which transitions into a mostly barren area above the high tide line with little biological activity. Several species of gulls (*Larus* spp.) may be present within the upper and lower beach and may be observed feeding on carrion, plant matter or invertebrates within the beach wrack. One of the most active organisms in the upper beach zone is the ghost crab (*Ocypode quadrata*), which is a scavenger, predator, and deposit sorter that lives in semi-permanent burrows in the upper beach. The lower beach including the intertidal zone is frequently inhabited by shorebirds including sanderling (*Calidris alba*), semipalmated sandpiper (*C. pusilla*), and western sandpiper (*C. mauri*), which utilize these areas to feed on invertebrate infauna.

4.2.2 Aquatic Environment

4.2.2.1 Benthic Environments

Projects that involve dredging and fill placement have direct and indirect effects on the benthic environment principally on the macrofauna inhabiting this environment. Benthic macroinvertebrates refer to those organisms living along the bottom of aquatic environments. They can be classified as those organisms dwelling in the substrate (infauna) or on the substrate (epifauna). Benthic invertebrates are an important link in the aquatic food chain and provide a food source for a variety of bottom feeding fish species and shorebirds in the intertidal zone. Various factors such as hydrography, sediment type, depth, temperature, irregular patterns of recruitment and biotic interactions (predation and competition) may influence species dominance in benthic communities. Benthic assemblages in Delaware coastal waters exhibit seasonal and spatial variability. Generally, coarse sandy sediments are inhabited by filter feeders and areas of soft silt or mud are more utilized by deposit feeders. Benthic communities along the Delaware Atlantic Coast are variable from those dominated by mollusks, polychaete worms or amphipods.

4.2.2.1.1 Benthos of Intertidal Zone and Nearshore Zone

Benthic invertebrates inhabiting the upper marine intertidal zone along the Delaware Atlantic beaches are scarce in a zone characterized by little biological activity. The beach wrack line provides a moist microhabitat inhabited by crustaceans such as the amphipods: *Orchestia spp.* and *Talorchestia spp*., which are also known as beach fleas. Biological activity becomes more intense within the intertidal zone, which is characterized as a high-energy environment due to pounding wave action and shifting sands. Fauna inhabiting the intertidal zone of a high-energy beach have developed special morphological adaptations to allow these organisms to rapidly burrow, relocate, and feed to enable their survival in this extreme environment. Typical benthic organisms that are likely to be found within the intertidal zone of beaches along the Delaware Atlantic Coast include the mole crab (*Emerita talpoida*), the coquina clam (*Donax variabillis*), a haustorid amphipod (*Haustorius canadensis*) and a spionid worm (*Scolelepis squamata*). Within the nearshore zone, diversity increases due to the transition into deeper water. The nearshore may include some of the intertidal species and some of the offshore species.

4.2.2.1.2 Benthos of Offshore Zones

Offshore benthic habitats along the Delaware Atlantic Coast are highly variable depending on depth and substrate type, which influence the benthic community composition. Here, benthic communities generally exhibit greater diversity than those within the intertidal and nearshore areas, which can be attributed to more stable physical environments.

Scott (2001) conducted sampling for benthic infauna of the IRI Ebb Shoal area where five grab samples were collected in June of 2000. The benthic community is indicative of a benthic community in a sandy high energy site. A total of 34 taxa were recorded from these five samples. Bivalves were the most abundant of the taxa and also made up the most biomass in the samples. Principal bivalve taxa in order of their abundance (greatest to lowest) were the coquina clam (*Donax variabilis*), surf clam (*Spisula solidissima*), dwarf tellin (*Tellina agilis*), and the razor clam (*Ensis directus*). Other abundant taxa at this location include oligochaete worms, a shrimp-like crustacean called a “tanaiad” (Tanaissus psammophilus), nemertinean worms (Nemertinea), the polychaete worms (*Paraonis fulgens*, *Hemipodus roseus*, and *Travisia* sp.) and the amphipod (*Protohaustorius wigleyi*). In addition, benthic megafuana were retrieved from fish trawls on the bottom in the ebb shoal by Wirth (2001), and the most abundant taxa included starfishes (Asteroidea), horseshoe crabs (*Limulus polyphemus*), portly spider crab (*Libinia emarginata*), blue crab (*Callinectes sapidus*), knobbed whelk (*Buscyon carica*), channeled whelk (*Busycotypus canaliculatus*), Atlantic rock crab (*Cancer irroratus*), lady crab *(Ovalipes ocellatus*), right-handed hermit crabs (Paguridae), and purple-spined urchin (*Arbacia punctulate*). There was one occurrence of the American lobster (*Homarus americanus*) in one of the winter trawls, which likely originated from the nearby jetty rocks.

USACE (1975) describes the benthic community in Indian River Bay as primarily a soft-bottom community composed of infaunal species such as the dwarf tellin clam, dwarf surfclam (*Mulinia lateralis*), bloodworm (*Glycera dibranchiate*) and the trumpet worm (*Pectinarice gouldi*). Other benthic species occurring large numbers in Rehoboth Bay and Indian River Bay include the hard clam (*Mercenaria mercenaria*), the snails: *Anachis translirata* and *A. avara*, a polychaete worm (*Clumenella torquata*), and the amphipods: *Corophium* sp., *Ampelisca abdita* and *A. vadorum*.

4.2.2.2 Fisheries

The proximity of several embayments allows the coastal waters of Delaware to have a productive fishery. Many species utilize the estuaries of Delaware Bay, Rehoboth Bay and Indian River Bay for forage and nursery grounds. The finfish found along the Delaware Atlantic coast are principally seasonal migrants. Winter is a time of low abundance and diversity as most species leave the area for warmer waters offshore and southward. During the spring, increasing numbers of fish are attracted to the Delaware Atlantic coast because of its proximity to several estuaries, which are utilized by these fish for spawning and nurseries (USACE, 1996).

Surveys conducted in the 1960s in the project area identified 38 species in Indian River Bay. Five of those species accounted for 92% of the catch. These species were striped killifish (*Fundulus majalis*), Atlantic silverside (*Menidia menidia*), mummichog (*Fundulus heteroclitus*), winter flounder (*Pleuronectes americanus*), and bay anchovy (*Anchoa mitchilli*). Although Indian River Bay does not support a commercial fishery, it indirectly contributes by serving as a spawning and nursery area for several economically valuable species. Species known to spawn in the bay include winter flounder, bay anchovy, Atlantic menhaden (*Brevoortia tyrannus*), Atlantic silverside, and hogchoker (*Trinectes maculatus*). Species known to use the upper estuary as a nursery area, include spot (*Leiostomus xanthurus*), weakfish (*Cynoscion regalis*), Atlantic menhaden, and bluefish (*Pomatomus saltatrix*). Recreational fishing in Indian River Bay is popular and sport fishes include winter and summer flounder (*Paralichthys dentatus*), snapper (*Lutjanus campechanus*), blue fish, striped bass (*Morone saxatilis*), and blowfish (*Sphoerides maculatus*). Diadromous species such as alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), striped bass and American eel (*Anguilla rostrata*) use the inlet to reach freshwater tributaries for spawning or growth to maturity (NMFS, 2013).

More recently, a fish survey was performed by Wirth (2001) within the Indian River Inlet Ebb Shoal area (Table 12). Fish collections were accomplished seasonally using commercial and experimental trawls and gill nets. Thirty-four species were captured in the different gear types over the four seasons. The most abundant species overall included the clearnose skate (*Raja eglanteria*), little skate (*Raja erinacea*), windowpane (*Scophthalmus aquosus*), weakfish, summer flounder, bullnose ray (*Myliobatis freminvillei*), spotted hake (*Urophycis regia*), scup (*Stenotomus chrysops*), smallmouth flounder (*Etropus microstomus*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic croaker (*Micropogonias undulatus*), spot, and southern stingray (*Dasyatis americana*).

Table 12. Indian River Inlet Ebb Shoal Area Seasonal Fish Occurrence (Wirth, 2001)

Common Name	Scientific Name	Winter	Spring	Summer	Fall
Shortnose sturgeon	*Acipenser brevirostrum*		R		
Alewife	*Alosa pseudoharengus*				R
Bay anchovy	*Anchoa mitchilli*				O
Silver perch	*Bairdiella chrysoura*				R
Atlantic menhaden	*Brevoortia tyrannus*			R	R
Dusky shark	*Carcharhinus obscurus*		R	O	
Sandbar shark	*Carcharhinus plumbeus*		R		
Black sea bass	*Centropristis striata*		O	O	
Squids*	Cephalopoda	R	R		R
Atlantic herring	*Clupea harengus harengus*	R			
Weakfish	*Cynoscion regalis*		R	A	A
Southern stingray	*Dasyatis americana*		O	A	
Roughtail stingray	*Dasyatis centroura*		R		
Smallmouth flounder	*Etropus microstomus*		A		
Spot	*Leiostomus xanthurus*		R	A	O
Northern kingfish	*Menticirrhus saxatilis*		O		R
Atlantic croaker	*Micropogonias undulatus*		R	A	A
Smooth dogfish	*Mustelus canis*		A	O	O
Bullnose ray	*Myliobatis freminvillei*		A	A	
Summer flounder	*Paralichthys dentatus*	A	O	A	A
Butterfish	*Peprilus triacanthus*		A		O
Winter flounder	*Pleuronectes americanus*	O			
Bluefish	*Pomatomus saltatrix*			R	O

Common Name	Scientific Name	Winter	Spring	Summer	Fall
Northern searobin	*Prionotus carolinus*		R		
Striped searobin	*Prionotus evolans*		O		R
Clearnose skate	*Raja eglanteria*	A	A	A	A
Little skate	*Raja erinacea*	A	A		A
Winter skate	*Raja ocellata*				R
Windowpane	*Scophthalmus aquosus*	A	A	A	A
Northern puffer	*Sphoeroides maculatus*		R	O	R
Spiny dogfish	*Squalus acanthias*	R			
Scup	*Stenotomus chrysops*		A		
Dusky pipefish	*Syngnathus floridae*		R		
Northern pipefish	*Syngnathus fuscus*		R		R
Hogchoker	*Trinectes maculatus*		O	O	O
Spotted hake	*Urophycis regia*		A	R	O
# Taxa		8	26	17	22

*A pelagic invertebrate captured

R=rarely encountered; O=Occurrence, A=Abundant

A small commercial and recreational whelk fishery exists along the Delaware Atlantic Coast. Two species are principal targets: the channeled whelk (*Buscyon canaliculatum*) and the knobbed whelk (*B. carica*). These species (often referred to as “conchs”) are harvested either by pots or dredges.

4.2.2.3 Essential Fish Habitat (EFH)

Under provisions of the reauthorized Magnuson-Stevens Fishery Conservation and Management Act of 1996 (MSA), the entire project area including the borrow areas, nearshore and intertidal beach areas were designated as Essential Fish Habitat (EFH) for species with Fishery Management Plans (FMPs), and their important prey species. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity under the MSA. The MSA requires Federal agencies to perform an EFH assessment when activities may affect EFH. The EFH mapper was queried for EFH species and their life stages at a representative point to all project features at Latitude 38.608 and Longitude -75.055. This query generated a list identifying 24 species and their respective life stages presented in Table 13.

Table 13. Summary of EFH Designations in Waters Associated with Indian River Inlet and North Beach and their Habitat Requirements Per Associated Life Stage

Managed Species	Eggs	Larvae	Juveniles	Adults
Albacore Tuna (*Thunnus alalunga)*			**Habitat:** Offshore. Highly migratory. Epipelagic. Summer brings in juveniles to the productive waters of the northeastern Atlantic. **Prey:** wide variety of fishes and invertebrates	
Bluefin Tuna (*Thunnus thynnus*)			**Habitat:** Offshore. Coastal and pelagic habitats of the mid-Atlantic Bight and the Gulf of Maine and Cape Lookout, from shore (excluding Delaware Bay) to the continental shelf break; temperatures from 4 to 25 C, water depts range from 40-100m, but typically <20m . **Prey:** zooplanktivorous fish and crustaceans	
Skipjack Tuna (*Katsuwonus pelamis*)				**Habitat:** Offshore/nearshore. epipelagic, occurring in waters ranging in temp. from 14.7 to 30 C. Remain at the surface during the day and may descend to depths of 260m at night. **Prey:** Opportunistic feeders on a variety of fish (eg. herrings), crustaceans, cephalopods, mollusks, and sometimes other skipjack tunas.
Yellowfin Tuna *(Thunnus albacares)*			**Habitat:** Offshore pelagic habitats from Cape Cod to mid-east coast of Florida and the Blake Plateau; **Prey:** Opportunistic including cephalopods, fish and crustaceans	
Red hake *(Urophycis chuss)* (Steimle et al. 1998)	**Habitat:** Surface waters, May – Nov.	**Habitat:** Surface waters, May –Dec. Abundant in mid-and outer continental shelf of Mid-Atl. Bight. **Prey:** copepods and other microcrustaceans under floating eelgrass or algae.	**Habitat:** Pelagic at 25-30 mm and bottom habitat at 35-40 mm. Young inhabit depressions on open seabed. Older juveniles inhabit shelter provided by shells and shell fragments. **Prey:** small benthic and pelagic crustaceans (decapod shrimp, crabs, mysids, euphasiids, and amphipods) and polychaetes).	**Habitat:** Offshore. Demersal. Inhabit bottom habitats in depressions with a substrate of sand and mud in depths of 10 – 130 meters in temperatures below 12^{o}C. **Prey:** small benthic and pelagic crustaceans (decapod shrimp, crabs, mysids, euphasiids, and amphipods) and polychaetes).
Windowpane flounder *(Scopthalmus aquosus)* (Chang, 1998)	**Habitat:** Offshore/nearshore Surface waters <70 m, Feb-July; Sept-Nov.	**Habitat:** Offshore/nearshore Initially in pelagic waters, then bottom <70m,. May-July and Oct-Nov. **Prey:** copepods and other zooplankton	**Habitat:** Offshore/nearshore Demersal. Bottom (fine sands) 5-125m in depth, in nearshore bays and estuaries less than 75 m **Prey**: small crustaceans (mysids and decapod shrimp) polychaetes and various fish larvae	**Habitat:** Offshore/nearshore Demersal. Bottom (fine sands), peak spawning in May , in nearshore bays and estuaries less than 75 m **Prey**: small crustaceans (mysids and decapod shrimp) polychaetes and various fish larvae
Atlantic sea herring *(Clupea harengus)* (Reid et al., 1998)			**Habitat:** Pelagic waters and bottom, < 10 C and 15-130 m depths **Prey:** zooplankton (copepods, decapod larvae, cirriped larvae,	.

Managed Species	Eggs	Larvae	Juveniles	Adults
			cladocerans, and pelecypod larvae)	
Bluefish *(Pomatomus saltatrix)*			**Habitat:** Offshore/nearshore Pelagic waters of cont. shelf and in Mid-Atlantic estuaries from May-Oct. **Prey:** squids, smaller fish	**Habitat:** Offshore/nearshore Pelagic waters; found in Mid-Atlantic estuaries April – Oct. **Prey:** squids, smaller fish
Long finned squid *(Loligo pealei)*	**Habitat:** Offshore/nearshore EFH for pre-recruits is pelagic waters over the Cont. Shelf			
Atlantic butterfish *(Peprilus tricanthus)*			**Habitat:** Offshore/nearshore Pelagic waters in 10 – 360 m	**Habitat:** Offshore/nearshore Pelagic waters **Prey:** jellyfish, crustaceans, worms, and small fishes
Summer flounder *(Paralichthys dentatus)*		**Habitat:** Offshore/nearshore Pelagic waters, nearshore at depths of 10 – 70 m from Nov. – May.	**Habitat:** Offshore/nearshore Demersal waters (mud and sandy substrates) in lower estuaries. **Prey:** mysid shrimp	**Habitat:** Offshore/nearshore Demersal waters (mud and sandy substrates). Shallow coastal areas in warm months, offshore in cold months. **Prey:** fish, shrimp, squid, worms
Scup *(Stenotomus chrysops)*			**Habitat:** Offshore/nearshore Demersal waters	**Habitat:** Offshore/nearshore Demersal waters offshore from Nov – April. **Prey:** small benthic inverts.
Black sea bass *(Centropristus striata)*			**Habitat:** Offshore/nearshore Demersal waters over rough bottom, shellfish and eelgrass beds, man-made structures in sandy-shelly areas	**Habitat:** Offshore/nearshore Demersal waters over structured habitats (natural and man-made), and sand and shell areas. **Prey:** benthic & near bottom inverts., small fish, squid
Spiny dogfish *(Squalus acanthias)*				**Habitat:** Offshore/nearshore Pelagic or demersal in coastal waters in depths from 1-500m. **Prey:** ctenophores, salps, scallops, squid, euphausiids, *Cancer* spp. crabs, herring, bay anchovies, hakes, sand lances, mackerels, butterfish, spot, croaker and weakfish.
Sand tiger shark *(Odontaspis taurus)*		**Habitat** Offshore/nearshore Shallow coastal waters, bottom or demersal. Lower DE Bay and adjacent coastal areas from 19 to 25 C, salinities range from 23 to 30 ppt at depths of 2.8-7.0m in sand and mud areas; migrate from area in the fall.	**Habitat:** Offshore/nearshore Shallow coastal waters, bottom or demersal. Lower DE Bay and adjacent coastal areas from 19 to 25 C, salinities range from 23 to 30 ppt at depths of 2.8-7.0m in sand and mud areas; migrate from area in the fall.	**Habitat:** Offshore/nearshore Shallow coastal waters, bottom or demersal **Prey:** small fishes (including mackerels, menhaden, flounders, skates, sea trout, and porgies), crabs, squids.
Atlantic angel shark *(Squatina dumerili)*		**Habitat:** Offshore/nearshore Shallow coastal waters	**Habitat:** Offshore/nearshore Shallow coastal waters	**Habitat:** Offshore/nearshore Shallow coastal waters, bottom (sand or mud near reefs)
Atl. Sharpnose shark *(Rhizopriondon terraenovae)*				**Habitat:** Shallow coastal waters
Common Thresher Shark (*Alopias vulpinus*)		**Habitat:** Shallow coastal waters	**Habitat:** Shallow coastal waters	**Habitat:** Shallow coastal waters
Dusky shark *(Charcharinus obscurus)*		**Habitat:** Shallow coastal waters		

Managed Species	Eggs	Larvae	Juveniles	Adults
Sandbar shark *(Charcharinus plumbeus)* (Pratt 1999)		**Habitat:** Offshore/nearshore Shallow coastal waters; submerged flats (1-4 m). HAPC is identified within lower DE Bay and possibly HCS Area.	**Habitat:** Offshore/nearshore Shallow coastal waters; submerged flats (1-4 m). HAPC is identified within lower DE Bay and possibly HCS Area..	**Habitat:** Offshore/nearshore. Shallow coastal waters; submerged flats (1-4 m). HAPC is identified within lower DE Bay and possibly HCS Area.
Smoothhound Shark Complex (*Mustelus mustelus*) (Atlantic Stock)		**Habitat:** Shallow coastal waters	**Habitat:** Shallow coastal waters	**Habitat:** Shallow coastal waters
Clearnose skate (*Raja eglanteria*)			**Habitat:** Offshore/nearshore continental shelf waters but will occasionally come into shallow waters and bays during the summer months. Eggs are laid off the coast in spring. **Prey:** Fish, benthic organisms and other macro-invertebrates. .	**Habitat:** Offshore/nearshore continental shelf waters but will occasionally come into shallow waters and bays during the summer months. Eggs are laid off the coast in spring. **Prey:** Fish, benthic organisms and other macro-invertebrates.
Little skate (*Raja erinacea*)			Offshore/nearshore Same as clearnose skate, but they leave shallow water during summer.	Offshore/nearshore
Winter skate (*Raja ocellata*)			Offshore/nearshore Occur in deep continental shelf waters.	Offshore/nearshore

In Wirth (2001), a total of fourteen species with Federal management plans and identified EFH within the borrow areas were collected throughout the year. Some of these species exhibited seasonal and habitat-based preferences. The ebb shoal area exhibited abundant summer flounder, windowpane, and clearnose skate throughout most of the year. The spring exhibited abundance of butterfish. Occurrences of black sea bass and dusky shark were in the spring and summer months.

4.2.2.4 Marine Mammals and Sea Birds

A number of marine mammals are frequent transients along the nearshore and offshore waters of the Delaware Coast. Cetaceans (whales and dolphins) include the right whale (*Eubalaena glacialis*), the humpback whale (*Megaptera novaengliae*), minke whale *(Balaenoptera acutorostrata), fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis)* and rarely, the blue whale *(Balaenoptera musculus*) are likely to venture into the nearshore waters along the Delaware Atlantic Coast. Bottlenose dolphins (T*ursiops truncates*) are common summertime migrants and can be found in nearshore water along Delaware's beaches. Coastal waters may also be visited by the harbor porpoise (*Phocoena phocoena*). Pinnipeds (seals) are more frequently encountered during the fall, winter and spring months along the coast, and may commonly be observed hauling out on to the beaches. These include the gray seal *(Halichoerus grypus),* harbor Seal *(Phoca vitulina),hooded seal (Cystophora cristata) and* harp Seal *(Pagophilus groenlandicus).*

Many species of birds utilize open water marine habitat for feeding and resting. Birds utilizing this area may include gulls, terns (*Sterna spp.*), razorbills (*Alca torda*), scoters (*Melanitta* spp.), long-tailed duck (*Clangula hyemalis*) and loons (*Gavia* spp.). Open ocean species such as gannet (*Sula bassanus*), blacklegged kittiwake (*Rissa triadctyla*), storm petrel

(*Oceanites oceanicus*), and shearwaters (*Puffinus/Calonectris* spp.) may also be present offshore. Black and surf scoters and long-tailed ducks are common sea ducks in the nearshore during the fall and winter months.

4.2.3 Threatened and Endangered Species

The affected areas that include beaches, nearshore marine habitats, inlet and estuarine habitats could potentially be inhabited with special status species including Federal and State Threatened or endangered species (Table 14).

Table 14. Special Status Species along Delaware's Atlantic Coast Beaches and Coastal Waters

Scientific Name	Common Name	Taxon	Habitat	Federal Status	State Status	State Rank	SGCN Tier
Balaenoptera musculus	Blue whale	Mammal	Marine/pelagic	E	E	*	*
Balaenoptera physalus	Fin whale	Mammal	Marine/pelagic	E	E	*	*
Megaptera novaeangliae	Humpback whale	Mammal	Marine/pelagic	E	E	*	*
Eubalaena glacialis	N. Atlantic Right whale	Mammal	Marine/pelagic	E	E	*	*
Balaenoptera borealis	Sei whale	Mammal	Marine/pelagic	E	E	*	*
Physeter macrocephalus	Sperm whale	Mammal	Marine/pelagic	E	E	*	*
Charadrius melodus	Piping Plover	Bird	Sandy beaches/overwash areas	T	E	S1	1
Calidris canutus	Red Knot	Bird	Sandy beaches/overwash areas	T	E	S1M	1
Laterallus jamaicensis jamaicensis	Eastern Black Rail	Bird	Saltmarshes	T	E		
Sterna dougallii dougallii	Roseate Tern	Bird	Sandy beaches/overwash areas	E			
Sterna antillarum	Least Tern	Bird	Sandy beaches/overwash areas	--	E	S1B	1
Sterna hirundo	Common Tern	Bird	Sandy beaches/overwash areas	--	E	S1B	1
Sterna forsteri	Forster's Tern	Bird	Sandy beaches/overwash areas	--	E	S1B	1
Rynchops niger	Black Skimmer	Bird	Sandy beaches/overwash areas	--	E	S1B	1

Scientific Name	Common Name	Taxon	Habitat	Federal Status	State Status	State Rank	SGCN Tier
Haematopus palliates	American Oystercatcher	Bird	Sandy beaches/overwash areas	--	E	S1B	1
Dermochelys coriacea	Leatherback sea turtle	Reptile	Marine/pelagic /demersal	E	E	*	*
Lepidochelys kempii	Kemp's Ridley sea turtle	Reptile	Marine/pelagic /demersal	E	E	*	*
Chelonia mydas	Green sea turtle	Reptile	Marine/pelagic /demersal	T	E	*	*
Caretta caretta	Loggerhead	Reptile	Marine/pelagic /demersal	T	E	*	*
Eretmochelys imbricata	Hawksbill sea turtle	Reptile	Marine/pelagic /demersal	E		*	*
Acipenser oxyrinchus oxyrinchus	Atlantic sturgeon	Fish	Marine/pelagic/demersal	E	E	*	*
Danaus plexippus	Monarch Butterfly	Insect	Widespread – dune habitats in affected area with goldenrod flowers	PT			
Photuris bethaniensis	Bethany Beach Firefly	Insect	Interdunal swales (freshwater wetlands)	C	E	S1	1
Amaranthus pumilus	Seabeach Amaranth	Plant	Sandy beaches/overwash areas	T	--	S1	--
Dicanthelium dichotonum	Witch Grass	Plant	Interdunal swales (freshwater wetlands)	--	--	S2	--
Fimbristylis caroliniana	Carolina Fimbry	Plant	Interdunal swales (freshwater wetlands)	--	--	S1	--
Sabatia campnulata	Slender Marsh Pink	Plant	Interdunal swales (freshwater wetlands)	--	--	S1	--
Spiranthes vernalis	Twisted Ladies' Tresses	Plant	Interdunal swales (freshwater wetlands)	--	--	S2	--
E=Endangered Species T=Threatened Species; PT=Proposed Threatened C= Candidate Species *Information on State Rank and SGCN Tier not readily available							

Nesting pairs of the piping plover, which are Federally threatened, and State endangered, normally occur within Cape Henlopen State Park and less frequently at the Delaware Seashore State Park. No known piping plover nesting activity has been recently observed within the Indian River Inlet North Shore affected area. The USFWS Information for Planning and Consultation (IPaC) website was accessed on 2/27/2024. The search inputs were for the Phase 2 affected areas including the ebb shoal and the shoreline along the North

Beach. The IPaC resulted in the identification of three Federally listed threatened and endangered species and/or proposed species within the affected area. This included: the roseate tern (endangered), the monarch butterfly (proposed threatened) and the seabeach amaranth (threatened). The roseate tern is a rare visitor in Delaware, but no breeding is known to occur south of Long Island, New York (with an exception in New Jersey).

The American oystercatcher, a state endangered bird, nests on sandy beaches, and has nested on the north side of Indian River Inlet. Other potential colonial beach nesting birds that are listed as endangered in Delaware are: black skimmer (*Rynchops niger*), least tern (*Sterna antillarum*), and the breeding populations of common tern (*Sterna hirundo*) and Forster's tern (*Sterna forsteri*). The rufa red knot (*Calidris canutus rufa*), is a Federally threatened and state endangered shorebird that can be found in lower densities during the spring and fall migrations along Atlantic Coast beaches and could occur within the project area. In wintering and migration habitats, red knots may forage on bivalves, gastropods, and crustaceans along the shoreline (USFWS 2013; Harrington 2001).

The monarch butterfly (*Danaus plexippus*) was proposed to be listed as Federally threatened on December 12, 2024. In North America, monarchs are grouped into two long-distance migratory populations: eastern and western populations. The eastern migratory population is the largest and overwinters in the mountains of central Mexico. In the mid-1990s, an estimated 380 million eastern monarchs made the long-distance journey to overwintering grounds in Mexico, completing one of the longest insect migrations in the world.

Today, the eastern migratory population is estimated to have declined by approximately 80%. The probability of extinction for eastern monarch ranges from 56 to 74%, according to the Service's most recent species status assessment. Threats to monarchs include loss and degradation of breeding, migratory and overwintering habitat; exposure to insecticides; and the effects of climate change (USFWS press release December 2024). Monarchs depend on milkweeds (*Asclepias* spp.) and other nectar-producing flowering plants for their breeding and feeding. The seaside goldenrod is one plant that occurs within the dunes of the affected area that provides an important nectar source for migratory monarch butterflies.

The sea beach amaranth or "pigweed" (*Amaranthus pumilus*) is a Federally threatened plant that primarily occurs on overwash flats at accreting ends of barrier islands and lower foredunes and upper strands on non-eroding beaches. This plant has been found within Cape Henlopen State Park, Delaware Seashore State Park, and Fenwick Island State Park. Most recently, seabeach amaranth was observed growing 1.4 miles north of the Indian River Inlet. This species has not been found in any of the municipal Federal project beaches, but did occur within the affected project area of the North Beach area of Indian River Inlet in 2002. However, the severe erosion of the North Beach area in recent years makes this area unlikely to be inhabited by sea beach amaranth.

The State endangered and Federally threatened and endangered sea turtles including the loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), hawksbill (*Eretmochelys imbricata*) and green sea turtle (*Chelonia mydas*) may occur in waters along the Delaware Atlantic Coast from the spring through the fall. Whales protected under the Endangered Species Act or Marine Mammal Protection Act include the humpback whale (*Megaptera novaengliae*), North Atlantic right whale (*Eubalaena glacialis*) minke whale (*Balaenoptera acutorostrata*), fin whale (Balaenoptera physalus), sei whale (*Balaenoptera borealis*) and rarely, the blue whale (*Balaenoptera musculus)* may also be present within Delaware Coastal Waters*.*

The New York Bight distinct population segment (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was recently listed as endangered by the NMFS. Atlantic sturgeon are anadromous, spending a majority of their adult life phase in marine waters, migrating up rivers to spawn in freshwater then migrating to brackish water in juvenile growth phases. The Atlantic sturgeon are known to spawn within the Delaware River and migrate along the coast of Delaware. Studies have indicated that depth distribution appears seasonal, with sturgeon inhabiting the deepest waters during the winter and the shallowest during summer and early fall. Tagging studies by Fox and Breece (2010) confirm that nearshore waters along the Delaware Atlantic coast are frequently inhabited by Atlantic sturgeon with over 85% of those detected within State waters. Recent telemetry studies suggest that there is a strong seasonal pattern of arrival and departure of Atlantic sturgeon along the Delaware coast. Marine phase Atlantic sturgeon return to Delaware's coastal waters in mid-late March through mid-late May and depart between early September and mid-December. During the summer months, it is reported that these sturgeon may either return to the Delaware River to spawn (mature adults), occupy river/upper estuary foraging areas (mostly sub-adults), or remain in the lower estuary mouth/Cape Henlopen region. Few Atlantic sturgeon have been detected in Delaware's Atlantic coastal waters during the winter months (mid-December through mid-March) (coordination between Dr. Dewayne Fox, Delaware State University and DNREC WSCRP referenced in a WSCRP to USACE letter dated 12/9/2014).

The sand tiger shark and sandbar shark are listed as NOAA species of concern and are frequently in Delaware's coastal waters between April and November. The project areas are also listed as EFH for the sand tiger shark and sandbar shark.

The Bethany Beach firefly (*Photuris bethaniensis*) is a state endangered insect species and Federal candidate species that inhabits freshwater interdunal wetland swale habitats along portions of the Delaware Atlantic coast. Other state species that occur in these types of habitats are the following plants: witchgrass, Carolina fimbry, slender marsh pink, and twisted ladies' tresses. A review of the National Wetlands Inventory mapper indicates that none of these habitats occur within or in close proximity to the affected area along the North Shore Beach.

4.3 Cultural and Social Environment

4.3.1 Cultural Resources

The identification of cultural resources on USACE Civil Works projects is an important part of the overall Federal responsibility. Numerous laws pertaining to identification, evaluation, and protection of cultural resources, Indigenous rights, curation and collections management, and the protection of resources from looting and vandalism establish the importance of cultural resources to our Nation's heritage. With the passage of these laws, the historical intent of Congress has been to ensure that the Federal government protects cultural resources. Guidance is derived from several cultural resources laws and regulations, including but not limited to Sections 106 and 110 of the National Historic Preservation Act (NHPA) of 1966 (as amended); Archaeological Resources Protection Act (ARPA) of 1979; Native American Graves Protection and Repatriation Act (NAGPRA); and 36 CFR Part 79, Curation of Federally Owned and Administered Archeological Collections. Implementing regulations for Section 106 of the NHPA and NAGPRA are 36 CFR Part 800 and 43 CFR Part 10, respectively. All cultural resources laws and regulations should be addressed under the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended. USACE summarizes the guidance provided in these laws in ER 1130-2-540.

4.3.1.1 Area of Potential Effect

For the purposes of this EA, there are four proposed Areas of Potential Effect (APEs). The first three apply to the beach nourishment to be completed in 2025, and a fourth that would apply to future needs.

APE1 – The beach nourishment extent along the North Beach as shown in red on Figure 3.

APE2 – The Indian River Inlet flood shoal located just inside the inlet bay area as shown in pink on Figure 3.

APE3 - called *IRI -Ebb A,* includes the use of the sediments in the Flood Shoal located just inside the bay inlet, and the Indian River Inlet Ebb Shoal (Ebb-A) Borrow Area, which was previously surveyed (Cox 2001). It is shown as a rectangle on Figure 14.

APE4 - called *IRI -Ebb B*, includes the larger shoal area surrounding the Indian River Inlet Borrow Area, and has not yet been surveyed for cultural resources. It is shown as an irregular shape surrounding Ebb A on Figure 14.

4.3.1.2 Cultural Context

The Cultural Context presented contains excerpts from the cultural context section of the report titled*, Phase I Submerged and Shoreline Cultural Resources Investigation, Delaware Atlantic Coast, Rehoboth Beach and Dewey Beach, Sussex County, Delaware* (Cox 2001).

4.3.1.3 Prehistoric Context

Evidence recovered from prehistoric sites within the Appalachian Ridge and Valley physiographic province of Pennsylvania indicates successive periods of human occupation dating from at least 12,000 years ago. Three distinct periods are generally used: Paleoindian, Archaic and Woodland. These periods are best understood by viewing them as constructs created by archaeologist's base on changes in technology and environment.

Paleoindian Period

The retreating of the continental glaciers at the end of the Pleistocene period, roughly 17,000 to 15,000 BP, and subsequent climate changes set forth shifts in flora and fauna communities that set the stage for prehistoric occupation in the Project Area (Watts 1979;

Custer 1996). At the maximum advance of the Wisconsin glacial intrusion, the Project Area was a cold, wet, and grassy tundra (Watts 1979). The plant communities on this periglacial landscape consisted of ericaceous shrubs, dwarf birch, and a variety of grasses (Watts 1979:458). This plant profile is based on floral remains recovered from the Longswamp bog in Longswamp, Pennsylvania (Watts 1979), and it is believed that the landscape in the Project Area would have been very similar to Longswamp. The faunal community hosted in this environment included megafauna such as mammoth and mastodon. As the climate warmed after 13,000 BP, floral and faunal communities changed. The environment in eastern Pennsylvania has been described as a "hodgepodge, or mosaic, of different vegetation communities" in this period (Custer 1996:97).

According to Custer, grassland settings were mixed within a larger coniferous spruce-pine forest, and deciduous tree species were present along streams and rivers and near wetlands. Fauna was equally varied. Finds made in York County include small mammals such as moles, shrews, squirrels, lemmings, voles, and mice; carnivores such as wolf, skunk, otter, weasel, and fox; and caribou and white-tailed deer (Custer 1996:98). Kinsey (cited in Custer 1996:98) claimed there had been grazing mammoth and browsing mastodon in Lancaster County, but they were most likely gone by the time of Paleoindian occupation (Custer 1996:99).

Carr and Adovasio (2002:3) date the earliest human occupation in Pennsylvania to 16,000 BP. They sub-divide the Paleoindian period into pre-Clovis (16,000-11,500 BP), Early Paleoindian (11,500-10,000 BP), and Late Paleoindian (10,000-9,000 BP). In general, subsistence strategies are not well understood in any of these periods. The most important data found in Pennsylvania relating to Paleoindian subsistence comes from the Shawnee Minisink site, located in the Delaware River drainage (Gingerich 2007). As noted by Custer (1996:111), "the presence of varied floral and fish remains in a Paleoindian context underscores the view that Paleoindian groups were hunters, gatherers, and fishers who opportunistically used whatever resources were available." This view is supported by Gingerich's (2007:144) analysis of recent excavations at Shawnee Minisink from which he concluded that Paleoindians at that site followed an "opportunistic collection" strategy.

Two lithic procurement patterns have been suggested for Paleoindian settlement in Pennsylvania: the cyclical pattern and the serial pattern (Carr and Adovasio 2002:40). In the cyclical pattern, which Carr and Adovasio hypothesize was followed within the Piedmont of southeastern Pennsylvania (near the Project Area), quarries of high-quality lithic material were the main focus of scheduled movements and the probable location of base camps. According to Gardner (cited in Carr and Adovasio 2002:40), this settlement system depended on a foraging radius of 40 to 150 km. The jasper quarries within the Hardyston district (Anthony and Roberts 1988), Flint Run in Virginia (Carr 1992), and the Iron Hill quarries in northern Delaware (Stanzeski and Hoffman 2006) served as focal points for Paleoindian movements in the Middle Atlantic region. In the serial pattern, several smaller quarry sites would have been exploited. As described by Carr and Adovasio (2002:40), this pattern may have been more dictated by the procurement of food resources than the collection of lithic materials.

Two of the best-known Paleoindian sites in Pennsylvania are the Meadowcroft and Shoop sites. While Meadowcroft is in the far southwestern corner of the state, Shoop is located not very far west of the Project Area in an upland setting within the Susquehanna River drainage. First discovered in the 1930s, this site, and the material recovered from it, have been examined and reexamined by virtually all the major prehistorians working in Pennsylvania (Carr and Adovasio 2002:30). The site produced thousands of lithic artifacts, including at least 100 fluted points, most of them purportedly made of Onondaga chert, an identification that has been questioned by both archeologists and geologists. The closest source of this chert is western New York State, which is a considerable distance from Shoop. Endscrapers (n=600) were the most common tool type found and there were also hundreds of retouched and utilized flakes, sidescrapers, late-stage bifaces, and wedges.

The Archaic Period

Around 10,500 BP, the rapid melting of the glacial remnants far to the north allowed for a broad air mass shift (Custer 1996:33). While in the Late Pleistocene, the glacial air mass interacted with the warm water from the Gulf Stream current to produce cold and very wet weather, dryer and warmer air replaced this (Custer 1996:33). According to Dent (1991:129-131), by 9,200 BP the pine and birch forest of 10,500 BP had shifted to pine-oak, and a boreal forest covered the landscape as a complex mosaic of ecosystems. Although it was warmer and dryer than in previous times, it was roughly 6°F colder with double the precipitation of today (Dent 1991:11). The beginning of the Early Archaic period (~10,000 BP - ~9,000 BP) is marked by a gradual transition from Paleoindian adaptations to adaptations to the changing environment. While the Early Archaic is one of the most poorly understood periods in Middle Atlantic prehistory, archeological evidence for variations in settlement patterns, food procurement strategies, lithic technologies, and population levels have been recognized.

Stylistically, the Early Archaic is marked by the introduction of notched and stemmed bifaces such as the Palmer and Kirk types. Gardner (1974:24) argues that the change to notched biface technology probably signifies changes in hunting technology and the introduction of the Atlatl. Adding to the argument, Stewart has suggested that the extinction of most of the Pleistocene megafauna and the retreat of the glacial ice sheets opened new ecosystems to smaller game animals such as white-tailed deer and elk and this, in turn, led to the specialization of Early Archaic hunting adaptations. There is little evidence for plant food processing, or the tools to do so, probably because specialized gathering and processing had not yet become a large part of the food economy (Gardner 1974). The recovery of ground cherry, blackberry, cherry, grape, and pokeberry, as well as pioneer species such as amaranth, chenopodium, and smartweed in Early Archaic contexts from the Shawnee-Minisink site, however, demonstrates that plant foods were utilized to some degree (Dent and Kauffman 1985).

Middle Atlantic settlement models of the Early Archaic are not very different from those of the preceding Paleoindian period. Sites were located on similar landforms, but there is evidence for a greater diversity of site types, intensity of utilization, and increased total population (Gardner 1989). In the Piedmont of the Middle Atlantic, both Paleoindian and Early Archaic components have been identified in poorly drained floodplains and upland bogs (Custer 1996:120). High quality lithic sources continued to be exploited, but new materials such as rhyolite, quartzite, and argillite were also used (Raber et al. 1998:126). Greater group mobility, fostered by moderated climate, hunting and gathering adaptations, and possible population increases, is evident in distinguishable site types in a variety of landscape settings (Raber et al. 1998:126).

The Middle Archaic is generally correlated with the Atlantic climatic phase which roughly dates to about 9,000 – 5,500 BP. The warming and drying of the environment continued in the Project Area with oak and hemlock deciduous forest replacing the pine forests (Carbone 1976:189). Terminal Pleistocene megafauna were gone before this point, and elk and caribou herds were thinning (Kingsley et al. 1990:11). The decreased presence of grazing animals is likely linked to the decrease in open grasslands and similar habitats that supported these species (Custer 1996:100). New ecotones opened and became the focus of shifting animal communities (Custer 1996:100). In the Project Area, the faunal assemblage became essentially modern in this period (Custer 1996:100; Dent 1991:134; Kingsley et al. 1990:11). Middle Archaic roughly coincides with the appearance of distinctive bifurcate base bifaces such as the LeCroy and St. Albans types (Ritchie 1961). These types are considered characteristic of the Middle Archaic, although a diversity of biface morphologies continues well into the Woodland period (Custer 1996; Lewis 1999). Few of the diverse biface styles of the later Middle Archaic are considered diagnostic, and it is likely that many Middle Archaic sites are lumped into the Late Archaic time period based on nondescript stemmed and notched points (Custer 1996). The Middle Archaic, however, represents a recognizable divergence form the preceding Early Archaic/Paleoindian periods (Custer 1996:133).

Changes in land-use practices are evident at the beginning of the period. Instead of focusing on high quality lithic quarries, base camps are found on floodplains and associated special procurement sites are found in a variety of upland settings (Carr 1998). Using the analysis of rhyolite artifact distribution, Stewart and Cavallo (1991) have suggested that the foraging radius of Middle Archaic base camps was reduced in size compared to earlier times and increasingly focused on local resources. Evidence for the exploitation of botanical remains in the form of hazelnuts was found in the Middle Archaic Stratum IX at the Sandts Eddy site on the Delaware River in Northampton County (Bergman et al. 1994:164). Excavations at this and other Middle Archaic sites in the Middle Atlantic during the past two decades have greatly expanded our knowledge of settlement patterns, although very few Middle Archaic components have been identified in the vicinity of the Schuylkill River Valley.
Around 6,000 to 5,000 BP the climate reached a warm and dry maximum called the Sub-Boreal period (Kingsley et al. 1990:11; Stewart 1991:104). This shift is thought to have had drastic effects on the plant, animal, and human populations of the region (Custer 1996:180). Evidence includes an increase in pine, a reduction in oak, negative effects on dry intolerant species, windblown sediment deposition, and an increase of grasses, shrubs, and herbs further south in the Middle Atlantic region (Stewart 1991:106). Importantly, Custer (1996:182) hypothesizes that the increase in oak/hickory forest over oak/hemlock within the Project Area provided a higher carrying capacity than in the Atlantic period (Custer 1996:182), and he considers the adaptations that emerged at the inception of the Late Archaic period (5,000-4,000 BP) to be the most significant changes in all of southeast Pennsylvania prehistory. A degree of sedentism, as well as alternations in settlement and subsistence patterns, appear to coincide with the beginning of the Late Archaic.

Stylistically, the lithic artifact assemblage does not differ dramatically from the Late-Middle Archaic. A broad range of notched and stemmed bifaces represents most Late Archaic assemblages in the Middle Atlantic region. Although Late Archaic biface morphologies overlap, numerous stylistic types have been identified as representative of various time periods and locations (e.g., Bare Island, Lackawaxen, Schuylkill, Lamoka, and Brewerton). Regional traditions have also been based on biface types and related traits. Traditions such as Maritime Archaic, Shield Archaic, and Laurentian Archaic represent identifiable groups of adaptations covering broad geographic regions across the northeastern United States (Kinsey 1977). The Piedmont Archaic represents the Late Archaic tradition in the Schuylkill River Valley and much of the surrounding area. Narrow stemmed points, hand sized "chopper" bifaces, numerous varieties of ground stone tools, and non-cryptocrystalline lithics, such as argillite, rhyolite, and quartzite, are hallmarks of the Piedmont Archaic (Kinsey 1977:376).

An intensification of resource utilization characterizes the Late and Terminal Archaic (Dent 1995:188, 200-208). Technologically, this intensification is expressed as the expanded use of ground stone tools, the appearance of steatite (soapstone) vessels and, in riverine and coastal areas, fishing implements in the form of notched cobble net sinkers. The presence of storage features has also been noted, although not on the scale seen in the later Woodland period. Such storage features have been viewed as strategies for minimizing risk, reflections of collector forager settlement systems (Binford 1980), and perhaps evidence of incipient social inequality, although reflections of status differentiation are virtually absent in the Archaic in Pennsylvania (Raber et al. 1998:129).

A series of distinctive technologies characterize a period referred to as the Transitional (Terminal) Archaic (4,000–3,000 BP). Although the diagnostic portions of the Transitional Archaic tool kit are distinctive, the underlying settlement pattern is not very different than that of the Late Archaic. As defined by Witthoft (1953), the characteristics of Transitional Archaic cultures are the use of steatite (soapstone) bowls and a distinctive class of biface known as "Broad spears" for their high width/length ratios and high width/thickness ratios. Kinsey (1972) argues for a functional interpretation of the broad spear as more suited to fishing than hunting. Broad spears and Orient Fishtail bifaces are not the only diagnostic Transitional Archaic types, but they are the most visible part of a stemmed and notched point assemblage.
Another addition to the Transitional Archaic toolkit is the use of non-organic cooking containers. The adoption of this technology was gradual, but it likely had an impact on native inhabitants' production and cooking efficiency (Custer 1996). The earliest ceramics in the Delaware Valley, identified as Marcy Creek Plain (Stewart 1998a:58), appear to be an adaptation in clay to the preexisting soapstone bowl technology (Custer 1996:220). Formed in the same rectangular to ovoid shape with lugged handles and flat bottoms as soapstone bowls, the Marcy Creek Plain pots are constructed of molded clay tempered with crushed chunks of steatite. A series of flat and rounded bottom ceramic types followed Marcy Creek and continued into the Orient Phase and beginnings of Early Woodland.

The Woodland Period

Most scholars consider the Woodland period to have begun at about 3,000 BP, or slightly earlier. As presented by Custer (1982, 1984, 1996), Woodland I is defined by four characteristics: 1) the development of estuarine and riverine adaptations that were stable and intensive enough to produce repeatedly reused base camp sites along the major drainages' floodplains; 2) population growth at single site locations, or more intensive site utilization, which produced sites much larger than Middle Archaic macro-band camps; 3) the appearance of foraging and collecting adaptations in areas less productive than riverine settings; and 4) the participation in exchange networks that moved raw materials as well as finished artifacts across large areas.

Although the Woodland period is generally distinguished among Early, Middle and Late subperiods in the Northeast, the Early and Middle Woodland in the Mid-Atlantic region have been treated together because of fewer temporal and cultural distinctions in the region. In general, the Early Woodland subperiod is signaled by the appearance of new cultural traits, namely the widespread use of ceramics, and intensification of older traits, including mortuary ceremonialism, which were carried over from the Late and Terminal Archaic (Ritchie 1980). Although the beginning the Early Woodland subperiod is generally marked at 3000 BP, there is inevitable overlap of several hundred years with the Terminal Archaic. During the Late Woodland (AD 1000-1600), which lasted up until European contact, the adoption of horticulture had an integral part in population growth and subsistence and settlement systems and saw the establishment of large villages in mostly riverine settings.

The Contact Period

The Indigenous people the Europeans met along the Delaware River during the late 16th and early 17th centuries were descended from the Unami and Munsee speaking people who had populated the Delaware and the Hudson River valleys for centuries.

The name collectively attributed to the descendants of such Unami and Munsee speaking people is Delaware, yet the word Delaware is not of indigenous origin. The term "Delaware" derives from the title given to Sir Thomas West, the third Lord de la Warr, who was appointed as the English governor of Virginia in 1610. European colonists applied the term "Delaware" to reference the Unami and Munsee speaking groups of the River Valley, who called themselves "the People" or Lenape, or the Lenni Lenape, the "True People".
In 1680, although most colonists of the time regarded Indians as subhuman, William Penn was careful to treat the Indians as sovereign nations, entitled to fair play, dignity, and respect. For many decades, Penn was able to enforce the statute forbidding settlers on land prior to negotiated purchase from the Indians. However, after Penn's death, a major wave of German and Scotch-Irish immigration created a population boom in the seaboard areas, increasing the need for additional land.

By this time, the region was controlled by William Penn's heirs, John Penn and Thomas Penn, along with the Penn's family land agent, James Logan, who was already illegally selling Indian land in the Lehigh Valley to the new European immigrants. In order to legitimize the theft of Indian Lands, Penn's heirs hatched a plan to convince the Indians to release the Lehigh Valley to them once and for all.

At dawn on September 19, 1737, three colonists and three Indians set off on the most peculiar "walk" in Pennsylvania's history. Their purpose was to measure out a land purchase that Thomas Penn claimed his father had made from the Indians fifty years earlier. Thomas Penn had in his possession a document that he and James Logan claimed was a deed signed by Unami and Munsee chiefs in 1686, selling the land north of Tohickon Creek to William Penn. According to this document, the amount of land would be measured by a day and a half's walk from an agreed upon starting point (Encyclopedia Britannica, n.d.).

The Indians presented with this document were suspicious and voiced their objections. Nevertheless, Penn and Logan went ahead with their plans and hired three of the fastest colonists to carry out the measurement of the land. The colonists selected for this task trained for months and were assisted by white settlers who cleared paths through the forest, arranged for supplies, and placed boats to ferry them across waterways. Two of the three colonist “walkers” dropped out from exhaustion on the second day, leaving only one to complete the task. In the final tally, he covered approximately 65 miles in eighteen hours.
The Penn family compounded the swindle with creative surveying and boundary setting, using the walk to claim possession of the Lehigh Valley, an area containing the modern cities of Allentown, Bethlehem, and Easton. The fraudulent land claim is now called “the Walking Purchase”. The Walking Purchase and the Revolutionary war marked the beginning of the removal of the Unami and Munsee speakers from the Delaware Valley westward and northward into the frontier.

4.3.1.4 Historic Context

Historic activity in Delaware Bay dates to 1609 when Henry Hudson first located the bay while surveying the northeast coast of North America for the Dutch East India Company. Hudson noted the entrance of Delaware Bay, but did not explore up into the upper bay and river. His observations of Delaware Bay were recorded and eventually stimulated a significant interest in additional exploration, trade, and colonization of the region. In 1614 the State General of Holland granted the merchants of Amsterdam and Hoorn exclusive privileges to trade between 40 and 45 degrees of latitude in an area identified as the territory “new Netherland.” The first Dutch explorers came to Delaware Bay from New Amsterdam (New York City) in October 1614. By decree from the Hague, October 11, 1614, the owners of five Dutch ships were authorized to establish the United Company of Merchants with the exclusive rights to explore the area between New France in the north and Virginia to the south. Captain Cornelius Hendrickson then became one of the first to explore the bay aboard the <u>Onrust.</u> Captain Hendrickson produced the first chart of Delaware Bay and River in 1615. Included in a brief report submitted to the Dutch merchants, Hendrickson claimed to have found “certain lands, a bay and three rivers situated between 38 degrees and 40 degrees (Westlager 1961). Soon the Dutch merchants set up trading stations and settlements at various locations along the banks of Delaware Bay and River. In 1623, the Dutch East India Company constructed the first of several fortifications on the east shore of the bay.

Swedish explorers were also active in the Delaware Bay region. In 1629, the Swedish West Indian Company purchased from the indigenous people, a two-mile wide tract of land on the west side of the bay which extended 32 miles from Cape Henlopen north to a location above present Bowers Beach, Delaware. Although the purchase was ratified in 1630, it was not until Peter Minuit arrived with an expedition in 1638 that the Swedish attempted to settle the region (Hazard 1850). The Swedes eventually settled further upriver at a more suitable landing site on the west shore near present day Wilmington.

For the next three decades the Swedes and Dutch co-existed in the Delaware Valley until 16645 when the British, under the command of Sir Robert Carr, assumed command of the region. When King Charles II made a grant of lands in the Delaware Valley to his brother James, Duke of York, the duke sent a flotilla of warships under Carr's direction to subjugate the Dutch and Swedes and institute British control in the area. After several years of limited interest on the part of the Duke of York, King Charles II deeded a substantial portion of the territory to William Penn in 1682. Penn subsequently established an English colony, Pennsylvania, on the Delaware River with Philadelphia as its capital (Weslager 1961).
In 1684, Penn also acquired the "three lower counties", present day Delaware, from the Duke of Yor4k to add to his Pennsylvania holdings. With Penn's involvement the colonization process and economic growth in Delaware became ties more closely to Philadelphia and Pennsylvania. Throughout the colonial period, settlement in the lower Delaware Valley consolidated in regions where solid banks came to Delaware's edge; for most of the waterfront was marshland and unhealthy for habitation. The high land was often some distance up a creek navigable only by shallow-draft vessels. Dover, Delaware and Salem, New Jersey, were examples of this. Some towns which appeared during the colonial period developed because they were stopping points along the 60-mile stretch of river on the much-traveled route from New York to Baltimore. Philadelphia, in the middle of this line of travel, was not merely a stop on the line but developed into a trade and travel center (Tyler 1955).

Wheat, rye, barley and tobacco were the principle colonial products of Delaware Valley inhabitants. After being hauled by wagon to mills established along the banks of the Schuylkill River, Brandywine Creek, and other swift-water tributaries of the Delaware, the flour was places aboard shallops and taken upriver to Philadelphia for consumption or further shipment. For the duration of the colonial period, the Delaware Valley region remained predominantly agricultural. The agricultural landscape that developed in response emphasized the importance of river and coastal transportation routes over roads. The system of agricultural production and transportation routes facilitated the rise of Philadelphia as one of the most important ports in the British Empire at the onset of the Revolutionary War.

The Revolutionary War disrupted the economic development of the region, as the British blockaded shipping and conducted raids along the shores of Delaware Bay (DeCunso and Catts 1990). Following the conclusion of the war, Delaware Valley merchants, now freed from the restrictions of the Navigation Acts, again prospered. Philadelphia became the most active port in North America, with its ships reaching new markets in the East Indies and across the world. By 1800 there were 40 Philadelphia vessels in the China Trade, about as many more trading in South America, and a considerable number still trading in Europe. The war of 1812 caused a second disruption to the social and economic life of Delaware Valley residents, but shortly thereafter, local inhabitants began to focus again on industry and agriculture.
The water link between Delaware Bay and Chesapeake Bay was forged when the Chesapeake and Delaware Canal was opened in 1829. Traffic across the peninsula between the two bays was so heavy that it supported the canal, a previously constructed turnpike, and

within a few years, the New Castle and Frenchtown Railroad, one of the first railroads in America (Tyler 1955). Manufacturing came to the upper Delaware Valley in the first half of the 19th century. By 1850 Wilmington had become a leading manufacturer of railroad cars, heavy machinery, gunpowder, textiles, flour, and iron ships (Weslager and Heite 1988).

There was little or no industrial development along the shores of lower Delaware Bay. The slow-moving tidal tributaries lacked the force to power a large industrial plant. The title rivers themselves were too shallow for most seagoing vessels to navigate. In addition to farming, fishing and oystering became major industries of the lower Delaware Bay during the 19th century. For nearly a century after the Civil War, oystering was the primary industry in many towns along the lower estuary in both New Jersey and Delaware fishing industries processing sturgeon and menhaden caught in Delaware Bay also peaked during the second half of the 19th century (Weslager and Heite 1988).

The introduction of steam technology had a dramatic effect on industries throughout the Delaware Valley. Regional companies became leaders in the production of steam engines for railroad locomotives and steamships. Several local companies also made railroad cars and car wheels, before expanding into the production of iron-hulled steamships. Delaware River shipyards gained an international reputation for producing quality iron-hulled steam vessels. Coal fuel was needed to power steam engines. Extensive anthracite coal reserves along the Lehigh and Schuylkill rivers were developed. Call became a leading export for Delaware River ports during the 19th and 20th centuries. Related industries of iron and steel, initially founded in the Delaware Valley since the colonial period, expanded after the 19th century.
The large chemical industry of the Delaware estuary began with the development of several small tanneries in and around New Castle County, Delaware, during the 19th century. Native black oak trees provided tan bark and local livestock production provided skins for the tanners. By the middle of the 19th century, Wilmington became a major producer of leather merchandise. Experiments were conducted in the tanning process that would revolutionize the leather making process. Prosperity gained from gunpowder production during the civil war, allowed the local du Pont company to expand over the next 30 years into one of the world's largest producer of chemicals and munitions. Petroleum related industries and refineries were also established shortly after the discovery of oil in central and northwestern Pennsylvania in the 19th century. Philadelphia refineries are among the oldest in the world still producing refined oil products (Weslager and Heite 1988).

Although Delaware Bay became a major thoroughfare for shipping activities calling on the ports of Philadelphia and Wilmington throughout the colonial period, there has been very limited historic activity along the Delaware's Atlantic Coast. Much of the limited activity along the coast was related to assisting stranded or wrecked vessels that were attempting to reach Delaware Bay. Maritime activity within the project areas was almost exclusively transient. Vessel crossing the project area were involved with coastal trading networks linking the Delaware River ports and New York with other ports from Maine to Texas. Additionally, maritime traffic across the project areas extended to ports in the Caribbean central and South America.

Historically, Indian River inlet was not used for commercial navigation. Indian River inlet, connecting Indian River Bay and the Atlantic Ocean, was a narrow and unstable passage through the barrier beach until the USACE permanently improved the waterway in the late 1930s. As early as 1882, the US Government allocated money to secure A4 foot channel through the inlet, Bay and Indian River to Millsboro, 6 miles from the mouth. The results of this dredging rapidly disappeared. The inlet closed entirely periodically between 1910 and 1937, causing concern among the local interests who feared the loss of salinity would adversely affect the seafood industry in the bays and estuaries, and they feared flooding might ruin agricultural crops planted near the estuaries. The construction of two parallel stone jetties, 500 feet apart and extending seaward approximately 1500 feet was proposed in 1937. The USACE concluded that the proposed improvements would afford an adequate small boat channel from the Atlantic Ocean to Indian River Bay, and in addition would produce a flow of salt water into the bay sufficient to improve seafood production in those waters. As no commercial traffic used the inlet, the USACE found that the benefits to small craft, and particularly to pleasure craft, in affording access between the ocean and the sheltered waters of these bays is "sufficient in the opinion of the Board of Engineers for Rivers and Harbors, to warrant federal participation in the project" (Department of Army 1937). Indian River inlet is the only entrance to the ocean from the inland waters between Delaware Bay, 15 miles to the north, and Ocean City inlet, Maryland, 25 miles to the south.

4.3.1.5 Previous Investigations

The US Army Corps of Engineers, Philadelphia District (USACE) and others have coastline to identify and evaluate cultural resources that could be impacted by proposed beach nourishment, inlet jetty repair and other construction activities. The following is a summary of this previous work.

Gilbert/Commonwealth prepared a study titled, *Cultural Resources Overview in the Philadelphia COE District, Indian River and Bay, Delaware* in 1978. This study provided a preliminary cultural resources overview of the Indian River and Bay area and identified areas sensitive to cultural site locations.

Thunderbird Archaeological Associates prepared a Phase 1A cultural resource investigation in 1983 titled, *A Preliminary Cultural Resources Reconnaissance of the Delaware Atlantic Coast*. This research identified known archaeological and historic resources along the Atlantic coast beach line and adjacent areas extending from Cape Henlopen south to the state line.

Complementing the above referenced study, an offshore Phase 1A cultural resource study titled, *Underwater Cultural Resources Background Study and Field Survey of the Delaware Inner Continental Shelf*, prepared by Karell Archaeological Services, dated 1984 investigated historic map and archival documentation to identify known shipwreck sites. A predictive model for unidentified shipwreck locations was also prepared.

In a 2001 cultural resources investigation report titled, *Phase I Submerged and Shoreline Cultural Resources Investigation, Delaware Atlantic Coast, Rehoboth Beach and Dewey Beach, Sussex County, Delaware* prepared for the USACE by Dolan Research, Inc., February, 2001, researchers surveyed newly proposed offshore borrow areas “B”, “G” and “Indian River Inlet” Inspection of the remote sensing records confirmed the presence of one target in Borrow Area “G” that is suggestive of potentially significant submerged cultural resources. No potentially significant targets were identified in in the “Indian River Inlet Sand Borrow Area (*IRI Ebb-A*)”.

4.3.2 Socioeconomics

4.3.2.1 Population and Land Use

The affected area includes either state park land or open ocean and estuarine waters, which do not occupy any incorporated communities within the 950 square miles of Sussex County. Sussex County is the southernmost and largest of the three counties in Delaware, encompassing 48% of the state's land. Although it is the largest of the counties it is also the least populated, with only 197,145 year-round residents, totaling 21.9% of the state's permanent population, according to the 2010 Census.

Both the State of Delaware and Sussex County are projected to increase in population over the next twenty years. Sussex County is growing faster than the state of Delaware as a whole.

The affected areas are lightly developed. The North Beach is primarily composed of tidal shoreline and areas classified as beaches and riverbanks (Delaware Seashore State Park) with an adjacent highway and bridge (SR 1) (Table 15). Within the interior inlet where the flood shoal occurs, there are permanent residences (single family homes) on the south side of the interior Indian River Inlet as part of the South Shore Marina. Seasonal campsites and cabins are on both the north and south sides of Indian River Inlet and a U.S. Coast Guard Station along the north side. Burton Island Shoal alternative is bounded on the north by Delaware Seashore State Park to the north, which is composed of predominantly mixed forest, tidal marsh and shoreline. The Middle Island Shoal alternative area contains a tidal marsh island and is bounded by private development including permanent mobile homes (Indian Landing), recreational beaches, and recreational facilities.

The Coastal Barrier Resources Act (CBRA, and previously the Coastal Barrier Improvement Act (CBIA)) is intended to protect fish and wildlife resources and habitat, prevent loss of human life, and preclude the expenditure of Federal funds that may induce development on coastal barrier islands and adjacent nearshore areas. The CBRA established the Coastal Barrier Resources System (CBRS), which consists of mapping of those undeveloped coastal barriers and other areas located on the coasts of the U.S. that were made ineligible for most Federal expenditures and financial assistance. The CBIA of 1990 expanded the CBRS and created a new category of lands known as otherwise protected areas (OPAs). The only Federal funding prohibition within OPAs is Federal flood insurance. Other restrictions to Federal funding that apply to CBRS units do not apply to OPA’s. The North Shore Indian River Inlet is within an OPA, which is part of DE-07P in Delaware Seashore State Park. OPAs only prohibit Federal funding for flood insurance. Project activities are not restricted in OPAs.

Table 15. Land Use and Landcover (LULC) Within Affected Areas and Alternatives

PROJECT FEATURE OR ALTERNATIVE	LAND USE/LAND COVER WITHIN OR ADJACENT TO FEATURE/ALTERNATIVE	LULC Code	Prevailing Use
North Indian River Inlet Beach	Bays and Coves (Tidal) (W)	540	DSSP
North Indian River Inlet Beach	Tidal Shoreline (W)	770	DSSP
North Indian River Inlet Beach	Beaches and Riverbanks (W)	720	DSSP
North Indian River Inlet Beach	Highways/Roads (A)	141	DELDOT
North Indian River Inlet Beach	Inland Natural Sandy Areas (W)	730	DSSP
Indian River Inlet Ebb Shoal	Bays and Coves (Tidal) (W) (A)	540	NAV/SERV
Indian River Inlet Ebb Shoal	Tidal Shoreline (A)	770	DSSP
Indian River Inlet Flood Shoal	Bays and Coves (Tidal) (W)(A)	540	NAV/SERV
Indian River Inlet Flood Shoal	Recreational/campground – north and south sides (A)	190	DSSP
Indian River Inlet Flood Shoal	Institutional/Governmental – USCG Station north side (A)	180	DSSP
Indian River Inlet Flood Shoal	Multi-Family Dwellings – State Park Cabins – north side (A)	112	DSSP
Indian River Inlet Flood Shoal	Mixed Forest – north side (A)	430	DSSP
Indian River Inlet Flood Shoal	Marinas/Port Facilities/Docks – north and south side (A)	146	DSSP
Indian River Inlet Flood Shoal	Tidal Emergent Wetland – south side (A)	673	DSSP
Indian River Inlet Flood Shoal	Single-Family Dwellings – south side (A)	111	PRIV
Burton Island Shoal	Bays and Coves (Tidal) (W)(A)	540	NAV/SERV
Burton Island Shoal	Mixed Forest (A)	430	DSSP
Burton Island Shoal	Tidal Emergent Wetland (A)	673	DSSP
Burton Island Shoal	Tidal Shoreline (A)	770	DSSP
Middle Island Shoal	Bays and Coves (Tidal) (W)(A)	540	NAV/SERV
Middle Island Shoal	Tidal Emergent Wetland (W)	673	NAV/SERV
Middle Island Shoal	Beaches and Riverbanks (A)	720	PRIV
Middle Island Shoal	Recreational (A)	190	PRIV
Middle Island Shoal	Other Urban/Built-up Land (A)	170	PRIV
Middle Island Shoal	Mobile Home/Parks/Courts	114	PRIV

4.3.2.2 Economic Development

Major industries providing employment in the county as per the census are construction, manufacturing of nondurable goods, and retail trade. Other industries providing employment are health services, educational services, food services; finance, insurance, and real estate; manufacturing of durable goods, wholesale trade; agriculture, forestry, and fisheries; transportation, public administration, communications, and other public utilities. The top sectors in Sussex County were Special Trade Contractors, Eating and Drinking Places, Miscellaneous Retail Trade, and General Building Contractors. The number of employees in these top sectors are not large. Special trades contractors only averaged 5 employees per business in Sussex County, while eating and drinking places averaged 14 employees.

The estimated Bureau of Labor Statistics unemployment rate for Sussex County for 2015 is 4.4%. This is slightly below the state average of 4.9%, and below the national average of 5.3%. Historically, Sussex County generally has a relatively low unemployment rate compared to the national and state averages.

The coastal area differs from the rest of Sussex County, and Delaware, in its reliance on the tourism industry rather than agriculture and manufacturing/processing. In Sussex County, 1/3 of those employed in the county are in retail or services, while another 1/3 are in manufacturing. The coastal study area is devoid of manufacturing, relying almost 100% on the service/retail industry.

Even when economically hard times hit the State's economy (particularly poor agricultural crops or recession in the manufacturing industry), the economy of the Delaware coast should remain buoyant as it serves as a summer resort for the residents of the regional urban and suburban areas.

4.3.3 At Risk Communities

A review of the surrounding land uses of the affected areas do not indicate the presence of at risk and disadvantaged communities vulnerable to disproportionate adverse environmental effects within or immediately adjacent to the affected areas.

4.3.4 Recreation

Recreation services provided by the beach areas are a major draw for tourism along the Delaware Coast, which is a vital part of the State's economy. The affected areas include Delaware Seashore State Park, and the surrounding areas offer numerous recreational opportunities. The ocean side offers residents and visitors boating and beach activities such as swimming, surfing (board and body), skimboarding, surf fishing, sunbathing, and many other beach activities. The North Beach is one of Delaware's premiere surfing beaches with strong advocacy for improving and maintaining the surf break, safety and water quality by groups such as the Delaware Chapter of the Surfriders. The nearshore and offshore offers activities such as boating, wave runners, kayaking, parasailing, and SCUBA diving/snorkeling. Many recreational charter boats, head boats and private boats fish within Indian River Inlet and along the Delaware Atlantic Coast's artificial reefs and structures. These boats generally launch from Indian River Marina, Lewes (Roosevelt Inlet), and Ocean City, MD. The area State Parks offer several surf fishing vehicle access points. Surf fishing and jetty fishing (Indian River Inlet) along the Delaware Atlantic Coast beaches are very popular activities year-round. Generally, recreational fishing along the beaches and Indian River Inlet is most productive in the spring and fall when anglers target fish such as striped bass (rockfish), bluefish, kingfish, summer flounder, weakfish, croaker, spot, red hake and red drum that migrate into inshore waters. Anglers can also target several shark species, but are required to release prohibited species such as sandbar shark and sand tiger shark. The jetties of IRI are a popular spot to catch tautog (blackfish) and other species transiting the inlet. Many of the State Park beaches are often filled with vehicles with surf fishing tag permits that allow them to drive on the beach. State laws require that vehicle occupants must be actively fishing and can only access the beaches from designated access points in the State Parks. Surf fishing and jetty fishing activities significantly slow down following the fall runs as the coastline has fewer numbers of targeted species in the area.

Nearshore and offshore fishing is also a popular activity where wrecks, artificial reefs, and lumps hold fish. Some of the same species targeted by surf fishers can be caught by boat on headboats/party boats, charter boats and private boats originating out of Indian River Inlet, Delaware Bay, and Ocean City, MD. Reef and other structured bottoms usually hold black seabass, tautog, scup and flounder. Highly pelagic species such as dolphinfish (*Coryphaena hippurus*), tunas and billfish (Xiphioidea) are targeted further offshore. The Inland Bays offer activities such as clamming, crabbing, fishing, hunting, sailing, windsurfing, and birdwatching.

Recreational interests are an important constituency along the Delaware Atlantic Coast and are represented by many advocacy organizations that promote their interests. Surfing and fishing are two such interests that are well represented in this area.

4.3.5 Visual and Aesthetic Values

Aesthetics refer to the sensory quality of the resources (sight, sound, smell, taste, and touch) and especially with respect to judgment about their pleasurable qualities (Canter, 1993; Smardon et al. 1986). The aesthetic quality of the study area is influenced by the natural and developed environment. The beachfront of the affected municipal areas is developed with homes, hotels, condominiums, restaurants, retail businesses, and boardwalks. However, these resort towns draw on the high aesthetic values of the seashore environment, which includes clean sandy beaches, dunes, and ocean views. Resident and visitor beachgoers are attracted to the area for the beach scenery and clean, attractive beaches and structures that are present in the affected area. The State Park beaches including Cape Henlopen State Park, Delaware Seashore State Park, and Fenwick Island State Park offer visitors a more natural aesthetic quality with natural beaches, vegetation, wildlife, and surf.

5.0 ENVIRONMENTAL EFFECTS

The environmental effects presented in this section include the preferred alternative, which includes the completion of Phase 2 of the restoration of the North Beach berm and dune system for a distance extending approximately 5,000 feet north from the north jetty of the inlet. The completion of Phase 2 will require approximately 500,000 cubic yards of sand to be dredged from the Indian River Inlet Ebb Shoal (IRI-Ebb A) and placed along the North Beach shoreline. The preferred plan also includes dredging sand from IRI Ebb-A and the IRI Flood Shoal for periodic nourishment, on an as needed basis when the sand bypass plant is inoperable operation and major storm repairs. This section also considers the effects of the no action alternative.

5.1 Physical Environment

5.1.1 Floodplains

No Action: No action will result in the continued severe erosion along the North Beach shoreline, which will leave critical infrastructure such as State Route 1 more vulnerable to flooding, wave attack and overwash.

Preferred Alternative: The dredging of sand within the Indian River Inlet area ebb or flood shoals would occur entirely within open water subtidal environments and will not modify the floodplain or induce flooding. The placement of beachfill sand along the North Beach would occur in a severely eroded area within the VE zone along the Atlantic Coast shoreline. This activity will benefit infrastructure within the adjacent AE zone by providing coastal storm risk management benefits and will not modify the floodplain and/or induce flooding.

5.1.2 Climate

No Action: Without any action, changes in climatic conditions could lead to increased ocean temperatures, ocean acidification, sea level change, changes in currents, and upwelling and weather patterns, and has the potential to cause changes in the nature and character of the coastal ecosystem (USACE, 2017).

Preferred Alternative: The dredging of sand within the Indian River Inlet area ebb or flood shoals and beachfill placement will not entirely negate the effects of changes in climatic conditions and sea level change but would help maintain a more stable shoreline along the North Beach.

5.1.3 Coastal Hydraulics and Hydrodynamics

No Action: With no action, there would be no effect on coastal hydraulics and hydrodynamics. The processes of long-shore transport would still occur with an interruption created by the inlet jetties resulting with a sand deficit on the updrift side of the north jetty, which consequently results in severe erosion along the North Beach shoreline. The processes that contribute to shoaling that created both the Indian River Inlet Ebb Shoal and Flood Shoal would continue.

Preferred Alternative: Dredging within the presently delineated borrow area located directly offshore of the center line of Indian River Inlet would increase depths through the center of the ebb shoal complex. The depth of cut would be approximately 10 ft deeper than average depths of the existing and surrounding bathymetry. The effects of dredging the ebb shoal in the delineated area are considered in view of inlet sand transport, tidal currents, and wave processes.

The direction of net sand transport is from south to north along the shorelines adjacent to Indian River Inlet, and the inlet ebb shoal complex provides a natural pathway for sand to bypass the inlet from the south shoreline to the north shoreline. Sand that bypasses naturally across the ebb shoal reattaches to the north shoreline at a point approximately 5,000 ft north of the inlet. This natural inlet bypassing process interrupts supply of sand to the segment of the north shoreline located immediately north of the inlet. The Indian River Inlet bypass plant is designed to supply sand to this segment of shoreline that is cut off from the natural inlet bypassing process.

Sand removed from the delineated ebb shoal borrow area will be placed on the beach north of the inlet to restore the critically eroded shoreline that has resulted from inactivity of the bypass plant in recent years. Dredging of the borrow area will temporarily reduce the rate of natural sand bypassing across the inlet ebb shoal complex. Because the borrow area is in the active ebb shoal transport zone, it is expected to infill relatively rapidly and be restored to pre-dredge conditions within two to three years. During recovery of the borrow area, the rate of sand transport across the ebb shoal to the north shoreline attachment point will be reduced, but sand placed in the fill area north of the inlet will feed the shoreline north of the fill area to make up for the temporarily reduced rate of natural bypassing. As a result, dredging the ebb shoal is not expected to produce any negative impact on shoreline change of the adjacent beaches.

Dredging the IRI Ebb-A borrow area is not expected to substantially alter tidal current patterns or velocities. Any minor changes in tidal currents caused by the excavation will be temporary and will fully diminish as the borrow area recovers. Additionally, because the inlet ebb jet flows directly across the borrow area, the excavated area will continue to be subjected to strong tidal exchange, circulation, and mixing through the vertical water column that will deter formation of stagnant anoxic and hypoxic conditions in the dredged area.

Deepening of the delineated borrow area will temporarily increase the potential for wave energy to propagate into the inlet. Relative changes in depth in the borrow area compared to ambient depths and typical incident wave conditions will result in increases in wave energy on the order of approximately 5% based on linear wave theory assumptions. This magnitude of change in wave energy is not expected to substantially alter navigation conditions through the inlet or significantly modify wave conditions on the adjacent beaches. As the ebb shoal recovers, any changes in wave energy propagation will attenuate and revert to pre-dredge conditions.

For future periodic nourishment of the North Beach that may be required either in the absence of or in supplement to the operation of the bypass plant, consideration will be made to expand the proposed borrow area to encompass the south lobe of the ebb shoal. The south lobe of the ebb shoal has grown substantially in recent decades. This growth of the south lobe has altered wave and sand transport patterns on the south side of the inlet to the point of reducing the rate of longshore transport into the bypass plant borrow area located on the beach immediately south of the inlet. Dredging the south lobe of the ebb shoal will benefit the system by (a) restoring sand transport rates and patterns that existed previously on the south side of the inlet prior to growth of the south lobe and (b) enhancing capability of the bypass plant to operate at the design rate of production which is approximately 100,000 CY of sand pumped annually from the south beach to the north beach.

5.1.4 Geology

No Action: With No Action, continued sea level change would likely increase flooding and wave attack along the Atlantic Coast shoreline. The geomorphological processes of erosion and siltation and shoreline retreat would occur with potential effects to naturally occurring shorelines. Erosion, subsidence, and flooding events would continue.

Preferred Alternative: The dredging of either IRI Ebb-A or the IRI Flood Shoal complexes would affect the recently deposited Holocene sands and place them on the surface beach sands and nearshore of the North Beach shoreline nearby. Dredge cuts from within either of the borrow areas would not exceed ten feet deeper than existing deeper bathymetry and would remain within the Holocene units and therefore, would not have any effect on the Columbia, Pocomoke or Manokin aquifers.

5.1.5 Topography and Bathymetry

No Action: With No Action, continued erosion with direct wave attack of the North Beach would erode the berm and dune adjacent to SR 1 and would threaten this important roadway through either overwash or undermining.

Preferred Alternative: The restoration of the North Beach berm and dune will result initially in a considerably wider berm that would extend the berm (dry portion of the beach) out approximately 250 feet. As described in Figure 12, the beachfill will adjust to a flatter foreshore slope while the berm diminishes in width over time as the sands become re-distributed into the nearshore. The berm may form escarpments during this phase, which will become smoothed out from normal wave processes. This process is expected to result in a flatter beach profile after a few storm cycles following the initial placement.

The dredging of the ebb and flood shoal areas would result in cuts approximately ten feet deeper than the pre-existing bathymetry. These cuts would be filled in through sloughing from adjacent deposits and in-filling from the dynamic inlet processes that originally formed these shoals. A ten-foot cut could affect approximately 31 acres of marine bottom to obtain 500,000 cubic yards of sand. Dredging would increase the depths of the shoal and may reduce the shoal profile to the same bathymetry surrounding the shoal. The affected portion of the IRI Ebb Shoal A is in depths of 8.8 m to 13.1 m (29 ft. to 43 ft.) and the southern portion (IRI-B) depth ranges from 4.0 m to 8.5 m (13 ft. to 28 ft.). Initially, the post dredge cuts could result in depths of 11.9 m to 16.2m (39 to 53 feet) for IRI Ebb-A, and for IRI Ebb-B, post dredge depths would be 7 m to 11.6 m (23 ft. to 38 ft.). For the flood shoal, future dredging would be limited to a depth of -24 ft. NAVD, which is the permitted depth for previous times this area was used for sand. Based on vibracore data, similar substrate characteristics would remain. The processes that created the ebb and flood shoals are expected to regenerate these features over the long-term.

5.1.6 Soils

No Action: With No Action, continued erosion of the North Beach would occur resulting in increased losses of beach sands through cross shore and longshore currents.

Preferred Alternative: Sediments from the flood and ebb Shoals will be predominantly fine sands with some medium sands. Based on the sand texture data provided in Table 3, the beachfill sands will be slightly finer than the existing beach sands. This difference will not have adverse effects on the existing beach profile, beach fauna, or on recreation.

5.1.7 Indian River Inlet Ebb Shoal Sediments

No Action: With no action, it is expected that sands would continue to accumulate within the ebb shoal area particularly within the southern lobe of the ebb shoal complex.

Preferred Alternative: The removal of approximately 500,000 cubic yards of sand to complete the Phase 2 portion of the project would result in a maximum 10-foot cut in the ebb shoal, which would leave a depression in that location. It is expected that natural in-filling with similar sandy sediments would occur soon after dredging is completed since this area is in a dynamic, high-energy location where fine-grained materials are not likely to accumulate, but sand transport mechanisms are active. In-filling of the dredge cuts are expected to result in a re-establishment of the shoal feature over time. This effect is also expected for future uses of both the ebb shoal and flood shoal complexes as sand sources.

5.1.8 Hazardous, Toxic and Radioactive Waste

No Action: The no action alternative is not expected to increase the likelihood of encountering or generating any HTRW.

Preferred Alternative: An updated review of the DEN State database does not provide any indications of significant HTRW within the beachfill placement area or the sand borrow areas. However, this does not rule out a potential for encountering HTRW from unknown sources.

Dredging sand from within the proposed sand sources along the Delaware Atlantic Coast has a potential for encountering MEC associated with past artillery target practice activities along the Delaware Atlantic Coast. Therefore, it is necessary that safeguards are implemented to avoid any potential for exposure of MEC to the public and workers during and after construction.

Because a potential for encountering MEC has been identified for the existing and proposed borrow areas, MEC screening devices would be placed on the dredge intake or in pipeline section prior to reaching the dredge pump, and at the discharge end of the pipeline on the beach. Specifically, the screening device on the dredge intake would prevent the passage of any material greater than 1.25 inches in diameter and the discharge end screening device would retain all items 0.75 inches in diameter or larger. The beachfill operation would be overseen by an Ordnance and Explosives Safety Specialist(s) (OESS) from the Corps of Engineers Military Munitions Design Center. The OESS will be on-site or in the vicinity (within a 15-minute response time after notification) during the duration of the placement of beachfill. Strict inspection protocols and procedures would be implemented for inspection of screens and detection of oversized materials and our detection of MECs to insure worker and public safety. MEC screening measures have been in place since 2004 on all of the Delaware Atlantic Coast Federal beachfill projects.

The contractor would be responsible for proper storage and disposal of any hazardous material such as oils and fuels used during the dredging and beach nourishment operations. The U.S. EPA and U.S. Coast Guard regulations require the treatment of waste (*e.g.*, sewage, gray water) from dredge plants and tender/service vessels and prohibit the disposal of debris into the marine environment. The dredge contractor will be required to implement a marine pollution control plan to minimize any direct effects to water quality from construction activity. No accidental spills of diesel fuel from the dredge plant or tender vessels are expected.

5.1.9 Sediment and Water Quality

No Action: The no action alternative is not expected to cause any deleterious effects on sand resource areas. The no action alternative is not expected to affect water quality within the affected area and existing water quality conditions would continue to persist.

Preferred Alternative: Sediment quality analyses performed for the three shoal areas (IRI Flood Shoal, Burton Island Shoal and Middle Island Shoal) interior of the inlet and one area offshore of the inlet (IRI Ebb A) did not identify any chemicals of particular concern when compared to appropriate screening criteria (Table 6 thru Table 10). There were no exceedances of Delaware HSCA human health screening levels for inorganics (including heavy metals), polynuclear aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls, and dioxins and furans. Additionally, no ecological screening levels from the NOAA Effects Range-Low were exceeded for any of the constituents analyzed. The chemical composition coupled with the grain size analyses (Table 4 and Table 5) of the proposed IRI Flood Shoal and IRI Ebb-A confirm that these areas contain beachfill quality sand suitable for use on the North Beach shoreline.

The discharges associated with dredging and placement of sand would result in short-term minor adverse effects to water quality in the immediate vicinity of the dredging and beachfill placement. The direct effects on water quality result from the associated dredging and discharge of a sand slurry material mixed with water as it is pumped on the beach and nearshore area, which would temporarily increase turbidity/suspended solids at the point of dredging and receiving waters. A turbidity plume would be noticeable in both locations but would dissipate within hours to days after pumping ceases. Based on sediment grain size analyses, the sediments are greater than 90% sands; therefore, suspended particles should settle-out quickly after discharge.

Turbidity could also be generated offshore if a barge or hopper of a hopper dredge is allowed to overflow. This process is called “economic loading”, which is used to maximize sand loads per haul by allowing coarse grained materials to settle into the hopper and fine-grained sediments and mostly water is allowed to overflow back into the water body (Atlantic Ocean).

The results of the analytical testing of the sediments do not indicate that Delaware water quality criteria would be exceeded during the dredging and placement of beachfill. This was confirmed by the utilization of Equilibrium Partitioning (EqP) calculations, which can predict concentrations of contaminants in sediment porewater and that may be released into the water column at the point of dredging. This evaluation helps to further understand the potential ecological effects of sediment contaminant concentrations and bioavailability to aquatic life. This approach was adapted from procedures described in Greene (2010) for application within the Delaware Estuary. EqP theory is a simple mathematical method of estimating the proportion a chemical sorbed to sediment to the chemical dissolved in water. The partitioning between sorbed and dissolved metals, PAH's and PCBs were modeled using the data from the sediment samples presented in Table 5 through Table 9.

For heavy metals, the ratio of the inorganic metal concentration in the porewater to the applicable criterion was expressed as toxic units (TUs), where ratios greater than 1.0 suggest exposure concentrations in excess of the criterion and, additionally, the chronic toxic units for cadmium, copper, lead, nickel, silver and zinc were summed to produce an interstitial water benchmark unit (IWBU) as described in EPA (2005). Among the samples for the shoal complex areas, there were no individual TUs that exceeded acute or chronic ratio of 1.0 and no chronic IWBUs exceeded 1.0 suggesting that even the most stringent water quality criteria would be met for metals.

Sediment PCBs were only detected in the sample collected from the Indian River Inlet Ebb Shoal from 75 targeted congeners using EPA Method 1668. No PCBs were detected in the Indian River Inlet Flood Shoal, Burton Island Shoal, and Middle Island Shoal (10 PCB homolog groups utilizing EPA Method 680). For both EPA methods, PCBs with an "undetected" result were reported with a value that is 1/2 of the Method Detection Level to provide a conservative concentration estimate since presence is not known below these levels. The estimated concentration data for PCBs were compared with an organic carbon normalized Sediment Quality Benchmark (SQB) (Fuchsman, 2006). If the ratio of the measured organic carbon normalized concentration in the sediment to the SQB is less than 1, then chronic aquatic life toxicity in the sediments is unlikely. All of the estimated PCB values were far below the ratio of 1 for the SQB indicating that there would be no expected PCB toxicity from dredging and placement activities.

No polynuclear aromatic hydrocarbons (PAHs) were detected in the sediments in the IRI-Ebb A area and the IRI-Flood Shoal area. The samples obtained from the Burton Island Shoal and Middle Island Shoal had low level detections for several PAH's. The method used to evaluate toxicity of the majority of the PAHs was to compare carbon normalized concentrations to literature derived EqP based mechanistic sediment quality guidelines called Equilibrium Partitioning Sediment Benchmarks (ESBs) (Burgess et. al. 2013). Sediment concentrations less than or equal to the ESB values may result in adverse effects to benthic organisms. The results are expressed as a ratio of the organic carbon normalized concentration to the ESB with ratios greater than 1 indicating an increased likelihood of risk to ecological receptors. The resulting ratios were far below the value of 1.0. Therefore, based on the results of the toxicological evaluation for PAHs, there appears to be low to no potential for chronic and acute toxicity to aquatic life from the proposed dredging/dewatering activities.

Since the dredged and placed material is beachfill quality sand with little amounts of fines and low-level contaminants present, these effects are also expected to be minor. As such, the proposed project is not expected to violate State of Delaware water quality standards.

5.1.10 Air Quality

No Action: The no action alternative is not expected to affect air quality within the affected area and existing air quality conditions would continue to persist.

Preferred Alternative: Air quality effects resulting from the release of carbon monoxide and particulate emissions will occur at the site during project related activities and may be considered offensive but are generally not considered far-reaching. Exhaust from the construction equipment will have an effect on the immediate air quality around the construction operation but should not impact areas away from the construction area. These emissions will subside upon cessation of operation of heavy equipment.

The 1990 Clean Air Act Amendments include the provision of Federal Conformity, which is a regulation that ensures that Federal Actions conform to a non-attainment area's State Implementation Plan (SIP) thus not adversely impacting the area's progress toward attaining the National Ambient Air Quality Standards (NAAQS). The proposed Federal action is to dredge sand from IRI Ebb-A and /or the IRI Flood Shoal to complete restoration of the North Beach beach and dune, and periodically nourish and/or repair the project on an as needed basis in the future. The U.S. Army Corps of Engineers, Philadelphia District would be responsible for the dredging and construction activities along the beach. Sussex County, Delaware is within the Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE air region within which the Federal Action will take place and is classified as a marginal non-attainment based on the 2008 8-hour ozone standard.

Total direct and indirect emissions are calculated by determining horsepower-hours (hp-hrs), which are generated by cost engineers as part of the Micro Computer Aided Cost Estimating System (MCACES) cost estimate of the project. The cost estimate provides a detailed account of power equipment, the horsepower of the equipment, and the amount of time the equipment is being used. Once the hp-hrs are generated, a load factor is assigned to the equipment, which provides an average of the degree of how hard the equipment is operating (e.g. full power or half power). Once the hp-hrs are adjusted based on load factor, they are multiplied by the emissions factor, which is an estimate of the amount of emissions produced per hp-hr (an example would be grams of NOx per hp-hr). This value is then converted to tons of the constituent emitted. Indirect emissions for this project are typically computed by estimating the work crew travel trips to the work site and back during the construction period with an estimate of the emissions produced by this activity.

The Preferred Alternative would result in the maintenance of existing regional air quality conditions in New Castle County, Delaware, which is part of the Philadelphia-Wilmington-Atlantic City, PA- NJ-MD-DE nonattainment area for the 8-hour ozone NAAQS. There would be some minor, short-term effects during dredge material placement operations from the use of additional diesel engines and construction equipment during dredge material disposal operations. The use of additional construction equipment during the dredging material placement will produce temporary localized increases in NOx, VOCs, CO, SO2 and PM2.5 emissions.

The use of diesel engines on a hydraulic dredge and associated construction equipment for a typical beachfill dredging project of 500,000 cubic yards will produce temporary localized increases in NOx, VOCs, CO, SO_2 and $PM_{2.5}$ emissions. Based on the size of the operation and duration, air emissions are expected to be below the de minimus threshold for a marginal ozone nonattainment area. An emissions estimate for criteria pollutants is provided in Table 16 and Appendix B. The proposed action would meet de minimus thresholds for ozone (100 tons NOx and 50 tons VOCs per calendar year) and sulfur dioxide (100 tons per year). The other pollutants are in attainment of NAAQS for Sussex County and de minimis thresholds do not apply. Therefore, a General Conformity determination is not required based on the expected de minimus level emissions.

Table 16. Criteria Pollutant Emissions Estimates (Tons)

	NO_x (O_3 precursor)	VOC (O_3 precursor)	$PM_{2.5}$	SO_x	CO
IRI North Beach Restoration (500,000 CY)	**64.4**	**1.9**	**3.2**	**0.04**	**7.7**
Clean Air Act General Conformity Rule Limit (Threshold Tons/Year)	100	50	NA	NA	NA

5.1.11 Noise

No Action: The no action alternative is not expected to affect noise conditions within the affected area and existing noise conditions would continue to persist.

Preferred Alternative: Project-related noise at the placement site during construction will consist of the sound of dredged material passing through the pipe and discharging in a plume of water. Earth-moving equipment, such as bulldozers, will shape the newly deposited dredged material and produce engine noise in the nearby vicinity. These activities would produce noise levels in the 70 to 90 dBA (50 feet from the source) range. Utilizing heavy machinery fitted with approved muffling apparatus reduces noise, and vibration will reduce noise effects, but will not eliminate them.

At the offshore borrow areas, hydraulic suction dredging involves raising loosened material to the sea surface by way of a pipe and centrifugal pump along with large quantities of water. Suction dredgers produce a combination of sounds from relatively continuous sources including engine and propeller noise from the operating vessel and pumps and the sound of the drag head moving across the substrate. Robinson et al. (2011) carried out an extensive study of the noise generated by a number of trailing suction hopper dredgers during marine aggregate extraction. Source levels at frequencies below 500 hertz (Hz) were generally in line with those expected for a cargo ship travelling at modest speed. The dredging process is interspersed with quieter periods when the dragheads are raised to allow the dredge to change positions. Clarke et al. (2003) evaluated sound levels produced by a hopper dredge during its "fill" cycle working in a sandy substrate. They found that most of the sound energy produced fell within the 70 to 1,000 Hz range, with peak pressure levels in the 120 to 140 decibel (dB) range at 40 meters from the dredge. These data correlate well with a study conducted in the United Kingdom which found trailing suction hopper dredge sounds to be predominately in the low frequency range (below 500 Hz), with peak spectral levels at approximately 122 dB at a range of 56 meters (DEFRA, 2003).

In a review by Southall et.al. (2007), several studies showed altered behavior or avoidance by dolphins to increased sound related to increased boat traffic. Clarke et al. (2004) found that cutterhead dredging operations are relatively quiet compared to other sounds in aquatic environments, whereas hopper dredges produce somewhat more intense sounds. Thomsen et al. (2009) conducted a field study to better understand if and how dredge-related noise is likely to disturb marine fauna. This study found that the low-frequency dredge noise would potentially affect low- and mid-frequency cetaceans, such as bottlenose dolphins. Noise in the marine environment has also been responsible for displacement from critical feeding and breeding grounds in several other marine mammal species (Weilgart, 2007). Michel et al. (2013) conducted a review on noise effects to sea turtles and found that there is limited data on sea turtle hearing, no data specifically for sea turtles on which to determine the levels of sound that will cause adverse effects, either temporary or permanent. Michel et al. (2013) cites work done by McCauley et al. (2000) and Finneran and Jenkins (2012), who proposed a behavioral disturbance threshold (for sea turtles) as a weighted sound pressure level of 175 dB re 1 μPa. Noise has also been documented to influence fish behavior (Thomsen et al., 2009). Fish detect and respond to sound utilizing cues to hunt for prey, avoid predators, and for social interaction (LFR, 2004). High intensity sounds can also permanently damage fish hearing (Nightingale and Simenstad, 2001). It is likely that at close distances to the dredge vessel, the noise may produce a behavioral response in mobile marine species, with individuals moving away from the disturbance, thereby reducing the risk of physical or physiological damage. Accordingly, any resulting effects would be negligible.

5.2 Biological Environment

5.2.1 Terrestrial

No Action: No action would continue with losses of terrestrial beach and dune habitats that would adversely affect the flora and fauna that inhabit these areas that are described in 4.2.1.1.

Preferred Alternative: Existing dune vegetation would be disturbed by dune restoration in areas where dune erosion occurs, however, the dunes would be replanted with dune grasses. Rapid recolonization of other types of vegetation such as sea rocket and seaside goldenrod, cocklebur, and other dune associated vegetation is expected, which would provide additional diversity. Effects to wildlife species inhabiting the beach and dune areas are expected to be short-term and minor as most are highly mobile and capable of moving outside of the impacted areas until construction ceases. Beach and dune re-construction activities may temporarily displace resting and feeding shorebirds. Beach nesting birds such as piping plover, black skimmer, least tern and American oystercatchers could potentially be disturbed by construction activities, if present.

5.2.2 Aquatic Environment

5.2.2.1 Benthic Environments

5.2.2.1.1 Benthos of Intertidal Zone and Nearshore Zone

No Action: The no action alternative is not expected to significantly affect benthic organisms that inhabit the nearshore subtidal zone along the North Beach shoreline. This habitat would likely transgress westward as the shoreline retreats. With transgression, the intertidal zone may experience losses if constrained by a hardened roadway and efforts to maintain that roadway such as exposed stone revetment or steel sheeting.

Preferred Alternative: Beachfill placement would affect approximately 30 acres of marine intertidal and subtidal habitat along the North Beach shoreline. Beachfill placement will directly impact benthic organisms within the intertidal and nearshore subtidal zones of the North Beach through burial. Most of the organisms inhabiting these dynamic zones are highly mobile and respond to stress by displaying large diurnal, tidal, and seasonal fluctuations in population densities (Reilly *et al*., 1983). Species impacted in this zone include the mole crab, coquina clam and the haustorid amphipod. Despite the resiliency of intertidal benthic fauna, the initial effect of beachfill will result in some mortalities of existing benthic organisms. Recolonization is expected to be rapid because this habitat is extremely turbulent and consists of benthic organisms adapted to high disturbance and environmental stresses. Larval and horizontal recruitment is expected from nearby unaffected beaches. However, beach slope may play a role in the ability for intertidal organisms to recover if the slope is severe, which may be the case initially until the foreshore slope adjusts through wave action. Losses of intertidal habitat are offset by gains of this habitat seaward. Losses of nearshore subtidal habitat are minor as this would be offset seaward, likewise. Grain size compatibility analyses conducted on sediments from the proposed sand sources suggest that fine-grained materials (silts and clays) are low and should not significantly affect recolonization of benthic organisms in the intertidal and nearshore zones.

5.2.2.1.2 Benthos of Offshore Zones

No Action: No action is not expected to have any effects on offshore benthic communities.

Preferred Alternative: Essentially, dredging will result in the temporary complete loss and removal of the benthic community within the affected areas of the borrow site. However, this is expected to be a temporary condition. Recolonization by benthic organisms would occur shortly after being impacted as the affected areas would be available for larval and juvenile recruitment along with horizontal migration into the affected areas. Recolonization may initially result in a different benthic community that may change over time. Recovery rates may vary depending on the habitat impacted and the post impact condition of the affected area. Factors such as sediment grain size, dissolved oxygen, and availability of larva and horizontal recruitment can affect the recovery rate of benthos in dredged areas. Two post-dredge monitoring investigations were done by Scott (2009a) and Scott (2009b) in Delaware Atlantic Coastal waters three years after the use of the Fenwick Island South Borrow Area and Area G. Post dredge monitoring of the Fenwick South Borrow area (Scott, 2009a) showed that with the exception of one station, abundances of infauna taxa and major taxonomic groups were similar. Stations in the affected and unaffected areas of the Fenwick South site tended to be dominated by the amphipod *Unciola serrata* and polychaete *Polygordius* spp., which comprised a cluster grouping of the entire southern portion of the Fenwick Island Borrow Area. However, one station did exhibit a significant difference from the other stations with fewer taxa, biomass and abundances, and was dominated by the bivalve *Tellina agilis*. This station was in the deepest part of the affected area and may have been experiencing lingering effects of the dredging because it had the highest percent of fine sands and lowest percent of coarse sands and gravels compared to all of the other stations sampled. Scott (2009b) evaluated the post-dredge environment of borrow Area G and found a highly variable benthic community that attributes changes to the benthic community based on post dredge sediment composition and temporal differences. Stations from affected/deepened portions of the borrow area clustered similarly as those in the Fenwick Island South borrow area where there was a higher percentage of fine to medium sands, and lesser coarse sands and gravels. These stations were dominated by the amphipods *Unciola serrata* and *Tanaissus psammophilus*. Although there were some changes in sediment habitat among the deepened areas, Scott (2009b) concludes that a long-term impact of such a change on higher living resources in the area should be minimal.

The Indian River Inlet Ebb and Flood Shoal complexes are very active with dynamic currents and sedimentation. These areas are expected to infill rapidly with sand shortly after dredging is complete. The existing benthic communities of these areas are adaptable to frequent disturbance. It is expected that these areas will begin to re-establish a benthic community similar to what existed prior to dredging within a few months after dredging.

5.2.2.2 Fisheries

No Action: No action is not expected to have any effects on fisheries (finfish or shellfish) and their habitats.

Preferred Alternative: The potential effects of a dredging and beachfill operation on fishery resources include direct physical injury to organisms, and indirect injury due to factors such as water quality degradation, loss of benthic or planktonic food resources, disruption of spawning or nursery habitats and disruption of spawning activities (USACE, 1992). With the exception of some small finfish, most bottom and pelagic fishes are highly mobile and should be capable of avoiding entrainment into the dredging intake stream or burial at the placement location. Turbidity can clog gills and affect sight feeders. However, turbidity is expected to be temporary and localized to the dredging location and placement sites. It is anticipated that some finfish would avoid the turbidity plume while others may become attracted to the suspension of food materials in the water column. Minor effects to fish eggs and larvae are expected because these life stages are widespread throughout the Middle Atlantic Bight, and not particularly concentrated in the borrow site or surf zone of the project area (Grosslein and Azarovitz, 1982). The Indian River Inlet is approximately 500 feet wide seaward of the Charles W. Cullen Memorial Bridge and represents the narrowest constriction within the inlet area. The Indian River Inlet Flood Shoal occurs west of the bridge where the interior inlet area opens up to widths ranging from 1,300 ft. to 1,900 ft. Dredging within the Indian River Inlet flood shoal area has the potential to disrupt seasonal fish migrations for migratory fish transiting through the inlet. Therefore, a time of year restriction would be implemented from March 1 to June 30 for dredging the flood shoal sand source to avoid the peak migration period for marine species entering the estuaries. However, the Indian River Inlet Ebb Shoal complex is situated offshore of the inlet within the unrestricted high energy open ocean and is not likely to adversely affect migratory fish since it is not constricted and would not limit fish passage. Therefore, a dredging TOYR is not recommended for the ebb shoal complex. Beachfill placement along the North Beach would not affect migratory fish passage and also would not require a TOYR.

The primary indirect impact to fisheries will be from the immediate loss of a food source by disturbing benthic macroinvertebrate communities. Demersal finfish feed heavily on bottom-dwelling species, thus, the loss of benthos and epibenthos entrained or smothered during the project will temporarily disrupt the food chain in the impact area. This effect is expected to be temporary as these areas become rapidly recolonized by infaunal and epifaunal macroinvertebrates.

Megabenthos such as the channeled and knobbed whelks and horseshoe crabs would be affected during dredging operations and their complete removal within the borrow areas would result. Although these species are present in the borrow areas, they are not known to be particularly concentrated within these locations. It is expected that these species would return following dredging and after some recruitment of the benthic community has occurred.

5.2.2.3 Essential Fish Habitat

No Action: The no-action alternative would not have any effect on EFH as defined by the 1996 Magnuson-Stevens Act.

Preferred Alternative: A review of EFH designations and associated direct and indirect effects along the Delaware Coast Protection project area, which is defined by the Indian River Inlet Ebb and Flood Shoal complexes (sand sources) and the beachfill placement are on North Beach was completed in Table 17. Dredging and beachfill placement have the potential to impact EFH several ways: by direct entrainment of eggs and larvae; the creation of higher suspended sediment levels in the water column, reduce feeding success for site-feeding fish, alter physical bottom habitat structure, eliminate benthic food resources and reduce water oxygen levels. All of these effects are temporary in nature, either during the actual dredging period or for a period thereafter. Substrate conditions typically return to preconstruction conditions and the benthic community recovers through recolonization provided deep pits are not created. Effects to fish species with designated EFH occurs primarily within inlets and estuaries (*i.e.* inshore) as a variety of fish species migrate in and out of inlets, such as summer flounder. The IRI Ebb shoal complex (IRI Ebb A – 192 acres and IRI Ebb B – 388 acres) occurs in nearshore water in variable depth (13-39 feet). Based on the sand quantities required, it is not likely that the entire sand area would be impacted at one time. A hopper dredge could affect a larger area by making shallow cuts, whereas a hydraulic cutter-suction pipeline dredge could affect smaller areas making deeper cuts. Given the location in the nearshore environment, it is more likely that a hydraulic cutter-suction pipeline dredge would be used. Dredging depths can be variable based on the quality of material and dredging methods. However, these depths/cuts generally would not exceed 10 feet at one time or incrementally.

Table 17. Direct and Indirect Effects on Federally Managed Species and EFH

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Albacore Tuna (*Thunnus alalunga)*			Albacore tuna juveniles are epipelagic in habit in the offshore and would not be directly affected by dredging/beachfill. Indirect effects would be incurred through temporary disruptions in the food chain from loss of benthic prey species.	
Bluefin Tuna (*Thunnus thynnus*)			Bluefin tuna juveniles are pelagic in habit in the offshore and would not be directly affected by dredging/beachfill. Indirect effects would be incurred through temporary disruptions in the food chain from loss of benthic prey species.	
Skipjack Tuna (*Katsuwonus pelamis*)				Skipjack tuna adults are epipelagic in habit in the offshore and would not be directly affected by dredging/beachfill. Indirect effects would be incurred through temporary disruptions in the food chain from loss of benthic prey species.
Yellowfin Tuna *(Thunnus albacares)*			Yellowfin tuna juveniles are pelagic in habit in the offshore and would not be directly affected by dredging/beachfill. Indirect effects would be incurred through temporary disruptions in the food chain from loss of benthic prey species.	
Red hake *(Urophycis chuss)*	Eggs occur in surface waters; therefore, no direct or indirect effects are expected.	Larvae occur in surface waters; therefore, no direct or indirect effects are expected.	**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be	**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredge conditions. Shoreline placement areas and stormwater outfall construction are not expected to have any effects on red hake habitat.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			expected from entrainment into the dredge. **Indirect:** Temporary disruption of benthic food prey organisms.	**Indirect:** Temporary disruption of benthic food prey organisms.
Windowpane flounder *(Scopthalmus aquosus)*	Eggs occur in surface waters; therefore, no direct or indirect effects are expected.	Larvae occur in pelagic waters; therefore, no direct or indirect effects are expected.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.
Atlantic sea herring *(Clupea harengus)*			**Direct:** Occur in pelagic and near bottom. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** None, prey items are planktonic	**Direct:** Occur in pelagic and near bottom. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** None, prey items are primarily planktonic
Bluefish *(Pomatomus saltatrix)*			**Direct:** Juvenile bluefish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic food prey organisms.	**Direct:** Adult bluefish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic food prey organisms.
Long finned squid *(Loligo pealei)*	n/a	Pre-recruits are pelagic. No effects are anticipated.		
Atlantic butterfish *(Peprilus tricanthus)*		Larvae occur in pelagic waters. No effects are expected.	**Direct:** Juvenile butterfish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic food prey organisms in food chain.	**Direct:** Adult butterfish are pelagic species. No significant direct effects anticipated. **Indirect:** Temporary disruption of benthic food prey organisms in food chain.
Summer flounder *(Paralichthys dentatus)*		Larvae occur in pelagic waters; therefore, no direct or indirect effects are expected.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.	
Scup *(Stenotomus chrysops)*	n/a	n/a	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults should be capable of relocating during impact. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms.
Black sea bass *(Centropristus striata)*	n/a	Larvae are mainly pelagic, however, larvae later become more bottom oriented, which are potentially susceptible to entrainment into the dredge.	**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredge conditions. Black seabass are oriented to rocky bottoms and structure. The north jetty of the inlet, which makes-up intertidal and subtidal rocky habitat may be impacted due to sand partially covering it along the shoreline. **Indirect:** Temporary disruption of benthic food prey organisms.	**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredge conditions. Black seabass are oriented to rocky bottoms and structure. The north jetty of the inlet, which makes-up intertidal and subtidal rocky habitat may be impacted due to sand partially covering it along the shoreline. **Indirect:** Temporary disruption of benthic food prey organisms.
Spiny dogfish *(Squalus acanthias)*			**Direct:** Juveniles are bottom oriented. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of food chain by removal of benthic food prey organisms.	**Direct:** Adults are bottom oriented. Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of small adults could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of food chain by removal of benthic food prey organisms.
Sand tiger shark *(Odontaspis taurus)*		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of neonates could be expected from entrainment into the dredge because they may be		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of young could be expected from entrainment into the dredge because they may be oriented with the bottom. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
		oriented with the bottom. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.		food chain within borrow and placement sites.
Atlantic angel shark *(Squatina dumerili)*		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of neonates could be expected from entrainment into the dredge because they may be oriented with the bottom. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of juveniles could be expected from entrainment into the dredge. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults are mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.
Dusky shark *(Charcharinus obscurus)*		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Mortality from dredge unlikely because embryos are reported up to 3 feet in length Therefore, the newborn or neonates may be mobile enough to avoid a dredge or placement areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward.		

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
		Indirect: Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.		
Sandbar shark *(Charcharinus plumbeus)*		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. However, some mortality of neonates may be possible from entrainment into the dredge or burial in nearshore, but not likely since newborns are approx. 1.5 ft. in length and are considered to be mobile. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Juveniles are mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults are highly mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.
Atl. sharpnose shark *(Rhizopriondon terraenovae)*				**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults are highly mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.
Smoothhound Shark Complex (*Mustelus mustelus*)		**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Neonates are mobile and are mostly capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Juveniles are highly mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food	**Direct:** Physical habitat in borrow site should remain basically similar to pre-dredge conditions. Adults are highly mobile and are capable of avoiding impact areas. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
		impacted and displaced seaward. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow and placement sites.	chain within borrow and placement sites.	
Little Skate (*Raja erinacea*)			**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredged conditions. Juveniles are highly mobile, and most are capable of avoiding impact areas, although some entrainment into dredge is possible. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. Juveniles are expected to avoid placement areas during construction. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow area and placement sites.	
Winter Skate (*Raja ocellata*)			**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredged conditions. Juveniles are mobile, and most are capable of avoiding impact areas, although some entrainment into dredge is possible. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. Juveniles are expected to avoid placement areas during construction. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow area and placement sites.	
Clearnose Skate (*Raja eglanteria*)			**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredged conditions. Juveniles are mobile, and most are capable of avoiding impact areas, although some entrainment into dredge is possible. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. Juveniles are expected to	**Direct:** Physical habitat in borrow sites should remain basically similar to pre-dredged conditions. Adults are highly mobile, and most are capable of avoiding impact areas, although some entrainment into dredge is possible. Shoreline placement area bottom habitats will be temporarily impacted and displaced seaward. Adults are expected to avoid placement areas during construction. **Indirect:** Temporary disruption of benthic food prey organisms and

MANAGED SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
			avoid placement areas during construction. **Indirect:** Temporary disruption of benthic food prey organisms and food chain within borrow area and placement sites.	food chain within borrow area and placement sites.

Beachfill placement can affect EFH in the surf zone by displacing intertidal and nearshore shallow habitat, generation of turbidity, and burial/smothering of benthic food prey resources. The displacement of intertidal and shallow nearshore habitat would be likely created seaward assuming that similar substrates remain. Also, beachfill can initially affect fish-holding structures such as manmade rock groins, and nearshore bars and troughs by covering them. Subsequent storms may form new cuts and expose the groins, but these would likely be covered again with periodic nourishment. During construction, turbidity can inhibit respiration and sight feeders but would be a temporary effect once pumping ceases and fine grained sediments settle out. The loss of benthic food resources is a temporary effect as the benthic organisms that inhabit this zone are typically more resilient to frequent disturbances and are capable of rapid recolonization of newly placed beachfill.

In conclusion, of the species identified with Fishery Management Plans, and highly migratory pelagic species known to occur in the vicinity, the potential for adverse effects to EFH is considered temporary and minimal. The neonate stages of several shark species are predominately located in shallower coastal waters, but the proposed dredging/beachfill placement will not result in any habitat conversions. Additionally, since the work is located in highly dynamic environments, regeneration of shoal features is expected to occur within a few years of the disturbance by the same processes that created them.

The effect on benthic organisms (that include food prey items) in the borrow areas is considered to be temporary as benthic studies have demonstrated recolonization following dredging operations within 13 months to 2 years.

At the beachfill placement site (intertidal and nearshore zones), the slurry of dredged material and water pumped onto the beach typically results in an increase in localized turbidity. The Atlantic States Marine Fisheries Commission (Greene, 2002) review of the biological and physical effects of beach nourishment cites several studies on turbidity plumes and elevated suspended solids that drop off rapidly seaward of the sand placement operation. Other studies support this finding that turbidity plumes and elevated TSS levels are typically limited to a narrow area of the swash zone down current of the discharge pipe (USACE, 2001). Fish eggs and larvae are the most vulnerable to increased sediment in the water column and are subject to burial and suffocation. Given the location of the placement site (ocean coast as opposed to inlets) effects to eggs and/or larvae is considered minimal. Juvenile fish and adults are capable of avoiding sediment plumes. Increased turbidity due to placement operations will temporarily affect fish foraging behavior and concentrations of food sources are expected to return to the nearshore zone once placement operations cease due to the dynamic nature of nearshore benthic communities (USACE, 2001). Turbidity effects are anticipated to be minimized by the placement of the dredge pipe above the mean high water line during pump-out and development of the raised beach berm moving along the shoreline. Most shallow water coastal species will leave the area of disturbance at the immediate placement site. No overall conversions of intertidal and subtidal fish habitat are expected as these habitats would be displaced seaward equally along the shoreline. Sand coverage along the north side of the inlet jetty would reduce intertidal rocky shoreline habitat but would become exposed intermittently with erosion.

5.2.2.4 Marine Mammals and Seabirds

No Action: No action is not expected to have any effects on marine mammals and seabirds.

Preferred Alternative: Many marine mammals are highly mobile and capable of avoiding a dredging operation; however, marine mammals could potentially be directly impacted by collisions with moving dredges and support vessels resulting in severe injury or mortality. As discussed in 5.1.10, dredging noises may elicit behavioral responses in some marine mammals near a dredging operation. Most effects of offshore dredging on marine mammals are indirect, which may temporarily inhibit sight feeding and filter feeding from sediment plumes and the temporary loss of benthic forage resources in the borrow area. The beachfill component could have similar effects on nearshore marine mammals with noise and turbidity during pump-out operations. Additionally, active work areas may become temporarily inaccessible to pinnipeds attempting to “haul out” to rest on the beach.

Little is known on the effects of sand dredging on seabirds in the Delaware nearshore coastal waters. Potential effects to seabirds that could occur from dredging borrow areas include direct interactions with dredging equipment and support vessels (causing birds to flee location during foraging or resting; or collisions, which are not as likely), noise, turbidity (affecting sight feeding), benthic habitat alterations (removal or fragmentation of shoals and/or altering bathymetry where depths are inaccessible to benthic feeders), and temporary losses of benthic food resources to seabird feeding guilds that prey on benthic invertebrates or to feeding guilds that prey on fish that feed on benthic organisms. Pelagic seabirds (gulls, terns, kittiwakes, shearwaters, gannet, petrel, etc.) have a wide distribution and are not particularly concentrated in sand extraction areas (Michel et al. 2013). However, heavy use of the nearshore waters by overwintering sea ducks has been documented. The Delaware Division of Fish and Wildlife (WSCRP, 2015) reports that recent surveys have identified larger numbers of scoters, particularly black and surf scoters, as well as long-tailed ducks to be prevalent in the nearshore environment off the Delaware coast during fall and winter months. A review by Michel et al. (2013) discusses that peak numbers of scoters (particularly surf scoters) overwinter in coastal waters (2.2 to 4.1 nautical miles from shore) in depths of 10 meters (32.8 ft.) over sandy shoals to feed on benthic taxa such as bivalves, gastropods, crustaceans, polychaetes and annelids. The Indian River Inlet Ebb Shoal borrow area is ½ mile offshore of the coast. Sand extraction would temporarily impact the food source in these areas by removing the benthic community, which could take up to 2 years to recover after disturbance. Post dredge depths could also potentially affect the accessibility of benthic food resources. The IRI Ebb Shoal A is in depths of 8.8 m to 13.1 m (28 ft. to 41 ft.) and the southern lobe (IRI-Ebb B) has depth ranges of 4.0 m to 8.5 m (13 ft. to 28 ft.). Michel et al. (2013) and Geo-Marine (2010) report that in a study off the coast of New Jersey, the distribution of scoters peaked at depths of 10 m (32.8 ft.). The existing depths of the IRI Ebb Shoal are variable with post dredge depths of 12 m to 16 m (40 to 50 feet) for IRI Ebb-A, and post dredge depths would be 7 m to 11.6 m (23 ft. to 38 ft.) for IRI Ebb-B. Therefore, with subsequent in-filling and re-generation of the shoal, the dredge cuts are not expected to make bottom foraging habitat inaccessible to seabirds.

5.2.3 Threatened and Endangered Species

No Action: No action would result in continued loss of terrestrial beach habitat along the North Beach shoreline, which would make this area uninhabitable for beach nesting birds and other coastal species. No action is not expected to have any effects on marine species.

Preferred Alternative: The North Beach has historically supported the nesting of beach nesting birds such as the piping plover, which is Federally listed as threatened and State listed as endangered, and the least tern, American oystercatcher, and black skimmer (both State endangered species).

Beach replenishment can potentially have significant direct and indirect adverse effects on these species. Sand placement can bury nests, and machinery on the beach can crush eggs, nestlings, and adults. Human disturbance related to noise and lights can disrupt successful nesting of these birds (Louis Berger Group, 1999). Also, pipelines used during construction may become barriers to young chicks trying to reach intertidal areas to feed. The presence of these species in the project area will require the implementation of protection measures, which may include the establishment of a buffer zone around any nests and limiting construction to be conducted outside of the nesting period (1 March – 31 August).

Other indirect effects associated with the proposed plan include the temporary reduction in the quality of foraging habitat for piping plover and other shorebirds within the intertidal zone until the area becomes recolonized by benthic fauna such as polychaete worms, mollusks, and crustaceans. This impact is expected to be short-lived as the area could become recolonized as early as a few weeks after filling is completed. The construction of a wider beach may result in the beach becoming more attractive to nesting birds such as piping plover, least tern, and black skimmers. Although this may appear beneficial, it is believed that this could have adverse effects on these species. This is based on the fact that a replenished wider beach may attract these birds away from natural areas with less human disturbance.

Based on previous coordination with the U.S. Fish and Wildlife Service (USFWS) and the Delaware Division of Fish and Wildlife (DFW), North Beach has not had any nesting piping plovers within the last 10 years. However, since this action potentially involves maintaining the beach on an as needed basis, there is a potential to impact future nesting plovers. Therefore, prior to renourishment activities, the District will consult with USFWS and DFW to identify any nesting piping plovers and to establish appropriate buffer zones around any nests, if present. Beach nourishment construction specifications currently have protocols developed in case beach nesting birds are present in an active construction area that provide for monitoring and establishment of buffer zones.

The Federally threatened, red knot, is a migratory shorebird that can be found on Atlantic Coast beaches during spring and fall migrations. Construction during this period (especially the fall migration) could affect foraging patterns by disturbing habitat and temporarily displacing a food source by burying intertidal benthic organisms. Since the affected area is a highly dynamic beach area, this would be a temporary effect.

Another species which may be found within the project area is the Federally-listed threatened plant, seabeach amaranth, which inhabits overwash flats, accreting ends of coastal barrier beaches and lower foredunes of non-eroding beaches. Seabeach amaranth has sporadically appeared along the Delaware Atlantic Coast (within Cape Henlopen State Park, Delaware Seashore State Park and Fenwick Island State Park) and most recently 1.4 miles north of the Indian River Inlet. Therefore, it is possible that seabeach amaranth may become naturally established within the affected project areas within the life of the project. As such, the dunes and upper beach areas that would be affected by beach nourishment should be inspected prior to renourishment activities. If a plant or groups of plants are located within the affected areas, the District would consult with the USFWS and the Delaware Division of Fish and Wildlife – Wildlife Species Conservation and Research Program (WSCRP) to determine an appropriate course of action to avoid impacting this species. This may involve seasonal restrictions, sand stockpiling or relocation of the plant(s) to a safer location.

The proposed Federally threatened monarch butterfly could potentially be present within the dune habitats that contain seaside goldenrod and other nectar bearing flowers. Seaside goldenrod typically flowers in the late summer and into the fall, which is timed with the monarch migration. The proposed beachfill activities would affect severely eroded beach and dune areas where goldenrods may not be established. Seaside goldenrod plants are common in dune habitat areas and are likely to recolonize re-constructed dunes. However, opportunities to enhance their re-establishment on dunes such as planting or seeding will be considered to benefit monarch butterflies.

Using the USFWS IPaC, a biological analysis was performed to provide an effect determination on the three species identified in the IPaC search. This determination resulted in a “no effect” (NE) determination for the roseate tern since it does not nest within the affected area, and “not likely to adversely affect” (NLAA) for the seabeach amaranth and the monarch butterfly provided that conservation measures are implemented as described in Appendix C.

State of Delaware protected species identified in Table 14 include the Bethany Beach firefly (also a Federal candidate species) and the rare plants: witch grass, Carolina fimbry, slender marsh pink, and twisted ladies’ tresses. These species occur within interdunal swales and depressions, which could be in close proximity to project activities. However, they are not likely to be impacted since beach nourishment project activities are mostly limited to the seaward side of the dunes. Any future activities that could occur in these areas (such as access and staging) will be coordinated with the Delaware Division of Fish and Wildlife and Division of Parks and Recreation prior to the action to ensure that appropriate measures can be implemented.

From June through November, Delaware’s coastal waters are inhabited by migratory sea turtles, especially the loggerhead (Federally listed threatened) or the Kemp's ridley (Federally listed endangered). Sea turtles have been known to be adversely impacted during dredging operations that have utilized a hopper dredge. Dredging encounters with sea turtles are more prevalent within waters of the southern Atlantic and Gulf coasts; however, incidences of "taking" sea turtles with hopper dredges have been increasing in waters of the Middle Atlantic Coast. Endangered whales such as the endangered Right whale may also transit the project area. As with all large vessels, there is a potential for a collision of the dredge that could injure or kill a whale.

As discussed in Section 4.2.3, the New York Bight Distinct Population Segment (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is listed as endangered by NMFS, and although this species is migratory in the marine environment, this species could be present within the project area. With regard to physical injuries to the Atlantic sturgeon, the potential exists for them to become entrained during dredging operations. It is expected, however, that most adult sturgeon would actively avoid a working dredge. As with other fish species, the temporary effects to water quality due to increased turbidity can impact prey availability during construction activities. Noise generated from a working dredge at the dredge site and beachfill placement could potentially be a factor affecting sturgeon. However, it is expected that sturgeon will avoid the borrow areas and nearshore beachfill areas during construction. Due to the open water nature of the borrow sites, this temporary movement away from the borrow areas does not constitute a significant effect on this species.

Formal consultation with the National Marine Fisheries Service (NMFS) in accordance with Section 7 of the Endangered Species Act was initially undertaken in 1995 on all dredging projects (including navigation, coastal engineering, and authorizations carried out under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act) with a Biological Opinion (BO) issued in 1996 (NMFS, 1996) and subsequent incidental take statement (ITS) in 1999 for the shortnose sturgeon: loggerhead, Kemp’s ridley, green and leatherback sea turtles; and humpback and right whales. Subsequent consultation was undertaken in 2013 to further refine the activities including the use of MEC screens for each authorized beach nourishment project and associated offshore sand sources in New Jersey and Delaware. This consultation culminated in the issuance of a Programmatic Biological Opinion (PBO) prepared by the NMFS (NMFS, 2014). The PBO considered the effects of the various dredges that are typically used including self-propelled hopper dredges and hydraulic cutterhead pipeline dredges and the species within the action area that may be affected by the proposed actions that include the Northwest Atlantic DPS of loggerhead sea turtle (threatened), Kemp’s ridley sea turtle (endangered), green sea turtle (endangered/threatened), and Atlantic sturgeon: Gulf of Maine DPS (threatened), New York Bight DPS (endangered), Chesapeake Bay DPS (endangered), South Atlantic DPS (endangered), and Carolina DPS (endangered). The PBO also considered the affected beach areas and the sand sources, which included the IRI sand bypass plant/North Beach and the IRI Flood Shoal as a sand source. However, at the time of issuance of the PBO, the IRI Ebb Shoal complex was not considered, but is presumed to have similar effects as described in the PBO.

The PBO evaluated project activity effects on protected marine species and concluded: “After reviewing the best available information on the status of endangered and threatened species under our jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects, it is NMFS’ biological opinion that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of the Gulf of Maine, New York Bight, Chesapeake Bay and South Atlantic DPS of Atlantic sturgeon, Kemp’s ridley or green sea turtles or the Northwest Atlantic DPS of loggerhead sea turtles and is not likely to adversely affect leatherback sea turtles, the Carolina DPS of Atlantic sturgeon, right, fin or humpback whales. Because no critical habitat is designated in the action area, none will be affected by the proposed action.”

The conclusion reached for the North Atlantic right whale, fin whale and humpback whale are based on a rationale presented in NMFS (2014), which states: “Whales in the action area will be exposed to effects of the proposed actions including vessel traffic, increased turbidity/suspended sediment (which may affect prey), and potential removal of prey during dredging. All sand will be placed on beaches or in nearshore shallow areas adjacent to beaches. Whales do not occur in these areas; therefore, no whales will be exposed to effects of sand placement. We have determined that all effects of the proposed actions on right, humpback and fin whales will be insignificant and discountable.” This rationale can also apply to other whale species that may occur within the project area listed in Table 14.

Since NMFS determined that these actions “may adversely affect” sea turtles and Atlantic sturgeon, an Incidental Take Statement (ITS) was developed in the PBO. Due to the uncertainty of monitoring for these species with MEC screens in place, the ITS within the PBO provides incidental takes “by proxy” as 1 take per every 3.8 million cubic yards dredged for sea turtles and 1 take per every 8.6 million cubic yards dredged for Atlantic sturgeon. The PBO also issued reasonable and prudent measures (RPMs), which are necessary and appropriate to minimize and monitor effects of incidental take resulting from these actions. Adherence to the RPMS ensures project compliance with Section 7 ESA. RPMS are implemented through the “Terms and Conditions”. NMFS (2014) also provided a number of discretionary conservation recommendations. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The RPMS, Terms and Conditions, and Conservation Recommendations are presented in an excerpt of the BO (NMFS, 2014) in Appendix C.

State listed endangered marine birds that may be found feeding in the offshore and nearshore affected areas include the common tern, least tern, Forster’s tern and the black skimmer. These birds may be potentially disrupted by dredging operations, particularly when they are foraging, which can result in changes to their daily movements, including distances travelled of adults tending to young. The Delaware Division of Fish and Wildlife (DFW-WSCRP, 2015) notes that disruptions to established feeding patterns may affect the ability and capacity of adult birds to adequately tend to chicks. These disruptions would be temporary and limited to when there is active construction during dredging and use of support vessels in offshore and nearshore waters.

5.3 Cultural and Social Environment

5.3.1 Cultural Resources

No Action: The no action alternative is not expected to have any adverse effects on cultural resources or historic properties eligible for or listed on the National Register of Historic Places (NRHP).

Preferred Alternative: The USACE is in consultation with the DESHPO, the Tribes and other consulting parties pursuant to Section 106 of the NHPA, as amended, during the preparation of this Environmental Assessment to identify and evaluate historic properties in order to fulfill our responsibilities under the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800. As part of this work, the Philadelphia District conducted an evaluation of existing site conditions and previous cultural resources investigations to determine the potential for significant cultural resources in the four proposed APEs.

Indian River Inlet North Beach Shoreline (APE1) - The shoreline and near shore areas have been subjected to numerous episodes of erosion and filling over the last decades; therefore, little likelihood exists for the proposed sand placement to impact historic properties eligible for inclusion in the NRHP.

Indian River Inlet Flood Shoal (APE2) – There are no historic properties listed on the NRHP located within the boundaries of the IRI Flood Shoal. This area was previously surveyed and subsequently dredged several times as a sand source (most recently by DNREC as part of the Phase 1 Indian River North Beach restoration in 2024-2025).

Indian River Inlet Ebb A (APE3) - There are no historic properties listed on the NRHP located within Ebb A APE. The Indian River Inlet borrow area was previously surveyed in 2001 with no significant targets located, and the flood shoal area has been previously dredged.

Indian River Inlet Ebb B (APE4) – Although the Indian River Inlet was previously surveyed, the area surrounding it has not been surveyed for potential shipwrecks. The USACE, in consultation with the DESHPO, the Tribes and other consulting parties will coordinate the Section 106 process within this APE prior to any future use of the area. Any sensitive anomalies located during that investigation will be avoided by a sufficient buffer or will require further analysis.

The USACE has determined that the proposed use of the flood shoal sediments within its current width and depth (APE2), the placement of the sediments on the beach segment (APE1), and the use of the ebb shoal within the area previously surveyed (Ebb Shoal A) (APE3) will have No Effect to historic properties eligible for or listed on the NRHP. The USACE has further determined that the Ebb Shoal B (APE4) will require a marine remote sensing investigation prior to use to determine if there are any sensitive anomalies that can be avoided or tested further.

5.3.2 Socioeconomics

No Action: Under the no action alternative, the significant erosion that threatens critical infrastructure such as the Charles W. Cullen Memorial Bridge and the approach to SR 1 along the North Beach shoreline would continue. Damages to these structures would incur significant costs on the State. SR1 is a critical artery in coastal Delaware and is an important component of the coastal economy. Disruptions from road closures would require traffic to re-route, increasing travel times for emergency vehicles, commerce, and local travel inconveniences for local travelers. SR1 is also an important emergency evacuation route, and its closure could have significant life safety issues during a coastal emergency.

Preferred Alternative: Completing the restoration of the beach and dune system along the North Beach shoreline by dredging sand from the ebb shoal will accommodate present and expected future demands for recreational beach areas along the Delaware Atlantic Coast. The SR1 is a critical link to all the beach communities along the Delaware Coast and is important to the seasonal coastal economy. The influx of seasonal population is reflected by a greater demand for social services such as housing, transportation, health, safety, and sanitation facilities. The coastal communities are supported by a tourist economy, which they cannot afford to lose, and their expansion would provide fuller employment and greater revenues. As the demand for recreation gradually increases, it is expected that State and local efforts would be made to satisfy these needs. Because of this, noise and air quality levels would similarly degrade through personal activity and auto utilization. They will not however, become a significant problem. Various indicators of the presence and/or level of Corps activity in beachfront communities generally have no statistically significant relation to development in those areas. Thus, the statistical evidence indicates that the effect of the Corps on induced development is, at most, insignificant, compared to the general forces of economic growth which are stimulating development in these areas, many of which are induced through other municipal infrastructure developments such as roads, wastewater treatment facilities, etc. (USACE, 1995c). Implementation of the preferred alternative is expected to have long-term beneficial effects on socioeconomics.

Implementation of the preferred alternative is not expected to change or adversely impact existing land use within the affected area. The Coastal Barrier Resources Act restricts certain Federal expenditures for areas designated within the Coastal Barrier Resources System. The North Beach area is within an area designated as an “Otherwise Protected Area (OPA)”, which is part of DE-07P in Delaware Seashore State Park. OPAs only prohibit Federal funding for flood insurance. Therefore, the proposed project activities are not restricted in OPAs.

5.3.3 At Risk Communities

No Action: There are no at risk and disadvantaged communities within the affected area. Therefore, no action would not have any disproportional adverse or beneficial effects on disadvantaged communities.

Preferred Alternative: A review of the surrounding land uses of the affected areas does not indicate the presence of at risk and disadvantaged communities vulnerable to disproportionate adverse environmental effects within or immediately adjacent to the affected areas. Therefore, the proposed dredging and beachfill placement activities will not incur any direct or indirect effects on disadvantaged communities.

5.3.4 Recreation

No Action: With no action, significant erosion would continue to occur. Further, erosion will occur if there are any unforeseen shutdowns of the sand bypass plant that prevent periodic nourishment or following a major storm event that requires full beach and dune restoration. A diminished beach results in the loss of recreational beach. Overcrowding of any remaining available beach above the high tide line would occur along with the potential safety issues associated with exposed debris similar to what was experienced in 2024.

Preferred Alternative: Direct adverse effects on recreation are temporary and localized in nature. Project construction during warm season months may temporarily displace beachgoers such as bathers and others enjoying the beach within the immediate impact area. Recreational beachgoers engaged in sunbathing, surf fishing, surfing, skim boarding, bathing, etc. will be temporarily affected by the project, since the public will not be permitted to enter the actual work segments. However, since the project will be constructed in segments (approximately 1,000 feet long at a time), only the segment actually under construction will be closed to the public, which would typically last a few days to a week. Therefore, effects to beach and fishing access will be localized and relatively short-lived. This impact would be further minimized if beach nourishment activities were considered from late fall to early spring when beach recreation activities are minimal.

In the long-term, the project will not impede public access to the beach once construction activities are completed. Public access to the beaches in the affected areas will be maintained by the maintenance of existing dune walkovers and existing vehicle access ramps for authorized vehicles.

Boating and offshore fishing may be temporarily displaced in the vicinity of the dredging operations within the sand borrow areas for safety reasons. This impact is temporary and localized and boaters will be allowed to return to the borrow area(s) after construction ceases. Recreational fishing may be temporarily reduced in portions of the borrow area after dredging due to the temporary loss of benthic prey organisms, which provide a food source for some target species such as summer flounder or as a food source for other prey species. However, the borrow areas represent a small portion of available coastal waters.

It is generally regarded that shoreline areas with structure produce the best fishing spots and are frequently targeted for surf fishing. Structured areas can be natural or man-made. Natural structure along the Delaware Atlantic shoreline is formed by waves and currents in the form of cuts and sloughs with nearshore sand bars that can attract and hold fish. These areas are most pronounced where rip currents are present. Man-made structures that attract fish are in the forms of groins and jetties. These structures (man-made or natural) initially become buried during beach nourishment activities. After initial profile adjustment, portions of the North Beach jetty may become uncovered along the north side of the jetty, but the degree of its exposure is variable. A complete exposure would return this structure to a pre-project state but would likely signify that the beach is in need of periodic nourishment to perform its storm damage reduction purpose. Natural structure can also reform, but this would be dependent on post-fill profile adjustment and the formation of new cuts, sloughs and nearshore bars, particularly after storm events. Although fishing structure would initially be affected, targeted fish species may return to the filled areas within hours or days after a beachfill is completed (USACE, 2001).

5.3.5 Visual and Aesthetic Values

No Action: No action would result in adverse effects on aesthetics as continued erosion would diminish the natural beach landscape. This erosion, as experienced in 2024, resulted in the exposure of scattered debris along the remaining beach which also detracted from the aesthetic values of the North Beach.

Preferred Alternative: With dredging and beachfill placement, there are potentially two temporary adverse aesthetic effects that would come in the form of visual effects and odor effects that are expected to be present during and immediately after construction. These effects stem from the chemically reduced state of the beachfill material, which would initially be darker in color and may produce unpleasant odors (rotten egg odor) from the presence of naturally occurring hydrogen sulfide gas. Generally, if there is a high amount of organic material in the sediments, this impact would be more significant. However, since this material is predominantly sandy material (less than 1% total organic carbon), these effects are expected to be minor and temporary. The material once placed on the beach is expected to undergo chemical oxidation as the beach dewaters and sorts from the high wave energy and becomes exposed to direct sunlight. The sand is expected to become lighter, and any odors would quickly subside within a few days after pumping ceases. With the exception of short-term effects during construction, overall aesthetics of the beach would be improved as a result. A natural-looking beach and dune would be more aesthetically pleasing and attractive to beachgoers.

6.0 COORDINATION AND COMPLIANCE WITH ENVIRONMENTAL STATUTES

A Notice of Availability of the draft Environmental Assessment was released via public notice on March 20, 2025 for public and agency review and comment on the Philadelphia District's website at https://www.nap.usace.army.mil/Missions/Civil-Works/Public-Notices-Reports/. Copies of the link to the draft Environmental Assessment were provided by e-mail letter to key federal and state agencies including the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, the National Marine Fisheries Service and the Delaware Department of Natural Resources and Environmental Control for review and comment. Comments received on the documents are provided in Appendix F with responses, as appropriate.

Table 18 provides a complete listing of compliance status relative to environmental quality protection statutes and other environmental review requirements for the proposed action.

Table 18. Compliance with Environmental Quality Protection Statutes and Other Environmental Review Requirements

FEDERAL STATUTES	COMPLIANCE W/PROPOSED PLAN
Archeological - Resources Protection Act of 1979, as amended	Full
Clean Air Act, as amended	Full
Clean Water Act of 1977	Full
Coastal Barrier Resources Act	Full
Coastal Zone Management Act of 1972, as amended	Full
Endangered Species Act of 1973, as amended	Full
Estuary Protection Act	Full
Federal Water Project Recreation Act, as amended	N/A
Fish and Wildlife Coordination Act	Full
Land and Water Conservation Fund Act, as amended	N/A
Marine Protection, Research and Sanctuaries Act	Full
Magnuson-Stevens Fishery Conservation and Management Act	Full
National Historic Preservation Act of 1966, as amended	Full
National Environmental Policy Act, as amended	Full
Rivers and Harbors Act	Full
Watershed Protection and Flood Prevention Act	N/A
Wild and Scenic River Act	N/A
Executive Orders, Memorandums, etc.	
EO 11988, Floodplain Management	Full
EO 11990, Protection of Wetlands	Full
EO12114, Environmental Effects of Major Federal Actions	Full
County Land Use Plan	Full

Full Compliance - Requirements of the statute, EO, or other environmental requirements are met for the current stage of review.
Partial Compliance - Some requirements and permits of the statute, E.O., or other policy and related regulations remain to be met.
Noncompliance - None of the requirements of the statute, E.O., or other policy and related regulations have been met.
N/A - Statute, E.O. or other policy and related regulations are not applicable.

- **National Environmental Policy Act (NEPA)**: Section 1.0 provides a list of previous NEPA documents incorporated by reference. This EA evaluates a proposed new sand borrow area, the Indian River Inlet Ebb Shoal, and the continued use of the Indian River Inlet Flood Shoal sand borrow area. These borrow areas would be used to supplement the Delaware Coast Protection - Indian River Inlet Sand Bypass Project. Full compliance with NEPA for these changes will be achieved following the full consideration of public and agency comments and a determination that a Finding of No Significant Impact (FONSI) is appropriate. A signed FONSI is provided in the front of this document.
- **Endangered Species Act (ESA):** Formal consultation with NMFS was concluded in 2014 with a Programmatic Biological Opinion (NMFS, 2014), which included the Indian River Inlet Sand Bypass Plant and the use of the Indian River Inlet Flood Shoal. NMFS concluded "that the proposed actions may adversely affect but are not likely to jeopardize the continued existence of the Gulf of Maine, New York Bight, Chesapeake Bay and South Atlantic DPS of Atlantic sturgeon, Kemp's ridley or green sea turtles or the Northwest Atlantic DPS of loggerhead sea turtles and is not likely to adversely affect leatherback sea turtles, the Carolina DPS of Atlantic sturgeon, right, fin or humpback whales. Because no critical habitat is designated in the action area, none will be affected by the proposed action." Since the Indian River Inlet Ebb Shoal was not included in the PBO, an analysis of the effects of the modified plan for IRI was provided to NMFS. NMFS concurred that based on the effects of the action that reinitiation of consultation is not required at this time. The USACE has made a determination based on an IPaC review that the preferred alternative will have "no effect" on the roseate tern and a NLAA determination for the seabeach amaranth and monarch butterfly. The USFWS has concurred with these determinations.
- **Fish and Wildlife Coordination Act (FWCA):** The draft EA was distributed to the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for review and comment in accordance with the FWCA. Comments from both agencies were provided in Appendix F.
- **Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (Essential Fish Habitat)**. An evaluation to address the dredging and placement of beachfill is provided in Sections 4.0 and 5.0 and Appendix D of this document. A copy of the draft EA was provided to NMFS for review in accordance with the MSFCMA. Conservation recommendations were provided by the National Marine Fisheries Service in Appendix F.
- **Clean Water Act Section 404(b)(1) Evaluation**. A Section 404(b)(1) evaluation to address the discharges associated with dredging and placement of beachfill along the North Beach shoreline is provided in Appendix A.
- **Clean Water Act Section 401 Water Quality Certification (WQC).** A Section 401 WQC was provided by DNREC (Appendix F) authorizing the use of the proposed sand sources and beachfill placement along the North Beach shoreline.
- **Coastal Zone Management Act - Federal Consistency Determination.** The proposed use of the Indian River Inlet Ebb Shoal and Indian River Inlet Flood Shoal and placement of beachfill in 2025 and potential future placements on an as needed basis were reviewed in accordance with Delaware Coastal Management Program Policies. A Federal Consistency Certification request was submitted to the Delaware Coastal

Management Program (DECMP) upon submittal of the Draft EA for public review. Compliance was achieved upon a concurrence with the Corps' Federal Consistency determination by the Delaware Department of Natural Resources and Environmental Control.

- **Coastal Barrier Resources Act (CBRA).** The North Beach area is within an "Otherwise Protected Area" (OPA), which is part of DE-07P in Delaware Seashore State Park. OPAs only prohibit Federal funding for flood insurance. Project activities are not restricted in OPAs.
- **Section 106 National Historic Preservation Act**. The USACE has determined that the preferred plan will have "no effect" on properties eligible for, or listed in, the NRHP. A concurrence was provided by the Delaware State Historic Preservation Officer (DESHPO).
- **Clean Air Act (CAA)**. The proposed action is not expected to exceed thresholds for NOx and VOCs based on analyses that assumed a fixed quantity of sand (500,000 cubic yards). A Record of Non-Applicability (RONA) is provided in Appendix B with supporting analysis.

7.0 CONCLUSIONS

This EA evaluated the environmental effects of the utilization of two proposed sand borrow areas (Indian River Inlet Ebb Shoal and Indian River Inlet Flood Shoal) to support the restoration of the berm and dune of the Indian River Inlet North Beach shoreline extending for a distance of 5,000 feet north of the north jetty. Effects associated with dredging in the sand borrow areas are considered to be temporary and minor on marine biota. The Indian River Inlet Ebb Shoal A will be utilized to complete the Phase 2 restoration of the beach in 2025. Subsequent needs for additional sand resources utilizing the southern lobe of IRI Ebb Shoal B would require supplemental investigations to be undertaken for submerged cultural resources, benthic community and sand quality analyses.

Based on the information presented and continuing coordination with State and Federal resource agencies, no significant adverse environmental effects are expected to occur as a result of the proposed action. Since the potential effects identified have been determined to be minor, localized and temporary, the preparation of a new or Supplemental Environmental Impact Statement is not warranted and a Finding of No Significant Impact (FONSI) for the proposed action is appropriate.

8.0 REFERENCES

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APPENDIX-A

CLEAN WATER ACT SECTION 404(B)(1) EVALUATION

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EVALUATION OF 404 (b)(1) GUIDELINES

A review of the effects associated with discharges of dredged or fill material to waters of the United States for the Indian River Inlet Ebb and Flood shoal dredging and subsequent beachfill placement on the North Beach side of the inlet in Delaware Seashore State Park, Sussex County, Delaware is required by Section 404(b)(1) of the Clean Water Act, as amended (Public Law 92-500).

I. PROJECT DESCRIPTION

A. Location

The project discharge site is located along a 5,000 ft. stretch of beach (North Beach) on the north side of Indian River Inlet in Sussex County, Delaware. Dredging for sand would either occur within the Indian River Inlet Ebb Shoal (offshore of the inlet) or the Indian River Inlet Flood Shoal (inshore of the inlet).

B. General Description

The beachfill portion of the project consists of a design template with a 100-foot berm at an elevation of +9.2 feet NAVD with a dune at elevation +16.0 feet NAVD. The berm width may be considerably wider than 100 feet to accommodate advanced (sacrificial) nourishment quantities and to hold a construction template profile. The proposed work includes the completion of the Phase 2 restoration of the North Beach shoreline, which consists of dredging 500,000 cubic yards of sand from the Indian River Inlet Ebb Shoal and placement of sand along a 5,000-foot stretch of beach along the North Beach shoreline to reconstruct the beach berm and dune to its design dimensions. The plan also consists of future nourishment/restoration activities to supplement the sand bypass plant operation and/or to make major repairs following significant storm/erosion events. The supplemental sand sources would be either the Indian River Inlet Flood Shoal or Ebb Shoal. This project was first constructed in 1990 and has been maintained by routine periodic nourishment (operation of the sand bypass facility) and storm repairs in accordance with PL-84-99 under the Flood Control and Coastal Emergencies (FCCE) Program. Beachfill quantities and extents will vary depending on conditions and needs at the time of each placement and emergency storm repairs in order to maintain the design template.

C. Authority and Purpose

The Delaware Coast Protection project is a Flood and Coastal Storm Damage Reduction project, which is authorized by the Flood Control Act of 1968 and the Water Resources Development Act of 1986 (P.L. 99-662). This project was authorized to address chronic beach erosion along the North Beach of the Indian River inlet caused by the inlet jetties. Here, the jetties interrupt the northward longshore transport of sand resulting in a deficiency of sand on the north side of the inlet. The plan of improvement consists of constructing a sand bypassing plant and operation of said plant for periodic nourishment of a feeder beach (approximately 100,000 cubic yards of sand, annually) to nourish approximately 3,500 feet of feeder beach on the north side of the inlet and protect the Delaware Route 1 highway. Initial construction was completed in 1990, and the sand bypass plant has been subsequently operated and maintained by the non-Federal sponsor, the Delaware Department of Natural Resources and Environmental Control. In 2013, USACE conducted a major emergency repair of the beach in response to a disaster declaration from Hurricane Sandy under the

P.L. 84-99 (Flood Control and Coastal Emergencies) utilizing the interior flood shoal as a sand source where approximately, 520,000 cubic yards of sand was used to restore a 5,000-foot segment of beach and dune north of the inlet.

The purpose of the Project is to restore the severely eroded berm and dune system at North Beach using beachfill material (sand) back to the project template dimensions as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

D. General Description of Dredged or Fill Material

1. General Characteristics of Material.
> 90% Fine to Medium Sands with trace gravels/silts

2. Quantity of Material. The quantity of material required to be discharged is approximately 500,000 cubic yards for completion of Phase 2 and up to 800,000 cubic yards for subsequent beach restorations along the North Beach.

3. Source of Material.

The source of material would be from the Indian River Inlet Ebb Shoal for completion of Phase 2 of the North Beach restoration and either the Indian River Inlet Flood Shoal or Indian River Inlet Ebb Shoal for future needs for either supplementing the Indian River Inlet Sand Bypass operation or for major storm damage repairs and erosion.

E. Description of the Proposed Discharge Site

1. Location. The proposed discharge locations include the upper beach and dunes, lower beach intertidal areas and nearshore areas of the Indian River Inlet North Beach shoreline.

2. Size. 30 acres (the approximate footprint of fill below MHW)

3. Type of Site. Aquatic/shoreline (sandy beach)

4. Type(s) of Habitat. Tidal/marine sandy beach, tidal estuarine open water (flood shoal), and tidal marine open water (ebb shoal)

5. Timing and Duration of Discharge. Approximately 2-3 months for total project construction

F. Description of Discharge Method

Material will be placed using a hydraulic pipeline dredge

II. FACTUAL DETERMINATION

A. Physical Substrate Determinations

1. **Substrate Elevation and Slope.** The beachfill construction template will have a berm elevation of +9.2 ft NAVD with a foreshore slope of 5 Horizontal:1 Vertical. This slope is expected to become flatter as wave action redistributes the beachfill, which will change the profile after construction.

2. **Sediment Type.** > 90% sand

3. **Dredged/Fill Material Movement.** The planned construction would establish an initial construction template, which is wider than the final intended design template or profile. It is expected that the placement, erosion and sorting would be the primary processes resulting in the change to the design template. The loss or winnowing of fine grain materials into the water column would occur during the initial settlement. These materials may become re-deposited within subtidal nearshore waters and reworked and re-distributed by tidal and long-shore currents.

4. **Physical Effects on Benthos.** The proposed construction and discharges would result in initial burial of the existing beach and nearshore benthic communities when this material is discharged during berm construction. Substrate is expected to be composed of material that is similar to existing substrate, which is expected to become recolonized by the same type of benthos that previously existed at the location.

5. **Other Effects.** Other effects would include a temporary increase in suspended sediment load and a change in the beach profile, particularly in reference to elevation. Bathymetric changes in the placement site would raise the bottom several feet, which would be offset seaward.

6. **Actions Taken to Minimize Impacts.** Actions taken to minimize impacts include selection of fill material that is similar in nature to the pre-existing substrate.

B. Water Circulation, Fluctuation, and Salinity Determinations

1. **Water. Consider effects on:**

   a. **Salinity** - No effect.
   b. **Water chemistry** - No significant effect.
   c. **Clarity** - Minor short-term increase in turbidity during construction.
   d. **Color** - No effect.
   e. **Odor** - No significant effect.
   f. **Taste** - No effect.
   g. **Dissolved gas levels** - No significant effect.
   h. **Nutrients** - Minor effect.
   i. **Eutrophication** - No effect.
   j. **Others as appropriate** - None.

2. **Current patterns and circulation**

   a. **Current patterns and flow** – Minor effects to circulation patterns and flow in the beach zone and nearshore where the existing circulation pattern and flow would be offset seaward the width of the beachfill placement.

   b. **Velocity** - No effects on tidal velocity and longshore current velocity regimes.

   c. **Stratification** - Thermal stratification normally occurs beyond the mixing region created by the surf zone. The normal pattern should continue after construction of the proposed project.

   d. **Hydrologic regime** - The regime is tidal marine. This will remain the case following construction of the proposed project.

3. **Normal water level fluctuations** - The tides are semidiurnal. The mean tide range for the area is 3.6 feet. Beachfill placement would not affect the tidal regime. Mean High Water occurs at +1.3 ft. NAVD and Mean Low Water occurs at -2.3 ft. NAVD.

4. **Salinity gradients** - There should be no significant effect on the existing salinity gradients.

5. **Actions that will be taken to minimize impacts**- None are required; however, utilization of clean sand that matches existing beach sand would minimize water chemistry effects.

C. <u>Suspended Particulate/Turbidity Determinations</u>

1. **Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal (Beachfill Placement) Site** - There would be a short-term elevation of suspended particulate concentrations during construction phases in the immediate vicinity of the fill discharge locations. Elevated levels of particulate concentrations at the discharge locations may also result from "washout" after beachfill is placed.

2. **Effects (degree and duration) on Chemical and Physical Properties of the Water Column** -

   a. **Light penetration** - Short-term, limited reductions would be expected at the discharge sites from fill placement and berm washout, respectively.

   b. **Dissolved oxygen** - There is a potential for a decrease in dissolved oxygen levels but the anticipated low levels of organics in the fill material should not generate a high, if any, oxygen demand.

   c. **Toxic metals and organics** – No effect. Testing of sands do not indicate the presence of any significant contaminants.

d. **Pathogens** – No significant effect. However, temporary increases in indicator bacteria levels may occur during beachfill discharges as bottom sediments in the intertidal and nearshore become stirred-up during the discharge.

e. **Aesthetics** - Minor adverse and temporary effects limited to the construction period. Sand color would initially be darker, but would lighten within a short time period following placement.

3. **Effects on Biota**

a. **Primary production, photosynthesis** - Minor, short-term effects related to turbidity.

b. **Suspension/filter feeders** - Minor, short-term effects related to suspended particulates outside the immediate deposition zone. Sessile organisms would be subject to burial if within the deposition area.

c. **Sight feeders** - Minor, short-term effects related to turbidity.

4. **Actions taken to minimize impacts** include the selection of clean sand with a small fine grain component and a low organic content. Standard construction practices would also be employed to minimize turbidity and erosion.

D. <u>Contaminant Determinations</u>

The material is not expected to introduce, relocate, or increase contaminant levels at the placement location.

E. <u>Aquatic Ecosystem and Organism Determinations</u>

1. **Effects on Plankton** - The effects on plankton should be minor and mostly related to light level reduction due to turbidity. Significant dissolved oxygen level reductions are not anticipated.

2. **Effects on Benthos** – Initially, sand placement would result in the burial of benthos within the discharge (beachfill) location. The losses of benthic organisms are somewhat offset by the expected rapid opportunistic recolonization from adjacent areas that would occur following cessation of construction activities. Recolonization is expected to occur rapidly in the discharge (beachfill placement) area through horizontal and in some cases vertical migrations of benthos. Some minor losses of benthos associated with rocky intertidal habitat are expected, as portions of the inlet jetty would become temporarily covered with beachfill material.

3. **Effects on Nekton** - Only a temporary displacement is expected, as the nekton would probably avoid the active work area. The proposed action is not expected to have significant adverse effects on essential fish habitat (EFH) for the species and their life stages identified within the impact area.

4. **Effects on Aquatic Food Web** – Localized effects in the affected areas due to loss of benthos as a food source through burial at the beachfill placement site. This is expected to be short-term as the beachfill placement sites could become recolonized by benthos within a few days or weeks.

5. **Effects on Special Aquatic Sites** - No special aquatic sites such as sanctuaries and refuges, wetlands, mud flats, vegetated shallows, coral reefs and riffle and pool complexes are present at the discharge site.

6. **Threatened and Endangered Species** - The piping plover (*Charadrius melodus*), a Federal and State threatened species, utilizes sandy beach habitat in Delaware. This bird nests on the beach, however, no nesting sites have been reported within the project impact area. The sea beach amaranth (*Amaranthus pumilus*) is a Federally threatened plant that can be found on the upper beach and lower dunes in along the Atlantic Coast Beaches of Delaware. However, this plant has not been identified within the project impact area. The rufa red knot (*Calidris canutus rufa*) could occur in the area, but the USFWS has concluded that its use of the project area would be minimal. Beachfill placement in the intertidal and shallow nearshore is not expected to affect the Federally threatened or endangered Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*), sea turtles, and whales.

7. **Other Wildlife** - The proposed plan would not significantly affect other wildlife.

8. **Actions to minimize impacts** – None required. The utilization of suitable sand as beachfill minimizes effects to benthic and pelagic organisms at the discharge locations.

F. <u>Proposed Disposal/Discharge (Beachfill Placement) Site Determinations</u>

1. **Mixing Zone Determination**

   a. **Depth of water** - 0 to-10 feet NAVD
   b. **Current velocity** - Generally less than 3 feet per second
   c. **Degree of turbulence** - Moderate to high
   d. **Stratification** - None
   e. **Discharge vessel speed and direction** - Not applicable
   f. **Rate of discharge** – N/A. Rate is continuous with a hydraulic pipeline dredge with intermittent shutdowns. Fill manipulation with dozers will also affect rate of discharge.
   g. **Dredged material characteristics** - Medium-fine sand and gravels with low silts, clays and organics
   h. **Number of discharge actions per unit time** - Continuous over the construction period

2. **Determination of Compliance with Applicable Water Quality Standards** - Prior to construction, a Section 401 Water Quality Certificate will be obtained from the State of Delaware.

3. **Potential Effects on Human Use Characteristics** -

a. **Municipal and private water supply** - No effect

b. **Recreational and commercial fisheries** - Short-term effect during construction; there would be a temporary disruption to fisheries at the placement locations where finfish may avoid construction area. Burial of benthos would result in temporary loss of food source for finfish. Beach access for recreational fisherman may be temporarily restricted in segments during construction.

c. **Water related recreation** - Short-term effect during construction where potential beachgoers, bathers, surfers, and surf-fishermen would be prohibited from accessing active construction locations.

d. **Aesthetics** - Short-term adverse effects to noise sight and smell during construction are anticipated.

e. **Parks, national and historic monuments, national seashores, wilderness areas, research sites and similar preserves** – No effects.

G. **<u>Determination of Cumulative Effects on the Aquatic Ecosystem</u>**- Effects on benthos and the aquatic ecosystem in general are considered to be temporary and do not represent a significant loss of habitat. This action in concert with other existing or proposed similar actions, may produce measurable temporary cumulative effects to benthic resources. However these effects are short-term.

H. **<u>Determination of Secondary Effects on the Aquatic Ecosystem</u>** – Secondary effects such as turbidity on aquatic organisms or temporary loss of food sources through the burial of benthos are considered to be of short duration.

III. <u>FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE</u>

A. **Adaptation of the Section 404(b)(1) Guidelines to this Evaluation.** No significant adaptation of the Section 404(b)(1) Guidelines were made relative to this evaluation.

B. **Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site, Which Would Have Less Adverse Impact on the Aquatic Ecosystem.** The alternative measures considered for accomplishing the project objectives were previously evaluated in USACE (1984) and Section 3.0 of the Environmental Assessment. The No Action alternative would likely have less adverse effects on the aquatic ecosystem.

C. **Compliance with Applicable State Water Quality Standards.** This action is not expected to violate State of Delaware Water Quality Standards. A Section 401 water quality certificate will be obtained from the Delaware Department of Natural Resources and Environmental Control prior to initiation of discharges associated with this project.

D. **Compliance with Applicable Toxic Effluent Standards or Prohibition Under Section 307 of the Clean Water Act.** The proposed action is not expected to violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

E. **Compliance with Endangered Species Act.** The selected plan will comply with the Endangered Species Act of 1973. Informal Section 7 consultation will be completed with the U.S. Fish and Wildlife Service and NMFS for this the project prior to project construction.

F. **Compliance with Specified Protection Measures for Marine Sanctuaries Designated by the Marine Protection, Research, and Sanctuaries Act of 1972.** The proposed action will not violate the protective measures for any Marine Sanctuaries designated by the Marine Protection, Research, and Sanctuaries Act of 1972.

G. **Evaluation of Extent of Degradation of the Waters of the United States.** The proposed action is not expected to result in permanent significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Significant adverse effects on life stages of aquatic life and other wildlife dependent on aquatic ecosystems; aquatic ecosystem diversity, productivity, and stability; and recreational, aesthetic, and economic values is not expected to occur or have long-term effects on impacted resources.

H. **Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem.** Appropriate steps to minimize potential adverse effects of the discharge on aquatic systems include selection of fill material that is low in silt content, has little organic material, and is expected to be uncontaminated.

I. **On the basis of the guidelines**, the proposed discharge sites for the dredged material is specified as complying with the requirements of these guidelines, with the inclusion of appropriate and practical conditions to minimize pollution or adverse effects on the aquatic ecosystem.

APPENDIX-B

CLEAN AIR ACT RECORD OF NON-APPLICABILITY

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RECORD OF NON-APPLICABILITY (RONA)

Project Name: Delaware Coast Protection – Indian River Inlet North Beach Restoration

Project/Action Point of Contact: Steven Allen, CENAP-PL-E

Begin Date: August 2025

End Date: November 2025

1. Project Description: The Delaware Coast Protection project is a Flood and Coastal Storm Damage Reduction project, which is authorized by the Flood Control Act of 1968 and the Water Resources Development Act of 1986 (P.L. 99-662). This project was authorized to address chronic beach erosion along the North Beach of the Indian River inlet caused by the inlet jetties. Here, the jetties interrupt the northward longshore transport of sand resulting in a deficiency of sand on the north side of the inlet. The plan of improvement consists of constructing a sand bypassing plant and operation of said plant for periodic nourishment of a feeder beach (approximately 100,000 cubic yards of sand, annually) to nourish approximately 3,500 feet of feeder beach on the north side of the inlet and protect the Delaware Route 1 highway. Initial construction was completed in 1990, and the sand bypass plant has been subsequently operated and maintained by the non-Federal sponsor, the Delaware Department of Natural Resources and Environmental Control. The purpose of the Project is to restore the severely eroded berm and dune system at North Beach using beachfill material (sand) back to the project template dimensions as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

2. The proposed work includes the completion of the Phase 2 restoration of the North Beach shoreline, which consists of the dredging of 500,000 cubic yards of sand from the Indian River Inlet Ebb Shoal and placement of sand along a 5,000-foot stretch of beach along the North Beach shoreline to reconstruct the beach berm and dune to its design dimensions. The plan also consists of future nourishment/restoration activities to supplement the sand bypass plant operation and/or to make major repairs following significant storm/erosion events.

3. An emissions estimate was completed to determine the Nitrogen Oxides (NOx) and Volatile Organic Carbon (VOC) emissions (precursors to ozone formation) associated with the sand quantity required to complete Phase 2 of the North Beach restoration. This sand quantity is estimated at 500,000 cy. The dredging and placement of beachfill is calculated to generate a total of 64.4 tons of NOX and 1.9 tons of VOCs within one calendar year of work.

4. The project described above has been evaluated for Section 176 of the Clean Air Act. Project related emissions associated with the federal action were estimated to evaluate the applicability of General Conformity regulations (40CFR§93 Subpart B).

5. The project is located in Sussex County, Delaware, which has the following nonattainment-related designations with respect to the National Ambient Air Quality Standards (40CFR§81.133): Marginal Nonattainment 2008 8-hour Ozone Standard (primary and secondary).

6. The requirements of this rule do not apply because the total direct and indirect emissions from this project are less than the 100 tons trigger level for NO_x for each project year and significantly below the 50 tons trigger level for VOC (40CFR§93.153(b)(1) & (2)), as VOCs, are typically a fraction of total NOx emissions. The estimated emissions for the project for each pollutant are provided below.

CALENDAR YEAR	MONTHS	TONS NOx	TONS VOC
2025	3	64.4	1.9
TOTAL	**3**	**64.4**	**1.9**

7. The project conforms with the General Conformity requirements (40CFR§93.153(c)(1)) and is exempted from the requirements of 40 CFR §93 Subpart B.

/Electronically signed by Steven D. Allen/
for
Adrian Leary
Chief, Planning Division

Estimated NOX and VOX emissions calculator - CUTTER																							
Project:	FY25 Indian River Inlet North Beach Restoration																						
Mob/Demob duration (days):	20																						
Volume (CY):	500,000																						
Estimated production rate* (CY/day):	6,506																						
Percent Effective Time* (EWT):	43.8%																						
*based on W912BU12C0047 recorded data								CRITERIA POLLUTANTS										OTHER EMISSIONS					
								NOx	NOx	VOC	VOC	PM 2.5	PM 2.5	SOx	SOx	CO	CO	CO2	CO2	CH4	CH4	N2O	N2O
Equipment	**# of Engines**	**HP**	**Load Factor (LF)**	**Days of Operation**	**Hrs/Day**	**Total Hours**	**hp-hr**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**	**EF (g/hp-hr)**	**Emissions (tons)**
Water equipment																							
Mob/Demob																							
PIPELINE DREDGE, PRIME ENGINE	0	3400	0.66	20.0	12	0.0	0	9.70	0.00	0.20	0.00	0.51	0.00	0.005	0.00	1.06	0.00	515	0.00	0.067	0.00	0.015	0.00
PIPELINE DREDGE, ELECTRIC GENERATOR	1	830	0.40	20.0	12	240.0	79,680	7.50	0.66	0.20	0.02	0.29	0.03	0.005	0.000	1.27	0.11	515	45.23	0.067	0.01	0.015	0.00
PIPELINE DREDGE, DREDGE PUMP	0	1900	0.80	20.0	12	0.0	0	7.50	0.00	0.20	0.00	0.51	0.00	0.005	0.000	1.06	0.00	515	0.00	0.067	0.00	0.015	0.00
WORK TUG, PRIMARY	2	1000	0.69	20.0	12	480.0	331,200	9.70	3.54	0.37	0.14	0.51	0.19	0.005	0.002	1.06	0.39	515	188.02	0.067	0.02	0.015	0.01
WORK TUG, SECONDARY Electric	2	25	0.40	20.0	12	480.0	4,800	7.50	0.04	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.01	515	2.72	0.067	0.00	0.015	0.00
SURVEY BOAT, SHORE	1	210	0.50	14.0	12	168.0	17,640	9.70	0.19	0.37	0.01	0.51	0.01	0.005	0.000	1.06	0.02	515	10.01	0.067	0.00	0.015	0.00
SURVEY BOAT, SHORE, SECONDARY Electric	1	40	0.40	14.0	12	168.0	2,688	7.50	0.02	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.00	515	1.53	0.067	0.00	0.015	0.00
DERRICK, PRIMARY	1	200	0.40	20.0	12	240.0	19,200	7.50	0.16	0.20	0.00	0.51	0.01	0.005	0.000	1.06	0.02	515	10.90	0.067	0.00	0.015	0.00
DERRICK, SECONDARY Electric	1	40	0.20	20.0	12	240.0	1,920	7.50	0.02	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.00	515	1.09	0.067	0.00	0.015	0.00
TENDER TUG, PROPULSION	0	4000	0.69	20.0	12	0.0	0	9.70	0.00	0.37	0.00	0.51	0.00	0.005	0.000	1.06	0.00	515	0.00	0.067	0.00	0.015	0.00
TENDER TUG, SECONDARY	0	50	0.40	20.0	12	0.0	0	7.50	0.00	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.00	515	0.00	0.067	0.00	0.015	0.00
SUVEY BOAT, OFFSHORE	0	500	0.50	20.0	12	0.0	0	9.70	0.00	0.20	0.00	0.51	0.00	0.005	0.000	1.06	0.00	515	0.00	0.067	0.00	0.015	0.00
SUVEY BOAT, OFFSHORE, SECONDARY Electric	0	40	0.40	20.0	12	0.0	0	7.50	0.00	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.00	515	0.00	0.067	0.00	0.015	0.00
Dredging																							
PIPELINE DREDGE, PRIME ENGINE	1	3400	0.66	76.9	10.51	807.9	1,812,860	9.70	19.38	0.20	0.40	0.51	1.02	0.005	0.010	1.06	2.12	515	1,029.13	0.067	0.13	0.015	0.03
PIPELINE DREDGE, ELECTRIC GENERATOR	1	830	0.40	76.9	10.51	807.9	268,213	7.50	2.22	0.20	0.06	0.29	0.09	0.005	0.001	1.27	0.38	515	152.26	0.067	0.02	0.015	0.00
PIPELINE DREDGE, DREDGE PUMP	1	1900	0.80	76.9	10.51	807.9	1,227,962	7.50	10.15	0.20	0.27	0.51	0.69	0.005	0.007	1.06	1.43	515	697.09	0.067	0.09	0.015	0.02
WORK TUG, PRIMARY	2	1000	0.69	76.9	10.51	1,615.7	1,114,860	9.70	11.92	0.37	0.45	0.51	0.63	0.005	0.006	1.06	1.30	515	632.88	0.067	0.08	0.015	0.02
WORK TUG, SECONDARY Electric	2	25	0.40	76.9	10.51	1,615.7	16,157	7.50	0.13	0.20	0.00	0.29	0.01	0.005	0.000	1.27	0.02	515	9.17	0.067	0.00	0.015	0.00
SURVEY BOAT, SHORE	1	210	0.50	76.9	10.51	807.9	84,826	9.70	0.91	0.37	0.03	0.51	0.05	0.005	0.000	1.06	0.10	515	48.15	0.067	0.01	0.015	0.00
SURVEY BOAT, SHORE, SECONDARY Electric	1	40	0.40	76.9	10.51	807.9	12,926	7.50	0.11	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.02	515	7.34	0.067	0.00	0.015	0.00
DERRICK, PRIMARY	1	200	0.40	76.9	10.51	807.9	64,630	7.50	0.53	0.20	0.01	0.51	0.04	0.005	0.000	1.06	0.08	515	36.69	0.067	0.00	0.015	0.00
DERRICK, SECONDARY Electric	1	40	0.20	76.9	10.51	807.9	6,463	7.50	0.05	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.01	515	3.67	0.067	0.00	0.015	0.00

TENDER TUG, PROPULSION	1	1000	0.69	76.9	10.51	807.9	557,430	9.70	5.96	0.37	0.23	0.51	0.31	0.005	0.003	1.06	0.65	515	316.44	0.067	0.04	0.015	0.01
TENDER TUG, SECONDARY	1	50	0.40	76.9	10.51	807.9	16,157	7.50	0.13	0.20	0.00	0.29	0.01	0.005	0.000	1.27	0.02	515	9.17	0.067	0.00	0.015	0.00
SURVEY BOAT, OFFSHORE	0	500	0.50	76.9	10.51	0.0	0	9.70	0.00	0.20	0.00	0.51	0.00	0.005	0.000	1.06	0.00	515	0.00	0.067	0.00	0.015	0.00
SURVEY BOAT, OFFSHORE, SECONDARY Electric	1	40	0.40	76.9	10.51	807.9	12,926	7.50	0.11	0.20	0.00	0.29	0.00	0.005	0.000	1.27	0.02	515	7.34	0.067	0.00	0.015	0.00
Land equipment (assumes tier 2 engines)																							
Mob/Demob																							
TRUCK TRAILER, LOWBOY, 75 TON, 3 AXLE (ADD TOWING TRUCK)	2	310	0.59	20.0	8	320.00	58,528	10.72	0.69	0.66	0.04	0.16	0.01	0.005	0.000	1.21	0.08	536	34.58	0.034	0.00	0.015	0.00
TRUCK, HIGHWAY, 55,000 LBS (24,948KG) GVW, 6X4, 3 AXLE, (ADD ACCESSORIES)	1	310	0.59	20.0	8	160.00	29,264	10.72	0.35	0.66	0.02	0.16	0.01	0.005	0.000	1.21	0.04	536	17.29	0.034	0.00	0.015	0.00
LOADER/BACKHOE, WHEEL, 0.80 CY FRONT END BUCKET, 9.8' DEPTH OF HOE, 24" DIPPER, 4X4	1	78	0.59	20.0	8	160.00	7,363	9.50	0.19	1.30	0.01	0.16	0.00	0.005	0.000	1.21	0.01	694	5.63	0.034	0.00	0.015	0.00
TRUCK, HIGHWAY, CONVENTIONAL, 8,600 LBS (3,901KG)GVW, 4X2, 2 AXLE, 3/4 TON -PICKUP	4	135	0.59	20.0	8	640.00	50,976	10.33	0.58	0.54	0.03	0.16	0.01	0.005	0.000	1.21	0.07	536	30.12	0.034	0.00	0.015	0.00
																					0.00	0.015	0.00
Dredged Material Placement																					0.00	0.015	0.00
TRUCK, HIGHWAY, 8,600 GVW, 4X4 (SUBURBAN)	2	135	0.59	76.9	10.51	1,615.74	128,694	10.33	1.47	0.54	0.08	0.16	0.02	0.005	0.001	1.21	0.17	536	76.04	0.034	0.00	0.015	0.00
TRACTOR ATTACHMENTS, BLADE, UNIVERSAL, HYDRAULIC, FOR D9, 21.40 CY (ADD D9 TRACTOR)	0	0	0	76.9	10.51	0.00	0	4.90	0.00	1.30	0.00	0.16	0.00	0.005	0.000	1.21	0.00	536	0.00	0.034	0.00	0.015	0.00
TRACTOR, CRAWLER (DOZER), 410 HP, POWERSHIFT, W/17.7 CY SEMI-U BLADE (ADD ATTACHMENTS)	2	410	0.59	76.9	10.51	1,615.74	390,847	9.50	4.09	0.19	0.08	0.16	0.07	0.005	0.002	1.21	0.52	595	256.34	0.034	0.01	0.015	0.01
LOADER, FRONT END, WHEEL, INTEGRATED TOOL CARRIER, 1.75 CY (1.3 M3) LOADER; 6,303 LB (2,859 KG) @ 12.17' (3.7 M) HIGH, FORK LIFT, OR 1,841 LB (835 KG) @ 22.42' (6.8 M) HIGH, MATERIAL HANDLING ARM	1	90	0.59	76.9	10.51	807.87	42,898	9.50	0.45	0.19	0.01	0.16	0.01	0.005	0.000	1.21	0.06	694	32.82	0.034	0.00	0.015	0.00
LOADER/BACKHOE, WHEEL, 0.80 CY FRONT END BUCKET, 9.8' DEPTH OF HOE, 24" DIPPER, 4X4	1	78	0.59	76.9	10.51	807.87	37,178	9.50	0.39	0.19	0.01	0.16	0.01	0.005	0.000	1.21	0.05	694	28.44	0.034	0.00	0.015	0.00
TOTAL EMISSIONS (tons)									64.44		1.92		3.21		0.04		7.70		3,690.09		0.45		0.11
(Sussex County)																							
CLEAN AIR ACT GENERAL CONFORMITY RULE LIMIT (THRESHOLD TONS/YEAR)									100.00		50.00												
Emissions Factors Obtained from:																							
South Shore of Staten Island (SSSI) Feasibility Study/EIS																							
Equipment Emission Estimates																							
and NY/NJ Harbor and Tributaries Feasibility Study/EIS																							

APPENDIX-C

ENDANGERED SPECIES ACT CONSULTATION

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chesapeake Bay Ecological Services Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401-7307
Phone: (410) 573-4599 Fax: (410) 266-9127

In Reply Refer To: 02/27/2025 19:35:15 UTC
Project code: 2025-0062061
Project Name: Delaware Coast Protection Indian River Inlet North Beach Restoration

Federal Nexus: yes
Federal Action Agency (if applicable): Army Corps of Engineers

Subject: Technical assistance for 'Delaware Coast Protection Indian River Inlet North Beach Restoration'

Dear Steven Allen:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on February 27, 2025, for “Delaware Coast Protection Indian River Inlet North Beach Restoration” (here forward, Project). This project has been assigned Project Code 2025-0062061 and all future correspondence should clearly reference this number.

The Service developed the IPaC system and associated species’ determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northeast Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative effect(s)), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17). Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no further consultation with, or concurrence from, the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect (NLAA)" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13]).

The IPaC results indicated the following species is (are) potentially present in your project area and, based on your responses to the Service's Northeast DKey, you determined the proposed Project will have the following effect determinations:

Species	**Listing Status**	**Determination**
Roseate Tern (*Sterna dougallii dougallii*)	Endangered	No effect
Seabeach Amaranth (*Amaranthus pumilus*)	Threatened	May affect

Consultation with the Service is not complete. Further consultation or coordination with the Service is necessary for those species or designated critical habitats with a determination of "May Affect". Please contact our Chesapeake Bay Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species or designated critical habitats.

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and are not covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Proposed Threatened

Please Note: If the Action may impact bald or golden eagles, additional coordination with the Service under the Bald and Golden Eagle Protection Act (BGEPA) (54 Stat. 250, as amended, 16 U.S.C. 668a-d) by the prospective permittee may be required. Please contact the Migratory Birds Permit Office, (413) 253-8643, or PermitsR5MB@fws.gov, with any questions regarding potential impacts to Eagles.

If you have any questions regarding this letter or need further assistance, please contact the Chesapeake Bay Ecological Services Field Office and reference the Project Code associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Delaware Coast Protection Indian River Inlet North Beach Restoration

2. Description

The following description was provided for the project 'Delaware Coast Protection Indian River Inlet North Beach Restoration':

> The action being undertaken by USACE is to complete the Phase 2 portion of the beach berm and dune restoration of approximately 5,000 feet of shoreline on the north side of Indian River Inlet. The Delaware DNREC is completing the first phase (Phase 1) with the placement of approximately 300,000 cubic yards of sand being dredged from the Indian River Inlet Flood Shoal and placed on the North Beach shoreline, which will end by April 1. The USACE Phase 2 will likely commence approximately in August 1 and end by December 31. The USACE Phase 2 component will complement the Phase 1 component, and involve the dredging of approximately 500,000 cubic yards of sand from the Indian River Inlet Ebb Shoal (offshore of the inlet in the Atlantic Ocean) via hydraulic cutter suction pipeline dredge and sand would be placed along the North Beach shoreline extending north approximately 5,000 feet from the IRI north jetty. The IRI Ebb shoal borrow area is approximately 192 acres of marine sandy bottom. Approximately 50 acres of this location will be deepened by approximately ten feet. The construction template of the beach will result in a 100 to 150-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 5H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes. The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted by the State of Delaware.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.6094932,-75.04332761776413,14z

QUALIFICATION INTERVIEW

1. As a representative of this project, do you agree that all items submitted represent the complete scope of the project details and you will answer questions truthfully?

   Yes

2. Does the proposed project include, or is it reasonably certain to cause, intentional take of listed species?

   Note: This question could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered, or proposed species.

   No

3. Is the action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   Yes

4. Is the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), or Federal Transit Administration (FTA) the lead agency for this project?

   No

5. Are you including in this analysis all impacts to federally listed species that may result from the entirety of the project (not just the activities under federal jurisdiction)?

   Note: If there are project activities that will impact listed species that are considered to be outside of the jurisdiction of the federal action agency submitting this key, contact your local Ecological Services Field Office to determine whether it is appropriate to use this key. If your Ecological Services Field Office agrees that impacts to listed species that are outside the federal action agency's jurisdiction will be addressed through a separate process, you can answer yes to this question and continue through the key.

   Yes

6. Are you the lead federal action agency or designated non-federal representative requesting concurrence on behalf of the lead Federal Action Agency?

   Yes

7. Is the lead federal action agency the Environmental Protection Agency (EPA) or Federal Communications Commission (FCC)?

   No

8. Is the lead federal action agency the Federal Energy Regulatory Commission (FERC)?

   No

9. Is the lead federal action agency the Natural Resources Conservation Service?

   No

10. Will the proposed project involve the use of herbicide where listed species are present?

    No

11. Are there any caves or anthropogenic features suitable for hibernating or roosting bats within the area expected to be impacted by the project?

    No

12. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **birds** (e.g., plane-based surveys, land-based or offshore wind turbines, communication towers, high voltage transmission lines, any type of towers with or without guy wires)?

    Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

13. Does any component of the project associated with this action include activities or structures that may pose a collision risk to **bats** (e.g., plane-based surveys, land-based or offshore wind turbines)?

    Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

    No

14. Will the proposed project result in permanent changes to water quantity in a stream or temporary changes that would be sufficient to result in impacts to listed species?

    For example, will the proposed project include any activities that would alter stream flow, such as water withdrawal, hydropower energy production, impoundments, intake structures, diversion structures, and/or turbines? Projects that include temporary and limited water reductions that will not displace listed species or appreciably change water availability for listed species (e.g. listed species will experience no changes to feeding, breeding or sheltering) can answer "No". Note: This question refers only to the amount of water present in a stream, other water quality factors, including sedimentation and turbidity, will be addressed in following questions.

    No

15. Will the proposed project affect wetlands where listed species are present?

    This includes, for example, project activities within wetlands, project activities within 300 feet of wetlands that may have impacts on wetlands, water withdrawals and/or discharge of contaminants (even with a NPDES).

    No

16. Will the proposed project activities (including upland project activities) occur within 0.125 miles of the water's edge of a stream or tributary of a stream where listed species may be present?

    No

17. Will the proposed project directly affect a streambed (below ordinary high water mark (OHWM)) of the stream or tributary where listed species may be present?

    No

18. Will the proposed project bore underneath (directional bore or horizontal directional drill) a stream where listed species may be present?

    No

19. Will the proposed project involve a new point source discharge into a stream or change an existing point source discharge (e.g., outfalls; leachate ponds) where listed species may be present?

    No

20. Will the proposed project involve the removal of excess sediment or debris, dredging or in-stream gravel mining where listed species may be present?

    No

21. Will the proposed project involve the creation of a new water-borne contaminant source where listed species may be present?

    Note New water-borne contaminant sources occur through improper storage, usage, or creation of chemicals. For example: leachate ponds and pits containing chemicals that are not NSF/ANSI 60 compliant have contaminated waterways. Sedimentation will be addressed in a separate question.

    No

22. Will the proposed project involve perennial stream loss, in a stream of tributary of a stream where listed species may be present, that would require an individual permit under 404 of the Clean Water Act?

    No

23. Will the proposed project involve blasting where listed species may be present?

    No

24. Will the proposed project include activities that could negatively affect fish movement temporarily or permanently (including fish stocking, harvesting, or creation of barriers to fish passage).

    No

25. Will the proposed project involve earth moving that could cause erosion and sedimentation, and/or contamination along a stream or tributary of a stream where listed species may be present?

    Note: Answer "Yes" to this question if erosion and sediment control measures will be used to protect the stream.

    No

26. Will the proposed project impact streams or tributaries of streams where listed species may be present through activities such as, but not limited to, valley fills, large-scale vegetation removal, and/or change in site topography?

    No

27. Will the proposed project involve vegetation removal within 200 feet of a perennial stream bank where aquatic listed species may be present?

    No

28. Will erosion and sedimentation control Best Management Practices (BMPs) associated with applicable state and/or Federal permits, be applied to the project? If BMPs have been provided by and/or coordinated with and approved by the appropriate Ecological Services Field Office, answer "Yes" to this question.

    No

29. Is the project being funded, lead, or managed in whole or in part by U.S Fish and Wildlife Restoration and Recovery Program (e.g., Partners, Coastal, Fisheries, Wildlife and Sport Fish Restoration, Refuges)?

    No

30. Will the proposed project result in changes to beach dynamics that may modify formation of habitat over time?

    Note: Examples of projects that result in changes to beach dynamics include 1) construction of offshore breakwaters and groins; 2) mining of sand from an updrift ebb tidal delta; 3) removing or adding beach sands; and 4) projects that stabilize dunes (including placement of sand fences or planting vegetation).

    Yes

31. [Hidden Semantic] Is the project area located within the roseate tern AOI?

    Automatically answered
    Yes

32. If you have determined that the roseate tern is unlikely to occur within your project's action area or that your project is unlikely to have any potential effects on the roseate tern, you may wish to make a "no effect" determination for the roseate tern. Additional guidance on how to make this decision can be found in the project review section of your local Ecological Services Field Office's website. CBFO: https://www.fws.gov/office/chesapeake-bay-ecological-services/project-review ; MEFO: https://www.fws.gov/office/maine-ecological-services ; NJFO: https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide ; NEFO: https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review#Step5 ; WVFO: https://www.fws.gov/office/west-virginia-ecological-services/project-planning. If you are unsure, answer "No" and continue through the key.

    Would you like to make a no effect determination for the roseate tern?

    Yes

33. [Hidden Semantic] Is the action area located within the seabeach amaranth AOI?

    Automatically answered
    Yes

34. If you have determined that seabeach amaranth is unlikely to occur within your project's action area or that your project is unlikely to have any potential effects on the seabeach amaranth, you may wish to make a "no effect" determination for the seabeach amaranth. Additional guidance on how to make this decision can be found in the project review section of your local Ecological Services Field Office's website. CBFO: https://www.fws.gov/office/chesapeake-bay-ecological-services/project-review ; MEFO: https://www.fws.gov/office/maine-ecological-services ; NJFO: https://www.fws.gov/office/new-jersey-ecological-services/new-jersey-field-office-project-review-guide ; NEFO: https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review#Step5 ; WVFO: https://www.fws.gov/office/west-virginia-ecological-services/project-planning. If you are unsure, answer "No" and continue through the key.

    Would you like to make a no effect determination for the seabeach amaranth?

    No

35. Did a qualified surveyor conduct a survey within the time frame when seabeach amaranth would be expected to be present and identifiable?

    Note: The following date ranges are the accepted survey times by State:
    Maryland - July 1 through September 30
    New York - May 1 through November 1
    New Jersey - May 15 through November 30

    No

36. Will the project involve direct impacts (crushing, burying, and/or digging, including placement of fill on sandy beaches where seabeach amaranth plants and/or seeds may be present) to seabeach amaranth plants or potential removal/burial of seeds?

    Yes

37. [Semantic] Does the project intersect the Virginia big-eared bat critical habitat?

    Automatically answered
    No

38. [Semantic] Does the project intersect the Indiana bat critical habitat?

    Automatically answered
    No

39. [Semantic] Does the project intersect the candy darter critical habitat?

    Automatically answered
    No

40. [Semantic] Does the project intersect the diamond darter critical habitat?

    Automatically answered
    No

41. [Semantic] Does the project intersect the Big Sandy crayfish critical habitat?

    Automatically answered
    No

42. [Hidden Semantic] Does the project intersect the Guyandotte River crayfish critical habitat?

    Automatically answered
    No

43. Do you have any other documents that you want to include with this submission?

    No

PROJECT QUESTIONNAIRE

1. Approximately how many acres of trees would the proposed project remove?

   0

2. Approximately how many total acres of disturbance are within the disturbance/construction limits of the proposed project?

   262

3. Briefly describe the habitat within the construction/disturbance limits of the project site.

   Dredging would occur within a 192-acre ebb shoal area offshore of Indian River Inlet. Dredging depths would vary but would have a maximum 10-foot cut. This area is very dynamic and is expected to infill with a new shoal feature. Beachfill slurry of sand would be pumped onto the North Beach affecting a 5,000 foot stretch of severely eroded Atlantic Coast shoreline extending north from the north jetty of Indian River Inlet. Approximately 70 acres of dune, beach, and shallow subtidal would be affected.

IPAC USER CONTACT INFORMATION

Agency: Army Corps of Engineers
Name: Steven Allen
Address: 1650 Arch Street
City: Philadelphia
State: PA
Zip: 19103-2004
Email steven.d.allen@usace.army.mil
Phone: 2156566559

DELAWARE COAST PROTECTION INDIAN RIVER INLET NORTH BEACH RESTORATION

BIOLOGICAL ANALYSIS

Prepared using IPaC

Generated by Steven Allen (steven.d.allen@usace.army.mil)

March 11, 2025

The purpose of this document is to assess the effects of the proposed project and determine whether the project may affect any federally threatened, endangered, proposed, or candidate species. If appropriate for the project, this document may be used as a biological assessment (BA), as it is prepared in accordance with legal requirements set forth under [Section 7 of the Endangered Species Act (16 U.S.C. 1536 (c))].

In this document, any data provided by U.S. Fish and Wildlife Service is based on data as of February 27, 2025.

Prepared using IPaC version 6.123.0-rc6

DELAWARE COAST PROTECTION INDIAN RIVER INLET NORTH BEACH RESTORATION BIOLOGICAL ASSESSMENT

TABLE OF CONTENTS

1 DESCRIPTION OF THE ACTION

1.1 PROJECT NAME

Delaware Coast Protection Indian River Inlet North Beach Restoration

1.2 EXECUTIVE SUMMARY

The purpose of the Project is to restore the severely eroded berm and dune system at North Beach using beachfill material (sand) back to the project template dimensions as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

The selected plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the North Beach shoreline. The Phase II portion of the beach berm and dune restoration will complement the Phase I portion to be completed by DNREC prior to Phase II. For the completion of the Phase II berm and dune restoration, approximately 500,000 cubic yards of sand beachfill would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 100 to 150-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 5H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes. The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted by the State of Delaware. The Phase II sand would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A). The selected plan also includes the periodic nourishment of the North Beach on an as needed basis to supplement the Indian River Inlet sand bypass plant operations to maintain the Phase II berm and dune template.

The IPaC search identified three species potentially occurring within the affected area of the action along the North Beach shoreline and dune habitat. These species included: the roseate tern, the monarch butterfly, and the seabeach amaranth.

Based on the known biological factors of the species and the construction activities and timing of these activities. Impact determinations were made resulting in the following conclusions:

The presence of breeding roseate terns is highly unlikely within the project area, therefore a no effect determination of the action is warranted.

Monarch butterflies are likely to be present in the project area during construction activities. The equipment and associated construction activities are not likely to directly affect monarch butterflies; however, the nectar food source (seaside goldenrod) could be affected in some locations by burial of sand. This would not result in a significant loss of seaside goldenrod and it is expected to recolonize rapidly after construction from nearby windblown seed sources. Therefore, for the monarch butterfly, it is concluded that this activity may affect, but is not likely to adversely affect this species.

The seabeach amaranth has historically been present in the vicinity of the affected area. Current conditions with severe erosion make it not likely to be present within the action area. However, based on completion of the Phase 1 prior to initiating Phase 2 (this action), a potential exists that seabeach amaranth could appear in created supratidal locations prior to the start of construction of Phase 2. Therefore, a foot survey to look for the presence of this plant would occur prior to construction. Any found plants would be isolated and avoided. The USFWS and DNREC would be consulted on appropriate actions to conserve this plant from either letting it complete its lifecycle in place and collecting its seed to transplanting it. Therefore, with these measures in place, it is concluded that the activity may affect but is not likely to adversely affect this species.

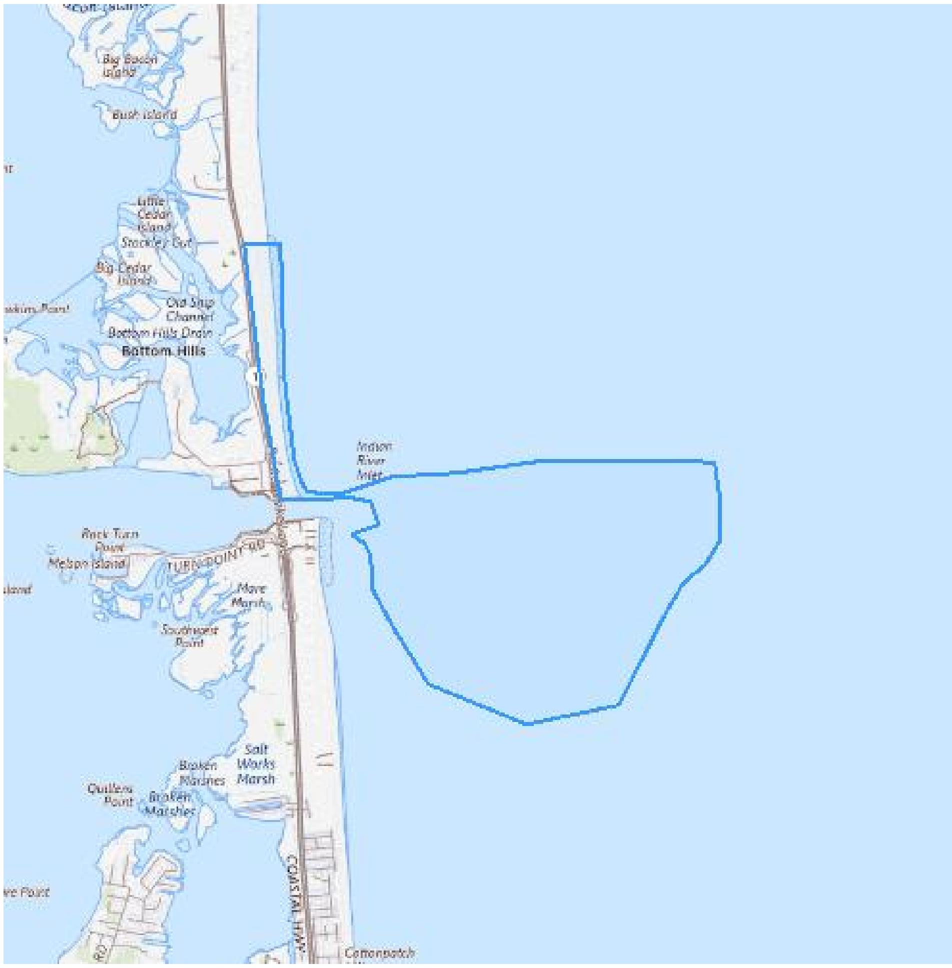
1.3 EFFECT DETERMINATION SUMMARY

SPECIES (COMMON NAME)	SCIENTIFIC NAME	LISTING STATUS	PRESENT IN ACTION AREA	EFFECT DETERMINATION
Monarch Butterfly	Danaus plexippus	Proposed Threatened	Yes	NLAA
Roseate Tern†. **This species or critical habitat is covered by a DKey.**	Sterna dougallii dougallii	Endangered		NE
Seabeach Amaranth	Amaranthus pumilus	Threatened	Yes	NLAA

† This species or critical habitat has been analyzed through a Determination Key.

1.4 PROJECT DESCRIPTION

1.4.1 LOCATION



LOCATION
Sussex County, Delaware

1.4.2 DESCRIPTION OF PROJECT HABITAT

The affected area includes a severely eroded beach and dune along the north side of the Indian River Inlet, Delaware. This erosion is most severe nearest to the north jetty and extends about a 1,000 feet north where the beach has experienced inundation and overwash onto the adjacent State Route 1 highway. Efforts to recreate the dune with truck imported sand have been challenged by persistent waves and tides. The State of Delaware has embarked on a beach nourishment project (Phase 1) commencing in November 2024 and is expected to complete the Phase 1 portion by March 15, 2025. This will result in a widened beach for the completion of Phase 2 under the proposed action, which would complement the beachfill conducted by the State of Delaware. Another habitat affected by the proposed action is an offshore marine ebb shoal area that is the sand source for the beach nourishment.

1.4.3 PROJECT PROPONENT INFORMATION

Provide information regarding who is proposing to conduct the project, and their contact information. Please provide details on whether there is a Federal nexus.

REQUESTING AGENCY

Department of Defense

Army Corps of Engineers

FULL NAME

Steven Allen

STREET ADDRESS

1650 Arch Street

CITY	STATE	ZIP
Philadelphia	PA	19103-2004

PHONE NUMBER	E-MAIL ADDRESS
2156566559	steven.d.allen@usace.army.mil

LEAD AGENCY

Lead agency is the same as requesting agency

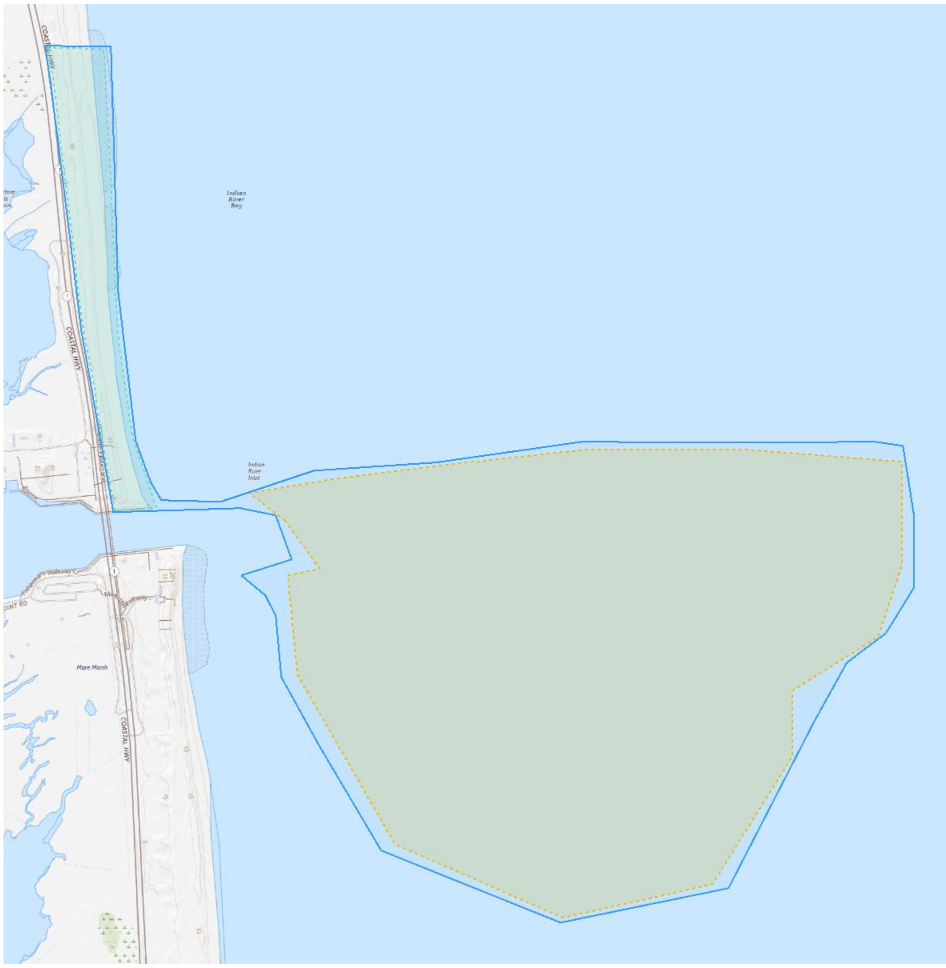
1.4.4 PROJECT PURPOSE

The purpose of the Project is to restore the severely eroded berm and dune system at North Beach using beachfill material (sand) back to the project template dimensions as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

1.4.5 PROJECT TYPE AND DECONSTRUCTION

This project is a beach nourishment project.

1.4.5.1 PROJECT MAP



LEGEND

Project footprint

Layer 1: Marine dredging

Layer 2: Biological surveys (coastal), dune building, install sand fence, pipeline sand transport/placement, redistribute sand, restore / establish coastal vegetation, stockpile sand, transport sand

1.4.5.2 BIOLOGICAL SURVEYS (COASTAL)

ACTIVITY START DATE
July 01, 2025

ACTIVITY END DATE
August 31, 2025

STRESSORS
This activity is not expected to have any impact on the environment.

DESCRIPTION
A foot survey to identify the presence and any locations of the threatened plant, seabeach amaranth, will occur along the upper beach/lower dune areas prior to construction.

1.4.5.3 DUNE BUILDING

ACTIVITY START DATE
August 15, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS

- Decrease in vegetation
- Increase in water turbidity
- Change in topography
- Increase in noise
- Increase in soil disturbance

DESCRIPTION
Dune building will occur where there is severe erosion and our diminishment of the existing dune. Some vegetation may be covered by this activity to build-up a diminished dune to achieve the design template. Noise from construction equipment conducting earthwork/soil disturbance would occur. This activity would occur along the entire 5,000 foot span of beach habitat, but dune building may not be required in all locations if a sufficient dune profile already exists. Beach nourishment will temporarily increase water turbidity in the ocean within the affected areas.

1.4.5.4 INSTALL SAND FENCE

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
March 15, 2026

STRESSORS
- Increase in vegetation

DESCRIPTION
Sand fencing would be installed once the constructed dune dimensions are achieved. Posts would require power augers for excavation and handheld power tools to install fencing. Fencing would require delivery most likely from front-end loaders or small trucks.

1.4.5.5 MARINE DREDGING

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS
- Increase in water turbidity
- Increase in noise

DESCRIPTION
The marine dredging component would be limited to the offshore subtidal areas and will not affect onshore habitats.

1.4.5.6 PIPELINE SAND TRANSPORT/PLACEMENT

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS

- Change in topography
- Increase in noise

DESCRIPTION
A pipeline would make landfall from the offshore dredge plant offshore. The pipeline would be positioned parallel along the beach for the entire 5,000 foot span of beachfill. The pipeline will typically have a "Y" valve which can be used to re-direct sand slurry flows. The pipeline will be increased or decreased in length as needed. The pipeline will be disassembled and removed from site upon cessation of dredging/beachfill activities.

1.4.5.7 REDISTRIBUTE SAND

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS

- Increase in water turbidity
- Change in topography
- Increase in noise
- Increase in soil disturbance

DESCRIPTION
Once deposited sand slurry has settled and sufficiently de-watered, the re-distribution of sand would occur with dozers to achieve final grades of berm and dune template configuration.

1.4.5.8 RESTORE / ESTABLISH COASTAL VEGETATION

ACTIVITY START DATE
October 31, 2025

ACTIVITY END DATE
March 15, 2026

STRESSORS
- Increase in vegetation

DESCRIPTION
The restoration of coastal vegetation would consist of the planting of sprigs of American beachgrass on the reconstructed dunes to stabilize the dunes. This activity would occur during dormancy of the plants generally from late October to mid-March. Seeding of the upper dune crest and back side of the dune with coastal panicgrass may also occur.

1.4.5.9 STOCKPILE SAND

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS
- Change in topography

DESCRIPTION
Temporary stockpiles of sand may occur as the sands are de-watered prior to their re-distribution to achieve final grades.

1.4.5.10 TRANSPORT SAND

ACTIVITY START DATE
August 31, 2025

ACTIVITY END DATE
December 31, 2025

STRESSORS
- Increase in noise

DESCRIPTION
Sand may be transported either by dozers or placed in dump trucks to designated locations to achieve final grades of the berm and dune features.

1.4.6 ANTICIPATED ENVIRONMENTAL STRESSORS

Describe the anticipated effects of your proposed project on the aspects of the land, air and water that will occur due to the activities above. These should be based on the activity deconstructions done in the previous section and will be used to inform the action area.

1.4.6.1 PLANT FEATURES

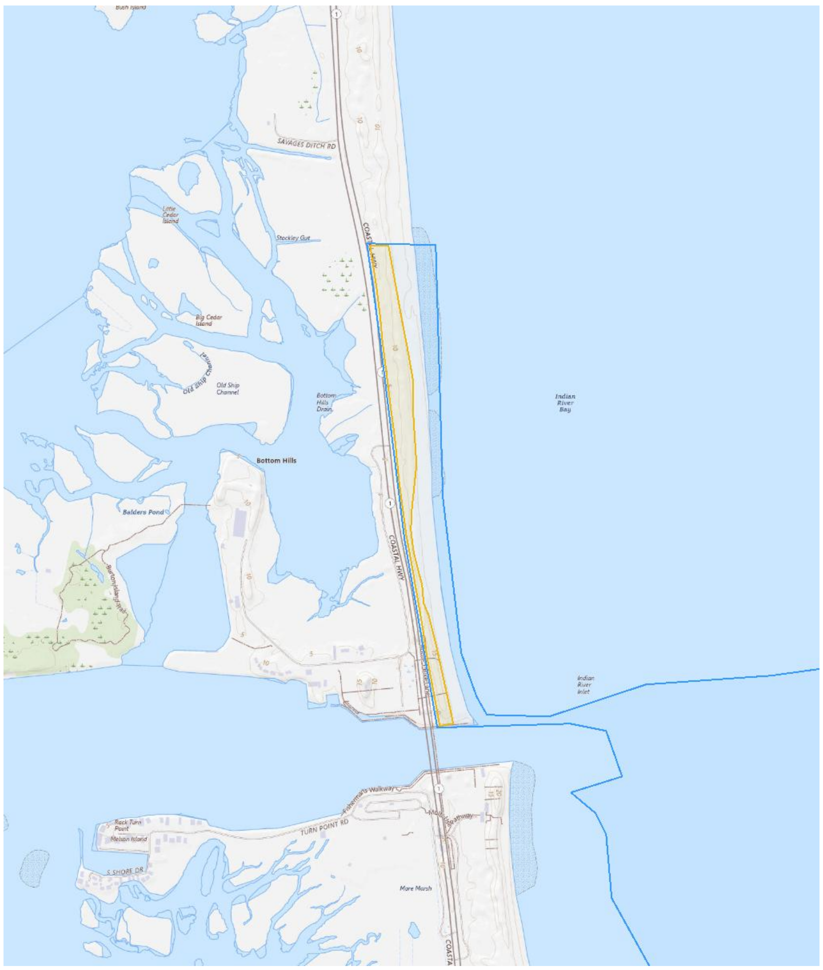
Individuals from the Plantae kingdom, such as trees, shrubs, herbs, grasses, ferns, and mosses. This feature also includes products of plants (e.g., nectar, flowers, seeds, etc.).

1.4.6.1.1 DECREASE IN VEGETATION

ANTICIPATED MAGNITUDE

Minor decreases in vegetation could occur where colonizing beach vegetation may have grown on a dune/upper beach area that is below the design template. Therefore, these areas may get buried by new sand. Since this area is very dynamic by wind and water movement of sand, the vegetation that typically grows in the upper beach would quickly recolonize the affected areas. Dune grass would be planted after the dune dimensions are achieved to stabilize the sand dunes.

STRESSOR LOCATION



LEGEND

Project footprint

Stressor location

CONSERVATION MEASURES

No conservation measures for this stressor

STRUCTURES AND ACTIVITIES

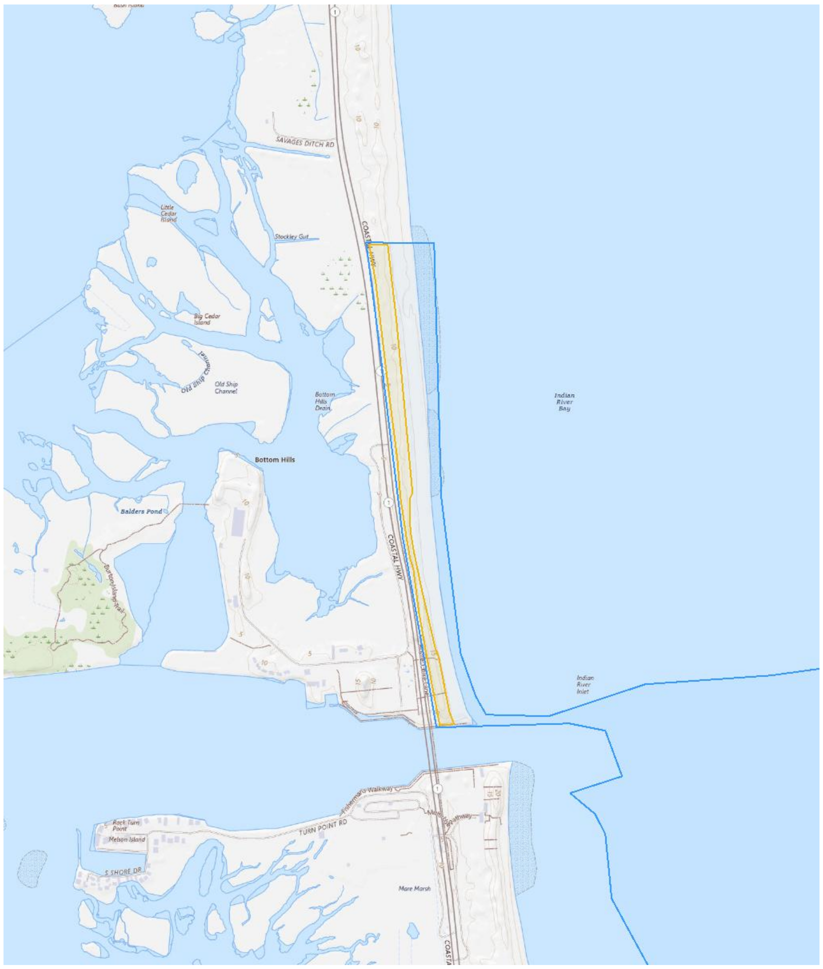
- Dune building

1.4.6.1.2 INCREASE IN VEGETATION

ANTICIPATED MAGNITUDE

Increases in vegetation would occur in newly constructed dune areas that require the planting of American beachgrass and the seeding of seaside panic grass. This would only affect areas where the dune has become reconstructed.

STRESSOR LOCATION



LEGEND

Project footprint

Stressor location

CONSERVATION MEASURES

No conservation measures for this stressor

STRUCTURES AND ACTIVITIES

- Restore / establish coastal vegetation
- Install sand fence

1.4.6.2 ENVIRONMENTAL QUALITY FEATURES

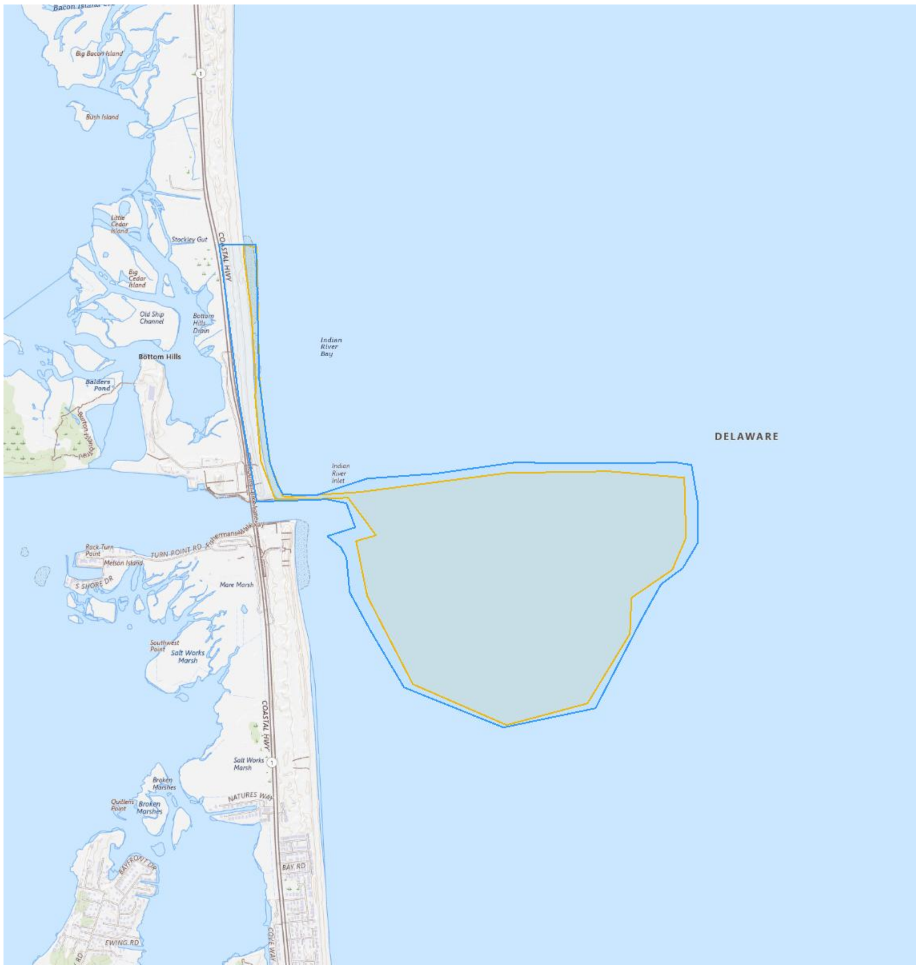
Abiotic attributes of the landscape (e.g., temperature, moisture, slope, aspect, etc.).

1.4.6.2.1 INCREASE IN WATER TURBIDITY

ANTICIPATED MAGNITUDE

Increases in turbidity are localized to the dredging location and the placement location along the nearshore. Since the material is clean sand, the turbidity will be localized and temporary.

STRESSOR LOCATION



LEGEND

Project footprint

Stressor location

CONSERVATION MEASURES

No conservation measures for this stressor

STRUCTURES AND ACTIVITIES

- Redistribute sand
- Marine dredging
- Dune building

1.4.6.3 LANDFORM (TOPOGRAPHIC) FEATURES

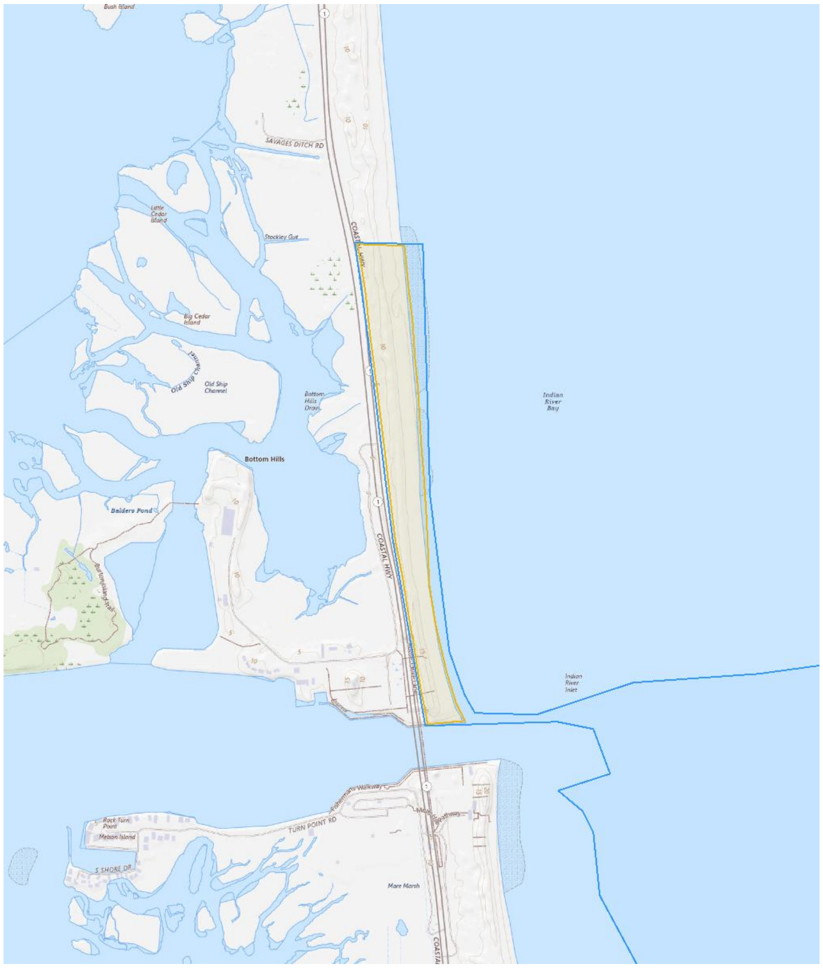
Topographic (landform) features that typically occur naturally on the landscape (e.g., cliffs, terraces, ridges, etc.). This feature does not include aquatic landscape features or man-made structures.

1.4.6.3.1 CHANGE IN TOPOGRAPHY

ANTICIPATED MAGNITUDE

The existing beach berm and dune have experienced severe erosion and is in a deflated condition. The beach nourishment will increase the elevations of the berm and dune to the specified design dimensions. This will also increase the width of the beach significantly.

STRESSOR LOCATION



LEGEND

Project footprint

Stressor location

CONSERVATION MEASURES

No conservation measures for this stressor

STRUCTURES AND ACTIVITIES

- Stockpile sand
- Pipeline sand transport/placement
- Redistribute sand
- Dune building

1.4.6.4 SOIL AND SEDIMENT

The topmost layer of earth on the landscape and its components (e.g., rock, sand, gravel, silt, etc.). This feature includes the physical characteristics of soil, such as depth, compaction, etc. Soil quality attributes (e.g, temperature, pH, etc.) should be placed in the Environmental Quality Features.

1.4.6.5 HUMAN ACTIVITIES

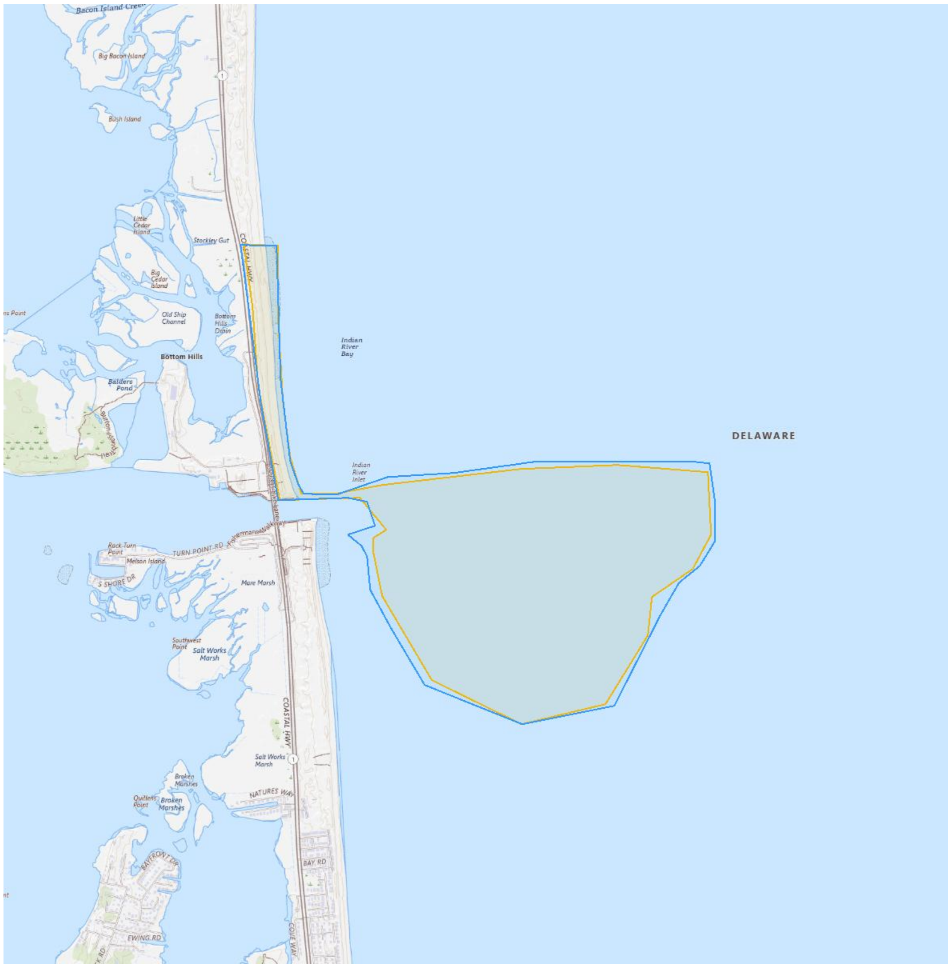
Human actions in the environment (e.g., fishing, hunting, farming, walking, etc.).

1.4.6.5.1 INCREASE IN NOISE

ANTICIPATED MAGNITUDE

Increases in noise would occur at the dredging location where large diesel engines and pumps would be used as part of the dredging operation. Other marine vessels such as tugs, survey boats and crew boats will generate noise during the construction. Construction equipment such as generators, dozers (engines and backup beeping), graders, forklifts, backhoes, and dump trucks would create noise disturbance during construction.

STRESSOR LOCATION



LEGEND

Project footprint

Stressor location

CONSERVATION MEASURES

No conservation measures for this stressor

STRUCTURES AND ACTIVITIES

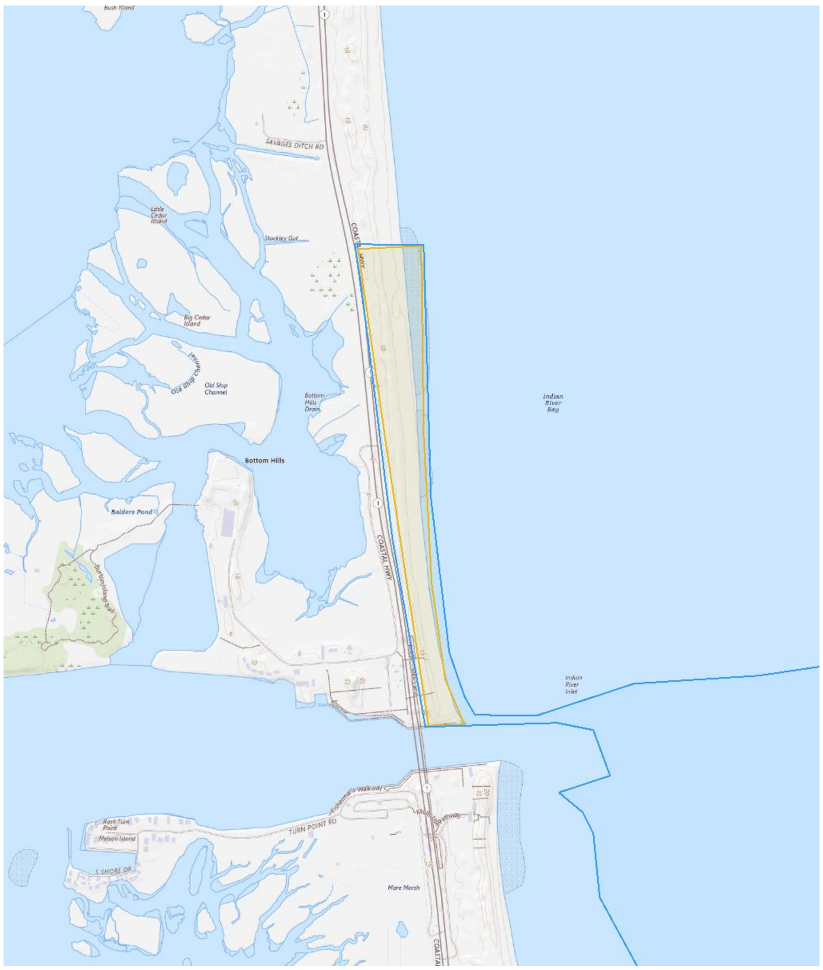
- Transport sand
- Pipeline sand transport/placement
- Redistribute sand
- Marine dredging
- Dune building

1.4.6.5.2 INCREASE IN SOIL DISTURBANCE

ANTICIPATED MAGNITUDE

Dredging/beach nourishment projects result in significant disturbance of soils. However, the soils are beach sands that are part of a dynamic coastal environment where frequent disturbance is a natural occurrence. The dredging/filling and redistribution of sand will not have significant adverse effects with respect to soil disturbance.

STRESSOR LOCATION



LEGEND

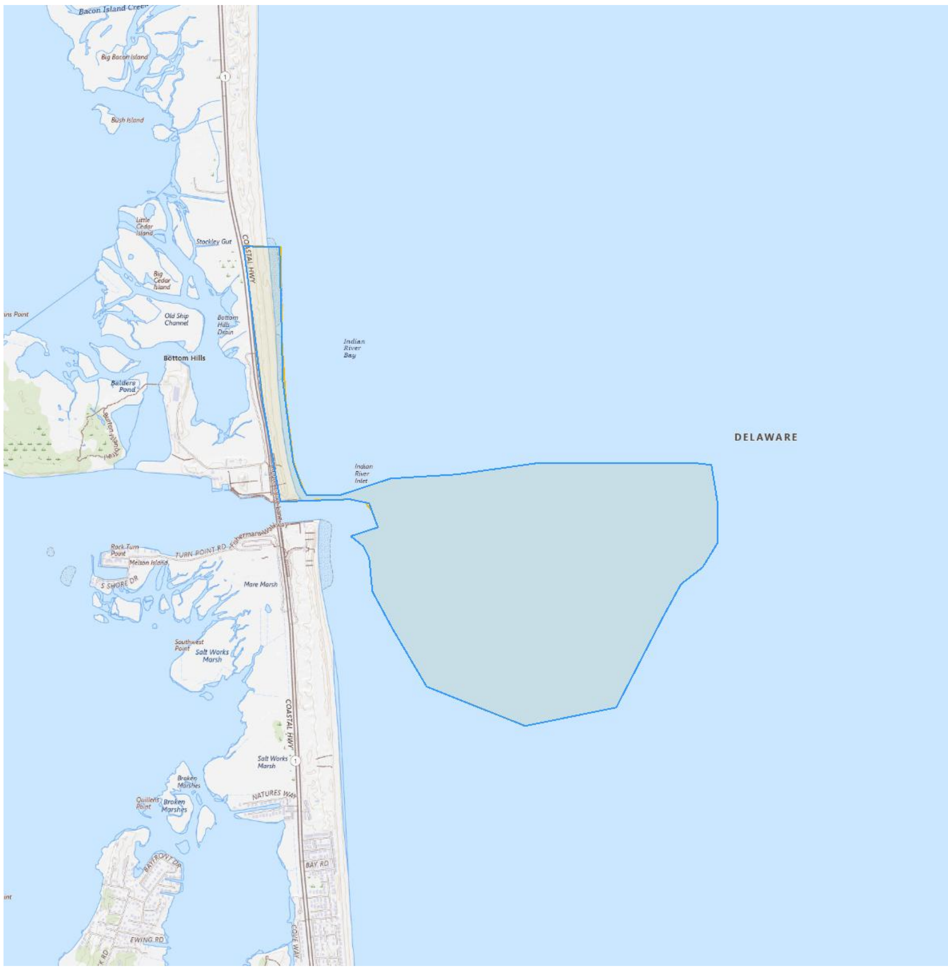
Project footprint

Stressor location

CONSERVATION MEASURES
No conservation measures for this stressor

STRUCTURES AND ACTIVITIES
- Redistribute sand
- Dune building

1.5 ACTION AREA



LEGEND

Project footprint

Stressor location

1.6 CONSERVATION MEASURES

1.6.1 CONDUCT PRE-CONSTRUCTION SURVEY FOR SEABEACH AMARANTH AND PRACTICE AVOIDANCE DURING CONSTRUCTION

DESCRIPTION

Prior to construction, a foot survey will be conducted along the upper beach and lower dune supra tidal zone to look for any established or emerging plants in this zone. If plants are observed, they will be located and isolated with exclusion fencing to alert construction crews and these locations will be avoided. USFWS and DNREC would be notified to determine a course of action on either transplantation during the growing season or to let the plants complete their life-cycle in place. In similar situations, seed that had dropped from the plants was collected and then placed in the new beachfill area location.

RESOURCE NEEDS

- beaches
- substrate structure and characteristics (type: sand)

1.7 PRIOR CONSULTATION HISTORY

Informal consultation has occurred periodically and occurred initially in 1990 with the construction of the sand bypass plant and operation at Indian River Inlet. Informal consultation occurred in 2013 for the repairs and restoration of the beach and dune following Hurricane Sandy under the Flood Control and Coastal Emergencies Program (FCCE). Informal consultation occurred in 2015 to add sand borrow areas to be interchangeable along the Delaware Atlantic Coast. This consultation also included an update to the Indian River Inlet North Beach location.

1.8 OTHER AGENCY PARTNERS AND INTERESTED PARTIES

None

1.9 OTHER REPORTS AND HELPFUL INFORMATION

None

2 SPECIES EFFECTS ANALYSIS

This section describes, species by species, the effects of the proposed action on listed, proposed, and candidate species, and the habitat on which they depend. In this document, effects are broken down as direct interactions (something happening directly to the species) or indirect interactions (something happening to the environment on which a species depends that could then result in effects to the species).

These interactions encompass effects that occur both during project construction and those which could be ongoing after the project is finished. All effects, however, should be considered, including effects from direct and indirect interactions and cumulative effects.

2.1 MONARCH BUTTERFLY

2.1.1 STATUS OF THE SPECIES

This section should provide information on the species' background, its biology and life history that is relevant to the proposed project within the action area that will inform the effects analysis.

2.1.1.1 LEGAL STATUS

The Monarch Butterfly is federally listed as 'Proposed Threatened' and additional information regarding its legal status can be found on the ECOS species profile.

2.1.1.2 RECOVERY PLANS

Available recovery plans for the Monarch Butterfly can be found on the ECOS species profile.

2.1.1.3 LIFE HISTORY INFORMATION

For information on monarch conservation, visit https://www.fws.gov/initiative/pollinators/monarchs, http://www.mafwa.org/?page_id=2347, and, for the West, https://wafwa.org/committees-working-groups/monarch-working-group/.

Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side of the wings. Adult monarchs are sexually dimorphic, with males having narrower wing venation and scent patches. The bright coloring of a monarch serves as a warning to predators that eating them can be toxic.

During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.), and larvae emerge after two to five days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months.

In many regions where monarchs are present, monarchs breed year-round. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites. This migration can take monarchs distances of over 3,000 km and last for over two months. In early spring (February-March), surviving monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again.

IDENTIFIED RESOURCE NEEDS

Nectar

In the affected area of an atlantic coast beach/dune, the primary impacted area is the primary dune. the only plant that would occur in this area that would be utilized by the monarch butterfly is the seaside goldenrod, which is a nectar provider for adult monarchs.

2.1.1.4 CONSERVATION NEEDS

Indiscriminate uses of herbicides, development and loss of flowering/nectar producing prairie type habitats.

2.1.2 ENVIRONMENTAL BASELINE

*The environmental baseline describes the species' health **within the action area only** at the time of the consultation, and does not include the effects of the action under review. Unlike the species information provided above, the environmental baseline is at the scale of the Action area.*

2.1.2.1 SPECIES PRESENCE AND USE

Migratory monarch butterflies may be present on the dune areas where goldenrod flowers are blooming in the late summer and fall.

2.1.2.2 SPECIES CONSERVATION NEEDS WITHIN THE ACTION AREA

Monarchs would require nectar-bearing flowers such as the seaside goldenrod during their late summer/fall migration, which occurs in dune habitats potentially affected by project actions. Priority will be given to conserve seaside goldenrods on dune areas wherever practicable.

2.1.2.3 HABITAT CONDITION (GENERAL)

NECTAR (IN THE AFFECTED AREA OF AN ATLANTIC COAST BEACH/DUNE, THE PRIMARY IMPACTED AREA IS THE PRIMARY DUNE. THE ONLY PLANT THAT WOULD OCCUR IN THIS AREA THAT WOULD BE UTILIZED BY THE MONARCH BUTTERFLY IS THE SEASIDE GOLDENROD, WHICH IS A NECTAR PROVIDER FOR ADULT MONARCHS.)

The seaside goldenrod is expected to occur within the affected area. Typically where this plant occurs, it may be at a location where dune restoration/disturbance would not be required because it would be in an area not subject to high erosion. However, there may be exceptions and instances where seaside goldenrod could be disturbed by construction activities.

2.1.2.4 INFLUENCES

Severe erosion of the coastal dunes north of Indian River Inlet have diminished the vegetation such as the seaside goldenrod plant that is used by monarch butterflies.

2.1.2.5 ADDITIONAL BASELINE INFORMATION

N/A

2.1.3 EFFECTS OF THE ACTION

This section considers and discusses all effects on the listed species that are caused by the proposed action and are reasonably certain to occur, including the effects of other activities that would not occur but for the proposed action.

2.1.3.1 INDIRECT INTERACTIONS

RESOURCE NEED	STRESSORS	CONSERVATION MEASURES	AMOUNT OF RESOURCE IMPACTED	INDIVIDUALS AFFECTED
Nectar (in the affected area of an atlantic coast beach/dune, the primary impacted area is the primary dune. the only plant that would occur in this area that would be utilized by the monarch butterfly is the seaside goldenrod, which is a nectar provider for adult monarchs.)	Increase in soil disturbance Decrease in vegetation		***There will be no impacts to this resource*** Seaside goldenrod, for the most part, will be in locations that may not require beachfill disturbance because it typically inhabits upper dune, dune crests and the back side of dunes. It is also likely to quickly colonize and establish on newly restored dunes.	***There will be no impacts to this resource, so no individuals will be affected.***

2.1.3.2 DIRECT INTERACTIONS

No direct interactions leading to effects on species are expected to occur from the proposed project.

Justification:

Since monarch butterflies are mobile. They are not likely to be affected directly by construction activities.

2.1.4 CUMULATIVE EFFECTS

The proposed activities of dredging/beachfill placement are not likely to have any significant direct or indirect effects, and by default will not have cumulative effects on this species.

2.1.5 DISCUSSION AND CONCLUSION

DETERMINATION: NLAA

COMPENSATION MEASURES
None. The nectar producing seaside goldenrod is expected to colonize and establish on restored dunes from nearby windblown seed sources.

2.2 SEABEACH AMARANTH

2.2.1 STATUS OF THE SPECIES

This section should provide information on the species' background, its biology and life history that is relevant to the proposed project within the action area that will inform the effects analysis.

2.2.1.1 LEGAL STATUS

The Seabeach Amaranth is federally listed as 'Threatened' and additional information regarding its legal status can be found on the ECOS species profile.

2.2.1.2 RECOVERY PLANS

Available recovery plans for the Seabeach Amaranth can be found on the ECOS species profile.

2.2.1.3 LIFE HISTORY INFORMATION

No description available

IDENTIFIED RESOURCE NEEDS

- Beaches
- Substrate structure and characteristics
  - Type: sand

2.2.1.4 CONSERVATION NEEDS

The sea beach amaranth or “pigweed” (*Amaranthus pumilus*) is a Federally threatened plant that primarily occurs on overwash flats at accreting ends of barrier islands and lower foredunes and upper strands on non-eroding beaches. This plant has been found within Cape Henlopen State Park, Delaware Seashore State Park, and Fenwick Island State Park. Most recently, seabeach amaranth was observed growing 1.4 miles north of the Indian River Inlet. This species has not been found in any of the municipal Federal project beaches, but did occur within the affected project area of the North Beach area of Indian River Inlet in 2002. However, the severe erosion of the North Beach area in recent years makes this area unlikely to be inhabited by sea beach amaranth.

2.2.2 ENVIRONMENTAL BASELINE

*The environmental baseline describes the species' health **within the action area only** at the time of the consultation, and does not include the effects of the action under review. Unlike the species information provided above, the environmental baseline is at the scale of the Action area.*

2.2.2.1 SPECIES PRESENCE AND USE

This species has historically occurred in the affected area of the beach. However, this area has undergone significant erosion in recent years, which would preclude its establishment in the area. However, given the Phase 1 beachfill efforts to be completed by the Delaware Department of Natural Resources and Environmental Control, which will be completed in March, there is a potential that seabeach amaranth could appear within the project area prior to the Phase 2 component, which is the action described in this consultation.

2.2.2.2 SPECIES CONSERVATION NEEDS WITHIN THE ACTION AREA

This species requires beaches to be left in a natural state with no vehicular or foot traffic that would trample on this delicate plant. Also, this plant requires a sandy beach that isn't severely eroded, but can experience periodic overwash.

2.2.2.3 HABITAT CONDITION (GENERAL)

BEACHES
The beaches north of Indian River inlet have all of the life requisites that would allow for the growth and reproduction of seabeach amaranth. The affected area is currently stressed due to the significant erosion of this habitat. This may improve following project construction.

SUBSTRATE STRUCTURE AND CHARACTERISTICS (TYPE: SAND)
The affected area includes a sandy beach that is significantly eroded. However, some locations may be supratidal where waves and inundation may not adversely impact seabeach amaranth habitat suitability.

2.2.2.4 INFLUENCES
Severe erosion, hardened structures (bulkheads, revetments), vehicular and foot traffic and habitat alterations have resulted in significant declines.

2.2.2.5 ADDITIONAL BASELINE INFORMATION
None

2.2.3 EFFECTS OF THE ACTION
This section considers and discusses all effects on the listed species that are caused by the proposed action and are reasonably certain to occur, including the effects of other activities that would not occur but for the proposed action.

2.2.3.1 INDIRECT INTERACTIONS

RESOURCE NEED	STRESSORS	CONSERVATION MEASURES	AMOUNT OF RESOURCE IMPACTED	INDIVIDUALS AFFECTED
Beaches	Increase in soil disturbance Change in topography Decrease in vegetation	Conduct pre-construction survey for seabeach amaranth and practice avoidance during construction	***There will be no impacts to this resource*** If this species is present, the plant locations will be fenced off and will be allowed to complete their life cycle. Upon coordination with USFWS and DNREC, it will be determined whether if the seed source can be collected	***There will be no impacts to this resource, so no individuals will be affected.***

RESOURCE NEED	**STRESSORS**	**CONSERVATION MEASURES**	**AMOUNT OF RESOURCE IMPACTED**	**INDIVIDUALS AFFECTED**
			and redeposited on the new beach following construction.	
Substrate structure and characteristics (type: sand)	Increase in water turbidity Change in topography Decrease in vegetation	Conduct pre-construction survey for seabeach amaranth and practice avoidance during construction	***There will be no impacts to this resource*** If this species is present, the plant locations will be fenced off and will be allowed to complete their life cycle. Upon coordination with USFWS and DNREC, it will be determined whether if the seed source can be collected and redeposited on the new beach following construction.	***There will be no impacts to this resource, so no individuals will be affected.***

2.2.3.2 DIRECT INTERACTIONS

No direct interactions leading to effects on species are expected to occur from the proposed project.

Justification:

If this species is present, the plant locations will be fenced off and will be allowed to complete their life cycle. Upon coordination with USFWS and DNREC, it will be determined whether if the seed source can be collected and redeposited on the new beach following construction.

2.2.4 CUMULATIVE EFFECTS

The activity is not expected to result in the burial or removal of this species if surveys and avoidance are practiced. Therefore, this activity will not contribute to significant cumulative effects on this species.

2.2.5 DISCUSSION AND CONCLUSION

DETERMINATION: NLAA

COMPENSATION MEASURES
If this species is present, the plant locations will be fenced off and will be allowed to complete their life cycle. Upon coordination with USFWS and DNREC, it will be determined whether if the seed source can be collected and redeposited on the new beach following construction.

3 CRITICAL HABITAT EFFECTS ANALYSIS

No critical habitats intersect with the project action area.

4 SUMMARY DISCUSSION AND CONCLUSION

4.1 SUMMARY DISCUSSION

The proposed action, which includes the offshore dredging and beachfill placement to reconstruct the beach berm and dune will not have an effect on roseate terns because they do not nest south of Long Island, New York (with a noted exception in New Jersey) and are rarely sighted in Delaware. This activity could result in the burial of seaside goldenrod, which is a nectar producing species for the monarch butterfly. It is expected that once the dune construction is completed, the dune areas would be recolonized with seaside goldenrod as it is very common in this area. Seabeach amaranth has historically grown on occasions in Delaware Seashore State Park in locations not far from the affected area, and could potentially be trampled or buried by construction activities. The affected area has some habitat suitable for seabeach amaranth and there is a potential for its presence at the time of construction. Therefore, a preconstruction survey for this plant would occur and if present, it would be avoided until it's life cycle is completed.

4.2 CONCLUSION

The presence of breeding roseate terns is highly unlikely within the project area, therefore a no effect determination of the action is warranted.

Monarch butterflies are likely to be present in the project area during construction activities. The equipment and associated construction activities are not likely to directly affect monarch butterflies; however, the nectar food source (seaside goldenrod) could be affected in some locations by burial of sand. This would not result in a significant loss of seaside goldenrod and it is expected to recolonize rapidly after construction from nearby windblown seed sources. Therefore, for the monarch butterfly, it is concluded that this activity may affect, but is not likely to adversely affect this species.

The seabeach amaranth has historically been present in the vicinity of the affected area. Current conditions with severe erosion make it not likely to be present within the action area. However, based on completion of the Phase 1 prior to initiating Phase 2 (this action), a potential exists that seabeach amaranth could appear in created supratidal locations prior to the start of construction of Phase 2. Therefore, a foot survey to look for the presence of this plant would occur prior to construction. Any found plants would be isolated and avoided. The USFWS and DNREC would be consulted on appropriate actions to conserve this plant from either letting it complete its lifecycle in place and collecting its seed to transplanting it. Therefore, with these measures in place, it is concluded that the activity may affect but is not likely to adversely affect this species.

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
1650 Arch Street
PHILADELPHIA, PENNSYLVANIA 19103-2004

April 22, 2025

Environmental Resources Branch

Christine Vaccaro
ESA Section 7 Branch Chief
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930-2276
nmfs.gar.esa.section7@noaa.gov

Dear Ms. Vaccaro:

This letter is to provide an updated analysis of changes to the Delaware Coast Protection - Indian River Inlet Sand Bypass Project - Sussex County, Delaware. On March 20, 2025, The Philadelphia District (District) – U.S. Army Corps of Engineers (USACE) submitted a Verification Form (VF) and cover letter along with a link to the draft Environmental Assessment (EA) titled: *Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment - Sussex County, Delaware*. Based on coordination with your staff via teleconference meeting on April 1, 2025 and follow-up e-mail correspondence from Ms. Darcie Webb on April 4, 2025, the Philadelphia District requests to withdraw the VF submitted to your office on March 20, 2025. Because the proposed current action includes activities that were not considered in the 2014 Biological Opinion (BiOp), "Use of sand borrow areas for beach nourishment and hurricane protection, offshore Delaware and New Jersey NER-2014-10904" (GARFO-2014-00018), the District has determined that a review of these activities is appropriate due to the changes in the project as evaluated in the 2014 BiOp.

Consultation History Related to the Proposed Action

In March 2014, the District initiated formal consultation for all District beach nourishment projects by submitting the document: *A Programmatic Biological Assessment for Potential Impacts to the Federally Listed Endangered New York Bight Distinct Population Segment of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus) Resulting from Beach Restoration Activities In New Jersey and Delaware*. The Indian River Inlet Sand Bypass Project was included in the analysis of the sand bypass plant operations and sand borrow areas.

On June 26, 2014, NMFS issued a programmatic biological opinion for all District beach nourishment projects for the "*Use of sand borrow areas for beach nourishment* *and hurricane protection, offshore Delaware and New Jersey NER-2014-10904*". This BiOp included the sand bypass plant and sand sources.

<u>Project Description in 2014 BiOp</u>

The following description is an excerpt of the Indian River project from the 2014 BiOp:

"In 1984, the Philadelphia District evaluated the environmental impacts associated with the construction of the Indian River Inlet Sand Bypass Plant, and prepared a Final EA. The project consists of a onetime initial placement of fill to build the existing beach to a minimum profile which is required to protect the highway, followed by nourishment of the beach over the life of the project using a mechanical sand by-passing system. The project is located in Sussex County, Delaware, on the Atlantic Ocean at Indian River Inlet.

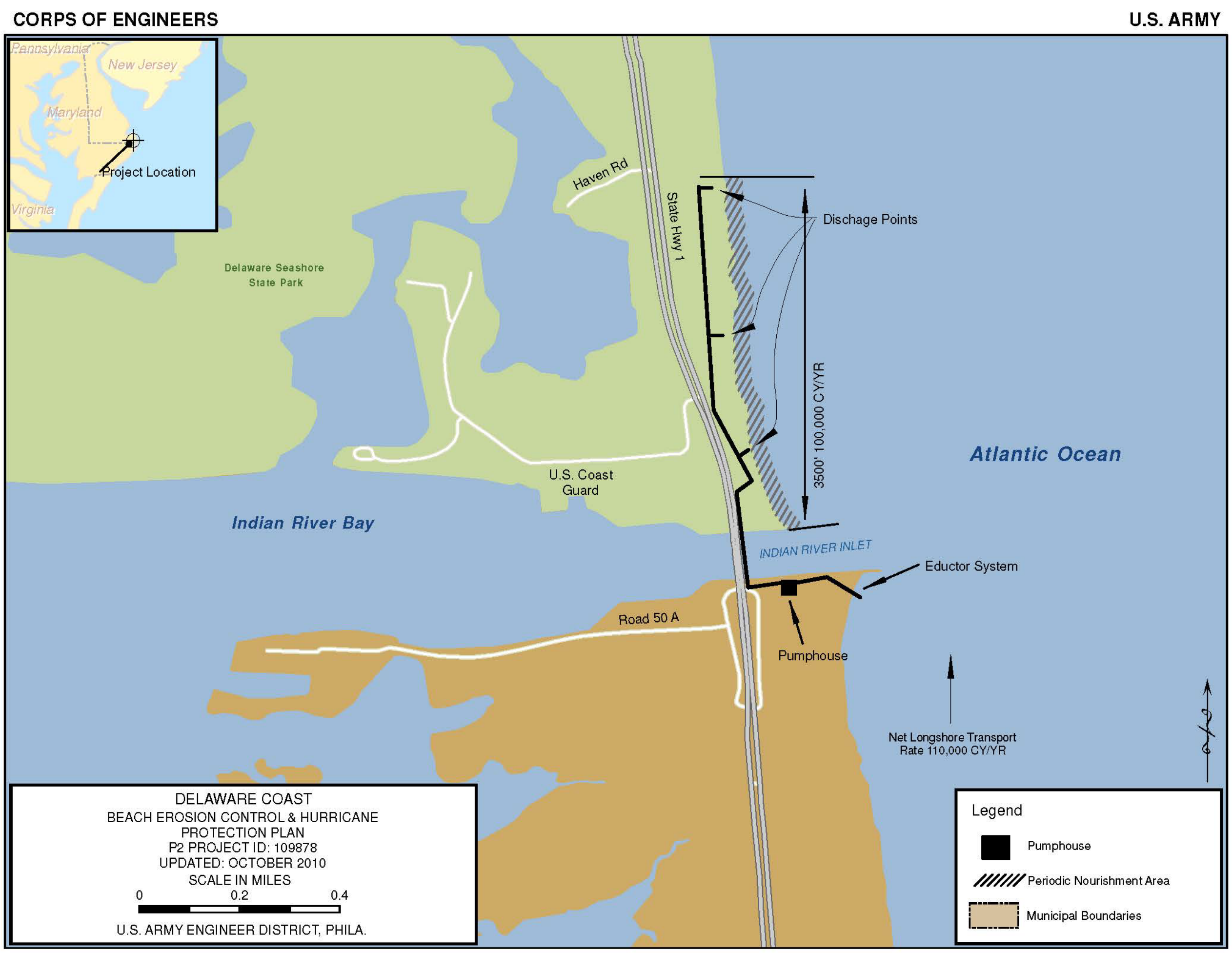


Figure 1. Indian River Inlet Sand Bypass Plant, Delaware Project Area

The initial design template consists of 80,000 CY of sand placed along the north beach between station 0+00 and station 15+00. The selected design template adequate to protect Rt.1, calls for a berm 180 feet east of the east edge of the highway (including shoulder) at an elevation of +10 NGVD. The volume of sand required for nourishment of the north beach is 100,000 CY annually. This project will utilize sand obtained by dredging the required quantity from the interior of the Indian River Inlet. Initial construction of this project has been completed with annual nourishment taking place. The project is currently authorized until September 2021.

The Indian River Inlet (IRI) Sand Bypass Plant was constructed in 1990, which required the initial placement of approximately 175,000 CY of sand on the North Shore of IRI (Figure 21). This placement was conducted by the Delaware Department of Natural Resources and Environmental Control (DNREC) utilizing a hydraulic cutterhead dredge. The sand source for the initial placement was the IRI flood shoal. Sand bypass operations are performed by the DNREC on an annual basis (since 1990) where an average of 84,419 CY of sand are pumped annually from the south shore IRI fillet to the north shore (Figure 22). Repairs due to storm damages were required in 1992 and 2013 for the north shore beach. In 2013, approximately 529,000 CY were dredged from the IRI flood shoal with a hydraulic cutterhead dredge, and placed to repair and restore the north shore beach. The IRI flood shoal sand source was approximately 50 acres in size with depths ranging from -10 ft. NAVD to -26 ft. NAVD. A maximum dredging depth was permitted for -30 ft. NAVD.

Annual sand bypass operations are expected to continue, however, future repairs may be required using either the IRI flood shoal or the offshore sand sources."

Indian River Inlet North and Vicinity
Hurricane Sandy Related Beach Repair

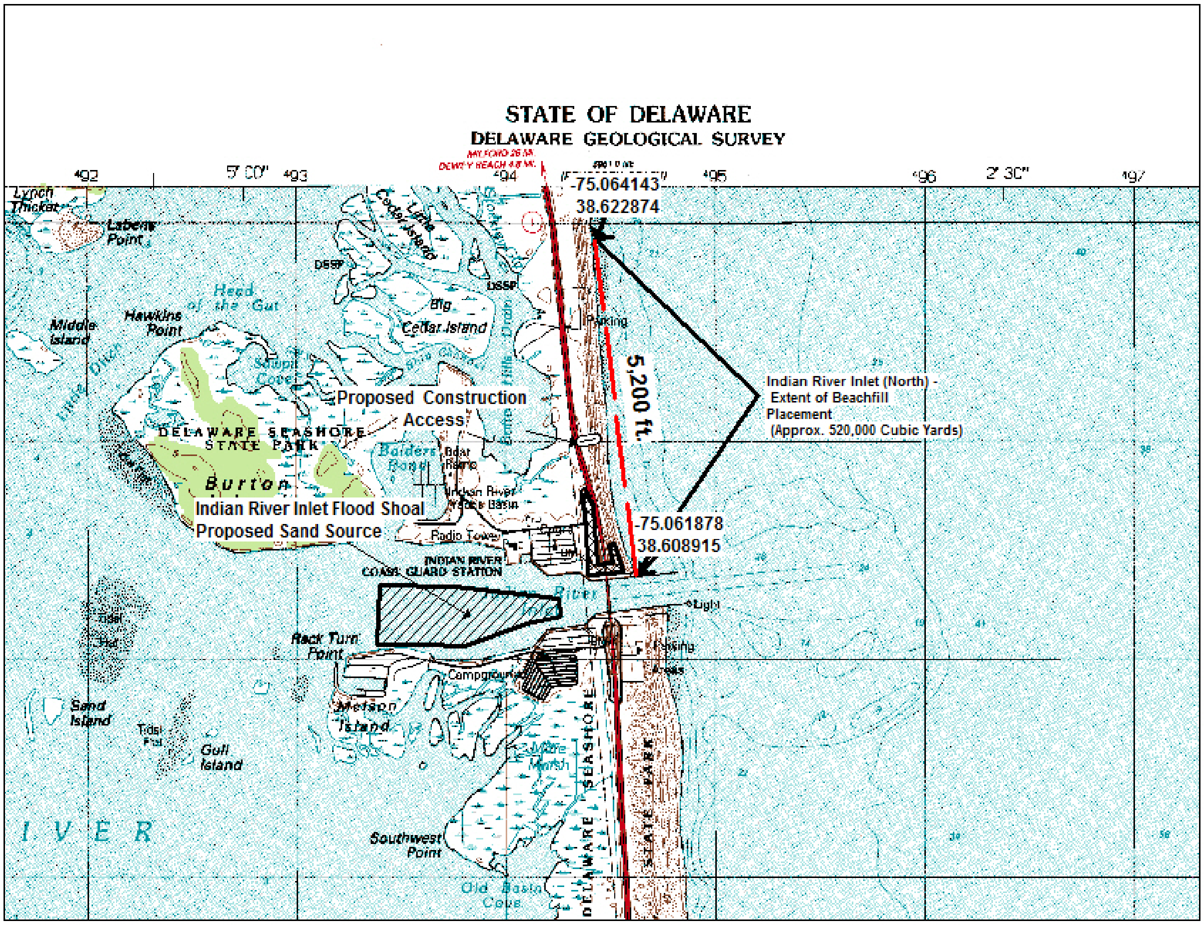


Figure 2. Indian River Inlet Borrow Area

The 2014 BiOp also had the following operational information for the Indian River Inlet Sand Bypass Project in Table 3 of the BiOp.

Year	***Project Phase***	***Quantity of Sand (CY)***	***Borrow Area(s)***	***Dredge Type(s)***
1990	*Initial Construction*	*175,000*	*IRI Flood Shoal*	*Hydraulic cutterhead*
1990-2013	*Annual Sand Bypass (average)*	*84,419 (avg./year)*	*Southern Fillet*	*Bypass Plant*
1992	*Additional Nourishment/Storm Repair*	*40,000*	*IRI Flood Shoal*	*Hydraulic cutterhead*

Year	***Project Phase***	***Quantity of Sand (CY)***	***Borrow Area(s)***	***Dredge Type(s)***
2013	*FCCE Repair/Restore (2012 Hurricane Sandy)*	*529,000*	*IRI Flood Shoal*	*Hydraulic cutterhead*

<u>Sand Bypass Plant Operation Following 2014 BiOp</u>

Subsequent to the FCCE action in 2013, the State of Delaware operated the sand bypass plant annually (cost-shared with USACE) until the unit was shut-down to replace the engine pump in 2020. The table below details the activities of the sand bypass plant and North Beach nourishment since the 2014 BiOp. The plant experienced a complete shutdown in 2020 due to the need to replace the diesel engine pump with an electric pump and controls. Sand bypass plant operations are expected to resume in 2025 and operate annually until 2034.

Year	**Project Phase**	**Quantity of Sand (CY)**	**Borrow Area(s)**	**Dredge Type(s)**
2014	Annual Sand Bypass	60,219*	Southern Fillet	Bypass Plant
2015	Annual Sand Bypass	31,775**	Southern Fillet	Bypass Plant
2016	Annual Sand Bypass	0***	-	-
2017	Annual Sand Bypass	2,800**	Southern Fillet	Bypass Plant
2018	Annual Sand Bypass	4,410	Southern Fillet	Bypass Plant
2019	Annual Sand Bypass	22,500**	Southern Fillet	Bypass Plant
2020	Annual Sand Bypass	0****	-	-
2021	Annual Sand Bypass	0****	-	-
2022	Annual Sand Bypass	0****	-	-
2023	Sand Bypass Shut-down	0****	-	-
2024-2025	Completed: DNREC Phase 1 Restore North Beach	480,000	IRI Flood Shoal	Hydraulic cutterhead
2025	Proposed: USACE Phase 2 Restore North Beach	520,000	IRI Ebb Shoal	Hydraulic cutterhead
2025-2034	Annual Sand bypass Resumption	900,000 (approximately 100,000/year)	Southern Fillet	Bypass Plant

* Pumping shutdown for USACE nourishment of the North Beach & completion of infrastructure installation
** Pumping operations shutdown - lack of material on south side Inlet beach
***Pumping operations shutdown - construction of bypass facility addition
**** Pumping operations shutdown - conversion to electrical pumps and controls

Project Authorization

The 2014 BiOp described that the project was authorized until 2021. Subsequent to 2021, the project received two amendments of the Local Cost-Sharing Agreement (LCA) with the State of Delaware that were executed in 2021 and 2023. These amendments extended the cost sharing agreement until 2034, which allows for the operation of the sand bypass system until then. Resumption of the sand bypass is expected to occur later in 2025 once modifications to the facility are completed.

Current Proposed Project Modifications

On March 20, 2025, the District distributed a draft Environmental Assessment titled: *Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment - Sussex County, Delaware,* which evaluates the placement of beachfill along the shoreline on the north side of Indian River Inlet (North Beach) for the purpose of restoring and/or maintaining the berm and dune for a distance of approximately 5,000 linear feet north of the north inlet jetty (Figure 3). The EA also evaluates sand sources that would provide beachfill quality material for the beach restoration. The purpose of this action is to provide protection to the critical infrastructure of the State Route 1 Charles W. Cullen Bridge and its approach on the north side, which has been experiencing significant erosion.

The plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the Indian River Inlet North Beach shoreline. The Delaware Department of Natural Resources and Environmental Control completed an initial phase of the restoration of the beach by dredging from the interior Indian River Inlet Flood Shoal and placing approximately 480,000 cubic yards of sand on the North Beach shoreline. This phase is identified as “Phase 1” in the document, which was constructed to address severe erosion of the North Beach and dune. Phase 1 was completed March 1, 2025. The next phase (Phase 2) is the USACE component, which will complement the Phase 1 portion. For the completion of the Phase 2 berm restoration, approximately 500,000 cubic yards of sand beachfill would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 10H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes. The Phase 2 sand would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A) (Figure *3*) to an average depth of 10 feet below existing bathymetry.

The plan also includes the periodic nourishment of the North Beach on an as needed basis to supplement the Indian River Inlet sand bypass plant operations to maintain the Phase 2 berm and dune template during intense erosion cycles or following significant storm events. From 1992-2014, approximately 560,000 cubic yards of sand were required to be dredged to supplement the sand bypass plant, and from 2014 to 2025, approximately 820,000 cubic yards of sand were required to account for

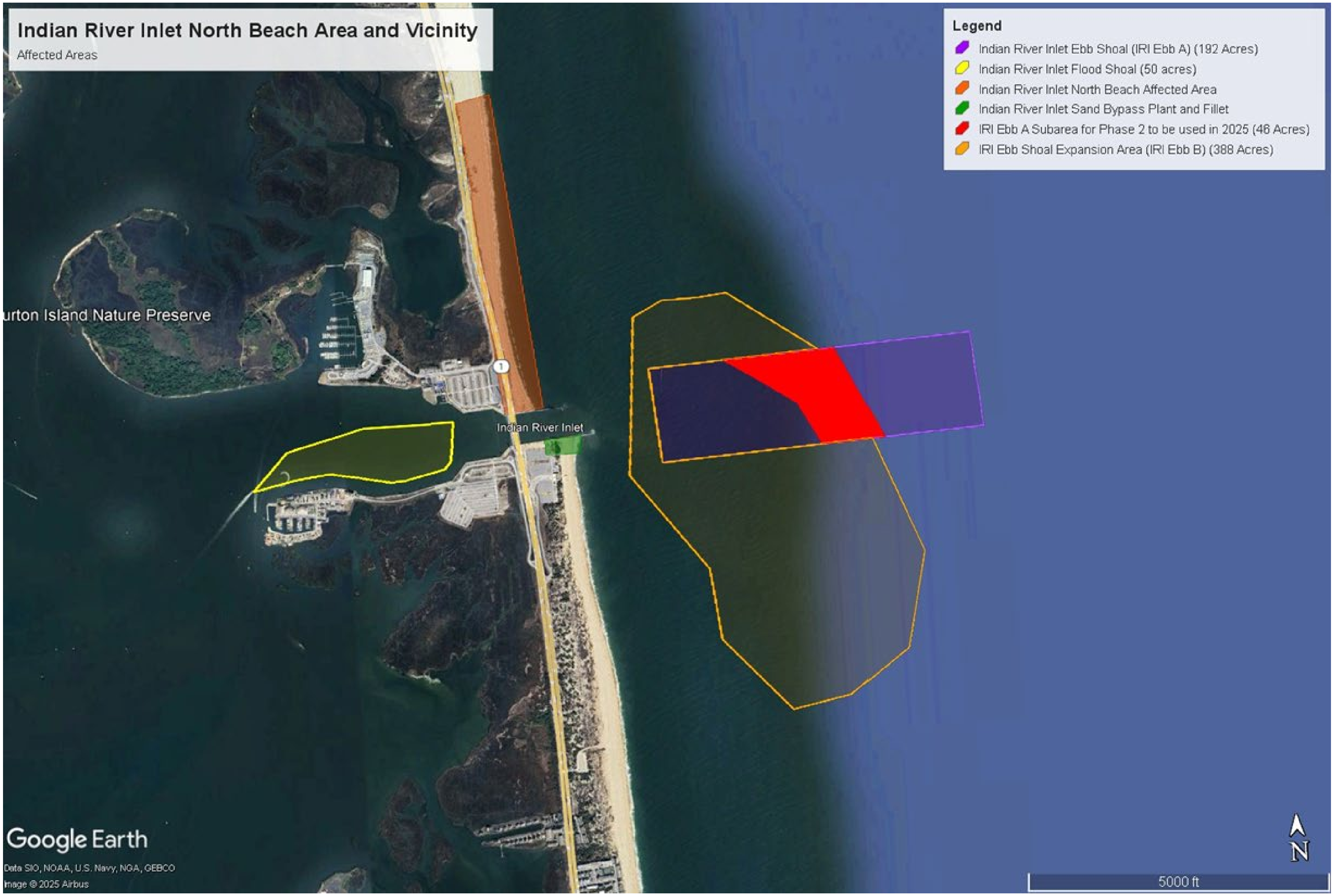


Figure 3. Indian River Inlet North Beach Project Area and Proposed Affected Areas

pumping shortfalls or the plant facility shutdown for about 5 years. Based on this, and due to the uncertainty of future storm events, unplanned bypass plant shutdowns, and any other extraneous factors, it is estimated that supplemental sand would be dredged and placed approximately every 5 years (up to 800,00 cubic yards at a time) totaling approximately 1.6 million cubic yards within a ten-year span. The sand sources include the Indian River Inlet Ebb Shoal (Ebb-A) and the existing Indian River Inlet Flood Shoal Sand Source. Additionally, the portion of the Indian River Inlet Ebb Shoal (Ebb-B) that includes the proposed southern lobe expansion area (Figure 3) is considered for future use but would require supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources.

Effects of the Proposed Action

The proposed action includes the use of an offshore sand source by dredging approximately 46 acres of the Indian River Inlet ebb shoal and the placement of approximately 500,000 cubic yards of beachfill along a 5,000-foot stretch of shoreline north of the north Indian River Inlet jetty (approximately 30 acres intertidal and subtidal habitat affected) to complete the Phase 2 portion as described. This work would continue between the months of September and December 2025. The proposed work also includes the continued use and expansion of the ebb shoal identified as “Ebb-B” (388 acres) and the Indian River Inlet Flood Shoal (50 acres) for future use “as needed” to supplement the sand bypass plant for system shutdowns, significant erosion cycles or following major storm events. The Indian River Inlet flood shoal would only use a hydraulic cutterhead dredge. Based on the proximity to the shoreline and location of the designated beach, the Indian River Inlet ebb shoal would most likely use a hydraulic cutterhead dredge as well. As described in the BiOp, all dredging would be outfitted with munitions screens on the dredge intake and a basket screen on the beach. There are no new species listed or critical habitat designated that may be affected by the identified action, which would require a reinitiation of the consultation. Additionally, there is no new information that reveals effects of the action that may affect listed species in a manner or to an extent not previously considered in the BiOp.

The following effects (stressors) of the dredging and beachfill are anticipated and were considered in the 2014 BiOp:

*Potential entrainment into a dredge intake
*Temporary increased turbidity
*Vessel strikes
*Habitat alterations
*Effects on prey availability
*Northward expansion of nesting range of sea turtles

The action area includes the following threatened and endangered species:

*Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) (all DPS’s)
*Green sea turtle (*Chelonia mydas*) (N. Atlantic DPS)

*Kemp's ridley sea turtle (*Lepidochelys kempi*)
*Loggerhead sea turtle (*Caretta caretta*) (NW Atlantic DPS)
*Leatherback sea turtle (*Dermochelys coriacea*)
*North Atlantic right whale (*Eubalaena glacialis*)
*Fin whale (*Balaenoptera physalus*)
*Humpback whale (*Megaptera novaeangliae*)

The 2014 BiOp concluded that the North Atlantic right whale, fin whale, and the humpback whale are potentially within the action area; however after considering the effects of dredging, potential for vessel strikes associated with dredging and hopper dredge movements, impacts on prey, and turbidity, it was concluded that effects are minimal to these species and based on the analysis presented in the BiOp, "all effects to right, humpback and fin whales will be insignificant or discountable. Therefore, the proposed actions are not likely to adversely affect these species. No incidental take of right, humpback or fin whales is anticipated."

The 2014 BiOp also considered the same factors for the leatherback sea turtle including vessel traffic, increased turbidity/suspended sediment and effects on prey (direct removal or turbidity effects). Leatherbacks within the action area are too large to be vulnerable to impingement or entrainment in a dredge. In consideration of these factors, the BiOp concluded that "all effects to leatherback sea turtles will be insignificant or discountable. Therefore, the proposed actions are not likely to adversely affect these species.

The proposed modifications will result in either no or a minor increase in vessel traffic above what was considered in the BiOp. The proposed modification to the project would include vessel operation during the one year of dredging of a relatively small quantity of material for Phase 2 of the project. Vessel activity will also occur if and when dredging is needed to supplement the sand bypass plant for system shutdowns, significant erosion cycles, or following major storm events. This modest increase in vessel traffic, when added to what was considered in the BiOp, will not change the determination in the BiOp. The proposed extension of the authorization and inclusion of the Ebb-A and Ebb-B shoals for source material will not change the equipment and methods (cutterhead dredge) used. Thus, the modifications will not include stressors or effects to whales or leatherback sea turtles not considered in the BiOp. Further, no new information reveals effects of the action that may affect listed whales or leatherback sea turtles in a manner or to an extent that was not previously considered.

Effects at the Beachfill Placement Site

For the sea turtles, the BiOp considered the effects on them at the beachfill placement site (North Beach Indian River Inlet Shoreline) and the potential for nesting turtles on the beach (particularly loggerheads and/or green sea turtles) and an expansion northward; however, it concluded that "it is unlikely over the time period considered here, that there would be an increase in nesting activity in the action area or that hatchlings would be present in the action area." It also concludes that should a nesting shift occur that “none of the activity is likely to reduce the suitability of these beaches for potential future nesting.” Based on a review of the proposed project modifications, these effects would remain unchanged from the effects considered in the BiOp. Further, no new information reveals effects of the action that may affect listed sea turtles in a manner or to an extent that was not previously considered.

The BiOp considered the effects of beachfill placement-induced turbidity on sea turtles and Atlantic sturgeon along the North Beach Indian River Inlet Shoreline. The BiOp determined that “turbidity levels created by the beach fill operations along the shoreline are expected to be between 34-64 mg/l; limited to an area approximately 500 meters down current from the discharge pipe, with dissipation occurring within several hundred meters along the shore; and are expected to be short term, only lasting several hours.” Based on this and the presumption that clean sand would be utilized at the beachfill placement site, the BiOp further concluded that “any sea turtles or sturgeon in the vicinity of the beach disposal sites during disposal may temporarily avoid the disposal area; however, as any effects to movements will be small and temporary, these effects will be insignificant.” Based on a review of the proposed project modifications, the effects of turbidity are expected to be similar and would remain unchanged from the effects considered in the BiOp.

The BiOp considered the effects of beachfill placement on the availability of prey items for sea turtles and Atlantic sturgeon along the North Beach Indian River Inlet Shoreline. It cited that the intertidal and nearshore areas consist of high wave energy and erosion and are likely devoid of high densities of colonies of benthic organisms (e.g., shellfish beds, mollusks, crabs, SAV), which are preferred prey for Atlantic sturgeon and sea turtles. For this reason, the BiOp determined that “it is extremely unlikely that the placement of dredged material in the nearshore waters of Delaware and New Jersey, will result in the removal of critical amounts of prey resources from the area.” Based on the fairly rapid recolonization rates of benthos on nourished beaches and the typical paucity of available food resources in these habitats, the BiOp concluded that “the effects of these operations on foraging or migrating turtles of Atlantic sturgeon will be insignificant.” Based on a review of the proposed project modifications, the effects of beachfill placement on benthic communities and prey availability are expected to be similar and would remain unchanged from the effects considered in the BiOp.

Effects of Dredging and Vessel Movements

The BiOp considered the potential for vessel strikes from dredging activities on sea turtles and Atlantic sturgeon and determined that there is a risk of vessel strikes, but this risk is low due to the slower vessel speeds associated with a dredging operation. There is no new information on the effects of vessel strikes from dredging and associated activities that has become available subsequent to the information presented in the BiOp. The modified action for Indian River Inlet will require the dredging of the flood shoal and ebb shoal sand sources utilizing a hydraulic cutterhead dredge. Thus, vessels involved would be tugboats to tow the dredge and position it, and any other service and survey boats operating within the vicinity. This would increase the vessel traffic within the action area by two to three vessels a day operating at slower speeds during the construction period, which is not a significant difference than the effects analyzed and described in the BiOp. Based on the low numbers of dredge vessels and their speeds and the large volume and variability of typical boat traffic in the action area in any given day, the increase in traffic of one to two vessels per day was considered negligible. Thus, the increased risk of a vessel striking an Atlantic sturgeon, leatherback, loggerhead, Kemp's ridley or green sea turtles was determined to be insignificant. There is no new information that reveals effects of the action that may affect listed species in a manner or to an extent not previously considered. As stated above, vessel activity related to the additional dredging and beach nourishment is low, and, when added to what was considered in the BiOp, will not change the determination in the BiOp. Therefore, we have concluded that for the proposed modifications for the Indian River Inlet project that the effects would be similar to the effects described in the BiOp.

Use of Hydraulic Cutterhead Suction Dredges

There is no new information that reveals that the effects that cutterhead dredging may have on affected listed species or critical habitat would occur in a manner or to an extent not previously considered in the BiOp.

The BiOp considered the entrainment of sea turtles from hydraulic cutterhead suction dredges. Sea turtles are not known to be vulnerable to entrainment in cutterhead dredges. Therefore, the BiOp did not "anticipate any entrainment of sea turtles any time a cutterhead dredge is used." The proposed project modifications do not include a change in dredging methods or equipment used. Thus, the effects of hydraulic cutterhead suction dredges are expected to be similar and would remain unchanged from the effects considered in the BiOp.

The BiOp considered the entrainment of Atlantic sturgeon from hydraulic cutterhead suction dredges. The BiOp cited several instances where other species of sturgeon were entrained in hydraulic cutterhead suction dredges when dredging navigation channels. Studies of dredge head intake velocities has shown that risk of entrainment occurs within 1 meter of the dredge head. Given the overall small area affected at the time of dredging in an oceanic environment and that a sturgeon is not likely to be within a meter of the cutterhead, the BiOp assessed that the overall risk of entrainment is low. However, given that there is limited information to estimate the means to estimate any dredge interactions in a marine sand source, the BiOp estimated that no more than 1 Atlantic sturgeon will be injured or killed for approximately every 8.6 million cubic yards of material removed during cutterhead dredging operations in the action area (the entire New Jersey and Delaware Atlantic Coasts with beach nourishment borrow areas). The total cumulative cubic yards accounted for in the BiOp for all covered projects is 138.7 million cubic yards (incidental take of 16 Atlantic sturgeon) with both hopper and cutter head dredges. It has been estimated that approximately 61.78 million cubic yards have been cumulatively dredged from 2014 through 2024. This is below the proxy quantity of 138.7 million cubic yards. When considering that the dredging for Indian River Inlet North Beach would occur in open ocean waters where Atlantic sturgeon do not aggregate, adding 500,000 cubic yards in 2025 (1.6 million cubic yards cumulatively in ten years) to the dredging amount considered in the BiOp will not increase the risk of entrainment beyond what was analyzed in the BiOp. Therefore, based on a review of the proposed project modifications, the effects of entrainment on Atlantic sturgeon are expected to be similar to the effects described in the BiOp and would remain unchanged from the effects considered in the BiOp and would be consistent with the incidental take rate described in the BiOp.

The BiOp considered the effects of the sediment plume on Atlantic sturgeon during dredging. Modeling of sediment plumes during dredging are temporary and localized and indicated that the concentration of suspended sediments resulting from hydraulic dredging would be highest close to the bottom and would decrease rapidly downstream and higher in the water column (to within 1,150 feet from a dredge and mostly within 2 meters of the bottom). The BiOp further states that eggs and larvae of Atlantic sturgeon, which are most vulnerable to increased turbidity would not be present within the action area, and that subadult and adult sturgeon would be sufficiently mobile to avoid any sediment plume generated from dredging. Based on a review of the proposed project modifications, the effects of turbidity generated from dredging are expected to be similar to the effects described in the BiOp and would remain unchanged from the effects considered in the BiOp.

The BiOp considered the effects of dredging on habitat including benthic resources and forage species on sea turtles and Atlantic sturgeon. Dredging would remove benthic forage species including clams, mussels, sea urchins, whelks, horseshoe crabs, blue crabs and rock crabs through entrainment. This would reduce prey species within the affected area. The BiOp cited studies that demonstrated rapid recovery and resettlement by benthic biota and similar biomass and species diversity. Therefore, it was concluded that the direct and indirect impacts to benthic communities are anticipated to be minimal, and that rapid recovery and resettlement of benthic species is expected. Based on a review of the proposed project modifications, the effects of a temporary loss of benthic food prey species for sea turtles and Atlantic sturgeon from dredging are expected to be similar to the effects described in the BiOp and would remain unchanged from the effects considered in the BiOp.

Munitions Screening on Dredges and Outfall Baskets

The BiOp considered the utilization of munitions screens for unexploded ordnance (UXO) and munitions and explosives of concern (MEC) on dredges and outfalls on the beach to screen out any potential items of concern. This has become standard practice for beachfill projects within the action area. The dimensions of the screens as described in the BiOp have not changed. The BiOp recognizes that the screens may prevent turtles or sturgeon from entering the intake pipes. They do not prevent or reduce the risk of dredge interactions with these species. They do, however, affect the ability to monitor for entrained sea turtles or sturgeon. The proposed modification will also be employing the munitions screens as described in the BiOp.

There is no new information pertaining to the use of munitions screens and their effects on sea turtles and Atlantic sturgeon that has become available subsequent to the information presented in the BiOp.

Operation of the Sand Bypass Plant

The Delaware Department of Natural Resources and Environmental Control anticipates that operations of the sand bypass plant will resume in 2025 once a new electric pump engine is installed. As per the amended LCA with the State of Delaware, the cost-sharing between the State and USACE will occur until 2034 (unless extended through a subsequent amendment). As reported in the BiOp, an average of 84,000 cubic yards of sand were bypassed between 1990 and 2013. Subsequently, the average was much less due to intermittent shutdowns or insufficient material availability from the fillet. The bypass system was designed to pass on average 100,000 cubic yards of sand per year and this is still the expectation once the system is back online in 2025. As discussed in the BiOp, the bypass “pump operates when buried in the sand in the intertidal zone. Atlantic sturgeon, leatherback, green, loggerhead and Kemp’s ridley sea turtles do not occur in the intertidal zone where the pump operates. Therefore, these species are not exposed to any effects of the Indian River Inlet sand bypass system.” The change in pump engine from diesel to electric will not result in any operational changes that would require a re-evaluation of the effects on threatened and endangered species. Therefore, based on a review of the proposed project modifications, the effects of operating the eductor pump within the intertidal zone on sea turtles and Atlantic sturgeon are expected to be similar to the effects described in the BiOp and would remain unchanged from the effects considered in the BiOp.

Conclusion

Based on the proposed modifications to the Indian River Inlet Sand Bypass Project and a reanalysis of the effects on sea turtles and Atlantic sturgeon, the District has determined that a re-initiation pursuant to the Endangered Species Act would not be required. We understand that the utilization of a hydraulic cutterhead dredge for the proposed modification will be conducted in accordance with the applicable reasonable and prudent measures and terms and conditions as presented in the BiOp. Additionally, the use of a cutterhead dredge for this project would be included in the proxy take of 1 adult Atlantic sturgeon for every 8.6 million cubic yards dredged within the Philadelphia District Atlantic Coast beach nourishment program in New Jersey and Delaware.

If you have any questions, please contact Mr. Steven Allen of our Environmental Resources Branch at (215 656-6559) Steven.D.Allen@usace.army.mil. Thank you for your attention to this matter.

Sincerely,

for Adrian Leary
Chief, Planning Division

Enclosure

From:	Darcie Webb - NOAA Affiliate
To:	Allen, Steven D CIV USARMY CENAP (USA)
Cc:	christine.vaccaro@noaa.gov; Peter Johnsen (peter.b.johnsen@noaa.gov); Brandreth, Mary E CIV USARMY CENAP (USA); Gori, Peter D CIV USARMY CENAP (USA)
Subject:	[Non-DoD Source] Re: Indian River Inlet North Beach Supplemental Nourishment EA and NLAA
Date:	Tuesday, June 17, 2025 11:47:17 PM

Hi Steve,

Re: Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment - Sussex County, Delaware, a site included in the “Use of sand borrow areas for beach nourishment and hurricane protection, offshore Delaware and New Jersey NER-2014-1090” Biological Opinion (GARFO-2014-00018).

Thank you for providing an updated analysis of changes to the the Indian River Inlet project, consulted on under the 2014 Biological Opinion “Use of sand borrow areas for beach nourishment and hurricane protection, offshore Delaware and New Jersey NER-2014-10904” (GARFO-2014-00018) and included in the Environmental Assessment: Delaware Coast Protection - Indian River Inlet Sand Bypass Project - Sussex County, Delaware, within your memo sent April 22, 2025. We have received your analysis and agree that reinitiation of consultation is not required at this time.

Reinitiation of consultation is required and shall be requested by the lead federal agency or by us, where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; (c) if a new species is listed or critical habitat designated that may be affected by the identified action; or (d) the amount or extent of take specified in the incidental take statement is exceeded.

Sincerely,

Darcie Webb
Environmental Specialist, Contractor with Azura in support of
NOAA Fisheries Protected Resources Division, GARFO | U.S. Department of Commerce
Office: (978) 281-9316
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultations-greater-atlantic-region

On Tue, Apr 22, 2025 at 12:40 PM Allen, Steven D CIV USARMY CENAP (USA) <Steven.D.Allen@usace.army.mil> wrote:

> Good afternoon,
>
> Please find attached our consultation letter for the Indian River Inlet project. As advised, this letter requests the withdrawal of the previously submitted NLAA VF and provides an update of the project modifications with respect to the 2014 BiOp. If you have any questions, please feel free to contact me. Thank you.

V/R

Steven D. Allen, Chief

Environmental Resources Branch

U.S. Army Corps of Engineers

1650 Arch Street

Philadelphia, PA 19103-2004

Office: 215-656-6559

Mobile: 445-942-9478

From: Allen, Steven D CIV USARMY CENAP (USA)
Sent: Thursday, March 20, 2025 12:29 PM
To: NMFS Section 7 Consultations (nmfs.gar.esa.section7@noaa.gov) <nmfs.gar.esa.section7@noaa.gov>
Cc: Meagan Riley - NOAA Federal <meagan.riley@noaa.gov>; darcie.webb@noaa.gov
Subject: Indian River Inlet North Beach Supplemental Nourishment EA and NLAA

Good Afternoon:

This is to notify you that the Philadelphia District, U.S. Army Corps of Engineers (USACE) has prepared a draft Environmental Assessment (EA) titled: *Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment - Sussex County, Delaware.* In addition to the no action alternative, the EA evaluates the placement of beachfill along the shoreline on the north side of Indian River Inlet (North Beach) for the purpose of restoring and/or maintaining the berm and dune for a distance of approximately 5,000 linear feet north of the north inlet jetty (Figure 1 and Figure 2). The EA also evaluates sand sources that would provide beachfill quality material for the beach restoration. The purpose of this action is to provide protection to the critical infrastructure of the State Route 1 Charles W. Cullen Bridge and its approach on the north side, which has been experiencing significant erosion.

The plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the North Beach shoreline. The Delaware Department of Natural Resources and Environmental Control completed an initial phase of the restoration of the beach by dredging from the interior Indian River Inlet Flood Shoal and placing approximately 480,000 cubic yards of sand on the North Beach shoreline. This phase is identified as “Phase 1” in the document, which was constructed to address severe erosion of the North Beach and dune. Phase 1 was completed March 1, 2025. The next phase (Phase 2) is the USACE component, which will complement the Phase 1 portion. For the completion of the Phase 2 berm restoration, approximately 500,000 cubic yards of sand beachfill would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 10H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes (Figure 3 through Figure 6). The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted. An access and staging area will be needed for the contractor. Access will be gained from the existing Phase 1 construction at Inlet Road along the east side of the parking lot and staging will extend under the SR1 bridge approach through an opening in the dune along the North Beach. The Phase 2 sand would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A) (Figure *2*) to an average depth of 10 feet below existing bathymetry.

The plan also includes the periodic nourishment of the North Beach on an as needed basis to supplement the Indian River Inlet sand bypass plant operations to maintain the Phase 2 berm and dune template during intense erosion cycles or following significant storm events. The required sand quantities may be variable but could be as high as 800,000 cubic yards. The sand sources include the Indian River Inlet Ebb Shoal (Ebb-A) and the existing Indian River Inlet Flood Shoal Sand Source. Additionally, the portion of the Indian River Inlet Ebb Shoal (Ebb-B) that includes the proposed southern lobe expansion area (Figure *2*) is considered for future use but would require supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources.

The draft EA was prepared in accordance with National Environmental Policy Act (NEPA) regulations and the *U.S. Army Corps of Engineers Procedures for Implementing NEPA, Engineering Regulation (ER) 200-2-2.* The EA evaluates existing environmental, cultural, and socio-economic conditions in the study area, and the effects of the project on existing resources in the immediate and surrounding areas.

The EA can be downloaded from our District website:

http://www.nap.usace.army.mil/Missions/CivilWorks/PublicNoticesReports.aspx

The public has been invited to comment on the draft EA.

The USACE is requesting initiation of informal Section 7 ESA consultation with your agency for the Atlantic sturgeon and sea turtles which may be present in the project area. The USACE prepared the enclosed GARFO NLAA Verification Form for the proposed hydraulic maintenance dredging of the Indian River Inlet Ebb Shoal, Indian River Inlet Flood Shoal and sand placement along the shoreline of the North Beach with respect to potential impacts to federally-listed threatened and endangered species in the project area. The USACE has determined that the proposed action is not likely to adversely affect Federally listed threatened and endangered species or critical habitat under your jurisdiction that may occur in the study area, and complies with all applicable Project Design Criteria (PDC).

The draft EA addresses potential impacts to the Atlantic sturgeon and sea turtles that may occur in the vicinity of the proposed activities. We request your review and comments on the draft report and your concurrence with the NLAA determination within 30 days of the date of this letter.

If you have any questions, please contact Mr. Steven Allen of our Environmental Resources Branch at (215 656-6559) Steven.D.Allen@usace.army.mil. Thank you for your attention to this matter.

Sincerely,

Adrian Leary

Chief, Planning Division

Enclosures

V/R

Steven D. Allen

U.S. Army Corps of Engineers, Philadelphia District

Environmental Resources Branch

1650 Arch Street

Philadelphia, PA 19103-2004

(215) 656-6559 (Desk)

(445) 942-9478 (Mobile)

APPENDIX-D

ESSENTIAL FISH HABITAT EVALUATION

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NOAA Fisheries Greater Atlantic Regional Fisheries Office
Essential Fish Habitat (EFH) Assessment & Fish and Wildlife Coordination Act (FWCA) Consultation Worksheet
August 2021 rev.

Authorities

The Magnuson Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with NOAA Fisheries on any action or proposed action authorized, funded, or undertaken by such agency that may adversely affect essential fish habitat (EFH) identified under the MSA. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in the consultation process.

The Fish and Wildlife Coordination Act (FWCA) requires that all federal agencies consult with NOAA Fisheries when proposed actions might result in modifications to a natural stream or body of water. The FWCA also requires that federal agencies consider the effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. Under the FWCA, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not federally managed and do not have designated EFH.

It is important to note that these consultations take place between NOAA Fisheries and federal action agencies. **As a result, EFH assessments, including this worksheet, must be provided to us by the federal agency, not by permit applicants or consultants.**

Use of the Worksheet

This worksheet can serve as an EFH assessment for **Abbreviated EFH Consultations**, and as a means to provide information on potential effects to other NOAA trust resources considered under the FWCA. An abbreviated consultation allows us to determine quickly whether, and to what degree, a federal action may adversely affect EFH. Abbreviated consultation procedures can be used when federal actions do not have the potential to cause substantial adverse effects on EFH and when adverse effects could be alleviated through minor modifications.

The intent of the EFH worksheet is to provide a guide for determining the information needed to fully assess the effects of a proposed action on EFH. In addition, the worksheet may be used as a tool to assist you in developing a more comprehensive EFH assessment for larger projects that may have more substantial adverse effects to EFH. <u>However, for large, complex projects that have the potential for significant adverse effects, an **Expanded EFH Consultation** may be warranted and the use of this worksheet alone is not appropriate as your EFH assessment</u>.

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

Consultation under the MSA is not required if there is no adverse effect on EFH or if no EFH has been designated in the project area. However, because the definition of "adverse effect" is very broad, most in-water work will result in some level of adverse effect requiring consultation with us, even if the impact is temporary or the overall result of the project is habitat restoration or enhancement. It is important to remember that an adverse effect determination is a trigger to consult with us. It does not mean that a project cannot proceed as proposed, or that project modifications are necessary. An adverse effect determination under the EFH provisions of the MSA simply means that the effects of the proposed action on EFH must be evaluated to determine if there are ways to avoid, minimize, or offset adverse effects. Additional details on EFH consultations, tools, and resources, including frequently asked questions can be found on our website.

Instructions

This worksheet should be used as your EFH assessment for **Abbreviated EFH Consultations** or as a guide to develop your EFH assessment. It is not appropriate to use this worksheet as your EFH assessment for large, complex projects, or those requiring an Expanded EFH Consultation.

When completed fully and with sufficient information to clearly describe the activities proposed, habitats affected, and project impacts, as well as the measures taken to avoid, minimize or offset any unavoidable adverse effects, this worksheet provides us with required components of an EFH assessment including:

1. A description of the proposed action.
2. An analysis of the potential adverse effects on EFH and the federally managed species.
3. The federal agency's conclusions regarding the effects of the action on EFH.
4. Proposed mitigation, if applicable.

When completing this worksheet and submitting information to us, it is important to ensure that sufficient information is provided to clearly describe the proposed project and the activities proposed. At a minimum, this should include the public notice (if applicable) or project application and project plans showing:

- location map of the project site with area of impact.
- existing and proposed conditions.
- all in-water work and the location of all proposed structures and/or fill.
- all waters of the U.S. on the project site with mean low water (MLW), mean high water (MHW), high tide line (HTL), and water depths clearly marked.
- Habitat Areas of Particular Concern (HAPCs).
- sensitive habitats mapped, including special aquatic sites (submerged aquatic vegetation, saltmarsh, mudflats, riffles and pools, coral reefs, and sanctuaries and refuges), hard bottom or natural rocky habitat areas, and shellfish beds.
- site photographs, if available.

Your analysis of effects **should focus on impacts that reduce the quality and/or quantity of the habitat or result in conversion to a different habitat type** for all life stages of species with designated EFH within the action area. Simply stating that fish will move away or that the project will only affect a small percentage of the overall population is not a sufficient analysis of the effects of an action on EFH. Also, since the intent of the EFH consultation is to evaluate the direct, indirect, individual and cumulative effects of a particular federal action on EFH and to identify options to avoid, minimize or offset the adverse effects of that action, is it not appropriate to conclude that an impact is minimal just because the area affected is a small percentage of the total area of EFH designated. The focus of the consultation is to reduce impacts resulting from the activities evaluated in the assessment. Similarly, a large area of distribution or range of the fish species is also not appropriate rationale for concluding the impacts of a particular project are minimal.

Use the information on the our EFH consultation website and NOAA's EFH Mapper to complete this worksheet. The mapper is a useful tool for viewing the spatial distribution of designated EFH and HAPCs. Because summer flounder HAPC (defined as: " all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH") does not have region-wide mapping, local sources and on-site surveys may be needed to identify submerged aquatic vegetation beds within the project area. The full designations for each species may be viewed as PDF links provided for each species within the Mapper, or via our website links to the New England Fishery Management Councils Omnibus Habitat Amendment 2 (Omnibus EFH Amendment), the Mid-Atlantic Fishery Management Councils FMPs (MAMFC - Fish Habitat), or the Highly Migratory Species website. Additional information on species specific life histories can be found in the EFH source documents accessible through the Habitat and Ecosystem Services Division website. This information can be useful in evaluating the effects of a proposed action. Habitat and Ecosystem Services Division (HESD) staff have also developed a technical memorandum *Impacts to Marine Fisheries Habitat from Non-fishing Activities in the Northeastern United States,* NOAA Technical Memorandum NMFS-NE-209 to assist in evaluating the effects of non-fishing activities on EFH. If you have questions, please contact the HESD staff member in your area to assist you.

Federal agencies or their non-federal designated lead agency should email the completed worksheet and necessary attachments to the HESD New England (ME, NH, MA, CT, RI) or Mid- Atlantic (NY, NJ, PA, DE, MD, VA) Branch Chief and the regional biologist listed on the Contact Regional Office Staff section on our EFH consultation website and listed below.

We will provide our EFH conservation recommendations under the MSA, and recommendations under the FWCA, as appropriate, within 30 days of receipt of a **complete** EFH assessment for an abbreviated consultation. Please ensure that the EFH worksheet is completed in full and includes detail to minimize delays in completing the consultation. If we are unable to assess potential impacts based on the information provided, we may request additional information necessary to assess the effects of the proposed action on our trust resources before we can begin a consultation. If the worksheet is not completely filled out, it may be returned to you for completion. **The EFH consultation and our response clock does not begin until we have sufficient information upon which to consult**.

If this worksheet is not used, you should include all the information required to complete this worksheet in your EFH assessment. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. You may need to prepare a more detailed EFH assessment for more substantial or complex projects to fully characterize the effects of the project and the avoidance and minimization of impacts to EFH. The format of the EFH worksheet may not be sufficient to incorporate the extent of detail required for large-scale projects, and a separate EFH assessment may be required.

Regardless of the format, you should include an analysis as outlined in this worksheet for an expanded EFH assessment, along with any additional necessary information including:

- the results of on-site inspections to evaluate habitat and site-specific effects.
- the views of recognized experts on habitat or the species that may be affected.
- a review of pertinent literature and related information.
- an analysis of alternatives that could avoid or minimize adverse effects on EFH.

For these larger scale projects, interagency coordination meetings should be scheduled to discuss the contents of the EFH consultation and the site-specific information that may be needed in order to initiate the consultation.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or threatened and endangered species and the appropriate consultation procedures.

HESD Contacts*

New England - ME, NH, MA, RI, CT	
Chris Boelke, Branch Chief	christopher.boelke@noaa.gov
Mike Johnson - ME, NH	mike.r.johnson@noaa.gov
Kaitlyn Shaw - ME, NH, MA	kaitlyn.shaw@noaa.gov
Sabrina Pereira -RI, CT	sabrina.pereira@noaa
Mid-Atlantic - NY, NJ, PA, MD, VA	
Karen Greene, Branch Chief	karen.greene@noaa.gov
Jessie Murray - NY, Northern NJ (Monmouth Co. and north)	jessie.murray@noaa.gov
Keith Hanson - NJ (Ocean Co. and south), DE and PA, Mid-Altantic wind	keith.hanson@noaa.gov
Maggie Sager - NJ (Ocean Co. and south), DE and PA	lauren.m.sager@noaa.gov
Jonathan Watson - MD, DC	jonathan.watson@noaa.gov
David O'Brien - VA	david.l.obrien@noaa.gov
Ecosystem Management (Wind/Aquaculture)	
Peter Burns, Branch Chief	peter.burns@noaa.gov
Alison Verkade (NE Wind)	alison.verkade@noaa.gov
Susan Tuxbury (wind coordinator)	susan.tuxbury@noaa.gov

***Please check for the most current staffing list on our contact us page prior to submitting your assessment.**

EFH Assessment Worksheet rev. August 2021

Please read and follow all of the directions provided when filling out this form.

1. General Project Information

Date Submitted: 03/17/2025

Project/Application Number: CENAP-PL-E-02

Project Name: Proposal of New Offshore Borrow Area in the Indian River Inlet Ebb Shoal with Placement on the North Beach

Project Sponsor/Applicant: U.S. Army Corps of Engineers (USACE)

Federal Action Agency (or state agency if the federal agency has provided written notice delegating the authority[1]):

Fast-41: Yes ☐ No ☑

Action Agency Contact Name: Steven D. Allen

Contact Phone: (215) 656-6559 Contact Email: Steven.D.Allen@USACE.ARMY.MIL

Address, City/Town, State:

Indian River Inlet North Beach (north of inlet jetty) and Indian River Inlet Ebb Shoal and Flood Shoal Sand Borrow Areas, Sussex County, Delaware

2. Project Description

[2]Latitude: 38.608456 Longitude: -75.048717°

Body of Water (e.g., HUC 6 name): Atlantic Ocean at Indian River Inlet

Project Purpose:

The purpose of the Project is to restore the severely eroded berm and dune system at North Beach using beachfill material (sand) back to the project template dimensions as constructed in 2013 following Hurricane Sandy. This would enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

The northside Indian River Inlet coastline (North Beach) has a long history of erosion due to the interruption of the northward flow of sand caused by the construction of the inlet jetties. This erosion has made critical infrastructure, such as SR-1 and the Indian River Inlet Bridge (currently the Charles W. Cullen Memorial (Inlet) Bridge), more vulnerable to storm damages. To mitigate risk and provide a consistent source of sand to North Beach, a sand bypass facility was constructed in 1990 by USACE and is operated and maintained by the State of Delaware. The sand bypass system mimics the natural flow of sand from south to north by continuously pumping sand from the southside beach fillet, across the inlet to the North Beach. Sand pumping rates are variable and average 100,000 cy of sand per year.

Project Description:

The plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the North Beach shoreline. The Delaware Department of Natural Resources and Environmental Control completed an initial phase of the restoration of the beach by dredging from the interior Indian River Inlet Flood Shoal and placing approximately 480,000 cubic yards of sand on the North Beach shoreline. This phase is identified as “Phase 1”, which was constructed to address severe erosion of the North Beach and dune. Phase 1 was completed March 1, 2025. The next phase (Phase 2) is the USACE component, which will complement the Phase 1 portion. For the completion of the Phase 2 berm restoration, approximately 500,000 cubic yards of sand beachfill would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. This will affect approximately 30 acres of intertidal and subtidal Atlantic coast sandy beach shoreline. The construction template will result in a 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of 10H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes (Figure 3 through Figure 6) . The installation of dune fencing, crossovers and dune grass plantings would subsequently be conducted. An access and staging area will be needed for the contractor. Access will be gained from the existing Phase 1 construction at Inlet Road along the east side of the parking lot and staging will extend under the SR1 bridge approach through an opening in the dune along the North Beach. The Phase 2 sand would be obtained from the hydraulic dredging of the offshore Indian River Inlet Ebb Shoal (IRI-Ebb A) (Figure 2) to an average depth of 10 feet below existing bathymetry. The Phase 2 dredging will affect approximately 46 acres of sandy bottom within the ebb shoal. This 46-acre portion of the shoal has existing bathymetry between -30 ft. to -40 ft. NAVD. Therefore, post dredging depths would be between -40 ft. to -50 ft. NAVD. The beach and ebb shoal environments are in high energy dynamic areas. The processes that formed the shoal would continue and replenish this area w/sand.

The plan also includes the periodic nourishment of the North Beach on an as needed basis to supplement the Indian River Inlet sand bypass plant operations to maintain the Phase 2 berm and dune template during intense erosion cycles or following significant storm events. The required sand quantities may be variable but could be as high as 800,000 cubic yards. The sand sources include the Indian River Inlet Ebb Shoal (Ebb-A) (192 acres) and the existing Indian River Inlet Flood Shoal Sand Source (50 acres) that was most recently used for the DNREC Phase 1 portion. However, the Flood Shoal would need several years to replenish with sand for future use. Since the flood shoal is in the interior of the inlet, a Time of Year Restriction for migratory fish would be implemented from March 1 to June 30th. Maximum dredging depths of the flood shoal would be to -24 ft. MLLW. Additionally, the portion of the Indian River Inlet Ebb Shoal (Ebb-B) portion including the proposed southern lobe expansion area (Figure 2) is considered for future use but requires supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources. Both the flood shoal area and ebb shoal areas are dynamic high energy areas that are expected to replenish/regenerate after their use.
Affected Areas Are as follows:
1. Indian River Inlet North Beach Shoreline (Phase 2 and subsequent placements) - 5,000 l.f. affecting approximately 30 acres (1,306,800 s.f.) of intertidal and subtidal marine habitat with beachfill placement. This habitat would be offset seaward and beach width will vary between erosion cycles.
2. Indian River Inlet Ebb Shoal Sand Borrow Area (IRI Ebb-A) is 192 acres (8,363,520 s.f.) of subtidal offshore sandy marine shoal habitat for completion of Phase 2 and future as needed sand. A smaller 46-acre (2,003,760 s.f.) portion of this site will be required to complete Phase 2 in 2025.
3. Indian River Inlet Flood Shoal - is 50 acres (2,178,000 s.f.) of subtidal estuarine sandy shoal within the interior of the inlet. This borrow area was recently used to complete Phase 1 of the IRI North Beach Restoration. This frequently shoaled area is proposed for future use as needed.
4. Indian River Ebb Shoal Sand Borrow Expansion Area (IRI Ebb-B) is 388 acres (16,901,280 s.f.) of subtidal offshore marine sandy shoal habitat for future as needed.

Anticipated Duration of In-Water Work including planned Start/End Dates and any seasonal restrictions proposed to be included in the schedule:

Work to complete Phase 2 in 2025 would begin approximately sometime between June 30th - December 31st with a duration of approximately 2-3 months. Future use for beach repairs could occur at any time of year for the ebb shoal. Use of the IRI flood shoal for sand dredging would require a TOYR from March 1 to June 30th. .

[1] A federal agency may designate a non-Federal representative to conduct an EFH consultation by giving written notice of such designation to NMFS. If a non-federal representative is used, the Federal action agency remains ultimately responsible for compliance with sections 305(b)(2) and 305(b)(4)(B) of the Magnuson-Stevens Act. [2] Provide the decimal, or the degrees, minutes, seconds values for latitude and longitude using the World Geodetic System 1984 (WGS84) and negative degree values where applicable.

3. Site Description

EFH includes the biological, chemical, and physical components of the habitat. This includes the substrate and associated biological resources (e.g., benthic organisms, submerged aquatic vegetation, shellfish beds, salt marsh wetlands), the water column, and prey species.

Is the project in designated EFH[3]?	☑ Yes	☐ No
Is the project in designated HAPC?	☑ Yes	☑ No
Does the project contain any Special Aquatic Sites[4]?	☐ Yes	☑ No
Is this coordination under FWCA only?	☐ Yes	☑ No

Total area of impact to EFH (indicate sq ft or acres): 630 ac. (subtidal) + 30 ac. intertidal/subtidal

Total area of impact to HAPC (indicate sq ft or acres): 30 ac.(beachfill placement location)

Current range of water depths at MLW	Salinity range (PPT):	Water temperature range (°F):
16 to 39 feet MLLW	24-33 ppt	63-77 F

[3]Use the tables in Sections 5 and 6 to list species within designated EFH or the type of designated HAPC present. See the worksheet instructions to find out where EFH and HAPC designations can be found. [4] Special aquatic sites (SAS) are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. They include sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes (40 CFR Subpart E). If the project area contains SAS (i.e. sanctuaries and refuges, wetlands, mudflats, vegetated shallows/SAV, coral reefs, and/or riffle and pool complexes, describe the SAS, species or habitat present, and area of impact.

4. Habitat Types

In the table below, select the location and type(s) for each habitat your project overlaps. For each habitat type selected, indicate the total area of expected impacts, then what portion of the total is expected to be temporary (less than 12 months) and what portion is expected to be permanent (habitat conversion), and if the portion of temporary impacts will be actively restored to pre- construction conditions by the project proponent or not. A project may overlap with multiple habitat types.

Habitat Location	Habitat Type	Total impacts ($lf/ft^2/ft^3$)	Temporary impacts ($lf/ft^2/ft^3$)	Permanent impacts ($lf/ft^2/ft^3$)	Restored to pre-existing conditions?*
Marine	Shore (unconsolidated)	5,000 lf		5,000 lf	No
Marine	Shore (unconsolidated)	1,306,800 sf		1,306,800 sf	No
Marine	Substrate (sand/shell)	8,363,520 sf	8,363,520 sf		No
Estuarine	Substrate (sand/shell)	2,178,000 sf	2,178,000 sf		No
Marine	Substrate (sand/shell)	16,901,280 sf	16,901,280 sf		No
Select one	Select One				Select one
Select one	Select One				Select one
Select one	Select One				Select one

*Restored to pre-existing conditions means that as part of the project, the temporary impacts will be actively restored,such as restoring the project elevations to pre-existing conditions and replanting. It does not include natural restoration or compensatory mitigation.

Submerged Aquatic Vegetation (SAV) Present?:

Yes: ☐ No: ☑

If the project area contains SAV, or has historically contained SAV, list SAV species and provide survey results including plans showing its location, years present and densities if available. Refer to Section 12 below to determine if local SAV mapping resources are available for your project area.

Sediment Characteristics:

The level of detail required is dependent on your project – e.g., a grain size analysis may be necessary for dredging. In addition, if the project area contains rocky/hard bottom habitat [6](pebble, cobble, boulder, bedrock outcrop/ledge) identified as Rocky (coral/rock), Substrate (cobble/gravel), or Substrate (rock) above, describe the composition of the habitat using the following table.

Substrate Type* (grain size)	Present at Site? (Y/N)	Approximate Percentage of Total Substrate on Site
Silt/Mud (<0.063mm)	Yes	1.4%
Sand (0.063-2mm)	Yes	98.2%
Rocky: Pebble/Gravel /Cobble(2-256mm)**	Yes	0.4%
Rocky: Boulder (256-4096mm)**	Select one	
Rocky: Coral	Select one	
Bedrock**	Select one	

[6]The type(s) of rocky habitat will help you determine if the area is cod HAPC.

* Grain sizes are based on Wentworth grain size classification scale for granules, pebbles, cobbles, and boulders.

** Sediment samples with a content of 10% or more of pebble-gravel-cobble and/or boulder in the top layer (6-12 inches) should be delineated and material with epifauna/macroalgae should be differentiated from bare pebble-gravel-cobble and boulder.

If no grain size analysis has been conducted, please provide a general description of the composition of the sediment. If available please attach images of the substrate.

N/A

Diadromous Fish (migratory or spawning habitat- identify species under Section 10 below):

Yes: ☐ No: ☑

5. EFH and HAPC Designations

Within the Greater Atlantic Region, EFH has been designated by the New England, Mid-Atlantic, and South Atlantic Fisheries Management Councils and NOAA Fisheries. Use the EFH mapper to determine if EFH may be present in the project area and enter all species and life stages that have designated EFH. Optionally, you may review the EFH text descriptions linked to each species in the EFH mapper and use them to determine if the described habitat is present at your project site. If the habitat characteristics described in the text descriptions do not exist at your site, you may be able to exclude some species or life stages from additional consideration. For example, the water depths at your site are shallower that those described in the text description for a particular species or life stage. We recommend this for larger projects to help you determine what your impacts are.

Species Present	**EFH is designated/mapped for:** Indian River Inlet Proposed Borrow Area and North Beach				**What is the source of the EFH information included?**
	EFH: eggs	**EFH: larvae**	**EFH: juvenile**	**EFH: adults/ spawning adults**	
albacore tuna	☐	☐	☑	☐	EFH Mapper c
Atlantic angel shark	☑	☑	☑	☑	EFH Mapper c
Atlantic butterfish	☐	☐	☑	☑	EFH Mapper c
Atlantic herring	☐	☐	☑	☐	EFH Mapper c
Atlantic sharpnose shark (Atlantic st	☐	☐	☐	☑	EFH Mapper c
Black sea bass	☐	☐	☑	☑	EFH Mapper c
bluefin tuna	☐	☐	☑	☐	EFH Mapper c
bluefish	☐	☐	☑	☑	EFH Mapper c
clearnose skate	☐	☐	☑	☑	EFH Mapper c
common thresher shark	☑	☑	☑	☑	EFH Mapper c
dusky shark	☐	☐	☑	☐	EFH Mapper c

*See *EFH Designations Continued* Document

Species	**EFH is designated/mapped for:**				**Habitat present based on text description (optional)**
	EFH: eggs	**EFH: larvae**	**EFH: juvenile**	**EFH: adults/ spawning adults**	
little skate	☐	☐	☑	☑	☑
long-finned squid	☑	☐	☐	☐	☑
red hake	☑	☑	☑	☑	☑
sandbar shark	☐	☑	☑	☑	☑
sand tiger shark	☐	☑	☑	☑	☑
scup	☐	☐	☑	☑	☑
skipjack tuna	☐	☐	☐	☑	☑
smoothhound shark (Atlantic stock)	☐	☐	☑	☑	☑
spiny dogfish	☐	☐	☐	☑	☑
summer flounder	☐	☑	☑	☑	☑
windowpane flounder	☑	☑	☑	☑	☑
winter skate	☐	☐	☑	☑	☑
yellowfin tuna	☐	☐	☑	☐	☑
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐

6. Habitat Areas of Particular Concern (HAPCs)

HAPCs are subsets of EFH that are important for long-term productivity of federally managed species. HAPCs merit special consideration based their ecological function (current or historic), sensitivity to human-induced degradation, stresses from development, and/or rarity of the habitat.While many HAPC designations have geographic boundaries, there are also habitat specific HAPC designations for certain species, see note below. Use the EFH mapper to identify HAPCs within your project area. Select all that apply.

✔	Summer flounder: SAV[7]	☐	Alvin & Atlantis Canyons
☐	Sandbar shark	☐	Baltimore Canyon
✔	Sand Tiger Shark (Delaware Bay)	☐	Bear Seamount
☐	Sand Tiger Shark (Plymouth-Duxbury-Kingston Bay)	☐	Heezen Canyon
☐	Inshore 20m Juvenile Cod[8]	☐	Hudson Canyon
☐	Great South Channel Juvenile Cod	☐	Hydrographer Canyon
☐	Northern Edge Juvenile Cod	☐	Jeffreys & Stellwagen
☐	Lydonia Canyon	☐	Lydonia, Gilbert & Oceanographer Canyons
☐	Norfolk Canyon (Mid-Atlantic)	☐	Norfolk Canyon (New England)
☐	Oceanographer Canyon	☐	Retriever Seamount
☐	Veatch Canyon (Mid-Atlantic)	☐	Toms, Middle Toms & Hendrickson Canyons
☐	Veatch Canyon (New England)	☐	Washington Canyon
☐	Cashes Ledge	☐	Wilmington Canyon
☐	Atlantic Salmon		

[7] Summer flounder HAPC is defined as all native species of macroalgae, seagrasses, and freshwater and tidal macrophytes in any size bed, as well as loose aggregations, within adult and juvenile summer flounder EFH. In locations where native species have been eliminated from an area, then exotic species are included. Use local information to determine the locations of HAPC.

[8] The purpose of this HAPC is to recognize the importance of inshore areas to juvenile Atlantic cod. The coastal areas of the Gulf of Maine and Southern New England contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. Although this habitat type is not rare in the coastal Gulf of Maine, it provides two key ecological functions for juvenile cod: protection from predation, and readily available prey. See EFH mapper for links to text descriptions for HAPCs.

7. Activity Details

Select all that apply	Project Type/Category
☐	Agriculture
☐	Aquaculture - List species here:
☐	Bank/shoreline stabilization (e.g., living shoreline, groin, breakwater, bulkhead)
☑	Beach renourishment Approximately 5,000 linear feet along the North Beach extended from the north jetty.
☑	Dredging/excavation Approximately 500,000 cy from the proposed offshore borrow area (Ebb Shoal) for Phase 2 completion in 2025. Up to 800,00 cy may be required on as needed for repairs afte
☐	Energy development/use e.g., hydropower, oil and gas, pipeline, transmission line, tidal or wave power, wind
☑	Fill >90% sand; dredged material to be used for beach nourishment along the North Beach.
☐	Forestry
☐	Infrastructure/transportation (e.g., culvert construction, bridge repair, highway, port, railroad)
☐	Intake/outfall
☐	Military (e.g., acoustic testing, training exercises)
☐	Mining (e.g., sand, gravel)
☐	Overboard dredged material placement
☐	Piers, ramps, floats, and other structures
☐	Restoration or fish/wildlife enhancement (e.g., fish passage, wetlands, mitigation bank/ILF creation)
☐	Survey (e.g., geotechnical, geophysical, habitat, fisheries)
☐	Water quality (e.g., storm water drainage, NPDES, TMDL, wastewater, sediment remediation)
☐	Other:

8. Effects Evaluation

Select all that apply	Potential Stressors Caused by the Activity
☑	Underwater noise Dredge engines and pumps
☑	Water quality/turbidity/ contaminant release
☐	Vessel traffic/barge grounding
☑	Impingement/entrainment Hydraulic cutterhead or dragarm on demersal fish
☑	Prevent fish passage/spawning Dredging the flood shoal within the interior inlet would require a TOYR from 3/1 to 6/30
☑	Benthic community disturbance
☑	Impacts to prey species Benthic invertebrates and small fish entrained

Select all that apply and if temporary[9] or permanent		Habitat alterations caused by the activity
Temp	Perm	
☑	☐	Water depth change -10 ft. cut. Area expected to infill returning bathymetric feature to pre-dredge conditoin
☐	☐	Tidal flow change
☐	☑	Fill Beachfill placed within intertidal/nearshore along North Beach
☐	☐	Habitat type conversion
☐	☐	Other:
☐	☐	Other:

[9] Temporary in this instance means during construction. [10] Entrainment is the voluntary or involuntary movement of aquatic organisms from a water body into a surface diversion or through, under, or around screens and results in the loss of the organisms from the population. Impingement is the involuntary contact and entrapment of aquatic organisms on the surface of intake screens caused when the approach velocity exceeds the swimming capability of the organism.

Details - project impacts and mitigation

Briefly describe how the project would impact each of the habitat types selected above and the amount (i.e., acreage or sf) of each habitat impacted. Include temporary and permanent impact descriptions and direct and indirect impacts. For example, dredging has a direct impact on bottom sediments and associated benthic communities. The turbidity generated can result in a temporary impact to water quality which may have an indirect effect on some species and habitats such as winter flounder eggs, SAV or rocky habitats. The level of detail that you provide should be commensurate with the magnitude of impacts associated with the proposed project. Attach supplemental information if necessary.

The proposed borrow areas (IRI Ebb Shoal/Flood Shoal) contain EFH for both highly migratory and New England/ Mid-Atlantic species that may be adversely affected during dredging and placement activities. The proposed Ebb Shoal borrow area (IRI Ebb-A) is approximately 192 acres, IRI Ebb-B expansion area is 388 acres and the interior inlet flood shoal is 50 acres. Dredging will change the water depths by approximately 10 feet, but expected to infill w/ sand after construction. Underwater noise and the disturbance of bottom sediments due to dredging could interfere with feeding and predation of nearby organisms as well as generate turbidity in the water column. Beach nourishment can disturb invertebrate species that use the beach and cover potential food sources for fish. These adverse impacts are expected to be temporary and localized to the project area during construction. Mobile species are expected to disperse and avoid the dredging/placement sites. Beachfill placement would occur with a pipeline delivery to the shoreline. A sand slurry will be pumped along the shoreline and partially enclosed with training berms to maximize sand settlement to retain on the beach. Approximately 30 acres of intertidal and subtidal marine habitat would be converted/filled, but the same amount of habitat would be displaced towards the marine offshore.

What specific measures will be used to avoid and minimize impacts, including project design, turbidity controls, acoustic controls, and time of year restrictions? If impacts cannot be avoided or minimized, why not?

TOYRs are not required for beachfill placement or dredging from the offshore IRI Ebb Shoal sand borrow area. A TOYR is recommended for the inshore IRI Flood Shoal Borrow Area dredging from March 1 to June 30.
A pipeline delivery system and semi-enclosed training berms on the beach will maximize sediment retention on the beach area.

Is compensatory mitigation proposed? Yes ☐ No ☑

If compensatory mitigation is not proposed, why not? If yes, describe plans for compensatory mitigation (e.g. permittee responsible, mitigation bank, in-lieu fee) and how this will offset impacts to EFH and other aquatic resources. Include a proposed compensatory mitigation and monitoring plan as applicable.

Compensatory mitigation is not proposed as any adverse impacts are expected to be temporary and localized to the project area.

9. Effects of Climate Change

Effects of climate change should be included in the EFH assessment if the effects of climate change may amplify or exacerbate the adverse effects of the proposed action on EFH. Use the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathways (RCP) 8.5/high greenhouse gas emission scenario (IPCC 2014), at a minimum, to evaluate the future effects of climate change on the proposed projections. For sea level rise effects, use the intermediate-high and extreme scenario projections as defined in Sweet et al. (2017). For more information on climate change effects to species and habitats relative to NMFS trust resources, see Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes.

1. Could species or habitats be adversely affected by the proposed action due to projected changes in the climate?If yes, please describe how:

   No effect, the Project will increase habitat and coastal resiliency to the North Beach.

2. Is the expected lifespan of the action greater than 10 years? If yes, please describe project lifespan:

   The proposed borrow areas will likely need to used again in the future.

3. Is climate change currently affecting vulnerable species or habitats, and would the effects of a proposed action be amplified by climate change? If yes, please describe how:

   No effect.

4. Do the results of the assessment indicate the effects of the action on habitats and species will be amplified by climate change? If yes, please describe how:

   No effect.

5. Can adaptive management strategies (AMS) be integrated into the action to avoid or minimize adverse effects of the proposed action as a result of climate? If yes, please describe how:

   N/A

10. Federal Agency Determination

Federal Action Agency's EFH determination (select one)	
☐	There is no adverse effect[7] on EFH or EFH is not designated at the project site. EFH Consultation is not required. This is a FWCA only request.
✔	The adverse effect[7] on EFH is not substantial. This means that the adverse effects are no more than minimal, temporary, or can be alleviated with minor project modifications or conservation recommendations. This is a request for an abbreviated EFH consultation.
☐	The adverse effect[7] on EFH is substantial. This is a request for an expanded EFH consultation. We will provide more detailed information, including an alternatives analysis and NEPA documents, if applicable.

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

11. Fish and Wildlife Coordination Act

Under the FWCA, federal agencies are required to consult with us if actions that the authorize, fund, or undertake will result in modifications to a natural stream or body of water. Federal agencies are required to consider the effects these modifications may have on fish and wildlife resources, as well as provide for the improvement of those resources. Under this authority, we consider the effects of actions on NOAA-trust resources, such as anadromous fish, shellfish, crustaceans, or their habitats, that are not managed under a federal fisheries management plan. Some examples of other NOAA-trust resources are listed below. Some of these species, including diadromous fishes, serve as prey for a number of federally-managed species and are therefore considered a component of EFH pursuant to the MSA. We will be considering the effects of your project on these species and their habitats as part of the EFH/FWCA consultation process and may make recommendations to avoid, minimize or offset and adverse effects concurrently with our EFH conservation recommendations.

Please contact our Greater Atlantic Regional Fisheries Office, Protected Resources Division regarding potential impacts to marine mammals or species listed under the Endangered Species Act and the appropriate consultation procedures.

Fish and Wildlife Coordination Act Resources

Species known to occur at site (list others that may apply)	Describe habitat impact type (i.e., physical, chemical, or biological disruption of spawning and/or egg development habitat, juvenile nursery and/or adult feeding or migration habitat). Please note, impacts to federally listed species of fish, sea turtles, and marine mammals must be coordinated with the GARFO Protected Resources Division.
alewife	Alewife migrate through Indian River Inlet. Offshore borrow area (IRI Ebb Shoal) is sufficiently offshore to not impede migration. TOYR recommended for inshore
American eel	American eel migrate through Indian River Inlet. Offshore borrow area (IRI Ebb Shoal) is sufficiently offshore to not impede migration. TOYR recommended for
American shad	American shad migrate through Indian River Inlet. Offshore borrow area (IRI Ebb Shoal) is sufficiently offshore to not impede migration. TOYR recommended for
Atlantic menhaden	Atlantic menhaden migrate through Indian River Inlet. Offshore borrow area (IRI Ebb Shoal) is sufficiently offshore to not impede migration. TOYR recommended
blue crab	Wintering blue crabs are known to bury themselves into deeper waters near the mouth of estuaries, and would likely concentrate in "basin" habitat more so than
blue mussel	
blueback herring	Blueback herring migrate through Indian River Inlet. Offshore borrow area (IRI Ebb Shoal) is sufficiently offshore to not impede migration. TOYR recommended
Eastern oyster	
horseshoe crab	Horseshoe crabs may be present within borrow area but not highly concentrated. Atlantic ocean coast beach is not a spawning location.
quahog	
soft-shell clams	
striped bass	
other species:	Summer Flounder SAV: No SAV in dredging or placement area when dredging/placement would occur.
other species:	Sand Tiger Shark (Delaware Bay): HAPC for beachfill placement. No permanent habitat impacts or changes resulting from beachfill placement.
other species:	

12. Useful Links

National Wetland Inventory Maps
EPA's National Estuary Program (NEP)
Northeast Regional Ocean Council (NROC) Data Portal
Mid-Atlantic Regional Council on the Ocean (MARCO) Data Portal

Resources by State

Maine

Maine Office of GIS Data Catalog
Town shellfish information including shellfish conservation area maps
State of Maine Shellfish Sanitation and Management
Eelgrass maps
Casco Bay Estuary Partnership
Maine GIS Stream Habitat Viewer

New Hampshire

NH Statewide GIS Clearinghouse, NH GRANIT
NH Coastal Viewer
State of NH Shellfish Program

Massachusetts

MA DMF Shellfish Sanitation and Management Program
MassGIS Data (Including Eelgrass Maps)
MA DMF Recommended TOY Restrictions Document Massachusetts
Bays National Estuary Program
Buzzards Bay National Estuary Program
Massachusetts Division of Marine Fisheries
Massachusetts Office of Coastal Zone Management

Rhode Island

RI Shellfish and Aquaculture
RI Shellfish Management Plan
RI Eelgrass Maps
Narragansett Bay Estuary Program
Rhode Island Division of Marine Fisheries
Rhode Island Coastal Resources Management Council

Connecticut

CT Bureau of Aquaculture

Natural Shellfish Beds in CT

Eelgrass Maps

Long Island Sound Study

CT GIS Resources

CT DEEP Office of Long Island Sound Programs and Fisheries

CT River Watershed Council

New York

Eelgrass Report

Peconic Estuary Program

NY/NJ Harbor Estuary Program

New York GIS Clearinghouse

New Jersey

Submerged Aquatic Vegetation Mapping

Barnegat Bay Partnership

NJ GeoWeb

NJ DEP Shellfish Maps

Pennsylvania

Delaware River Management Plan

PA DEP Coastal Resources Management Program

PA DEP GIS Mapping Tools

Delaware

Partnership for the Delaware Estuary

Center for Delaware Inland Bays

Delaware FirstMap

Maryland

Submerged Aquatic Vegetation Mapping

MERLIN (Maryland's Environmental Resources and Land Information Network)

Maryland Coastal Atlas

Maryland Coastal Bays Program

Virginia

VMRC Habitat Management Division

Submerged Aquatic Vegetation mapping

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

May 22, 2025

Adrian Leary, Chief
Planning Division
U.S. Army Corps of Engineers
Philadelphia District
1650 Arch Street
Philadelphia, PA 19103

RE: Indian River Inlet North Shore Supplemental Nourishment Draft EA and FWCA/EFH Review

Dear Mr. Leary:

Reference is made to Public Notice CENAP-PLE-25-02, dated March 20, 2025, which solicits comments to the draft Environmental Assessment (EA) titled: *Delaware Coast Protection - Indian River Inlet Sand Bypass Project - North Beach Supplemental Sand Nourishment - Sussex County, Delaware (NEPA Unique ID: EAXX-202-00-E5P-1742316597).* The purpose of the project is to protect critical infrastructure including the Delaware State Route 1 Charles W. Cullen Memorial Bridge and the northern bridge approach from ongoing coastal erosion and repeated instances of storm damage. In addition to the no action alternative, the EA evaluates shoreline sand nourishment options to restore and/or maintain approximately 5,000 linear feet of dune and berm systems directly adjacent to the Indian River Inlet north jetty (North Beach). In addition to the EA, the U.S. Army Corps of Engineers Philadelphia District (District) has provided an essential fish habitat (EFH) assessment for the selected alternative.

Project History

The Indian River Inlet connects the Atlantic Ocean to Indian River Bay. The stability of the inlet is maintained by two jetties which interrupt the natural longshore transport of sand. As a result the beach north of the inlet (North Beach) is starved of sand and vulnerable to erosion. Beginning in 1990, a bypass system was used to move sand from south of the inlet to North Beach. The beach also received 500,000 cubic yards (CY) of hydraulically-dredged sand from the Indian River Flood Shoal in 2013 in response to severe erosion associated with Hurricane Sandy. The bypass system became inoperable in 2020 and transport of sand has been conducted via truck haul since that time. This method is unable to keep pace with the erosion rates and frequent dune breaches are observed north of the inlet. Repairs to the bypass system are scheduled to be completed this year; previously, this system transported approximately 100,000 CY of sand annually from the beach south of the inlet to North Beach.

In response to an August 17, 2024, dune breach, the Delaware Department of Natural Resources and Environmental Control completed an initial phase of restoration on March 1, 2025, through dredging of 480,000 CY of sand from the interior Indian River Inlet Flood Shoal for nourishment of a 5,200 linear foot section of North Beach. Currently, the District has assumed responsibility for a complementary effort (Phase 2) to use approximately 500,000 CY of sand dredged in the vicinity of the Indian River Inlet to construct a dune and berm system along the same approximately 5,000 linear foot section of shoreline to bolster the resiliency of adjacent infrastructure to erosion. The proposed berm will be 200 - 250 feet wide with a top elevation of +9.0 feet NAVD and a foreshore slope of 10H:1V. The berm will be topped with a dune with a crest elevation of +16 feet NAVD and a width of 25 feet with 3H:1V slopes. Stabilization efforts will include dune fencing and grass plantings.

The sand for Phase 2 would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A) to an average depth of 10 feet below existing bathymetry. The District has also proposed the periodic nourishment of North Beach using a long-term alternate sand source on an as needed basis to supplement the bypass system which should be operable later this year. Such infusions of sand would only occur during times of increased storm activity or when the bypass system is shut down. Sand quantities for each dredging event will vary, but may be as high as 800,000 cubic yards. Sand for periodic dredging events would be sourced from the IRI-Ebb A and the previously used Flood Shoal borrow area. Additionally, a portion of Ebb Shoal B (IRI-Ebb B) including a southern lobe expansion area is under consideration for future use, but would require supplemental environmental investigations and compliance approvals.

Consultation Authorities

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) require federal agencies to consult with one another on projects such as this that may adversely affect essential fish habitat (EFH) and other aquatic resources. In turn, we must provide recommendations to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. Under the FWCA, the consultation is intended to conserve fish and wildlife resources by preventing loss of and damage to such resources, as well as providing for their development and improvement.

Aquatic Resources and Adverse Effects of the Proposed Action

The Indian River Inlet is the main link between the Atlantic Ocean and the Indian River Bay, Rehoboth Bay, and Little Assawoman Bay, collectively known as the Delaware Inland Bays. The Delaware Inland Bays have been designated as an estuary of national significance since 1988 when they were included in the EPA's National Estuary Program. A wide variety of aquatic biota uses the Delaware Inland Bay complex to complete all or part of their life cycle, including species with designated EFH such as summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), scup (*Stenotomus chrysops*), Atlantic herring (*Clupea harengus*), Atlantic butterfish (*Peprilus triacanthus*), and many others. A variety of other species including, but not limited to tautog (*Tautoga onitis*), spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), and horseshoe crab (*Limulus polyphemus*) are also found in the project area as are shellfish species of commercial interest including northern quahog (*Mercenaria mercenaria*) and surf clam (*Spisula solidissima*).

The Indian River Inlet and Indian River Bay also provide a migratory pathway, spawning, nursery and forage habitat for diadromous fish such as river herring, inclusive of both alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), hickory shad (*Alosa mediocris*), striped bass (*Morone saxatilis*), and American eel (*Anguilla rostrata*). Given their dependence on both freshwater and marine environments, these diadromous species face a unique set of challenges that have led to significant declines in their populations. Stocks of both species of river herring remain depleted after decades of investment in their recovery (ASMFC, 2024). The Atlantic striped bass stock is considered overfished but is not experiencing overfishing (ASMFC, 2022). American eel remain in a depleted stock status, with insufficient data to determine if they are experiencing overfishing (ASMFC, 2023). Maintaining unimpeded connectivity of marine habitats to the Delaware inland bays is essential for the survival of these species in the mid-Atlantic region.

River herring are important forage for several federally-managed species and provide trophic linkages between inshore and offshore systems. Buckel and Conover (1997) in Fahay et al. (1999) reports that diet items of juvenile bluefish include these species. Additionally, juvenile *Alosa* species have all been identified as prey species for summer flounder, winter skate, and windowpane flounder, in Steimle et al. (2000). The EFH final rule states that prey species are an important component of EFH and that loss of prey may be an adverse effect on EFH and managed species. As a result, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH.

Many important commercial and recreational fish species that spawn offshore enter the Delaware Inland Bays through the Indian River Inlet in the winter. Targett and Rhode (2008) conducted a one year study of larval fish ingress through the inlet in 2006-2007. Peak abundances of summer flounder larvae appeared in December 2006 and January 2007. Ingress of American eel abundance peaked from late December to March. Furthermore, the DNREC American eel monitoring project has demonstrated that the eel ladder on the Indian River at Millsboro, DE captures remarkably high abundances of glass eels relative to the size of the river. It is routinely one of the most active juvenile eel sampling locations in the region in winter and spring. Atlantic croaker and Atlantic menhaden larvae have also been collected in the winter months (Targett and Rhode, 2008). While the winter work window is often preferred for dredging and beach nourishment activities, the aforementioned observations demonstrate that the biological productivity of these months should not be discounted.

Increases in turbidity due to the resuspension of sediments into the water column during activities such as dredging can degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine- grained sediments (Johnson et al. 2008). Suspended sediment can also mask pheromones used by migratory fishes to reach their spawning grounds and impede their migration and can smother immobile benthic organisms and demersal newly-settled juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Additionally, other effects from suspended sediments may include (a) lethal and non-lethal damage to body tissues, (b) physiological effects including changes in stress hormones or respiration, or (c) changes in behavior (Kjelland et al. 2015). Furthermore, dredging can result in the impingement and entrainment of eggs, larvae and free swimming diadromous fish, which can lead to injury and mortality (Thrush and Dayton 2002). As a result, dredging and other sediment generating activities should be avoided when sensitive life stages are present.

EFH Conservation Recommendations

Pursuant to Section 305 (b)(4)(A) of the MSA, we recommend the following EFH conservation recommendations be incorporated into the project to minimize adverse effects on EFH and federally-managed species. Please note that these recommendations apply only to the proposed Phase 2 dredging and nourishment project. Subsequent dredging from IRI Ebb-B requires additional consultation with our office.

1) Prohibit dredging between December 1 and January 31 to minimize entrainment of larval summer flounder.
2) Prohibit dredging between March 1 and June 30 to minimize impacts to diadromous fish.
3) Conduct pre- and post-dredging benthic infauna sampling of IRI-Ebb A to monitor the recovery of these communities. The sampling plan should be coordinated with NMFS HESD.
4) The intake on the dredge plant should not be turned on until the dredge head is at or near the bottom and should be turned off before being lifted through the water column to minimize larval entrainment.
5) Dredging within the borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area and best management practices such as not dredging too deeply and leaving similar substrate in place to allow for the benthic community recovery should be employed.
6) Use best management practices to minimize the release of suspended sediments during beach nourishment activities, including placing the material on the beach above the spring high tide line and moving the material to the intertidal zone during low tide, where feasible.

Please note that Section 305 (b)(4)(B) of the MSA requires that you provide us with a detailed written response to our EFH conservation recommendations, including the measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305 (b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920 (k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

Please note that our recommendations do not address federally threatened and endangered species under the purview of NOAA Fisheries, which are known to exist in portions of the project area. We understand that the District has solicited input to this EA from our Protected Resources Division, which provides oversight to activities which may impact threatened or endangered species pursuant to Section 7 of the Endangered Species Act (ESA). If you have any questions regarding our listed species or the ESA consultation process, please contact Darcie Webb at darcie.webb@noaa.gov or 978-281-9316.

Conclusion

Thank you for the opportunity to comment on the Indian River Inlet North Beach EA and proposed Phase 2 dredging and beach nourishment activities. Should you have any questions regarding our recommendations, please contact Robert Bourdon in our Annapolis field office at robert.bourdon@noaa.gov or 410-205-6055.

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
for Habitat and Ecosystem Services

cc: USACE - S. Allen, B. Brandreth
NOAA HESD - K. Greene
NOAA PRD - C. Vaccaro, D. Webb
USFWS - G. LaRouche, R. Li
EPA - C. Mazzarella, N. Motley
DNREC - J. Clark
MAFMC - C. Moore
NEFMC - C. O'Keefe
ASMFC - R. Beal

Literature Cited

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ASMFC. 2023. American Eel Benchmark Stock Assessment and Peer Review Report. Atlantic States Marine Fisheries Commission, Arlington, VA. 320 p.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
1650 Arch Street
PHILADELPHIA, PENNSYLVANIA 19103-2004

July 1, 2025

Environmental Resources Branch

Mr. Louis Chiarella
Assistant Regional Administrator for
Habitat and Ecosystem Services
National Marine Fisheries Service
Greater Atlantic Region
55 Great Republic Drive
Gloucester, MA 01930
lou.chiarella@noaa.gov

Dear Mr. Chiarella:

The U.S. Army Corps of Engineers (USACE), Philadelphia District has received your comments via letter dated May 22, 2025 for a review and consultation for the plan as proposed in the draft Environmental Assessment (DEA, dated March 21, 2025) and Essential Fish Habitat assessment (EFH) worksheet for the *Delaware Coast Protection – Indian River inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment – Sussex County, Delaware.*

We appreciate your review provided in accordance with the Fish and Wildlife Coordination Act (FWCA) and the Magnuson Stevens Fishery Conservation and Management Act (MSA). This letter serves to provide responses to the Conservation Recommendations, pursuant to Section 305 (b)(4)(B) of the Magnuson Stevens Fishery Conservation and Management Act (MSA) provided in the May 22, 2025 letter. As such, we offer responses to the following EFH conservation recommendations:

1. Prohibit dredging between December 1 and January 31 to minimize entrainment of larval summer flounder.

USACE Response: Based on the funding and bid schedule for the work to complete Phase 2 (USACE portion) of the project, construction is not expected to get underway until after September 15th. Based on the quantities needed for the beachfill, we expect dredging to be completed by December 1. However, unforeseen adverse weather and equipment breakdowns causing delays may push the work into December, but no later than December 31. Therefore, an extension into the month of December may be required.

2. Prohibit dredging between March 1 and June 30 to minimize impacts to diadromous fish.

USACE Response: We concur with prohibiting dredging between March 1 and June 30 for any future dredging within the Indian River Inlet Flood Shoal, which is interior of the inlet and is in a more constricted area. This could temporarily result in adverse effects on fish migrations into and out of the inlet area. However, the Indian River Inlet Ebb Shoal is exterior to the inlet at a distance of more than 2,500 feet from the nearest end of the jetty and is within the open ocean. Therefore, based on the location of the ebb shoal sand source, its distance from the inlet, and the coarse nature of the sediments (which will limit turbidity), it is our assessment that dredging within the ebb shoal is not expected to impede or prevent ingress or egress of diadromous species and therefore does not warrant a seasonal restriction.

3. Conduct pre- and post-dredging benthic infauna sampling of IRI-Ebb A to monitor the recovery of these communities. The sampling plan should be coordinated with NMFS HESD.

USACE Response: Benthic sampling was completed in Scott (2001) where several sample stations were positioned within the Ebb Shoal area required to complete the Phase 2 portion of the beachfill. The benthic community within the affected area was found to be typical of high energy sandy shoal environments. Although, this shoal environment is highly dynamic and is expected to recover rapidly, we intend to follow up with a post-dredge benthic assessment to document the benthic infaunal recruitment and recovery, which will be coordinated with HESD.

4. The intake on the dredge plant should not be turned on until the dredge head is at or near the bottom and should be turned off before being lifted through the water column to minimize larval entrainment.

USACE Response: The borrow area dredging would likely utilize a cutter-suction hydraulic dredge. For this type of operation, a cutterhead dredge needs to pump clear water through the line to keep the solids from settling out and clogging the line with sediment. A shutdown of the pumps during the dredging process would result in clogs within the system. This could result in damages to the dredge and pipelines as well as significant impacts on dredging efficiency. Therefore, a complete shutdown of the pumps is not operationally feasible. We offer that we can require that the dredge intake pumps be operated at the minimal power necessary when not actively dredging. This would not completely eliminate the potential for larval fish entrainment but would minimize this effect.

5. Dredging within the borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area and best management practices such as not dredging too deeply and leaving similar substrate in place to allow for the benthic community recovery should be employed.

USACE Response: For the Indian River Inlet Ebb Shoal, dredging during Phase 2 would only require a deepening of approximately 5 to 10 feet of a 46-acre area of the existing shoal feature, which is overall greater than 350 acres in size. It is anticipated that based on observations and modeling that the ebb shoal is highly accretionary and that there would be no significant depletion or diminishment of this feature as the affected areas are expected to fill in over time. Cores taken within the ebb shoal exhibit thick sand deposits that are deeper than the proposed dredging depths, which would allow for the recruitment of similar benthic organisms.

The Indian River Inlet Flood Shoal is not proposed to be dredged for Phase 2 in 2025; however, it may be utilized in future supplemental sand replenishments for the North Beach. Past actions have authorized dredging the flood shoal to a depth of -24 ft. MLLW. This has allowed for the maintenance of a soft sandy bottom and the area has typically returned to pre-dredge depths within a few years.

6. Use best management practices to minimize the release of suspended sediments during beach nourishment activities, including placing the material on the beach above spring high tide line and moving the material to the intertidal zone during low tide, where feasible.

USACE Response: A typical beachfill on the Atlantic Coast involves the implementation of temporary semi-enclosed training berms made of existing beach sand to help isolate the pumpout locations from active waves and to maximize sediment retention within the fill area while allowing for the free movement of return water back into the ocean. The return water would have higher amounts of turbidity, but since the material is predominantly coarse, the turbidity is short-lived. Once the newly placed sands are sufficiently de-watered, they will be spread out using dozers to distribute the sand to achieve the required beach template. The mechanized movement of sands at low tide would provide a more efficient means of distributing the sand but is not necessary to achieve the template.

If you have any further questions regarding this project and the responses, please contact Mr. Steve Allen of the Environmental Resources Branch at (215) 656-6559, email Steven.D.Allen@usace.army.mil.

Sincerely,

FOR

Adrian Leary
Chief, Planning Division

Copy Furnished:

Robert Bourdon, National Marine Fisheries Service (Robert.Bourdon@noaa.gov)

APPENDIX-E

DELAWARE COASTAL ZONE MANAGEMENT FEDERAL CONSISTENCY FORM

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Delaware Department of Natural Resources and Environmental Control
Delaware Coastal Management Program

Initial Review: ________
Updated On: ________
Complete: ________
Official Use Only

Coastal Zone Management Act Federal Consistency Form

This document provides the Delaware Coastal Management Program (DCMP) with a Federal Consistency Determination or Certification for activities regulated under the Coastal Zone Management Act of 1972, as amended, and NOAA's Federal Consistency Regulations, 15 C.F.R. Part 930. Federal agencies and other applicants for federal consistency are not required to use this form; it is provided to applicants to facilitate the submission of a Consistency Determination or Consistency Certification. In addition, federal agencies and applicants are only required to provide the information required by NOAA's Federal Consistency Regulations.

Project/Activity Name:	Delaware Coast Protection - Indian River Inlet Sand Bypass - North Beach Supplemental Sand Nourishment

I. Federal Agency or Non-Federal Applicant Contact Information:

Contact Name/Title: Steven D. Allen/Supervisory Biologist

Federal Agency Contractor Name (if applicable): ____________________

Federal Agency: U.S. Army Corps of Engineers - Philadelphia District
(either the federal agency proposing an action or the federal agency issuing a federal license/permit or financial assistance to a non-federal applicant)

Mailing Address: 1650 Arch Street

City: Philadelphia State: PA Zip Code: 19103-2004

E-mail: Steven.D.Allen@usace.army.mil Telephone #: 215-656-6559

II. Federal Consistency Category:

- (●) Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)
- ( ) Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)
- ( ) Federal Financial Assistance (15 C.F.R. Part 930, Subpart F)
- ( ) Federal License or Permit Activity (15 C.F.R. Part 930, Subpart D)
- ( ) Federal License or Permit Activity which occurs wholly in another state (interstate consistency activities identified in DCMP's Policy document)

III. Detailed Project Description (attach additional sheets if necessary)**:**

The plan is a combination of the dredging and beachfill plan and sand source alternatives for the restoration of the North Beach shoreline. The Delaware Department of Natural Resources and Environmental Control completed an initial phase of the restoration of the beach by dredging from the interior Indian River Inlet Flood Shoal and placing approximately 480,000 cubic yards of sand on the North Beach shoreline. This phase is identified as "Phase 1" in the document, which was constructed to address severe erosion of the North Beach and dune. Phase 1 was completed March 1, 2025. The next phase (Phase 2) is the USACE component, which will complement the Phase 1 portion. For the completion of the Phase 2 berm restoration, approximately 500,000 cubic yards of sand beachfill would be placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD and a foreshore slope of

IV. General Analysis of Coastal Effects (attach additional sheets if necessary):

The proposed action will provide significant benefits by protecting critical infrastructure State Route 1 and the approach to the Charles W. Cullen Bridge on the north side of the Indian River Inlet from erosion and overwash caused by a deficit of sand on the north side of the inlet. This project will have short term adverse effects on recreation by limiting beach access during construction, but would provide long-term benefits to recreation by providing a wider recreational beach. Environmental effects include living resources such as a temporary loss of benthic community in areas to be dredged and burial of benthic community in the beachfill placement area. Temporary adverse effects on fisheries through loss of food sources (benthic community). Fish passage impacts would be minimized by implementing a Time of Year Restriction for the Flood Shoal borrow area in the interior of the inlet. Temporary adverse effects on water quality from increases in turbidity during dredging and beachfill placement. Temporary adverse effects on air quality from emissions of NOx, VOCs, and other pollutants from the operation of diesel engines during construction.

V. Detailed Analysis of Consistency with DCMP Enforceable Policies (attach additional sheets if necessary):

Policy 5.1: Wetlands Management

N/A No wetlands would be affected by the proposed action.

Policy 5.2: Beach Management

The proposed action will restore and maintain the North Beach side of the inlet and is compatible with this policy.

Policy 5.3: Coastal Waters Management (includes wells, water supply, and stormwater management. Attach additional sheets if necessary)

The proposed action will have temporary increases in turbidity from dredging and beachfill placement activities, which will be localized and minor.

Policy 5.4: Subaqueous Land and Coastal Strip Management

The dredging of the Indian River Inlet Ebb and Flood Shoals and beachfill placement along the North Beach would occur within Subaqueous Lands in Delaware waters. Section 401 Water Quality Certification will be requested from DNREC upon review of the submitted application materials.

Policy 5.5: Public Lands Management

The beachfill placement would occur along the North Beach area, which is within the Delaware Seashore State Park. The proposed action is consistent with this use and would protect, preserve and enhance this resource.

Policy 5.6: Natural Lands Management

The Indian River Inlet flood shoal borrow area is within the Inland Bays Watershed. Dredging in this area will have temporary effects on turbidity, which would subside upon completion of the construction.

Policy 5.7: Flood Hazard Areas Management

The affected area of the North Beach is predominantly a high-risk coastal area that carry an additional hazard associated with storm waves and is designated by Zone VE. The proposed action will benefit this area by protecting a natural buffer by a wider beach and dune upon completion.

Policy 5.8: Port of Wilmington

N/A

Policy 5.9: Woodlands and Agricultural Lands Management

N/A

Policy 5.10: Historic and Cultural Areas Management

The dredging of the Indian River Inlet Flood Shoal and beachfill placement along the North Beach was previously evaluated in accordance with Section 106 of the National Historic Preservation Act, and the Delaware State Historic Preservation Office (SHPO) concurred with a "no effect" determination on historic and cultural resources (SHPO letter dated 4/18/2013). A 192-acre portion of the Indian River Inlet Ebb Shoal (IRI Ebb-A) was surveyed for submerged cultural resources and no No potentially significant targets suggestive of submerged cultural resources were identified. Therefore, the Philadelphia District made a determination of "no effect" for use of this site. A concurrence of this determination from the SHPO is being requested prior to utilization of this site for sand. The proposed use of the Indian River Inlet Ebb Shoal (IRI Ebb-B) will require a submerged cultural resources survey prior to any further reviews including the SHPO for this portion of the site.

Policy 5.11: Living Resources

The dredging of the Indian River Inlet Flood and Ebb Shoals would periodically remove the benthic community within the affected areas of these sites. This effect is temporary as the benthic community is expected to recover between dredging intervals. The dredging and beachfill discharges would affect finfish either through entrainment into the dredge or through turbidity generated from the dredging/beachfill placements. To avoid or minimize effects to migratory fish, a time of year restriction (TOYR) would be in place from March 1 to June 30th during peak migration period for the IRI flood shoal. A TOYR is not proposed for the ebb shoal area or at the beachfill placement location within the Atlantic Ocean. The affected areas are inhabited by several federal and state listed threatened and endangered species including the Atlantic sturgeon, shortnose sturgeon, loggerhead sea turtle, Kemp's Ridley sea turtle, hawksbill turtle, green sea turtle, seabeach amaranth plant, and proposed threatened monarch butterfly. Informal consultation is being conducted with the NOAA Fisheries and U.S. Fish and Wildlife Service. The EA preliminary conclusion is that the activities may affect, but are not likely to adversely affect these species.

Policy 5.12 Mineral Resources Management

N/A

Policy 5.13: State Owned Coastal Recreation and Conservation

The proposed action is compatible with this policy, which "would maintain important recreational areas and wildlife habitat, or would maintain or enhance the conservation of natural, cultural or historic resources shall be managed, preserved, and protected, for conservation and recreational use."

Policy 5.14: Public Trust Doctrine

The public would be temporarily prohibited from entering work areas such as dredging locations, pipelines, and discharge points at the beachfill placement locations until work is completed.

Policy 5.15: Energy Facilities

N/A

Policy 5.16: Public Investment

N/A

Policy 5.17: Recreation and Tourism

The proposed action would have short-term adverse effects on recreation during construction, but would have long-term benefits on recreation and tourism.

Policy 5.18: National Defense and Aerospace Facilities

N/A

Policy 5.19: Transportation Facilities

N/A

Policy 5.20: Air Quality Management

All dredging and beachfill placement activities will result in temporary and localized increases in emissions associated with diesel powered equipment. Based on the size of the operation and duration, air emissions are expected to be below the de minimus threshold for a marginal ozone non attainment area.

Policy 5.21: Water Supply Management

N/A

Policy 5.22: Waste Disposal Management

N/A

Policy 5.23: Development

N/A

Policy 5.24: Pollution Prevention

The proposed actions will be conducted in a manner that complies with pollution prevention policies in accordance with waste management and spill prevention and abatement practices.

Policy 5.25: Coastal Management Coordination

The proposed action will be reviewed concurrently under the National Environmental Policy Act as a draft Environmental Assessment made available for public and agency review. Section 401 Water Quality Certification review and a Federal Coastal Zone Consistency Determination will be requested from DNREC. The EA and other documents such as Essential Fish Habitat Evaluation and Endangered Species reviews will be provided to NOAA Fisheries and the U.S. Fish and Wildlife Service.

VI. JPP and RAS Review (Check all that apply)**:**

Has the project been reviewed in a monthly Joint Permit Processing and/or Regulatory Advisory Service meeting?

☐ JPP ☐ RAS ☒ None

*If yes, provide the date of the meeting(s): ____________________

VII. Statement of Certification/Determination and Signature (Check one and sign below)**:**

☒ **FEDERAL AGENCY CONSISTENCY DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity is consistent to the maximum extent practicable with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **FEDERAL AGENCY NEGATIVE DETERMINATION.** Based upon the information, data, and analysis included herein, the federal agency, or its contracted agent, listed in (I) above, finds that this proposed activity will not have any reasonably foreseeable effects on Delaware's coastal uses or resources (Negative Determination) and is therefore consistent with the enforceable policies of the Delaware Coastal Management Program.

OR

☐ **NON-FEDERAL APPLICANT'S CONSISTENCY CERTIFICATION.** Based upon the information, data, and analysis included herein, the non-federal applicant for a federal license or permit, or state or local government agency applying for federal funding, listed in (I) above, finds that this proposed activity complies with the enforceable policies of the Delaware Coastal Management Program and will be conducted in a manner consistent with such program.

Signature:	Steven D Allen		
Printed Name:	Steven D. Allen	Date:	3/18/2025

Pursuant to 15 C.F.R. Part 930, the Delaware Coastal Management Program must provide its concurrence with or objection to this consistency determination or consistency certification in accordance with the deadlines listed below. Concurrence will be presumed if the state's response is not received within the allowable timeframe.

Federal Consistency Review Deadlines:

Federal Activity or Development Project (15 C.F.R. Part 930, Subpart C)	60 days with option to extend an additional 15 days or stay review (15 C.F.R. § 930.41)
Federal License or Permit (15 C.F.R. Part 930, Subpart D)	Six months, with a status letter at three months. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.63)
Outer Continental Shelf Activity (15 C.F.R. Part 930, Subpart E)	Six months, with a status letter at three months. If three month status letter not issued, then concurrence presumed. The six month review period can be stayed by mutual agreement. (15 C.F.R. § 930.78)
Federal Financial Assistance to State or Local Governments (15 C.F.R. Part 930, Subpart F)	State Clearinghouse schedule

OFFICIAL USE ONLY:

Reviewed By:	Fed Con ID:	Date Received:
Public notice dates: to	Comments Received: ☐ NO ☐ YES *[attach comments]*	
Decision type: *(objections or conditions attach details)*	_ Decision Date:	

APPENDIX-F

COMMENTS AND RESPONSES

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U.S. Environmental Protection Agency Region 3 (4/17/2025)

From: Traver, Carrie
To: Allen, Steven D CIV USARMY CENAP (USA)
Cc: Witman, Timothy
Subject: [Non-DoD Source] RE: Indian River Inlet North Shore Supplemental Nourishment Draft EA
Date: Thursday, April 17, 2025 3:27:28 PM

Dear Steve,

Thank you for providing notification of the Environmental Assessment (EA) for *Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment* in Sussex County, Delaware. As described below, the EA evaluates the placement of beachfill along the shoreline on the north side of Indian River Inlet (North Beach) for the purpose of restoring and/or maintaining the berm and dune for a distance of approximately 5,000 linear feet. The EA also evaluates sand sources for the beach restoration.

Thank you for meeting with me to discuss the project yesterday (April 16th). As discussed, EPA reviewed the EA and has no significant concerns at this time. Overall, the EA supports the USACE's selected plan/preferred alternative to use the Indian River Inlet Ebb Shoal to complete Phase 2 of the Project.

Should the Ebb Shoal expansion area be needed to supplement the sand bypass plant operations in the future, additional investigations will be conducted to characterize potential effects to resources. We recommend that such future assessments also consider the potential impacts to or from other projects in the vicinity, including the export cables from the Maryland Offshore Wind project. 1.

Also, please note that EPA Region 3's NEPA program now has a mailbox for NEPA documents. In addition to staff contacts, please add R3NEPA@epa.gov to your distribution lists. 2.

Thank you,
Carrie

Carrie Traver
NEPA & Technical Assistance Branch
U.S. Environmental Protection Agency, Region 3
215-814-2772
traver.carrie@epa.gov

1. Concur.
2. Concur.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, Maryland 21401
http://www.fws.gov/chesapeakebay

April 17, 2025

Adrian Leary
Chief, Planning Division
1650 Arch St
Philadelphia, PA 19103

RE: Delaware Coast Protection Indian River Inlet Sand Bypass Project North Beach Supplemental Sand Nourishment Sussex County, Delaware Draft Environmental Assessment

Dear Mr. Leary:

The U.S. Fish and Wildlife Service (Service) submits this Planning Aid Letter for the project Delaware Coast Protection Indian River Inlet Sand Bypass Project North Beach Supplemental Sand Nourishment Sussex County, Delaware Draft Environmental Assessment (EA) pursuant to the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*) and Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*). The purpose of this letter is to provide recommendations to the U.S. Army Corps of Engineers (USACE) regarding the project pursuant to those Acts.

The purpose of the Project is to restore the severely eroded berm and dune system at North Beach, using beachfill material (sand), back to the project template dimensions as constructed in 2013 following Hurricane Sandy to enhance resiliency and protect critical infrastructure, habitat, and recreation from the effects of coastal erosion.

Phase 1 of the Project was completed from November 2024 through March 2025. Phase 1 dredged 480,000 cubic yards from the interior Indian River Inlet Flood Shoal on the North Beach shoreline. It addressed severe erosion.

This EA covers Phase II of the Project. Phase II includes placing approximately 500,000 cubic yards of sand beachfill along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet. The construction template will result in a 100 to 150-ft wide berm with an elevation of +9.0 ft North American Vertical Datum and a foreshore slope of 5H:1V. The berm will have a dune on top with an overall dune crest elevation of +16.0 ft NAVD and width of 25 ft with 3H:1V slopes. The installation of dune fencing, crossovers, and dune grass plantings would subsequently be conducted by the State of Delaware. The Phase II sand would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal.

Beachfill slurry of sand would be pumped onto the North Beach affecting a 5,000 foot stretch the shoreline extending north from the north jetty of Indian River Inlet. Approximately 70 acres of dune, beach, and shallow subtidal would be affected.

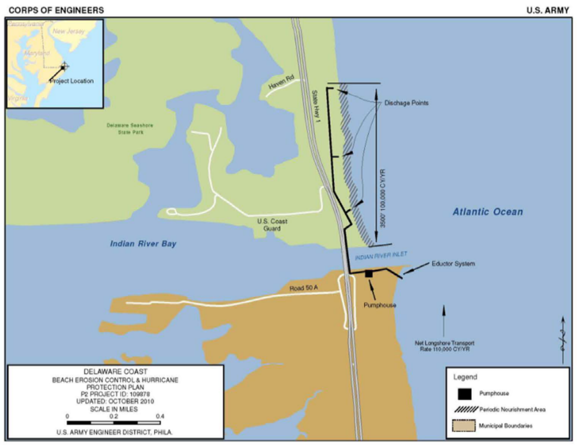

Figure 1. Delaware Coast Protection - Indian River Inlet Sand Bypass Plant and North Beach Beachfill Placement Area

Alternatives

Three alternatives were considered (Table 1): 1) no action; 2) dredging utilizing sand sources; and 3) local commercial sand quarry and truck haul delivery. The selected plan (preferred alternative) is the second: dredging utilizing sand sources alternative.

Table 1. U.S. Army Corps of Engineers' Decision Rationale from the Draft Environmental Assessment

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
No Action	None	-Continued North Beach erosion -Increases of dune breaches & over-wash of S.R. 1 -Significant infrastructure losses -Loss of critical emergency evacuation route -Exposure of hazardous debris on beach -Reduced recreational opportunities	None	-Adverse effects on land use -Adverse effects on aesthetics of the beach -Continue loss of beach and dune habitats -No effects on aquatic habitats -No effects on air quality -No effects on cultural resources	This alternative would not fulfill the purpose and need for action and is not preferred or recommended.
Dredging and Beachfill Placement	-Meets purpose and need requirements of restoring the North Beach berm/dune -Protection of critical infrastructure -Fast, efficient method for delivering sand -Cost effective for large sand quantity -Beachfill can mimic a natural beach and dune system -Maintain compatible recreation	-High mobilization and demobilization costs	-Approx. 1,000 ft. beach closure segments -Equipment breakdowns and weather delays -Time of Year Restrictions for migratory fish	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area and beach -Long-term restoration of habitat for beach nesting birds -Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction -Potential adverse effects on cultural resources can be avoided -Long-term benefit to recreation -Environmentally acceptable	As part of Phase 2, dredging and beachfill placement are the preferred method for restoring the North Beach berm and dune. Once the sand bypass plant is operational, dredging and beachfill placement may be required on an as needed basis and is a preferred method when large quantities of sand are needed. Therefore, this alternative is preferred and recommended.
Truck Haul of Sand	-Can be rapidly deployed -Cost effective for small quantities	-Increased truck traffic on roads -Increased wear and tear on roads -Truck fill would not be as effective in a highly dynamic and erosive environ. -Construction duration would be longer than dredging.	-Requires land-based access -Requires commercial sand pit/quarry	-Water quality effects are avoided or very minimal as sand would be delivered in a de-watered state -Minor, temporary adverse effects on wildlife habitat on beach during placement -Long-term restoration of habitat for beach nesting birds -No Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction -Truck transport would increase noise in communities of haul routes -Sand color may not match existing beach sand causing adverse effects on aesthetics -No adverse effects on cultural resources -Long-term benefit to recreation -Environmentally acceptable	This alternative is not a preferred method to complete Phase 2 due to the significant quantity of sand required to restore the North Beach berm and dune to full template. However, this method is viable for circumstances where smaller quantities are required to repair the beach/dune on an "as needed" basis.

No action

The existing beach will remain vulnerable to continued erosion leaving critical infrastructure at risk to damages from storm waves and overwash, if this alternative is selected.

Dredging Utilizing Sand Sources

This alternative will use hydraulic cutter-suction dredges and trailing suction hopper dredges to move sand from the source to the beach. Dozers then move the sand around the beach. The resulting beach berm will be two to three times wider than the authorized design width to account for loss. The berm will become far smaller after the first storm season.

The USACE's preferred sand source is the Indian River Inlet Ebb Shoal for both this project's dredging and as an alternate sand source for future needs. Based on the impacts of dredging on migratory fish at other identified project locations (Table 2), the Service concurs with this selection. The Service recommends that USACE closely conference with National Oceanic and Atmospheric Administration.

Table 2. U.S. Army Corps of Engineers' Rationale for Dredging Sand Source Alternatives (Under Alternative Dredging Utilizing Sand Sources) from the Draft Environmental Assessment

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
Middle Island Shoal	-Contains beachfill quality sand* -A sand source that replenishes itself periodically	-*A composited sample from several cores resulted in approximately 30% fine-grained silts-clays, which is not optimal for beachfill -Greater pumping distance required to beach locations -Only a small dredge plant could be used -Concerns with potential for encountering prehistoric cultural resources	-Dredge depth limited to -10 ft. NAVD -Avoid Middle Island and other intertidal areas	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area (134 acres shallow estuarine soft bottom habitat) and nearby wetlands -Time of Year Restrictions for migratory fish -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access) -Potential for adverse effects on cultural resources	The potential for encountering prehistoric cultural resources is high based on known nearby land-based sites. Utilization of this site would require a significant investigation effort to fully characterize the area to avoid or mitigate potential effects. Additional sediment characterization would be required to delineate optimal sand for beachfill. **This site is not recommended at this time for use.**
Indian River Inlet Ebb Shoal	-Contains beachfill quality sand -IRI Ebb A contains adequate quantity of sand for Phase 2 -A sand source that replenishes itself periodically -Site can be expanded (IRI-Ebb B) to accommodate greater sand needs in the future -Close proximity to North Beach	-"IRI-Ebb A" portion has limited sand quantity based on existing deep scour holes and would need expansion to "IRI-Ebb B" for future larger beachfill projects -"IRI-Ebb B" expansion requires additional environmental and cultural resources investigations and approvals -High energy marine environment would require larger ocean-going dredge plants	-Post dredge depths would be variable but would not exceed a cut deeper than 10 feet from existing bottom depth in depth ranging from -20 ft to -40 ft. -areas deeper than -40 feet would need to be avoided	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish habitat in borrow area due to disturbance (192 acres marine soft bottom) -High energy area with benthic fauna adapted (less sensitive) to disturbance -Open ocean dredging would not constrict migratory fish passage -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access)	The "IRI Ebb A" portion of the shoal complex contains a sufficient quantity of beachfill quality sand to complete Phase 2 of the restoration of the North Beach. **This area is preferred for this purpose.** Future uses may require an expansion ("IRI-Ebb B") for larger quantities of sand needed for large beach restorations.
Indian River Inlet Flood Shoal	-Contains beachfill quality sand -A sand source that replenishes itself periodically -Close proximity to North Beach -A small or large dredge plant could be used -Beneficial use of dredged material from navigation channel	-Sand quantity limited to approximately 550,000 cy at a time -Cannot be used (depleted) for Phase 2	-Permitted to dredge to -24 ft. NAVD	--Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area due to disturbance (50 acres shallow estuarine soft bottom) -Time of Year Restrictions for migratory fish (March 1 to June 30) -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access) -No effects on cultural resources	This alternative sand source would not fulfill the purpose and need for Phase 2 completion in 2025 because it would be depleted but is proposed as an alternate sand source for future use, as needed. **This site is preferred for future use.**
Burton Island Shoal	-Contains beachfill quality sand -A sand source that replenishes itself periodically	-Greater pumping distance required to beach locations -Only a small dredge plant could be used -Concerns with potential for encountering prehistoric cultural resources	-Dredge depth limited to -10 ft. NAVD	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish and wildlife habitat in borrow area (83.4 acres shallow estuarine soft bottom habitat) and nearby wetlands -Time of Year Restrictions for migratory fish -Air quality effects temporary --Short-term loss of recreation during construction (boat and fishing access) -Potential adverse effects on cultural resources	The potential for encountering prehistoric cultural resources is high based on known nearby land-based sites. Utilization of this site would require a significant investigation effort to fully characterize the area to avoid or mitigate potential effects. **This site is not recommended at this time for use.**

Alternative	PROS	CONS	Operational Considerations	Environmental Considerations	Selection Status
Beneficial Use of Dredged Material	-Benefits both navigation and CSRM for the North Beach -Supplemental sand source for IRI Sand bypass operation -Will not disturb bottom beyond navigation channel boundaries	-Sand quantities may be limited and may not be sufficient for any significant beach repairs -"Federal standard" may be exceeded -Availability of a split-hull type of dredge may be limited	-Sand placement in nearshore and not directly on beach	-Water quality effects are minor and temporary with sand -Minor, temporary adverse effects on fish habitat in navigation channel due to disturbance -Time of Year Restrictions for migratory fish at dredging location -Placement within a high energy area with benthic fauna adapted (less sensitive) to disturbance -Air quality effects temporary -Short-term loss of recreation during construction (boat and fishing access)	This alternative sand source would not fulfill the purpose and need for Phase 2 completion in 2025 because there are no navigation dredging projects currently proposed in the vicinity of the North Beach and sand quantities would be very limited; but is proposed as an alternate sand source for future use, as needed to supplement the IRI sand bypass operations. **This site is preferred for future use for supplemental sand.**

Truck-haul alternative

This method would require approximately 15,000 truckloads. This alternative may result in the objective not being met. In 2024, Delaware Natural Resources and Environmental Control utilized the truck haul method; they found this method to be inefficient for the large volume of sand required to repair the breaches in the berm and dune system. Delaware Natural Resources and Environmental Control reported that oftentimes the truck fill would be washed out within a day after placement.

The truck haul method would avoid adverse effects on the aquatic ecosystem in the Indian River Inlet Ebb and Flood Shoals. However, effects to the terrestrial, intertidal, and nearshore placement areas would be similar to dredging. Turbidity would be minimal since the material is coarse-grained, and will not require de-watering, as dredged sands would require.

Terrestrial Species

The Service recommends that the USACE pursue appropriate coordination and consultation with National Oceanic and Atmospheric Administration. who has Federal jurisdiction over marine species. A preliminary threatened and endangered species identification was conducted for the project area through the Information for Planning and Consultation process (Table 3). 1.

Table 3. Information for Planning and Consultation identified roseate tern, the monarch butterfly, and the seabeach amaranth as potentially occurring within the project footprint. From the Draft Environmental Assessment.

Species	D-Key determination	U.S. Army Corps of Engineers	U.S. Fish and Wildlife	Planned conservation measures

1. Concur. Copies of the draft EA were provided to the National Marine Fisheries Service along with consultations pursuant to the Endangered Species Act and Magnuson-Stevens Fishery and Conservation Management Act were conducted.

		Determination	determination	
Monarch butterfly	N/A	NLAA		N/A
Roseate Tern	No Effect			N/A
Seabeach Amaranth	May affect	NLAA		A foot survey would occur prior to construction. Any found plants would be isolated and avoided. The USFWS and Delaware Natural Resources and Environmental Control would be consulted on appropriate actions to conserve this plant from either letting it complete its lifecycle in place and collecting its seed to transplanting it.

2.

Migratory birds would likely not experience long-term habitat effects. Existing dune vegetation would be disturbed by dune reconstruction in areas where dune erosion occurs, however, the dunes will be replanted with dune grasses. Rapid recolonization of other types of vegetation such as sea rocket, seaside goldenrod, cocklebur, and other dune associated vegetation is expected. 3.

Potential effects to seabirds that could occur from dredging borrow areas include direct interactions with dredging equipment and support vessels (causing birds to flee location during foraging or resting; or collisions, which are not as likely), noise, turbidity (affecting sight feeding), benthic habitat alterations (removal or fragmentation of shoals and/or altering bathymetry where depths are inaccessible to benthic feeders), and temporary losses of benthic food resources to seabird feeding guilds that prey on benthic invertebrates or to feeding guilds that prey on fish that feed on benthic organisms. Sand extraction would temporarily impact the food source in these areas by removing the benthic community, which could take up to 2 years to recover after disturbance. Post dredge depths could also potentially affect the accessibility of benthic food resources. 4.

Dredging operations could change birds' daily movements, including distances travelled by adults tending to young, which could impact food resources and recruitment. These disruptions

2. USFWS determinations align with the USACE determinations for potential effects on threatened and endangered species.

3. No response required.

4. No response required.

would be temporary and limited to when there is active construction during dredging and use of support vessels in offshore and nearshore waters. 5.

No beach nesting birds are known to occupy this beach area. If they occupy the beach area in future, though they could be disturbed by construction activities. Presence of these species in the project area should require the implementation of protection measures. If occupied, the Service recommends consulting with the Service and Delaware Natural Resources and Environmental Control to determine protective measures, such as avoiding impacting activities from 15 March – September. 6.

Aquatic organisms

Benthic organisms reside on and in the soft sediment of fresh and salt waters. Infauna live under sediments, and epifauna, such as the Eastern oyster (*Crassostrea virginiana*), attach themselves to hard surfaces. Benthic organisms are essential parts of the Chesapeake Bay ecosystem and are also important indicators of water quality. Dredging can displace or bury under sediment benthic organisms, and the ones buried under any materials used to develop an island will not survive. They will, however, be able to recolonize the areas after dredging. The action of dredging disrupts sediments and buries benthic macroinvertebrates, which could temporarily negatively impact anadromous and catadromous fish. Best management practices should be implemented to avoid detrimental impacts to aquatic resources. The Service recommends that the USACE pursue appropriate coordination and consultation with National Oceanic and Atmospheric Administration who has Federal jurisdiction over marine species. 7.

Submerged aquatic vegetation (SAV) are vascular, rooted, underwater flowering plants that play an important role in bay ecosystems. SAV beds provide habitat, nursery areas, food, and refuge for many species including blue crab (*Callinectes sapidus*), striped bass (*Morone saxatillis*), bay scallops (*Argopecten irradians*), waterfowl, and other aquatic species. Watershed disturbances, such as dredging, can increase the turbidity of water, which blocks sunlight needed for SAV growth. Turbidity restricts grasses to shallow water, which can cause further die back of these habitats. All species of SAV are designated as habitat areas of particular concern by NOAA Fisheries due to its exceptional ecological value, relative scarcity, and susceptibility to environmental and human disturbance. We recommend the USACE contact the local National Oceanic and Atmospheric Administration office for coordination in minimizing impacts to these beds. 8.

Conclusions

The tentatively selected plan presented for this project involves dredging and placing sand. Dredging operations would have some temporary negative effects on fish and benthic communities and their habitats due to increased sedimentation. Best management practices should be implemented to avoid detrimental impacts to aquatic resources. We concur with the species determinations outlined by USACE in their draft EA. 9.

5. No response required.

6. Concur.

7. Concur. USACE consulted with the National Marine Fisheries Service in accordance with the Fish and Wildlife Coordination Act.

8. The Ebb Shoal and North Beach affected areas are in the Atlantic Ocean and do not contain suitable habitat for SAVs; therefore, there would be no effects. The Flood Shoal borrow area is estuarine and is interior of the inlet. No known previous occurrences of SAVs in this location were identified; however, updated coordination with DNREC and NMFS would be conducted to ensure that SAVs are avoided to the maximum extent practicable should they occur within the borrow area when there is a future need for this site.

9. No response required.

We appreciate the opportunity to provide information relative to fish and wildlife issues. Thank you for your interest in these resources. If you have any questions or need further assistance, please contact Sabrina Deeley of my staff at sabrina_deeley@fws.gov.

Sincerely,

SABRINA DEELEY

Digitally signed by SABRINA DEELEY
Date: 2025.04.17 18:15:44 -04'00'

Acting for Genevieve LaRouche
Field Supervisor

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930

2.

May 22, 2025

Adrian Leary, Chief
Planning Division
U.S. Army Corps of Engineers
Philadelphia District
1650 Arch Street
Philadelphia, PA 19103

3.

RE: Indian River Inlet North Shore Supplemental Nourishment Draft EA and FWCA/EFH Review

Dear Mr. Leary:

Reference is made to Public Notice CENAP-PLE-25-02, dated March 20, 2025, which solicits comments to the draft Environmental Assessment (EA) titled: *Delaware Coast Protection - Indian River Inlet Sand Bypass Project - North Beach Supplemental Sand Nourishment - Sussex County, Delaware (NEPA Unique ID: EAXX-202-00-E5P-1742316597).* The purpose of the 4. project is to protect critical infrastructure including the Delaware State Route 1 Charles W. Cullen Memorial Bridge and the northern bridge approach from ongoing coastal erosion and repeated instances of storm damage. In addition to the no action alternative, the EA evaluates shoreline sand nourishment options to restore and/or maintain approximately 5,000 linear feet of dune and berm systems directly adjacent to the Indian River Inlet north jetty (North Beach). In addition to the EA, the U.S. Army Corps of Engineers Philadelphia District (District) has provided an essential fish habitat (EFH) assessment for the selected alternative.

Project History

The Indian River Inlet connects the Atlantic Ocean to Indian River Bay. The stability of the inlet is maintained by two jetties which interrupt the natural longshore transport of sand. As a result the beach north of the inlet (North Beach) is starved of sand and vulnerable to erosion. Beginning in 1990, a bypass system was used to move sand from south of the inlet to North Beach. The beach also received 500,000 cubic yards (CY) of hydraulically-dredged sand from the Indian River Flood Shoal in 2013 in response to severe erosion associated with Hurricane Sandy. The bypass system became inoperable in 2020 and transport of sand has been conducted via truck haul since that time. This method is unable to keep pace with the erosion rates and 5. frequent dune breaches are observed north of the inlet. Repairs to the bypass system are scheduled to be completed this year; previously, this system transported approximately 100,000 CY of sand annually from the beach south of the inlet to North Beach.
In response to an August 17, 2024, dune breach, the Delaware Department of Natural Resources and Environmental Control completed an initial phase of restoration on March 1, 2025, through dredging of 480,000 CY of sand from the interior Indian River Inlet Flood Shoal for nourishment of a 5,200 linear foot section of North Beach. Currently, the District has assumed responsibility

2. The draft EA includes a determination made by USACE of “No effect” on historic properties or properties eligible for listing in the National Register of Historic Places. A letter dated 11/6/2020 was sent to the SHPO requesting a concurrence of this determination and review of the draft EA. The USACE had not received a response to that letter but considers this comment as a confirmation of “no effect”. Additionally, the USFWS Regional Historic Preservation Office also reviewed the plan and made a determination of “no effect” for the proposed activities within the East Pool of the Edwin B. Forsythe National Wildlife Refuge.

3. The proposed action would not affect freshwater wetlands, transition areas, and/or state open waters regulated under the Freshwater Wetlands Protection Act.

4. The *de minimis* emission threshold for VOCs was corrected to 50 tons per year for both sections.

5. The discharges associated with the proposed action are regulated pursuant to Section 404 of the Clean Water Act (Section 404(B)(1) guidelines in Appendix A) and also requires a Water Quality Certification from the State of New Jersey pursuant to Section 401 of the Clean Water Act. Since the proposed action is a discharge of dredged or fill material, these activities do not require NPDES permits and meet the exclusion of requiring a NPDES permit in accordance with 40 CFR 122.3(b) for a complementary effort (Phase 2) to use approximately 500,000 CY of sand dredged in the vicinity of the Indian River Inlet to construct a dune and berm system along the same approximately 5,000 linear foot section of shoreline to bolster the resiliency of adjacent infrastructure to erosion. The proposed berm will be 200 - 250 feet wide with a top elevation of +9.0 feet NAVD and a foreshore slope of 10H:1V. The berm will be topped with a dune with a crest elevation of +16 feet NAVD and a width of 25 feet with 3H:1V slopes. Stabilization efforts will include dune fencing and grass plantings. 6.

The sand for Phase 2 would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal (IRI-Ebb A) to an average depth of 10 feet below existing bathymetry. The District has also proposed the periodic nourishment of North Beach using a long-term alternate sand source on an as needed basis to supplement the bypass system which should be operable later this year. Such infusions of sand would only occur during times of increased storm activity or when the bypass system is shut down. Sand quantities for each dredging event will vary, but may be as high as 800,000 cubic yards. Sand for periodic dredging events would be sourced from the IRI-Ebb A and the previously used Flood Shoal borrow area. Additionally, a portion of Ebb Shoal B (IRI-Ebb B) including a southern lobe expansion area is under consideration for future use, but would require supplemental environmental investigations and compliance approvals.

Consultation Authorities

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act (FWCA) require federal agencies to consult with one another on projects such as this that may adversely affect essential fish habitat (EFH) and other aquatic resources. In turn, we must provide recommendations to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. Under the FWCA, the consultation is intended to conserve fish and wildlife resources by preventing loss of and damage to such resources, as well as providing for their development and improvement.

Aquatic Resources and Adverse Effects of the Proposed Action

The Indian River Inlet is the main link between the Atlantic Ocean and the Indian River Bay, Rehoboth Bay, and Little Assawoman Bay, collectively known as the Delaware Inland Bays. The Delaware Inland Bays have been designated as an estuary of national significance since 1988 when they were included in the EPA's National Estuary Program. A wide variety of aquatic biota uses the Delaware Inland Bay complex to complete all or part of their life cycle, including species with designated EFH such as summer flounder (*Paralichthys dentatus*), windowpane flounder (*Scophthalmus aquosus*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), scup (*Stenotomus chrysops*), Atlantic herring (*Clupea harengus*), Atlantic butterfish 8. (*Peprilus triacanthus*), and many others. A variety of other species including, but not limited to tautog (*Tautoga onitis*), spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), and horseshoe crab (*Limulus polyphemus*)

6. As stated in comment #5, the proposed action is a discharge of dredged or fill material regulated under Sections 404 and 401 of the Clean Water Act, these activities do not require NPDES permits and meet the exclusion of requiring a NPDES permit in accordance with 40 CFR 122.3(b). Any upland earth disturbance from the proposed activity would constitute less than an acre of impact.

are also found in the project area as are shellfish species of commercial interest including northern quahog (*Mercenaria mercenaria*) and surf clam (*Spisula solidissima*).

The Indian River Inlet and Indian River Bay also provide a migratory pathway, spawning, nursery and forage habitat for diadromous fish such as river herring, inclusive of both alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*), hickory shad (*Alosa mediocris*), striped bass (*Morone saxatilis*), and American eel (*Anguilla rostrata*). Given their dependence on both freshwater and marine environments, these diadromous species face a unique set of challenges that have led to significant declines in their populations. Stocks of both species of river herring remain depleted after decades of investment in their recovery (ASMFC, 2024). The Atlantic striped bass stock is considered overfished but is not experiencing overfishing (ASMFC, 2022). American eel remain in a depleted stock status, with insufficient data to determine if they are experiencing overfishing (ASMFC, 2023). Maintaining unimpeded connectivity of marine habitats to the Delaware inland bays is essential for the survival of these species in the mid-Atlantic region.

River herring are important forage for several federally-managed species and provide trophic linkages between inshore and offshore systems. Buckel and Conover (1997) in Fahay et al. (1999) reports that diet items of juvenile bluefish include these species. Additionally, juvenile *Alosa* species have all been identified as prey species for summer flounder, winter skate, and windowpane flounder, in Steimle et al. (2000). The EFH final rule states that prey species are an important component of EFH and that loss of prey may be an adverse effect on EFH and managed species. As a result, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH.

Many important commercial and recreational fish species that spawn offshore enter the Delaware Inland Bays through the Indian River Inlet in the winter. Targett and Rhode (2008) conducted a one year study of larval fish ingress through the inlet in 2006-2007. Peak abundances of summer flounder larvae appeared in December 2006 and January 2007. Ingress of American eel abundance peaked from late December to March. Furthermore, the DNREC American eel monitoring project has demonstrated that the eel ladder on the Indian River at Millsboro, DE captures remarkably high abundances of glass eels relative to the size of the river. It is routinely one of the most active juvenile eel sampling locations in the region in winter and spring. Atlantic croaker and Atlantic menhaden larvae have also been collected in the winter months (Targett and Rhode, 2008). While the winter work window is often preferred for dredging and beach nourishment activities, the aforementioned observations demonstrate that the biological productivity of these months should not be discounted. 1.

Increases in turbidity due to the resuspension of sediments into the water column during activities such as dredging can degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine- grained sediments (Johnson et al. 2008). Suspended sediment can also mask pheromones used by migratory fishes to reach their spawning grounds and impede their migration and can smother immobile benthic organisms and demersal newly-settled juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Additionally, other effects from suspended sediments may include (a) lethal and non-lethal damage to body tissues, (b)

3

1. Acknowledged that NJDEP- Division of Land Resource Protection has determined that the project is consistent with New Jersey’s rules on Coastal Zone Management – N.J.A.C. 7:7E-1.1 et seq. This determination also includes compliance with Section 401 Water Quality Certification.

physiological effects including changes in stress hormones or respiration, or (c) changes in behavior (Kjelland et al. 2015). Furthermore, dredging can result in the impingement and entrainment of eggs, larvae and free swimming diadromous fish, which can lead to injury and mortality (Thrush and Dayton 2002). As a result, dredging and other sediment generating activities should be avoided when sensitive life stages are present.

EFH Conservation Recommendations

Pursuant to Section 305 (b)(4)(A) of the MSA, we recommend the following EFH conservation recommendations be incorporated into the project to minimize adverse effects on EFH and federally-managed species. Please note that these recommendations apply only to the proposed Phase 2 dredging and nourishment project. Subsequent dredging from IRI Ebb-B requires additional consultation with our office.

1) Prohibit dredging between December 1 and January 31 to minimize entrainment of larval summer flounder.
2) Prohibit dredging between March 1 and June 30 to minimize impacts to diadromous fish.
3) Conduct pre- and post-dredging benthic infauna sampling of IRI-Ebb A to monitor the recovery of these communities. The sampling plan should be coordinated with NMFS HESD.
4) The intake on the dredge plant should not be turned on until the dredge head is at or near the bottom and should be turned off before being lifted through the water column to minimize larval entrainment. 1.
5) Dredging within the borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area and best management practices such as not dredging too deeply and leaving similar substrate in place to allow for the benthic community recovery should be employed.
6) Use best management practices to minimize the release of suspended sediments during beach nourishment activities, including placing the material on the beach above the spring high tide line and moving the material to the intertidal zone during low tide, where feasible.

Please note that Section 305 (b)(4)(B) of the MSA requires that you provide us with a detailed written response to our EFH conservation recommendations, including the measures you have adopted to avoid, mitigate, or offset the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305 (b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effect pursuant to 50 CFR 600.920 (k). 2.

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920 (j) if new information becomes available, or if the project is revised in such a manner that affects the basis for the above EFH conservation recommendations. 3.

4

1. Please see USACE responses in accordance with Section 305(b)(4)(B) of the MSA to the EFH Conservation Recommendations in following letter.

2. Please see USACE responses in accordance with Section 305(b)(4)(B) of the MSA to the EFH Conservation Recommendations in following letter.

3. Concur.

National Marine Fisheries Service Habitat and Ecosystem Services Division (5/22/2025) p.5

Endangered Species Act

Please note that our recommendations do not address federally threatened and endangered species under the purview of NOAA Fisheries, which are known to exist in portions of the project area. We understand that the District has solicited input to this EA from our Protected Resources Division, which provides oversight to activities which may impact threatened or endangered species pursuant to Section 7 of the Endangered Species Act (ESA). If you have any questions regarding our listed species or the ESA consultation process, please contact Darcie Webb at darcie.webb@noaa.gov or 978-281-9316. 4.

Conclusion

Thank you for the opportunity to comment on the Indian River Inlet North Beach EA and proposed Phase 2 dredging and beach nourishment activities. Should you have any questions regarding our recommendations, please contact Robert Bourdon in our Annapolis field office at robert.bourdon@noaa.gov or 410-205-6055.

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
for Habitat and Ecosystem Services

cc: USACE - S. Allen, B. Brandreth
NOAA HESD - K. Greene
NOAA PRD - C. Vaccaro, D. Webb
USFWS - G. LaRouche, R. Li
EPA - C. Mazzarella, N. Motley
DNREC - J. Clark
MAFMC - C. Moore
NEFMC - C. O'Keefe
ASMFC - R. Beal

5

4. Concur. ESA consultation with PRD is provided in Appendix C.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
1650 Arch Street
PHILADELPHIA, PENNSYLVANIA 19103-2004

July 1, 2025

Environmental Resources Branch

Mr. Louis Chiarella
Assistant Regional Administrator for
Habitat and Ecosystem Services
National Marine Fisheries Service
Greater Atlantic Region
55 Great Republic Drive
Gloucester, MA 01930
lou.chiarella@noaa.gov

Dear Mr. Chiarella:

The U.S. Army Corps of Engineers (USACE), Philadelphia District has received your comments via letter dated May 22, 2025 for a review and consultation for the plan as proposed in the draft Environmental Assessment (DEA, dated March 21, 2025) and Essential Fish Habitat assessment (EFH) worksheet for the *Delaware Coast Protection – Indian River inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment – Sussex County, Delaware.*

We appreciate your review provided in accordance with the Fish and Wildlife Coordination Act (FWCA) and the Magnuson Stevens Fishery Conservation and Management Act (MSA). This letter serves to provide responses to the Conservation Recommendations, pursuant to Section 305 (b)(4)(B) of the Magnuson Stevens Fishery Conservation and Management Act (MSA) provided in the May 22, 2025 letter. As such, we offer responses to the following EFH conservation recommendations:

1. Prohibit dredging between December 1 and January 31 to minimize entrainment of larval summer flounder.

USACE Response: Based on the funding and bid schedule for the work to complete Phase 2 (USACE portion) of the project, construction is not expected to get underway until after September 15th. Based on the quantities needed for the beachfill, we expect dredging to be completed by December 1. However, unforeseen adverse weather and equipment breakdowns causing delays may push the work into December, but no later than December 31. Therefore, an extension into the month of December may be required.

2. Prohibit dredging between March 1 and June 30 to minimize impacts to diadromous fish.

USACE Response: We concur with prohibiting dredging between March 1 and June 30 for any future dredging within the Indian River Inlet Flood Shoal, which is interior of the inlet and is in a more constricted area. This could temporarily result in adverse effects on fish migrations into and out of the inlet area. However, the Indian River Inlet Ebb Shoal is exterior to the inlet at a distance of more than 2,500 feet from the nearest end of the jetty and is within the open ocean. Therefore, based on the location of the ebb shoal sand source, its distance from the inlet, and the coarse nature of the sediments (which will limit turbidity), it is our assessment that dredging within the ebb shoal is not expected to impede or prevent ingress or egress of diadromous species and therefore does not warrant a seasonal restriction.

3. Conduct pre- and post-dredging benthic infauna sampling of IRI-Ebb A to monitor the recovery of these communities. The sampling plan should be coordinated with NMFS HESD.

USACE Response: Benthic sampling was completed in Scott (2001) where several sample stations were positioned within the Ebb Shoal area required to complete the Phase 2 portion of the beachfill. The benthic community within the affected area was found to be typical of high energy sandy shoal environments. Although, this shoal environment is highly dynamic and is expected to recover rapidly, we intend to follow up with a post-dredge benthic assessment to document the benthic infaunal recruitment and recovery, which will be coordinated with HESD.

4. The intake on the dredge plant should not be turned on until the dredge head is at or near the bottom and should be turned off before being lifted through the water column to minimize larval entrainment.

USACE Response: The borrow area dredging would likely utilize a cutter-suction hydraulic dredge. For this type of operation, a cutterhead dredge needs to pump clear water through the line to keep the solids from settling out and clogging the line with sediment. A shutdown of the pumps during the dredging process would result in clogs within the system. This could result in damages to the dredge and pipelines as well as significant impacts on dredging efficiency. Therefore, a complete shutdown of the pumps is not operationally feasible. We offer that we can require that the dredge intake pumps be operated at the minimal power necessary when not actively dredging. This would not completely eliminate the potential for larval fish entrainment but would minimize this effect.

5. Dredging within the borrow areas should be designed and undertaken in a manner that maintains geomorphic characteristics of the borrow area and best management practices such as not dredging too deeply and leaving similar substrate in place to allow for the benthic community recovery should be employed.

USACE Response: For the Indian River Inlet Ebb Shoal, dredging during Phase 2 would only require a deepening of approximately 5 to 10 feet of a 46-acre area of the existing shoal feature, which is overall greater than 350 acres in size. It is anticipated that based on observations and modeling that the ebb shoal is highly accretionary and that there would be no significant depletion or diminishment of this feature as the affected areas are expected to fill in over time. Cores taken within the ebb shoal exhibit thick sand deposits that are deeper than the proposed dredging depths, which would allow for the recruitment of similar benthic organisms.

The Indian River Inlet Flood Shoal is not proposed to be dredged for Phase 2 in 2025; however, it may be utilized in future supplemental sand replenishments for the North Beach. Past actions have authorized dredging the flood shoal to a depth of -24 ft. MLLW. This has allowed for the maintenance of a soft sandy bottom and the area has typically returned to pre-dredge depths within a few years.

6. Use best management practices to minimize the release of suspended sediments during beach nourishment activities, including placing the material on the beach above spring high tide line and moving the material to the intertidal zone during low tide, where feasible.

USACE Response: A typical beachfill on the Atlantic Coast involves the implementation of temporary semi-enclosed training berms made of existing beach sand to help isolate the pumpout locations from active waves and to maximize sediment retention within the fill area while allowing for the free movement of return water back into the ocean. The return water would have higher amounts of turbidity, but since the material is predominantly coarse, the turbidity is short-lived. Once the newly placed sands are sufficiently de-watered, they will be spread out using dozers to distribute the sand to achieve the required beach template. The mechanized movement of sands at low tide would provide a more efficient means of distributing the sand but is not necessary to achieve the template.

If you have any further questions regarding this project and the responses, please contact Mr. Steve Allen of the Environmental Resources Branch at (215) 656-6559, email Steven.D.Allen@usace.army.mil.

Sincerely,

Beth Brandreth

Digitally signed by Beth Brandreth
Date: 2025.07.01 13:04:48 -04'00'

FOR

Adrian Leary
Chief, Planning Division

Copy Furnished:

Robert Bourdon, National Marine Fisheries Service (Robert.Bourdon@noaa.gov)

From: Darcie Webb - NOAA Affiliate
To: Allen, Steven D CIV USARMY CENAP (USA)
Cc: christine.vaccaro@noaa.gov; Peter Johnsen (peter.b.johnsen@noaa.gov); Brandreth, Mary E CIV USARMY CENAP (USA); Gori, Peter D CIV USARMY CENAP (USA)
Subject: [Non-DoD Source] Re: Indian River Inlet North Beach Supplemental Nourishment EA and NLAA
Date: Tuesday, June 17, 2025 11:47:17 PM

Hi Steve,

Re: Delaware Coast Protection – Indian River Inlet Sand Bypass Project – North Beach Supplemental Sand Nourishment - Sussex County, Delaware, a site included in the "Use of sand borrow areas for beach nourishment and hurricane protection, offshore Delaware and New Jersey NER-2014-1090" Biological Opinion (GARFO-2014-00018).

Thank you for providing an updated analysis of changes to the the Indian River Inlet project, consulted on under the 2014 Biological Opinion "Use of sand borrow areas for beach nourishment and hurricane protection, offshore Delaware and New Jersey NER-2014-10904" (GARFO-2014-00018) and included in the Environmental Assessment: Delaware Coast Protection - Indian River Inlet Sand Bypass Project - Sussex County, Delaware, within your memo sent April 22, 2025. We have received your analysis and agree that reinitiation of consultation is not required at this time. 1.

Reinitiation of consultation is required and shall be requested by the lead federal agency or by us, where discretionary federal involvement or control over the action has been retained or is authorized by law and: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this consultation; (c) if a new species is listed or critical habitat designated that may be affected by the identified action; or (d) the amount or extent of take specified in the incidental take statement is exceeded.

Sincerely,

Darcie Webb
Environmental Specialist, Contractor with Azura in support of
NOAA Fisheries Protected Resources Division, GARFO | U.S. Department of Commerce
Office: (978) 281-9316
https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-consultations-greater-atlantic-region

1. The USACE updated analysis is provided in Appendix C in an April 22, 2025 letter to the NOAA Fisheries Protected Resources Division.

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF AIR QUALITY
STATE STREET COMMONS
100 W. WATER STREET, SUITE 6A
DOVER, DELAWARE 19904

PLANNING SECTION

PHONE
(302) 739-9402

May 5, 2025

Mr. Jesse Hayden
DNREC Delaware Coastal Programs
100 W. Water St., Suite 7B
Dover, Delaware 19904

RE: Federal Consistency Application Review US Army Corps of Engineers (USACE) Indian River Inlet North Shore Supplemental Nourishment (2025.0029)

Dear Mr. Hayden,

The Division of Air Quality (AQ) appreciates the opportunity to comment on the air quality impacts of the USACE Indian River Inlet North Shore Supplemental Nourishment (2025.0029) project as provided by Delaware Coastal Management Program, dated April 6, 2025.

Based on the environmental information provided, USACE proposes to restore and/or maintain the berm and dune along the shoreline on the north side of the Indian River Inlet, Sussex County, Delaware. Approximately 500,000 cubic yards of sand beach fill would be obtained from the hydraulic dredging of the Indian River Inlet Ebb Shoal to an average depth of 10 feet below existing bathymetry and placed along the shoreline of the North Beach extending north from the north Indian River Inlet jetty for approximately 5,000 feet.

The proposed construction will result in an approximately 200 to 250-ft wide berm with an elevation of +9.0 ft NAVD leading into a dune crest with an elevation of +16.0 ft NAVD and width of 25 ft. Associated work would include installation of dune fencing, crossovers and dune grass plantings. Future periodic nourishment would occur on an as-needed basis, where required sand quantity could be as high as 800,000 cubic yards. The sand sources would include the Indian River Inlet Ebb Shoal (Ebb-A), the existing Indian River Inlet Flood Shoal Sand Source, and potentially the portion of the Indian River Inlet Ebb Shoal (Ebb-B) that includes the proposed southern lobe expansion area.

According to the Coastal Zone Management Act Federal Consistency Form submitted, the projects is forecasted to have temporary and localized increases in emissions associated with diesel powered equipment resulting from dredging and beach-fill placement activities. These operations emit pollutants such as volatile organic compounds (VOCs), nitrogen oxides (NO_x), and fine particulate matter (PM2.5)—all of which are associated with adverse human health effects. Delaware currently exceeds federal health-based standards for ozone and PM2.5, and Sussex County remains designated as a **marginal nonattainment area** for the 8-hour ozone standard. 1.

In accordance with the General Conformity Rule under the Clean Air Act (40 CFR § 93.153), emissions associated with federal actions in marginal nonattainment areas must remain below the following annual thresholds: 2.

Table 1 General Conformity Rule Emission Thresholds for Marginal Nonattainment Areas (Sussex County, DE), eCFR :: 40 CFR 93.153 -- Applicability.

Counties	*Emission Threshold Levels (Tons/Year)*			
	VOC	NO_X	$PM_{2.5}$	SO_2
Sussex County	50	100	100	100

Project managers are advised to seek out and to comply with all Delaware Air Quality Regulations to not exceed air quality emission thresholds. To reduce emissions associated with the construction phase of the project, for example, AQ recommends:

- **Using retrofitted diesel engines** on both on-road and non-road vehicles and equipment, including commercial marine vessels, on-site machinery, and vehicles used to transport materials to and from the site.
- **Avoiding unnecessary engine idling** and utilizing appropriate fuels that meet fuel quality standards—specifically, the use of ultra-low sulfur diesel is recommended for equipment and generators. 3.

Additionally, a federal action is defined in 7 DE Admin. Code 1135 as "any activity engaged in by a department, agency, or instrumentality of the Federal government, or any activity a department, agency or instrumentality of the Federal government supports in any way, provides financial assistance for, licenses, permits, or approves, other than activities related to transportation plans, programs, and projects developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (49 U.S.C. 1601 et seq.)." Federally funded projects require action and would, therefore, need to comply with 7 DE Administrative Code 1135.

Please note the following regulations in Table 2 – Potential Regulatory Requirements may apply:

1. An emissions estimate was prepared and provided in Appendix B of the Draft Environmental Assessment. For completion of the Phase 2, which would be conducted between September and December of 2025. The following quantities of pollutants were estimated:

	NO_x (O_3 precursor)	VOC (O_3 precursor)	$PM_{2.5}$	SO_x	CO
IRI North Beach Restoration (500,000 CY)	**64.4**	**1.9**	**3.2**	**0.04**	**7.7**

2. Based on the results of the emissions estimates, General Conformity would not be required since the NOx and VOC precursors to ozone are below the annual thresholds of 100 and 50 tons per year, respectively, in a marginal nonattainment area for the 8-hour ozone standard.

3. When practicable, the use of retrofitted diesel engines, avoidance of unnecessary idling and use of ultra-low sulfur diesel will be considered.

Table 2: Potential Regulatory Requirements

Regulation	**Requirements**	
7 DE Admin. Code 1106 – Particulate Emissions from Construction and Materials Handling	• Use dust suppressants and measures to prevent transport of dust off-site from material stockpile, material movement, and use of unpaved roads. • Use covers on trucks transporting material to and from site to prevent visible emissions.	4.
7 DE Admin. Code 1113 – Open Burning	• Prohibit open burns statewide during the Ozone Season from May 1-Sept. 30 each year. • Prohibit the burning of land clearing debris, trash, or building materials/debris.	5.
7 DE Admin. Code 1121 – Emission Standards for Hazardous Air Pollutants	• Require an inspection for asbestos prior to any demolition/renovation. • Requires a notification to the Environmental Protection Agency (EPA) 10-days prior to the demolition of any asbestos containing material.	6.
7 DE Admin. Code 1135 – Conformity of General Federal Actions to the State Implementation Plan	• Require, for any "federal action," a conformity determination for each pollutant where the total of direct and indirect emissions would equal or exceed any of the de minimus levels (See Section 3.2.1)	7.
7 DE Admin. Code 1145 – Excessive Idling of Heavy-Duty Vehicles	• Restrict idling time for trucks and buses having a gross vehicle weight of over 8,500 pounds to no more than three minutes.	8.
7 DE Admin. Code 1149 – Regulations Governing the Control of Noise	• Require maximum noise and vibration limits. (See Section 6.0) • Prohibits noise disturbances as specified (See Section 4.0)	9.

AQ encourages project managers to comply with all current Delaware regulations during the project's timeline. For a complete listing of all Delaware applicable regulations, please look at our website: http://regulations.delaware.gov/AdminCode/title7/1000/1100/index.shtml. Project managers are advised to consult the https://www3.epa.gov/airquality/greenbook/anayo_de.html for the most up-to-date information regarding air quality designations and regulatory thresholds. Should the applicant have any questions or comments, please contact DNREC Division of Air Quality staff in the Dover office at (302) 739-9402.

Sincerely,

Pamela Keeney

Pamela Keeney
Environmental Program Manager II

4. The majority of the construction activities would be either in-water (dredging) and beachfill placement. The sand would be a wet slurry when pumped onto the beach and dust would not be created. For the construction staging areas and access roads, dust control measures would be implemented.

5. No open burns or the burning of land clearing debris, trash or other materials would be conducted as part of this project.

6. Asbestos containing materials are not expected to be encountered during project construction.

7. Based on the emissions estimate provided, the air pollutants emitted during completion of the Phase 2 portion of the project will all be below *de minimus* threshold levels.

8. When practicable, unnecessary idling of trucks and machinery having a gross weight of over 8,500 pounds to no more than three minutes would be implemented.

9. A major noise emission source would be the operation of a dredge and its pump engines. A hydraulic cutterhead dredge would typically produce a noise level of approximately 85 dBA at 15 meters (approx. 50 feet). The dredge would be operating more than 1,000 meters offshore in the Atlantic Ocean from the nearest beach. Using the inverse square law, the dredge would produce a sound level of approximately 49 decibels from 1,000 meters. There are no residences within 2,000 meters. Campgrounds and cottages exist on both sides of the interior Indian River Inlet. The nearest campsite is approximately 1,200 meters from the nearest dredging activity. However, the campgrounds and cottages are located west of Route 1 and are buffered by an elevated highway embankment and dune.

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

DIRECTOR'S OFFICE

PHONE
(302) 739-9910

April 25, 2025

Steven D. Allen
U.S Army Corps of Engineers – Philadelphia District
1650 Arch Street
Philadelphia, PA 19103-2004

Re: DNREC-CP 2025 Indian River Inlet North Shore Supplemental Nourishment

Dear Steven:

Thank you for contacting the Division of Fish and Wildlife (DFW) Species Conservation and Research Program about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

A review of our database indicates that the following state-rare or federally-listed plants, animals or natural communities occur at or adjacent to the project site:

Scientific Name	Common Name	Taxon	State Rank	State Status	SGCN Tier or Global Rank	Federal Status
Charadrius melodus	Piping Plover	Bird	S1B	E	Tier 1/ G3	
Rynchops niger	Black Skimmer	Bird	S1B	E	Tier 1/ G5	
Amaranthus pumilus LT	Seabeach amaranth	Plant	S1		G2	
Haematopus palliatus	American Oystercatcher	Bird	S1B	E	Tier 1/G5	
Sternula antillarum	Least Tern	Bird	S1B	E	Tier 1/G4	

State Rank: **S1** – Extremely rare within the state (typically 5 or fewer occurrences); **S2** – Very rare within the state (6 to 20 occurrences); **S3** – Rare to uncommon in Delaware; **S4** – Apparently secure, at fairly low risk of extinction or extirpation due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors; **S5** – Demonstrably secure, at very low risk of extinction or extirpation due to a very extensive range, abundant populations or occurrences, or little to no concern from declines or threats; **SX** – Extirpated or presumed extirpated from the state. All historical locations and/or potential habitat have been surveyed; **SH** – Historically known, but not verified for an extended period (usually 15+ years); there are expectations that the species may be rediscovered; **SE** – Non-native in the state (introduced through human influence); not a part of the native flora or fauna; **SNR** – Not yet ranked in Delaware; **SN** – Occurrences in DE of limited conservation value, **of concern due to a restricted range; **SU** – Status uncertain within the state. Usually, an uncommon species which is believed to be of conservation concern, but there is inadequate data to determine the degree of rarity; **B** – Breeding; **M** – Migratory; **N** – Nonbreeding.

State Status: E – Endangered, i.e., designated by the Delaware Division of Fish and Wildlife as seriously threatened with extinction in the state pursuant to State of Delaware Code (7 Del. §601 *et seq.*) and implementing regulation (Title 7, 3900, 16.0 Endangered Species); **NA** – Plants are not included in Title 7; **NL** – Not listed.

SGCN Tiers: Tier 1 – Species of Greatest Conservation Need (SGCN) that are most in need of conservation action in order to sustain or restore their populations. They are the focus of the Delaware Wildlife Action Plan (DEWAP), which is based on analyzing threats to their populations and habitats, and on developing conservation actions to eliminate, minimize, or compensate for these threats; **Tier 2** – SGCN that are also in need of conservation action, although not with the urgency of Tier 1 species. Their distribution across the landscape will help determine where DEWAP conservation actions will be implemented on the ground; **Tier 3** – These species are for the most part still relatively common in Delaware, but are listed as SGCN for various reasons, including documented population declines, high responsibility of the Northeast region for the global population, or continued need for monitoring and/or management. This tier also includes non-breeding species that are uncommon in Delaware. **NA** – Plants are not addressed in DEWAP.

Federal Status: E – Endangered, i.e., designated by the U.S. Fish and Wildlife Service as being in danger of extinction throughout its range; **T** – Threatened, i.e., designated by USFWS as being likely to become endangered in the foreseeable future throughout all or a significant portion of its range; **C** – Candidate, i.e., taxa for which the U.S. Fish and Wildlife Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. NOAA Managed Candidate: **SC** – Species of Concern, i.e., species about which NOAA's National Marine Fisheries Service (NMFS) has some concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA; **NL** – Not listed.

Global Rank: G1 – Imperiled globally because of extreme rarity (5 or fewer occurrences worldwide); **G2** – Imperiled globally because of great rarity (6 to 20 occurrences); **G3** – Either very rare and local throughout its range (21 to 100 occurrences) or found only locally in a restricted range; **G4** – Apparently secure globally but uncommon in parts of its range; **G5** – Secure on a global basis but may be uncommon locally; **T** – Variety or subspecies rank; **Q** – Questionable taxonomy.

Because rare species are present, this project is within a State Natural Heritage Site. State Natural Heritage Sites are identified as "Designated Critical Resource Waters" by the U.S. Army Corps of Engineers (USACE), and as such are subject to the restrictions and limitations imposed through Nationwide Permit General Condition No. 22. A copy of this letter shall be included in any permit application or pre-construction notification submitted to the USACE for activities on this property. 1.

State Natural Area
The proposed project area occurs within Delaware's Natural Areas Inventory. State Natural Areas are composed of areas of land and/or water, whether in public or private ownership, which have retained or reestablished its natural character (although it need not be undisturbed), has unusual flora or fauna, or has biotic, geological, scenic, or archaeological features of scientific or educational value. If you require further information about this area for your planning, please contact Benjamin Schlusser at 302-739-9039 or Bejamin.Schlusser@delaware.gov. 2.

Delaware Ecological Network
Habitat on this parcel has been identified as ecologically important by the Delaware Ecological Network (DEN) and is classified as a core area. The DEN, although non-regulatory, is a statewide conservation network developed using GIS and field collected datasets that help to identify and prioritize ecologically important areas for natural resource protection. The DEN includes ecologically important areas such as forests, wetlands, streams, habitat that supports 3.

1.The action described is to be undertaken by USACE to complete the Phase 2 portion of the beachfill project along the North Beach and to periodically place beachfill as needed in the future. Due to the size and scope of this project, this action does not meet the conditions to qualify under the Nationwide Permit Program. Additionally, USACE does not issue permits to itself. However, we note that the location of the project is a State Natural Heritage Site and therefore is "Designated Critical Resource Waters". In 2024, the project location was severely eroded and the habitat conditions for the listed federal and state rare species was in poor condition. With the completion of the Phase 1 portion by DNREC in March 2025, we anticipate that habitat conditions have improved and the Phase 2 portion of the project will require monitoring (if within nesting/growing season) and implementation of appropriate buffers from the work.

2. The work proposed at the Indian River Inlet North Beach will maintain an undeveloped beach and dune and is consistent with the attributes and features that give the location its natural character.

3. Concur. The proposed work would maintain the habitat attributes that makes this area classified as a core area in within the Delaware Ecological Network.

rare species and areas of especially high quality. The DEN includes the following key elements: 1) Core areas – which contain relatively intact natural ecosystems, and provide high-quality habitat for native plants and animals, 2) Hubs – which are slightly fragmented aggregations of core areas with contiguous natural cover and 3) Corridors – which link core areas together, allowing wildlife movement and seed and pollen transfer between them. The DEN can be accessed through First Map: Delaware Ecological Network 2.0 | Delaware Ecological Network 2.0 | State of Delaware (arcgis.com). We recommend that this DEN designated area be protected to the fullest extent possible.

Key Wildlife Habitat

The shoreline north of the Indian River Inlet on this property is mapped as Key Wildlife Habitat (KWH) in the Delaware Wildlife Action Plan (DEWAP) because it is part of a large wetland complex/large forest block that can support an array of plant and animal species across the landscape.

Although designation as KWH is non-regulatory, these maps are intended to help guide site-specific conservation planning efforts. Impacts to KWH should be minimized to the greatest extent practicable. 4.

The DEWAP is a comprehensive strategy for conserving the full array of native wildlife and habitats, common and uncommon, as vital components of the state's natural resources. This document can be viewed via the Division of Fish and Wildlife's website.

Atlantic Coast Beaches

Federally protected red knot (*Calidris canutus*) rely heavily on Delaware Bay shore beaches during spring migration (April 15 through June 7) and may also occur randomly and sparsely along Atlantic Coast beaches of Delaware, including the project area. We recommend the Coastal Waterbird Biologist, Kat Christie (Katherine.Christie@delaware.gov, 302-735-3612), be contacted before project work begins to coordinate if red knot are observed regularly and to determine appropriate recommendations to minimize potential impacts to these migrants. 5.

Seabeach Amaranth

There could be concerns regarding the presence of seabeach amaranth (*Amaranthus pumilus)*, as the project area contains habitat that could possibly support this federally-listed threatened plant. The occurrence of this annual species can vary from year to year as it will occupy suitable habitat as it becomes available. Plants may not be evident every year, but the species may survive in the soil seed bank. Surveys for this species should be conducted beginning in August and if plants are present, work activities should not take place until after plants have completed their life cycle (typically in September/October). 6.

In Delaware, the destruction of suitable habitat is identified as the largest threat to this species; habitat destruction primarily through the use of off-road vehicles. Other threats include beach grooming, tidal inundation, disease, and herbivory by insects and other animals. Additionally, jetties, groins, sea walls, bulkheads and other structures can impact habitat directly or change the natural distribution of seeds.

4. The restoration and maintenance of dune, beach and marine intertidal habitat will restore and maintain this area as a Key Wildlife Habitat.

5. Completion of the Phase 2 portion of the work would occur from September through December 2025, which would be outside of the spring migration for red knots. Future renourishments could occur during this time period, therefore, coordination would be undertaken with DNREC Division of Fish and Wildlife prior to construction.

6. The beachfill placement location along the shoreline of the North Beach was in a severely eroded condition in 2024 and suitable habitat for seabeach amaranth was not present within the affected area due to extensive erosion and scour of the beach. However, following DNREC's completion of the Phase 1 beachfill in March 2025, a potential exists for seabeach amaranth to be present based on the restoration of suitable habitat following beachfill placement. Therefore, USACE will conduct a foot survey of the affected area prior to construction of Phase 2 or any subsequent re-nourishments that may be needed in the future. If present, plants will be identified and mapped for avoidance during the season of their life cycle. Coordination/consultation would be undertaken with the U.S. Fish and Wildlife Service (USFWS) and Delaware DNREC to determine the best course of action for any plants located within a construction impact area, which may include letting the plant(s) complete its natural lifecycle in place and collecting its seed to transplanting it. The USFWS has concurred with this approach and has determined that the activities are not likely to adversely affect (NLAA) the species (USFWS letter dated April 17, 2025). In the long-term, the project is expected to restore/maintain suitable habitat for this species.

Delaware DNREC Division of Fish and Wildlife (as submitted to USACE

Beach Nesting Birds (incl. Piping Plover)

We have records of piping plovers (*Charadrius melodus*), least terns (*Sterna antillarum*), and American oystercatchers (*Haematopus palliates)* breeding at this site. To avoid impact to these species all work should be conducted outside of the breeding season (March 15th – September 15th). Note that because federally-listed threatened piping plovers may be affected, Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) may be necessary. For more information, please contact our Coastal Waterbird Biologist, Kat Christie (Katherine.Christie@delaware.gov, 302-735-3612). 7.

Pinnipeds

Four different species of seals are known to occupy the Lewes Harbor area in the winter months. These species include the harbor seal (*Phoca vitulina*), harp seal (*Pagophilus (Phoca) groenlandicus*), gray seal (*Halichoerus grypus*), and hooded seal (*Cystophora cristata*). Marine mammals such as harbor seals are protected under the Marine Mammal Protection Act of 1972 (MMPA) which prohibits the "take" of all marine mammal species. Under the MMPA, the term "take" is defined as "harass, hunt, capture, kill, or attempt to harass, hunt, capture, or kill any marine mammal." Furthermore, "harassment" is defined as "any act of pursuit, torment, or annoyance which (*i*) has the potential to injure a marine mammal or marine mammal stock in the wild, or (*ii*) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering". If any seals are encountered on the beach during sand replenishment, NOAA recommends that people remain at least 50 yards away from them to comply with the MMPA. 8.

Marine Mammals

Aerial surveys and sightings have confirmed the presence of cetaceans and pinnipeds along Delaware's coast from spring through fall. Bottlenose dolphins (Tursiops truncatus) and other pinniped species occur daily during the warmer months, often occurring just outside the surf zone. Large whales such as Humpback whales (Megaptera novaeangliae), Fin whales (Balaenoptera physalus), and North Atlantic right whales (Eubalaena glacialis) have been sighted in Delaware nearshore waters during the warmer months and have come as far inshore as the mouth of Delaware Bay, Atlantic coast beaches, and the Indian River Inlet. The North Atlantic right whale is one of the world's most endangered whale species with fewer than 400 individuals remaining. Vessel strikes, entanglements, and ocean noise are some of the greatest threats to this species as well as other marine mammals. Noise can interfere with communication, navigation, locating food, locating mates, avoiding predators, and can interrupt their normal behavior. DFW requests that no work occur from **May 1st- October 31st** to avoid impacts to marine mammals. 9.

Fisheries

Summer Flounder

Sampling conducted by our Division's fisheries staff revealed that Indian River Bay supports a large number of juvenile migratory fish and is thus considered an important nursery area in the Inland Bays. Several species of particular commercial and recreational importance utilize the bay and could be impacted by this project. A primary species of concern for this project is Summer Flounder (Paralichthys dentatus), which utilizes the bay as a nursery area. We request that dredging **not** occur from **March 1st to September 30th** to allow time for young of the year to grow large enough to be less vulnerable to habitat-altering activities and then migrate out of the 10.

DNREC-CP 2025 USACE Indian River Inlet North Shore Supplemental Nourishment

7. A potential exists for beach nesting birds to inhabit the Indian River Inlet North Beach. The Phase 2 completion of the beachfill is expected to begin in September and end in December 2025, which would be outside of any nesting season. For future beachfill activities, the project specifications require the use of beach nesting bird monitors to identify the presence of beach nesting birds and any nesting activities during the nesting season. Presence and nesting activities would be reported to DNREC DFW and USFWS. During the nesting season, the monitor would establish a buffer zone of up to1,000 meters between all construction activities and piping plover nests. If necessary, the buffer zone may be expanded if the 1,000-meter buffer zone is found to be inadequate. For species other than piping plovers (i.e. least terns, American oystercatcher, black skimmer, etc.), establish, at a minimum, a 100-meter buffer zone during the nesting season. This buffer area may increase once chicks have hatched and become mobile. DNREC DFW and the plover monitor will evaluate nesting situations to determine if the 100-meter buffer is sufficient or needs to be increased. USACE consulted with USFWS using the Information for Planning and Consultation (IPaC) for the affected areas. Based on the IPaC review, piping plover nesting has not been identified within the affected area. Future subsequent beachfill placements will require IPaC reviews prior to undertaking these activities.
8. Harbor seals and grey seals are commonly observed to be "hauling out" to rest on area beaches during the Fall, Winter, and Spring months, and are protected from harassment by the Marine Mammal Protection Act. If a seal is observed on the beach within a work area or in the vicinity of the work area, a 150-meter buffer/no entry/work stoppage zone would be immediately established. USACE would notify the DNREC DFW and Marine Education, Research and Rehabilitation (MERR) Institute for further direction for monitoring, additional buffer zone delineations (if necessary), and associated timeframes for implementation of monitoring and buffer zones. Seals are not to be approached by workers.
9. Based on the project specifications, the contractor is required to monitor for the presence of whales during all dredging activities. The presence of any whales would be recorded on the Daily Report of Operations form. Any whale sighting would be reported immediately. Dredges and vessels shall not intentionally approach whales closer than 100 yards when in transit. If listed species are present within a distance equal to 500 yards, speed would be reduced to 4 knots or less unless precluded by safety considerations. Unless positively identified as another whale species, any large whale shall be considered a suspected right whale, especially if one has been recently sighted by the vessel, or if the vessel is in an area where right whales could be present. A time of year restriction for the proposed activities in the Atlantic Ocean and along the beach may not be achievable based on safety concerns in the wintertime and availability of equipment.
10. Dredging of the Indian River Inlet Flood Shoal would not be conducted for

Delaware DNREC Division of Fish and Wildlife (as submitted to USAC .5

system. This window should minimize the number of young of the year flounder impacted by the dredging of Indian River Bay and Indian River Inlet.

Horseshoe Crab

The project site is a spawning area for horseshoe crabs and without site-specific data and appropriate monitoring, work should not be conducted from **April 15th to August 30th** to ensure that this species is not impacted. We further encourage beach renourishment be performed in a manner that maintains the existing slope to that which naturally exists, as well as the use of sand of similar grain size to that which naturally exists. The fisheries management plan for horseshoe crab also recommends that borrow areas for beach nourishment be located such that they avoid adverse impacts to essential juvenile habitat (nearshore, shallow water, subtidal flats). 11.

Shellfish

The Indian River Flood Shoal has a low to medium hard clam density of up to 3 to 5 clams per square meter. 12.

American Eel

The Indian River is used by large numbers of American eel (*Anguilla rostrata)*. We request that in-stream work not take place from **March 1st to May 15th** to allow upstream passage of elvers (young eels). 13.

We are continually updating our records on Delaware's rare, threatened and endangered species, unique natural communities and other significant natural resources. If the start of the project is delayed more than a year past the date of this letter, please contact us again for the latest information.

Please feel free to contact me with any questions or if you require additional information.

Sincerely,

Faith Garcia
Environmental Review Coordinator
Phone: (302) 735-8665
Cell: (302) 443-3812
Email: christinefaith.garcia@delaware.gov
89 Kings Highway
Dover, DE 19901

10. (continued) the Phase 2 portion of the project in 2025; therefore, a time of year restriction for summer flounder would not be needed since the work would be conducted in the open ocean and along the Atlantic Coast shoreline. For future nourishments on an as needed basis, the flood shoal, which is located within the interior inlet and Indian River Bay could be used. Therefore, a seasonal restriction (for dredging of the flood shoal) to minimize the impacts to young of the year summer flounder from March 1 to September 30th would apply.

11. The North Beach of the Indian River Inlet is along the Atlantic Ocean shoreline and is not suitable spawning habitat due to the high wave energy associated with this type of beach. Therefore, a time of year restriction for horseshoe crab spawning is not necessary at the affected location. The sand borrow areas are either in the open ocean (IRI Ebb Shoal in 13 ft. to 43 ft. depths mlw) or located submerged within the interior inlet (flood shoal) in water depths of 15 to 24 feet mlw.

12. The Indian River Inlet Flood Shoal was completely removed and dredged to a depth of approximately -24 ft. mlw from September 2024 to March 2025 to complete the Phase 1 portion of the project. This would have removed the existing benthic infaunal community.

13. Dredging within the interior Indian River inlet (Flood Shoal) would be avoided from March 1 to May 15.

Ken Scales (4/21/2025) (as submitted to USACE through the Delaware Coastal Management Program) p.1

From: ken scales
To: DNREC DCP Public Comment
Subject: North inlet / Indian river
Date: Monday, April 21, 2025 12:27:43 PM

Please allow time to study phase one before starting phase 2. The inlet area has been a construction zone this past winter and spring and has been closed to recreational activities including surfing. The area should be open this fall and winter and allow for the natural shift of sand due to storms so that any impacts to phase one can be studied and adjustments made to the amount of sand being pumped onto the beach for the second phase. Full completion of phase one should also occur, i. e. restoring the area to a recreational park without construction debris in the parking lot and surrounding areas. There is also very dangerous rebar on the beach that needs to be removed asap.
Thank you

We understand the recreational significance of the North Shore beach and the entire Indian River Inlet complex and State Park. With the beach fill work, our contractor would not close more than 1000 feet during operations, so the hope is to minimize impact to the recreation community to the greatest extent practical.

The State portion of the project (also known as 'phase one') did not fill the full design template for the project. The Federally managed portion of the project (also known as 'phase two') is required to complete the full template, which is designed to restore the beach back to 2013 repaired conditions. Bringing the beach back to the 2013 conditions would require the placement of approximately 850,000 cubic yards of sand. Additionally, we know that the conditions can rapidly change between now and placement. USACE and DNREC do not support delaying the beach nourishment project going into hurricane season.

The Philadelphia District is working with the non-federal sponsor (Delaware Department of Natural Resources and Environmental Control) to properly address the rebar concern.

From: Delaware Treasurer
To: DNREC DCP Public Comment
Cc: Matt Gove
Subject: Surfrider Comments - Federal Phase North Indian River Inlet Beachfill
Date: Wednesday, April 23, 2025 5:20:58 PM
Attachments: SurfriderDelaware_DNREC Comments.pdf

Jesse,

I have attached a comment letter from the Delaware Chapter of the Surfrider Foundation pursuant to The USACE permit application for the federal phase of proposed beachfill at the north side of Indian River Inlet.

Mike Powell

--

Treasurer
Surfrider Foundation Delaware Chapter

P.O. Box 364
Nassau, DE 19969

SURFRIDER FOUNDATION. DELAWARE

Submitted electronically to DNREC Coastal Programs

April 23, 2025

DNREC Coastal Programs, Administrator,
100 W. Water St., Suite 7B, Dover, DE, 19904
RE: Draft Environmental Assessment Delaware Coast Protection

Attn: Jesse Hayden

Mr. Hayden:

The Surfrider Foundation Delaware Chapter (Surfrider) submits these comments to DNREC regarding the U.S. Army Corps of Engineers (USACE) concerning the Draft Environmental Assessment (EA) for the *Delaware Coast Protection: Indian River Inlet Sand Bypass Project, North Beach Supplemental Sand Nourishment, Sussex County Delaware* (NEPA Unique ID: EAXX-202-00-E5P-1742316597) (the Project).

The Surfrider Foundation is a grassroots environmental organization of 80 chapters, 120 youth clubs, and more than 500,000 supporters, activists, and members in the United States, dedicated to the protection and enjoyment of the world's oceans, waves, and beaches, for all people.

According to the EA, the Project broadly consists of, *"the placement of beachfill along the shoreline on the north side of Indian River Inlet for the purpose of restoring and/or maintaining the berm and dune for a distance of approximately 5,000 linear feet north of the north inlet jetty. The EA also evaluates sand sources that would provide beachfill quality material for the beach restoration. The purpose of this action is to provide protection to the critical infrastructure of the State Route 1 Charles W. Cullen Bridge and its approach on the north side, which has been experiencing significant erosion."*[1]

[1] USACE. Draft Environmental Assessment for the Delaware Coast Protection: Indian River Inlet Sand Bypass Project, North Beach Supplemental Sand Nourishment, Sussex County Delaware. March 2025. *Available at*: nap.usace.army.mil/Portals/39/docs/Civil/Public%20Notice/2025/IRI%20Beach%20Draft%20EA%202025.pdf

PROJECT CONCERNS

Notwithstanding major changes in beach structure at Northside over the coming year, we believe the proposed USACE beach fill Project should be put on hold until the proposed work on the north jetty of the Indian River Inlet is complete, sometime in early 2026.

Northside beach and accompanying dunes are currently in better shape than they have been in over 6-8 years, after the recent Stae of Delaware led beach replenishment--it does not appear that additional sand is needed at this time. We understand the State project successfully filled the beach and dune to the design template for that project, and that parts of the new dune exceed the design width and volume. The volume of sand placed recently by the State exceeds the volume placed in 2013 following Hurricane Sandy, which provided many years of storm protection, including several severe storms.

Summer and fall are peak seasons for surfing North Indian River Inlet. After a year or more of impacts and closures, efforts should be made to allow the recreational beach and surf break to be used. Closing portions of the beach again in fall of 2025 would be a significant blow to the recreational community and economy--especially since additional replenishment is not needed at this time. When the Project does move forward, we applaud the USACE's plan to do "rolling closures" of 1000 feet of beach at a time, rather than closing the entire beach.

The north jetty repairs will help contain beach sand, in their current state they are "leaking" sand into the inlet. The more appropriate sequencing, now that the emergency sand replenishment is complete, is to upgrade the jetty prior to additional sand replenishment, which will have retainage issues.

The State of Delaware may be reluctant to operate the sand bypassing system while the proposed Project is underway, resulting in even more sand being lost from the beach at Southside into the inlet, rather than being bypassed.

Instead of beginning the proposed Project at Northside in fall 2025, we think USACE should:

1. Allow the recent State-led beach fill project to equilibrate, to determine where any additional sand may be needed.
2. Restart the sand bypassing system as soon as possible to begin recapturing sand from Southside, to prevent loss into the inlet.
3. Repair the north jetty to bring it into a more effective configuration at holding sand, before pumping additional fill onto Northside beach.
4. Be strategic with the federal money available for replenishment by waiting until it is apparent what the needs are.

PUBLIC HEARING REQUEST

2

USACE received a similar letter from the Delaware Surfrider Foundation dated April 11, 2025.

In the letter, USACE was asked to delay beach nourishment efforts until the completion of planned repairs of the north jetty.

The letter noted that the north shore beaches at Indian River Inlet are in better shape than over the past 6-8 years. This is correct; however, the beach has been in a depleted and worsening state during this time due to the lack of sand bypassing operations. The State portion of the project (also known as 'phase one') did not fill the full design template for the project. The Federally managed portion of the project (also known as 'phase two') is required to complete the full template, which is designed to restore the beach back to 2013 repaired conditions. Bringing the beach back to the 2013 conditions would require the placement of approximately 850,000 cubic yards of sand. Additionally, we know that the conditions can rapidly change between now and placement. USACE and DNREC do not support delaying the beach nourishment project going into hurricane season.

The letter also noted sand may end up right back in the inlet. The sand loss along the north shore is caused by the interruption of south-to-north net transport by the inlet and the lack of sand bypassing operations designed to restore the interruption of transport. The jetty repair will help to stabilize the north beach - not primarily through sand tightening but rather by providing a larger "footprint" to support the design width of beach.

We request a public hearing on this project. Northside beach at the Indian River Inlet is heavily used by the public, and multiple, large infrastructure projects are being proposed and are ongoing concurrently, so it makes sense to host a public meeting. Such a meeting should be announced in advance, held on a weekday evening, located near the Indian River Inlet, and if possible, streamed online.

The proposed borrow area, the ebb tidal shoal off the south side of Indian River Inlet, has never been used previously as a sand source for beach replenishment. There is significant public interest in learning how potential use of this shoal as a borrow area may affect fishing, beach erosion, operation of the sand by-passing system, and the landfall path of possible wind farm cables.

DNREC has studied sand movement in this area in an effort to determine how the evolution of this shoal complex may affect littoral drift from the south and sand by-passing operations. There is public interest in understanding how removing sand from this shoal may affect littoral sand transport.

Indian River Inlet is a heavily used surfing and recreational beach which has been impacted by debris and closures for much of the past year. There is significant public interest in getting information about how additional beach replenishment projects may avoid or minimize additional beach closures.

We thank you for considering and incorporating our comments.

Sincerely,
The Delaware Chapter of the Surfrider Foundation

Cc:
Delaware Department of Transportation (DelDOT)
Department of Natural Resources and Environmental Control (DNREC)
Delaware Seashore State Park (DSSP)

3

We understand the recreational significance of the North Shore beach and the entire Indian River Inlet complex and State Park. With the beach fill work, our contractor would not close more than 1000 feet during operations, so the hope is to minimize impact to the recreation community to the greatest extent practical.

We have considered your request for a public hearing and have decided not to hold one as we do not believe new information would be shared during a hearing.

In terms of the north jetty, we are still working through design. We held an industry day to solicit some feedback from private industry on constructability and aspects of design. Currently, we are aiming to advertise a contract this summer with a contract award in December 2025. The construction schedule would be determined and certainly widely shared after that. We will have discussions and coordination on staging and public access issues with Delaware State Parks with the intent being to enable the contractor to safely execute the work as specified in the contract while minimizing public access disruptions to the extent practical. We intend to hold a public meeting regarding the north jetty repairs but have not determined a date as design is still ongoing.

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF CLIMATE, COASTAL AND ENERGY
STATE STREET COMMONS
COASTAL PROGRAMS
100 W. WATER STREET, SUITE 7B
DOVER, DELAWARE 19904
PHONE
(302) 739-9283

May 15, 2025

Steven Allen
U.S. Army Corps of Engineers – Philadelphia District
1650 Arch Street
Philadelphia, PA 19103-2004

RE: Delaware Coastal Management Program — Federal Consistency Determination Concurrence for USACE Indian River Inlet North Shore Supplemental Nourishment (2025.0029)

Dear Steven Allen,

The Delaware Department of Natural Resources and Environmental Control (DNREC) Coastal Management Program (DCMP) has completed its review of the above referenced project, dated March 18, 2025, and received by this office on March 20, 2025.

PROPOSED ACTION

The US Army Corps of Engineers (USACE) proposes to restore and maintain the berm and dune complex along the shoreline on the north side of the Indian River Inlet, Sussex County, Delaware. The proposed project includes the hydraulic dredging of approximately 500,000 cubic yards of material from the Indian River Inlet Ebb Shoal (Ebb-A) to an average depth of 10 feet below the existing bathymetry to be placed along the shoreline of the beach extending approximately 5,000 feet north from the north Indian River Inlet jetty. The proposed construction will result in an approximately 200 to 250-ft. wide berm with an elevation of +9.0 ft. NAVD leading into a dune crest with an elevation of +16.0 ft. NAVD and width of 25 ft. Associated work would include installation of dune fencing, crossovers and dune grass plantings. To minimize impacts to recreational uses of the beach and impacts to living resources such as shorebird migration and beach nesting bird season, this phase of the project will be conducted between September through December 2025 and the beach closures will occur in no more than 1,000-foot increments during construction. The presence of other sensitive species (seabeach amaranth, pinnipeds, and other marine mammals) in the planned project area (shoreline to be renourished and Ebb-A shoal) will also be monitored and avoided. Air emissions are estimated to be below the annual thresholds in a marginal nonattainment area and, when practicable, unnecessary idling of trucks and machinery having a gross weight of over 8,500 pounds to no more than three minutes would be implemented. Dust control measures will be implemented for construction staging areas and access roads.

Future periodic nourishment would occur on an as-needed basis, where required sand quantity is not to exceed 800,000 cubic yards. Sand sources could include the Indian River Inlet Ebb Shoal (Ebb-A), the existing Indian

River Inlet Flood Shoal Sand Source, and potentially the portion of the Indian River Inlet Ebb Shoal (Ebb-B) that includes the proposed southern lobe expansion area. The Ebb-B shoal would only be used after supplemental environmental compliance approvals upon further investigations for sediment quality, benthic resources, and cultural resources. Sensitive species will be avoided in and around the shoreline being renourished including the sand resource shoals off the coast. The USACE would also avoid and minimize impacts to sensitive species if sand sources within the Indian River Bay would be utilized. Dredging within the interior Indian River inlet (Flood Shoal) would not occur from March 1 to September 30, for upstream passage of elvers (American eel), presence of young of the year summer flounder, and horseshoe crab spawning. DNREC and U.S. Fish and Wildlife Service will be notified and/or consulted for avoidance of Red Knots, beach nesting birds, seabeach amaranth, pinnipeds, and other marine mammals. Buffer zones will be maintained around any beach nesting birds, seals, or whales present during planned activities. 1.

FEDERAL CONSISTENCY UNDER THE COASTAL ZONE MANAGEMENT ACT

Pursuant to the Coastal Zone Management Act (CZMA) of 1972, as amended, each federal agency activity within or outside the coastal zone that can have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved state management programs. The National Oceanic and Atmospheric Administration (NOAA) is required to review and approve a proposed state management program for it to become effective. Under the CZMA implementing regulations, Federal Consistency with Approved Coastal Management Programs (15 CFR 930), subpart C, federal agencies are advised to provide state agencies with a consistency determination at the earliest practicable time in the planning or reassessment of an activity, and also before the federal agency reaches a significant point of decision-making in its review process. The term "consistent to the maximum extent practicable" in 15 CFR 930.32 means fully consistent with the enforceable policies of a management program unless full consistency is prohibited by existing law applicable to the federal agency.

PUBLIC PARTICIPATION

In accordance with 15 CFR §930.42, the public was invited to participate in the review of the USACE Indian River Inlet North Shore Supplemental Nourishment project. Public notice of this proposed action was published in the Daily State News, The News Journal, and the DNREC public notices list service website on April 6, 2025. The public was given 20 days from publication to comment on this notice. Two public comments were received in response to this notice and considered during the review.

FEDERAL CONSISTENCY ANALYSIS

The DNREC DCMP coordinates the review of consistency determinations with agencies administering the enforceable and advisory policies of the program. The proposed activity is to be implemented in a manner consistent with the enforceable policies of the DCMP under Section 5.0 of the DCMP Federal Consistency Policy and Procedures document. The following agencies participated in this review:

DNREC, Division of Air Quality
DNREC, Division of Fish and Wildlife
DNREC, Division of Water
DNREC, Division of Watershed Stewardship

1. We note that the time of year restriction from March 1 to September 30 only applies to the dredging of the interior Indian River Inlet Flood Shoal borrow area.

The Division of Air Quality provided emissions thresholds in accordance with the General Conformity Rule under the Clean Air Act, for marginal nonattainment areas. The applicant's Environmental Assessment expected pollutant quantities are below all thresholds.

Be advised that the following Delaware air quality regulations may apply: Particulate Emissions from Construction and Materials Handling (7 DE Admin. Code 1106), Open Burning (7 DE Admin. Code 1113), Emission Standards for Hazardous Air Pollutants (7 DE Admin. Code 1121), Conformity of General Federal Actions to the State Implementation Plan (7 DE Admin. Code 1135), Excessive Idling of Heavy-Duty Vehicles (7 DE Admin. Code 1145), and Regulations Governing the Control of Noise (7 DE Admin. Code 1149).

The Division of Fish and Wildlife provided comments regarding avoidance of sensitive species, including red knot, seabeach amaranth, beach nesting birds, pinnipeds, marine mammals, summer flounder, horseshoe crab, shellfish, and American eel. Time of year restrictions and buffer zones for these species have been incorporated in the proposed project plans.

CONCURRENCE

Based on its review and pursuant to 15 CFR 930, the DCMP concurs that the USACE Indian River Inlet North Shore Supplemental Nourishment project as proposed is consistent to the maximum extent practicable. Pursuant to 15 CFR 930.46, USACE shall notify the DCMP of any proposed modifications to activities after receiving a decision from the DCMP. Modifications will be subject to supplemental federal consistency review if effects to any coastal use or resource will be substantially different than originally described. 2.

Please be advised that this federal consistency review does not negate the need for other authorizations that may be required. Thank you for the opportunity to evaluate this federal activity. If you have any questions, please contact me or Stephanie Zmina of my staff at (302) 739-9283.

Sincerely,

Jesse Hayden (May 15, 2025 15:44 EDT)

Jesse Hayden, Administrator
Delaware Coastal Management Program

JH/sz

cc: File FC 2025.0029
Tina Merrill, DAQ
Faith Garcia, DFW
Matt Jones, DW
John Cargill, DWS
Joanna French, DWS

2. Concur.

HCA
DELAWARE HISTORICAL & CULTURAL AFFAIRS

Delaware Division of Historical & Cultural Affairs
29 N. State St., Dover, Delaware 19901
Tel. (302) 736-7400 | Fax. (302) 739-5660
history.delaware.gov

July 11, 2025

Nicole Cooper Minnichbach
Cultural Resource Specialist
US Army Corps of Engineers
1650 Arch Street
Philadelphia, PA 19103

Subject: **Indian River Inlet Sand Bypass Project**
SHPO Project No. 2025.03.20.04

Dear Ms. Minnichbach:

We understand from that the US Army Corps of Engineers (USACE) has prepared a draft Environmental Assessment (EA) for the proposed undertaking at the Indian River Inlet and North Beach in Sussex County. USACE is proposing to dredge the Indian River Inlet Flood Shoal and place approximately 480,000 cubic yards of sand along the North Beach shoreline to address erosion. As this is a federal undertaking, the project is subject to compliance with Section 106 of the National Historic Preservation Act of 1966 (as amended). 1.

USACE has identified four distinct areas of potential effect (APE). APE 1includes the North Beach shoreline. The fire control tower (S06049) is the only historic structure within a half-mile radius of APE 1. Due to the limited nature of the proposed undertaking and the distance to the known historic resource, there is no anticipated impact to this property. As APE 1 has undergone previous beach renourishment activities, there is low potential for any intact archaeological sites. APEs 2 and 3 include the Inlet Flood Shoal and the Inlet Ebb A. Both areas have been previously surveyed and subject to dredge activities. Therefore, there is low potential for any intact archaeological sites. There are no archaeological sites within a half-mile radius of the APE. The Indian River Inlet Ebb B (APE 4) has not yet been previously used as a borrow source, and therefore has not yet been surveyed. USACE has determined that archaeological survey is needed prior to any dredging in APE 4.

Our Office concurs there will be No Historic Properties Affected by the proposed undertaking, provided activities are limited to APEs 1-3. Our Office concurs with USACE's determination that underwater archaeological survey is necessary prior to any use of the Indian River Inlet Ebb B/APE 4. Should plans change, additional consultation may be necessary. 2.

Please feel free to contact me if you have any questions at (302) 736-7431 or sarah.carr@delaware.gov.

Sincerely,

Sarah Carr
Environmental Specialist
cc: Gwen Davis, Deputy SHPO

1. We note that the Phase 2 portion is not utilizing the Indian River Inlet Ebb Shoal but will be utilizing the Indian River Inlet Ebb Shoal – A (IRI Ebb-A), which is part of APE 3.

2. No response required as APE's 1-3 cover all aspects of completing Phase 2.

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
DIVISION OF WATER
RICHARDSON & ROBBINS BUILDING
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

WETLANDS & WATERWAYS SECTION

PHONE
(302) 739-9943

July 2, 2025

Mr. Adrian Leary, Chief
Planning Division
U.S. Army Corps of Engineers
1650 Arch Street
Philadelphia, PA 19103-2004

RE: Water Quality Certification (WQ-080/25)-United States Army Corps of Engineers-Indian River Inlet (North Beach)-Phase II

Dear Chief Leary,

The Wetlands and Waterways Section of the Delaware Department of Natural Resources and Environment Control (DNREC) has completed its review of the above referenced project. This letter is in response to the request for a Water Quality Certification submitted by Steven Allen, United States Army Corps of Engineers on March 20, 2025.

PROPOSED ACTION

The United States Army Corps of Engineers proposes to dredge up to 500,000 cubic yards of material from the Indian River Inlet Ebb Shoal for beneficial reuse along the North Beach area of Delaware Seashore State Park, located in Sussex County, Delaware. This activity is being conducted under an emergency authorization issued by the DNREC – Wetlands and Waterways Section to the DNREC – Division of Watershed Stewardship, as part of a cooperative, bipartisan effort between DNREC and the U.S. Army Corps of Engineers. The dredged material will be hydraulically transported via pipeline to the designated placement area (Tax Parcel # 334-25.00-11.00). This discharge will require an individual Water Quality Certification pursuant to Section 401 of the Clean Water Act (33 U.S.C. §1341) and in accordance with EPA regulations at 40 CFR Part 121.

WATER QUALITY CERTIFICATION UNDER THE CLEAN WATER ACT

Pursuant to 40 CFR Part 121, a Section 401 Water Quality Certification is required for any federal license or permit that authorizes an activity that may result in a discharge. According to 40 CFR §121.1, the term "discharge" refers to a discharge from a point source into a water of the United States. The construction activities referenced above are considered a discharge.

PUBLIC PARTICIPATION

In accordance with 7 Del. Admin. Code 7201, the public was invited to participate in the review of the United States Army Corps of Engineers request for a Section 401 Water Quality Certification Request. Public notice of this proposed action was published in the Delaware State News, The News Journal and the DNREC Public Notices website on May 14, 2025. The public was given until June 3, 2025, to provide comment.

Enclosed are the public notice comments provided by the DNREC Division of Fish and Wildlife to the DNREC Wetlands and Waterways Section on June 3, 2025.

WATER QUALITY ANALYSIS

The DNREC, Wetlands and Waterways Section reviewed the project in accordance with 7 Del. Admin. Code 7401 Surface Water Quality Standards, 7 Del. Admin. Code 7201 Regulations Governing the Control of Water Pollution, and §§ 301, 302, 303, 306, and 307 of the federal Clean Water Act. In addition, section staff coordinated with the following agencies as part of the review:

- DNREC, Division of Fish and Wildlife
- DNREC, Division of Watershed Stewardship, Watershed Assessment and Management Section
- DNREC, Division of Climate, Coastal and Energy, Delaware Coastal Management Program

DNREC representatives reviewed the draft Environmental Assessment titled *"Delaware Coast Protection Indian River Inlet Sand Bypass Project North Beach Supplemental Sand Nourishment, Sussex County, Delaware"* (dated March 2025), along with the associated sediment quality data spreadsheets, to evaluate compliance with Delaware Surface Water Quality Standards. The Division of Watershed Stewardship's Watershed Assessment and Management Section reviewed the chemical analysis of the sediments and concluded that the final documentation submitted with the application adequately addresses potential water quality concerns associated with the proposed activities.

Furthermore, the report also included an evaluation of sediment samples collected from five locations: (1) Indian River Inlet Flood Shoal, (2) Burton Island Shoal, (3) Middle Island Shoal, (4) Indian River Inlet Ebb Shoal, and (5) Indian River Inlet Sand Bypass Plant and Fillet. This evaluation was conducted to characterize sediments from areas proposed for potential dredging and to assess the potential for ecological and/or human health impacts associated with the proposed activities. The dominant grain size fractions were fine and medium sand, and the cores exhibited minimal stratification. No exceedances of applicable Delaware ecological or human health screening levels were identified. Based on the physical and chemical analysis, the material from the Indian River Inlet Ebb Shoal is deemed suitable for use as beach fill for the planned Indian River Inlet North Beach Phase II project.

DECISION

Based on its review and pursuant to U.S. Environmental Protection Agency regulations (40 CFR Part 121), the DNREC Wetlands and Waterways Section conditionally certifies that proposed discharge into Waters of the United States will comply with Delaware Surface Water Quality Standards provided the scope of the project remains unchanged, and the materials are sourced from the specified locations.

Pursuant to 7 Del. Admin. Code § 7401, where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected. In the case of ERES waters, existing quality shall be maintained or enhanced. Limited degradation may be allowed if the Department finds, after full satisfaction of public participation provisions of 7 Del. C. Sections 6004 and 6006 and the intergovernmental coordination provisions of the State's continuing planning process as required in 40 CFR Part 130, that allowing lower water quality is necessary to accommodate important social or economic development, or would result in a substantial net environmental or public health benefit, in the area in which the waters are located. In allowing such degradation or lower water quality, the Department shall assure maintenance of water quality adequate for full protection of existing uses. Further, the Department shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.

The following conditions are necessary to ensure the discharges associated with the proposed project comply with water quality standards in the State of Delaware.

Specific Conditions:

1) The United States Army Corps of Engineers is operating under an existing emergency waiver issued to DNREC – Division of Watershed Stewardship, which authorizes the hydraulic dredging of up to 500,000 additional cubic yards of suitable sand from the Indian River Inlet-Ebb Shoal. If there are any changes to the volume or source of the dredged material, the applicant must notify the DNREC – Division of Water, Wetlands and Waterways Section at 302-739-9943.

Please be advised that this conditioned Water Quality Certification certifies that the discharge of dredged or fill material into a Waters of the United States meets Delaware Surface Water Quality Standards, as long as the conditions of this certification are fulfilled. Furthermore, this pertains only to the authority of 7 DE Admin. Code 7201 and 7401 and does not extend to permitting requirements of other sections within DNREC. Additionally, this letter does not relieve the United States Army Corps of Engineers, of the obligation to comply with other applicable agencies.

Thank you for the opportunity to review and respond to the United States Army Corps of Engineers water quality certification request. If you have any questions, please contact me at (302) 739-9943.

Sincerely,

Matthew Jones

Matthew R. Jones, Section Manager
Wetlands and Waterways Section

Enclosures:

- United States Army Corps of Engineers- Section 401 Water Quality Certification Request Letter
- Draft Environmental Assessment titled *"Delaware Coast Protection Indian River Inlet Sand Bypass Project North Beach Supplemental Sand Nourishment, Sussex County, Delaware"* (dated March 2025).
- DNREC, Division of Fish and Wildlife Comments
- Regulations Governing the Control of Water Pollution (7 Del. Admin. Code § 7201)
- Surface Water Quality Standards (7 Del. Admin. Code § 7401)
- 40 CFR Part 121- Clean Water Act Section 401: State Certification of Activities Requiring a Federal License or Permit.

cc: Steve Williams, DNREC DWS
John Cargill, DNREC DWS
Karen Taylor, DNREC DWS
Joanna French, DNREC DWS
Faith Garcia, DNREC DFW
Jennifer Holmes, DNREC DCMP
Mike Snyder, DNREC DCMP
Steven Smailer, DNREC DOW
Rebecca Bobola, DNREC DOW

Stockbridge-Munsee Tribe (5/22/2025) p. 1

From: Minnichbach, Nicole C CIV USARMY CENAP (USA)
To: Allen, Steven D CIV USARMY CENAP (USA)
Subject: FW: IRI EA Cover _ Tribal.pdf
Date: Thursday, May 22, 2025 11:10:02 AM
Attachments: image001.jpg

Stockbridge-Munsee Community comments on IRI

From: thpo <thpo@mohican-nsn.gov>
Sent: Tuesday, March 25, 2025 1:49 PM
To: Minnichbach, Nicole C CIV USARMY CENAP (USA) <Nicole.C.Minnichbach@usace.army.mil>
Subject: [Non-DoD Source] RE: IRI EA Cover _ Tribal.pdf

Dear Nicole,

Thank you for the notice regarding the proposed Indian River Inlet North Beachfill Environmental Assessment project, Sussex County, DE.

Though we routinely consult on such undertakings, this project is situated outside of the Stockbridge-Munsee Community Traditional Homeland/Area of Interest. Therefore, the Stockbridge-Munsee Community Tribal Historic Preservation Office has no comment regarding the aforementioned action. For reference, please see the Stockbridge-Munsee Community Traditional Homeland/Area of Interest map at: https://www.mohican.com/mt-content/uploads/2023/05/county-maps.pdf.

Regards,
Jeff

Jeffrey C Bendremer Ph.D., RPA
Tribal Historic Preservation Officer
Stockbridge-Munsee Community
Tribal Historic Preservation Extension Office
86 Spring St.
Williamstown, MA 01267
413-884-6029 (o)
715-881-2254 (c)

www.mohican.com

SURFRIDER FOUNDATION DELAWARE

Submitted electronically to PDPA-NAP@usace.army.mil and Stephen.Rochette@usace.army.mil

April 11, 2025

Mr. Adrian Leary
U.S. Army Corps of Engineers
Philadelphia District
ATTN: Environmental Resources Branch

RE: Draft Environmental Assessment Delaware Coast Protection
(NEPA Unique ID: EAXX-202-00-E5P-1742316597)

Mr. Leary,

The Surfrider Foundation Delaware Chapter (Surfrider) submits these comments to the U.S. Army Corps of Engineers (USACE) concerning the Draft Environmental Assessment (EA) for the *Delaware Coast Protection: Indian River Inlet Sand Bypass Project, North Beach Supplemental Sand Nourishment, Sussex County Delaware* (NEPA Unique ID: EAXX-202-00-E5P-1742316597) (the Project).

The Surfrider Foundation is a grassroots environmental organization of 80 chapters, 120 youth clubs, and more than 500,000 supporters, activists, and members in the United States, dedicated to the protection and enjoyment of the world's oceans, waves, and beaches, for all people.

According to the EA, the Project broadly consists of, *"the placement of beachfill along the shoreline on the north side of Indian River Inlet for the purpose of restoring and/or maintaining the berm and dune for a distance of approximately 5,000 linear feet north of the north inlet jetty. The EA also evaluates sand sources that would provide beachfill quality material for the beach restoration. The purpose of this action is to provide protection to the critical infrastructure of the*

State Route 1 Charles W. Cullen Bridge and its approach on the north side, which has been experiencing significant erosion."[1]

PROJECT CONCERNS
Notwithstanding major changes in beach structure at Northside over the coming year, we believe the proposed USACE beach fill Project should be put on hold until the proposed work on the north jetty of the Indian River Inlet is complete, sometime in early 2026.

Northside beach and accompanying dunes are currently in better shape than they have been in over 6-8 years, after the recent Stae of Delaware led beach replenishment--it does not appear that additional sand is needed at this time. We understand the State project successfully filled the beach and dune to the design template for that project, and that parts of the new dune exceed the design width and volume. The volume of sand placed recently by the State exceeds the volume placed in 2013 following Hurricane Sandy, which provided many years of storm protection, including several severe storms.

Summer and fall are peak seasons for surfing North Indian River Inlet. After a year or more of impacts and closures, efforts should be made to allow the recreational beach and surf break to be used. Closing portions of the beach again in fall of 2025 would be a significant blow to the recreational community and economy--especially since additional replenishment is not needed at this time. When the Project does move forward, we applaud the USACE's plan to do "rolling closures" of 1000 feet of beach at a time, rather than closing the entire beach.

The north jetty repairs will help contain beach sand, in their current state they are "leaking" sand into the inlet. The more appropriate sequencing, now that the emergency sand replenishment is complete, is to upgrade the jetty prior to additional sand replenishment, which will have retainage issues.

The State of Delaware may be reluctant to operate the sand bypassing system while the proposed Project is underway, resulting in even more sand being lost from the beach at Southside into the inlet, rather than being bypassed.

Instead of beginning the proposed Project at Northside in fall 2025, we think USACE should:

1. Allow the recent State-led beach fill project to equilibrate, to determine where any additional sand may be needed.
2. Restart the sand bypassing system as soon as possible to begin recapturing sand from Southside, to prevent loss into the inlet.
3. Repair the north jetty to bring it into a more effective configuration at holding sand, before pumping additional fill onto Northside beach.

[1] USACE. Draft Environmental Assessment for the Delaware Coast Protection: Indian River Inlet Sand Bypass Project, North Beach Supplemental Sand Nourishment, Sussex County Delaware. March 2025. *Available at:* nap.usace.army.mil/Portals/39/docs/Civil/Public%20Notice/2025/IRI%20Beach%20Draft%20EA%202025.pdf

2

As described in the letter, the north shore beaches at Indian River Inlet are in better shape than over the past 6-8 years. This is correct; however, the beach has been in a depleted and worsening state during this time due to the lack of sand bypassing operations. The State portion of the project (also known as 'phase one') did not fill the full design template for the project. The Federally managed portion of the project (also known as 'phase two') is required to complete the full template, which is designed to restore the beach back to 2013 repaired conditions. Bringing the beach back to the 2013 conditions would require the placement of approximately 850,000 cubic yards of sand. Additionally, we know that the conditions can rapidly change between now and placement. USACE and DNREC do not support delaying the beach nourishment project going into hurricane season.

The letter also noted sand may end up right back in the inlet. The sand loss along the north shore is caused by the interruption of south-to-north net transport by the inlet and the lack of sand bypassing operations designed to restore the interruption of transport. The jetty repair will help to stabilize the north beach - not primarily through sand tightening but rather by providing a larger "footprint" to support the design width of beach.

USACE understands the recreational significance of the North Shore beach and the entire Indian River Inlet complex and State Park. With the beach fill work, our contractor would not close more than 1000 feet during operations, so the hope is to minimize impact to the recreation community to the greatest extent practical.

4. Be strategic with the federal money available for replenishment by waiting until it is apparent what the needs are.

PUBLIC HEARING REQUEST

We request a public hearing on this project. Northside beach at the Indian River Inlet is heavily used by the public, and multiple, large infrastructure projects are being proposed and are ongoing concurrently, so it makes sense to host a public meeting. Such a meeting should be announced in advance, held on a weekday evening, located near the Indian River Inlet, and if possible, streamed online.

The proposed borrow area, the ebb tidal shoal off the south side of Indian River Inlet, has never been used previously as a sand source for beach replenishment. There is significant public interest in learning how potential use of this shoal as a borrow area may affect fishing, beach erosion, operation of the sand by-passing system, and the landfall path of possible wind farm cables.

DNREC has studied sand movement in this area in an effort to determine how the evolution of this shoal complex may affect littoral drift from the south and sand by-passing operations. There is public interest in understanding how removing sand from this shoal may affect littoral sand transport.

Indian River Inlet is a heavily used surfing and recreational beach which has been impacted by debris and closures for much of the past year. There is significant public interest in getting information about how additional beach replenishment projects may avoid or minimize additional beach closures.

We thank you for considering and incorporating our comments.

Sincerely,
The Delaware Chapter of the Surfrider Foundation

Cc:
Delaware Department of Transportation (DelDOT)
Department of Natural Resources and Environmental Control (DNREC)
Delaware Seashore State Park (DSSP)

3

USACE considered the request for a public hearing and have decided not to hold one as we do not believe new information would be shared during a hearing.

In terms of the north jetty, the design is still being developed. USACE held an industry day to solicit some feedback from private industry on constructability and aspects of design. Currently, we are aiming to advertise a contract this summer with a contract award in December 2025. The construction schedule would be determined and certainly widely shared after that. We will have discussions and coordination on staging and public access issues with Delaware State Parks with the intent being to enable the contractor to safely execute the work as specified in the contract while minimizing public access disruptions to the extent practical. We intend to hold a public meeting regarding the north jetty repairs but have not determined a date as design is still ongoing.

EASTERN SHAWNEE
CULTURAL PRESERVATION DEPARTMENT
70400 East Highway 60, Wyandotte, OK 74370

May 13, 2025
USACE Philadelphia
1650 Arch Street
Philadelphia, PA 19103

RE: *Indian River Inlet North Beachfill Environmental Assessment, Sussex County, Delaware*

Dear Ms. Minnichbach,

The Eastern Shawnee Tribe has received your letter regarding the above referenced project(s) within Sussex County, Delaware. The Eastern Shawnee Tribe is committed to protecting sites important to Tribal Heritage, Culture and Religion. Furthermore, the Tribe is particularly concerned with historical sites that may contain but not limited to the burial(s) of human remains and associated funerary objects.

As described in your correspondence, and upon research of our database(s) and files, we find our people occupied these areas historically and/or prehistorically. However, the project proposes **NO Adverse Effect** or endangerment to known sites of interest to the Eastern Shawnee Tribe. Please continue project as planned. However, should this project inadvertently discover an archeological site or object(s) we request that you immediately contact the Eastern Shawnee Tribe, as well as the appropriate state agencies (within 24 hours). We also ask that all ground disturbing activity stop until the Tribe and State agencies are consulted. Please note that any future changes to this project will require additional consultation.

In accordance with the NHPA of 1966 (16 U.S.C. § 470-470w-6), federally funded, licensed, or permitted undertakings that are subject to the Section 106 review process must determine effects to significant historic properties. As clarified in Section 101(d)(6)(A-B), historic properties may have religious and/or cultural significance to Indian Tribes. Section 106 of NHPA requires Federal agencies to consider the effects of their actions on all significant historic properties (36 CFR Part 800) as does the National Environmental Policy Act of 1969 (43 U.S.C. § 4321-4347 and 40 CFR § 1501.7(a). This letter evidences NHPA and NEPA historic properties compliance pertaining to consultation with this Tribe regarding the referenced proposed projects.

Thank you, for contacting the Eastern Shawnee Tribe, we appreciate your cooperation. Should you have any further questions or comments please contact our Office.
Sincerely,

Lora Nuckolls

Lora Nuckolls, Tribal Historic Preservation Officer (THPO)
Eastern Shawnee Tribe of Oklahoma
(918) 238-5151 Ext:1840
THPO@estoo.net