

# ENVIRONMENTAL ASSESSMENT

Federal Financial Assistance Grant Number: 43281

Restoring Delaware Bay's Wetlands and Beaches in  
Mispillion Harbor Reserve and Milford Neck Conservation Area

Prepared as Part of the National Fish and Wildlife Foundation  
Hurricane Sandy Coastal Resiliency Competitive Grant Program

Prepared by:



U.S. Department of the Interior

In Partnership with:

Delaware Department of Natural Resources and Environmental Control

This Environmental Assessment becomes a Federal Document when evaluated and an associated NEPA determination is signed by the responsible Federal Official.

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## 1.0 INTRODUCTION

The Hurricane Sandy Coastal Resiliency Competitive Grant Program (Program) supports projects that reduce communities' vulnerability to future coastal storms, sea level rise, flooding, erosion, and associated threats through strengthening natural ecosystems that also benefit fish and wildlife. Funding for the Program is administered by the National Fish and Wildlife Foundation (NFWF) through the Department of the Interior (DOI) Hurricane Sandy disaster relief appropriation (Disaster Relief Appropriations Act of 2013).

On June 16, 2014, DOI announced the award of 54 grants totaling \$102.75 million. In addition, the grantees committed over \$55 million in additional funding and in-kind contributions, for a total conservation investment of over \$158 million. Grants were awarded to projects that assess, restore, enhance, or create wetlands, beaches and other natural systems to help better protect communities and to mitigate the impacts of future storms and naturally occurring events on fish and wildlife species and habitats. Projects are located in the region affected by Hurricane Sandy: Connecticut, Delaware, the District of Columbia, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Virginia, and West Virginia. Each of these states officially declared a natural disaster as a result of the 2012 Hurricane Sandy storm event.

Upon completion of the projects, the Program will benefit more than 210 communities and engage over 4,800 youths, veterans and volunteers. The Program will also result in more than 8,000 acres of wetlands and marshes restored or created, 220 acres of beach restored and over 182 million gallons of stormwater runoff reduced to protect communities and infrastructure from future storms, as well as to benefit fish and wildlife.

The DOI, as lead federal agency, and its project partner, the Delaware Department of Natural Resources and Environmental Control (DNREC), are proposing to restore the beach and dune system that protects tidal flow and the navigation channel along the Delaware Bayshore at Mispillion Harbor Reserve and adjacent Milford Neck Conservation Area (MNCA) in Kent County, Delaware, immediately west of Delaware Bay, in the Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area, Federal Financial Assistance Grant Number 43281 (Project) (Figure 1-1). The Mispillion Harbor Reserve is a unit of Milford Neck Wildlife Area, owned and managed by Delaware Division of Fish and Wildlife (DEDFW). The harbor is formed by the confluence of the Mispillion River and Cedar Creek, which together flow into Delaware Bay through an inlet stabilized by a mile-long jetty system built and maintained by the U.S. Army Corps of Engineers (USACE). The harbor itself is bounded by more than 200 acres of sandy beach, dune and tidal salt marsh, and is protected on its eastern side by a rock sill that connects with the north inlet jetty and extends approximately 2,700 feet to the north (Figure 1-2).



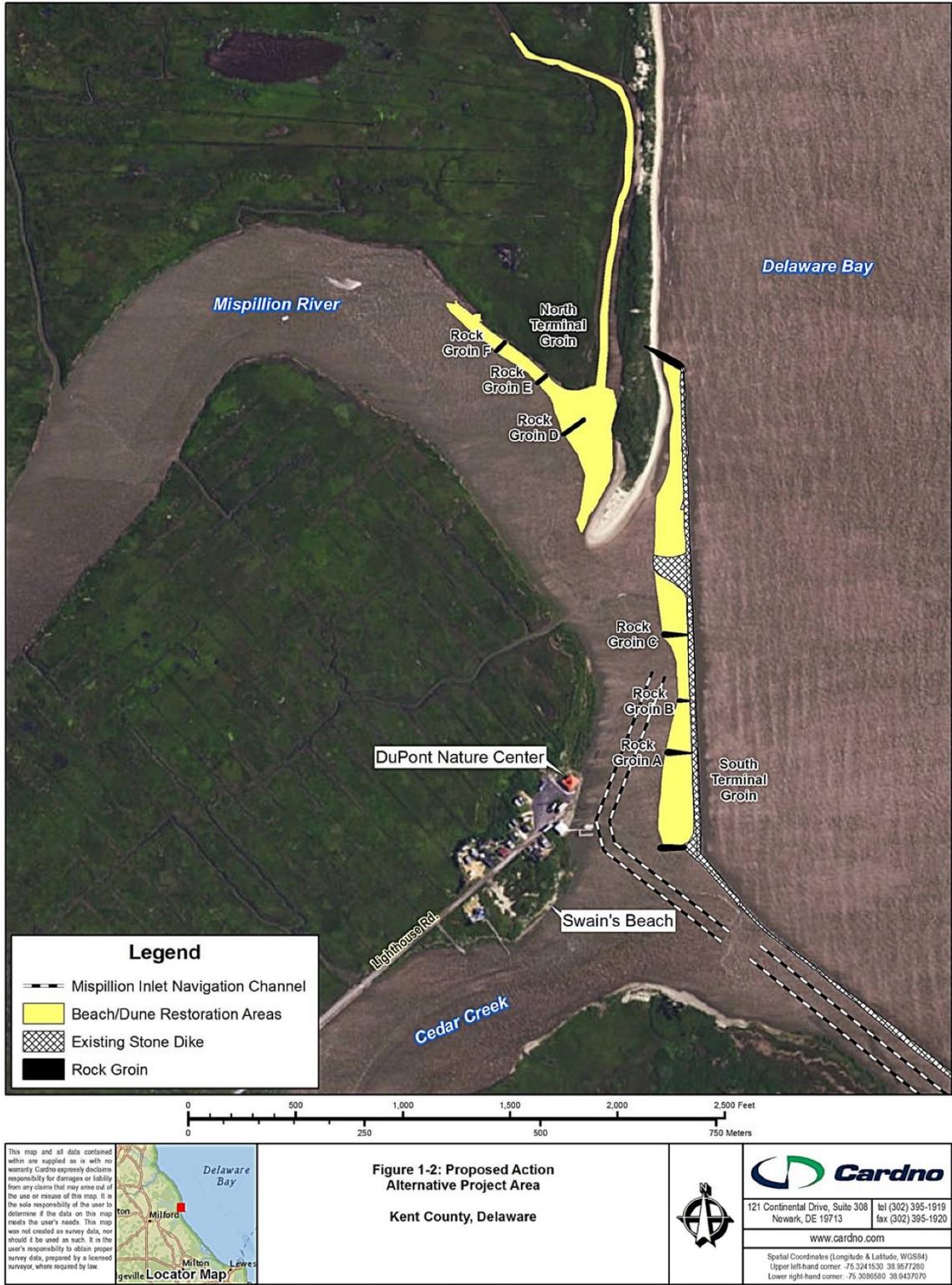
<p>This map and all data contained within are supplied as is with no warranty. Cardno expressly disclaims responsibility for damages or liability from any claims that may arise out of the use or misuse of this map. It is the sole responsibility of the user to determine if the data on this map meets the user's needs. This map was not created as survey data, nor should it be used as such. It is the user's responsibility to obtain proper survey data, prepared by a licensed surveyor, where required by law.</p>		<p><b>Figure 1-1: Project Area Overview</b></p>	<p>121 Continental Drive, Suite 308 Newark, DE 19713   tel (302) 395-1919 fax (302) 395-1920</p> <p>www.cardno.com</p> <p><small>Spatial Coordinates (Longitude &amp; Latitude, WGS84) Upper left hand corner: -75.4001910 38.9968730 Lower right hand corner: -75.2875400 38.8978970</small></p>
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**Figure 1-1 Project Area Overview**

Draft Environmental Assessment

Federal Financial Assistance Grant: 43281  
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**Figure 1-2 Proposed Action Alternative Project Area**

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This environmental assessment (EA) evaluates two alternatives to address the beach and dune erosion at the north end of the existing rock sill of the Mispillion Harbor navigation channel: a no-action alternative and one conceptual design action alternative (the Project). As the Project administrator, DNREC is managing the Project activities.

This EA further analyzes the potential impacts these alternatives may have on the natural and human environment. This EA has been prepared in accordance with the requirements of the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations (CFR) 1500-1508), and DOI regulations (43 CFR Part 46), policy, and guidance.

## 1.1 Purpose and Need

The purpose of the Program is to undertake a variety of actions to restore wetlands and other natural areas, better manage storm water using green infrastructure, and assist states, tribes and local communities in protecting themselves from major storms such as Hurricane Sandy. Overall, the Program goals relate to coastal resiliency and ecosystem enhancement. The Program provides funding for projects in five categories:

- **Project Planning and Design** – Projects that support the preparation of conceptual designs, engineering plans, facilitate federal, state, and local permitting processes to position projects for successful implementation in the future.
- **Coastal Resiliency Assessments** – Projects that perform mapping, analysis, assessments, resiliency planning, and natural resource prioritizations that advance our knowledge of the effects of climate change, sea level rise, and storm events on coastal natural ecosystems and communities.
- **Restoration and Resiliency Projects** – Projects that restore, enhance or create naturally functioning habitats or ecological systems for the benefit of communities and fish and wildlife species.
- **Green Infrastructure** – Projects that use green infrastructure techniques and approaches that provide multiple ecosystem benefits and help to provide community resiliency.
- **Community Coastal Resiliency Planning** – Projects that assist local governments and community organizations to integrate environmentally-sound solutions into comprehensive planning and zoning and into capital programs for parks, schools, transportation and community redevelopment.

The Program provides technical and financial assistance to identify, protect, conserve, manage, enhance, or restore habitat and infrastructure on both public and private lands that have been negatively impacted by Hurricane Sandy.

The purpose of the Project is to restore a beach and stone dike to enhance Atlantic horseshoe crab (*Limulus polyphemus*) spawning and habitat for migratory birds, including foraging habitat

for the federally listed red knot (*Calidris canutus rufa*), as well as to protect the tidal flow and navigation channels of the Mispillion River and Cedar Creek. The Project would build on the resiliency of the surrounding natural systems and the human communities that depend upon them through planning, designing, and creating a suite of restoration strategies within and along the tidal wetlands and sandy beaches of the Delaware Bay shoreline. This area is a hot spot in the Delaware Bay for crab spawning and red knot foraging. However, due to previous storm damage, a breach north of the stone dike has resulted in daily loss of habitat due to erosion. Design criteria for the Project evaluated hydrodynamic modeling data which suggested there was a potential for a catastrophic breach north of the rock wall and potential for the entire Mispillion River to redirect its course north of the rock wall (Moffatt & Nichol 2016). Therefore, the design of the Project focused on being resilient to future storms, preventing a catastrophic breach of the Mispillion River, and restoring as much beach as possible for crab spawning and red knot foraging. The Project is needed in order to avoid future additional damage within the Project area as well as potential damage to habitat outside of the Project area by restoring beach for spawning and foraging areas. Additionally, this Project is needed to restore the rock wall at the Mispillion Harbor to re-establish flow of the Mispillion River. Appendix A contains the Project proposal submitted to NFWF by DNREC for the Hurricane Sandy Coastal Resiliency Competitive Grant Program.

The overarching goal of the Project is to implement a coordinated system-wide approach to evaluating, planning, designing, and creating restoration and resiliency strategies for coastal tidal marshes and streams and sandy beach habitat along the central Delaware Bayshore. Another goal is to build upon the success of the Milford Neck Conservation Area (MNCA) Partnership, a coalition of DEDFW, Delaware Wild Lands (DWL), and The Nature Conservancy (TNC) collaborating across property lines to conserve and restore a mosaic of lands, waters, and natural communities within the MNCA. The objectives of this Project will leverage new and existing landscape-scale research to guide the development and implementation of science-based management strategies, increasing the resiliency of the lands and waters from MNCA south to Mispillion Harbor and Prime Hook National Wildlife Refuge (PHNWR). Flood risk to adjacent human communities and agricultural lands would be reduced. Navigation channels through the Mispillion Harbor and Inlet that support regional cargo shipping commerce in Delaware, New Jersey, and Pennsylvania through the Delaware River and Bay would likely be preserved. Recreational access for activities such as sport fishing and kayaking in the Delaware Bay would also be maintained.

## **2.0 ALTERNATIVES**

An alternatives analysis was performed to determine the most feasible and prudent means of achieving the defined Project's purpose and need. The ability to restore beach that was previously damaged and to restore the course of the Mispillion River at the Mispillion Harbor via restoration of a stone dike was evaluated under each alternative.

### **2.1 No Action Alternative**

Under this alternative, restoration of the beach or stone dike at Mispillion Harbor would not take place. This alternative does not meet the Program or Project purpose and need. It would not provide re-establishment of degraded and lost horseshoe crab spawning and red knot foraging habitat and could result in the complete loss of these habitats. The No Action Alternative does not re-establish flow of the Mispillion River at Mispillion Harbor that would be corrected by restoration of the stone dike at the harbor. Immediate vulnerabilities and resiliency needs would not be addressed. Current conditions of the stone dike have suggested that there is a risk of a catastrophic breach which could result in a complete loss of back beach and possible effect on the U.S. Fish and Wildlife Service (USFWS) Prime Hook project in the nearby PHNWR. This large tidal marsh restoration Project is anticipated to be completed in 2016 and would restore a highly damaged coastal ecosystem covering an area of approximately 4,000 acres. This information is detailed in DNREC's application to the USACE: *Pre-Construction Notification and Authorization Request to the Army Corps of Engineers under Nationwide Permit 27 (2015)*, provided in Appendix B. Flood risk to adjacent human communities and agricultural lands would not be reduced and navigation channels supporting regional commerce and recreational access to Delaware Bay would remain in their current condition.

### **2.2 Proposed Action Alternative**

Under this alternative, immediate vulnerability and resiliency needs in the Project area would be addressed. Approximately 3,000 feet of beach and dune habitat would be restored by placing approximately 45,000 to 60,000 cubic yards of sand along the harbor side of the existing rock sill and north along the bay shoreline to fill the breach north of the stone wall and rebuild beach and dunes able to withstand future coastal storms and sea level rise [*Note: Source of sand is undetermined and is the responsibility of DNREC*]. The Proposed Action Alternative Project area is in Kent County, Delaware, at the intersection of the Mispillion Harbor and Cedar Creek on the western shore of Delaware Bay (Figure 1-2). Beach grass would be planted to stabilize the restored dune. To ensure longer-term resiliency of the sandy shoreline habitat required by spawning crabs and migratory shorebirds, beach restoration work would be coupled with restoration of a 490-foot northern extension of the existing rock sill and the addition of new groins, protecting the navigation channel in the Mispillion River portion of the harbor and preventing the river from creating a new inlet into Delaware Bay. The anticipated start date for the Project was June 8, 2016, with an estimated Project duration of seven months. Based on this analysis, the Proposed Action Alternative meets the Program and Project's purpose and need. The Proposed Action Alternative, which would restore eroded beach damaged by previous

storms and would restore the stone dike at the Mispillion Harbor to re-establish the course of the Mispillion River, constitutes the Proposed Action and is the preferred alternative for this EA.

### **2.3 Alternatives Eliminated from Further Consideration**

In 2008, an alternatives study was conducted to assess the feasibility of six design structural and nonstructural options for restoring important horseshoe crab and shorebird habitat at Mispillion Inlet and to assess feasibility for each option in meeting these habitat restoration objectives (Moffat & Nichol 2008). Two secondary goals of the assessment were a reduction in shoaling in the nearby Cedar Creek navigation channel and a reduction in the risk of upland flooding from the Creek due to storm events. The six sites evaluated in the report were as follows:

- Delaware Bay-North Shoreline
- Delaware Bay-South Jetty
- Osprey Beach
- Cedar Creek-West Shoreline
- Mispillion River-East Shoreline
- Mispillion River-West Shoreline

The report assessed existing conditions at the Mispillion Inlet, developed models for waves, hydrodynamics and sediment transport within the inlet, and provided a conceptual layout for restoration at each of the six locations noted above. The conceptual layout at each location was optimized and adjusted as necessary to provide maximum benefit to habitat acreage with improvement to navigation conditions, while balancing other important factors such as cost and design.

The report recommended restoration of Delaware Bay-North Shoreline, Osprey Beach, Cedar Creek-West Shoreline, and Mispillion River-East Shoreline be considered as future sites for restoration. The Mispillion River-East Shoreline scenario, as it was termed in the report, is the current site selected for the Proposed Action. This alternative was ultimately selected as the priority to move forward as the Proposed Action because the site was shown to be the largest and most critical habitat for horseshoe crabs and red knot in Delaware Bay. In addition to considerations of cost and design, the immediate vulnerability and safety hazards posed by the rock sill at this location made restoration of the site a priority for DNREC to move forward and request grant funding by the Hurricane Sandy Coastal Resiliency Competitive Grant Program (Ashe 2016).

The other restoration alternatives evaluated in the 2008 Moffat & Nichol report may be vetted by wildlife, fisheries, shoreline/waterway and other resource science and management experts and stakeholders at a later date; however, at this time, none of the other alternatives were selected to move forward and are not considered further in this document. Sustainability of Project benefits

for MNCA may be incorporated as part of the planning and design process to further develop additional restoration alternatives.

### **3.0 AFFECTED ENVIRONMENT**

#### **3.1 Introduction – Scope of Resources Evaluated**

Environmental resources identified and analyzed in this document are listed below along with reasons for their inclusion in this EA. The evaluation of environmental effects to these resources for each alternative is described in Section 4.0: Environmental Consequences. A brief description of the existing resource conditions is provided below.

#### **3.2 Geology, Soils, and Sediment**

Several sources of data were considered to characterize the bottom sediments in the vicinity of Mispillion Inlet, including the U.S. Geological Survey (USGS) usSEABED database, the RoxAnn Seabed Classification System developed by DNREC's Delaware Coastal Programs (DCP), and USACE sediment samples taken in April 2002 (Moffatt & Nichol 2008). Samples included in the usSEABED database have been classified according to the Wentworth Classification System, and characterize the bottom sediment in the Delaware Bay near the inlet as a mixture of medium and coarse sands with some fine sands and a small percentage of silts and clays (Moffatt & Nichol 2008).

DCP developed a tool to classify bottom sediment type based on properties of sound waves from a remote acoustic sounder using a RoxAnn sonar system. One sample, from the interior of the inlet where Cedar Creek and Mispillion River divide, indicated the presence of coarse sand; remaining samples, located outside of the inlet, were consistent with USGS samples indicating the presence of medium to coarse sands with some silts and clays (Moffatt & Nichol 2008).

Sediment samples were collected from two locations in Cedar Creek and three in Mispillion River by the USACE in April 2002 in conjunction with maintenance dredging. The USACE Philadelphia District is charged with maintaining the jetties and the navigable waterways of the Mispillion River and Cedar Creek. Dredging was last performed in 2002 (Moffatt & Nichol 2008). Samples from Cedar Creek contained approximately 90% silt/clay; samples from Mispillion River showed more variability, though two of the three samples still contained a high percentage of silt/clay (Moffatt & Nichol 2008).

In addition to the three sources of data described above, sediment was qualitatively described in the Project area and presented in the Moffatt & Nichol report (2008). Adjacent to the north jetty, are two sand lobes that are composed primarily of sand, but also of some mud at the lower lying elevations. Adjacent to the south jetty, where it curves towards Cedar Creek, a sandy beach, known locally as Osprey Beach, has well-established vegetation. The marshes, which are primarily mud, extend along the south jetty. The channel in both Mispillion River and Cedar Creek is thought to be mostly mud, but near the mouth of the jetties, there are some shoaled areas of oyster shells and coarse sand. Outside of the jetties, to the north and south, the bottom is also mostly mud. To the north of the jetties, a narrow sandy beach extends several thousand feet to

the north. South of the jetties, the shoreline is primarily a sand beach with some mud and large peat and debris deposits.

A geotechnical investigation was conducted that included the collection of soil borings for foundation information and beach sand samples for grain size distribution analysis for beach nourishment. Results from March 2015 characterized surficial sediments as poorly-graded sand. Soil borings resulted primarily in an approximately eight foot layer of sand over soft silt down to the boring's termination at 25 feet (Appendix 1 in Moffatt & Nichol 2016).

As previously discussed, the breach north of the stone dike caused by storm damage has resulted in daily loss of habitat due to erosion (Appendix B). Historical shoreline erosion at the north side of the existing sill (from 1969 to 2015) has been 390 feet, a historic erosion rate of approximately 9 feet/year (Moffatt & Nichol 2015).

### **3.3 Water Resources and Wetlands**

#### **3.3.1 Flood Zones**

The Federal Emergency Management Agency (FEMA) defines floodplains as any land area susceptible to being inundated by floodwaters from any source. Flood zones, a commonly used term in floodplain management, are geographic areas defined by the Federal Emergency Management Agency (FEMA), reflecting the severity or type of flooding in the area. FEMA refers to flood zones that have a 1-percent or greater chance of flooding in any given year as Special Flood Hazard Areas (SFHA). SFHAs are further differentiated by zones (FEMA 2016a). The proposed Project is entirely located within SFHA Zone VE. Areas in SFHA Zone VE are defined as coastal flood zones with velocity hazards (e.g., wave action) (FEMA 2016b).

Executive Order (EO) 11988, *Floodplain Management* (1977), states that when considering the potential impacts of federal actions on flooding, the geographic extent of a floodplain should be established based on the type of action and whether or not the action is critical (i.e., an activity for which even a slight chance of flooding would be too great). EO 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input* (2015), amends EO 11988, "...to recognize and incorporate future conditions rather than rely solely on existing data and information." The amendment provides a higher vertical flood elevation and expanded corresponding horizontal floodplain when considering potential impacts of federally funded projects located within floodplains. The Project area is already located within an SFHA and would not be considered a critical action, therefore any increases to the extent of the floodplain as a result of EO 13690 would not affect the Project's flood zone designation.

Tidal range from mean high water (MHW) to mean low water (MLW) at Mispillion Inlet is 4.6 feet, and the tidal range between mean higher high water (MHHW) and mean lower low water (MLLW) is 5.3 feet. Dams limit the extent of tidal influence of both Mispillion River and Cedar Creek. Mispillion River is dammed in downtown Milford, and Cedar Creek is dammed 1.3 miles

north of where it passes under State Route 1, approximately 4 miles west of the Project area. A hydrodynamic model was developed and calibrated to obtain a more complete view of tidal currents in the inlet system (Moffatt & Nichol 2008). The model shows that maximum velocity through the jetties is significantly higher than that found in either the Mispillion River or Cedar Creek. Velocity is higher during flood tide and peaks at the confluence of Cedar Creek and Mispillion River. Velocities west of the structures in the Project area and through the body of the river increase only slightly and are most pronounced during flood tide.

### **3.3.2**      *Surface Water and Hydrology*

The Proposed Action is subject to Rivers and Harbors Act (33 USC 403) Section 10 and Clean Water Act (CWA) (33 USC 1344) Section 404 permits from the USACE, which governs work or structures in navigable waters of the United States and/or the discharge of dredged or fill material into waters of the United States, including their adjacent wetlands. Additionally, CWA Section 401 requires states to certify that activities authorized by the federal government pursuant to Section 404 will not violate the State Water Quality Standards, often included as a condition for compliance under USACE CWA Section 404 Nationwide Permits (NWP).

The Mispillion River and Cedar Creek connect at Mispillion Inlet and provide access for tidal flow and navigation in the Delaware Bay through an inlet stabilized by a mile-long jetty system built and maintained by the USACE. The Mispillion River, approximately 13 miles long, 12 miles of which are navigable and maintained by the USACE, flows southeast past a sand shoal called Back Beach, then south along the stone dike towards the inlet (Figure 1-2). The Inlet itself is bounded by more than 200 acres of sandy beach, dune, and tidal salt marsh, and is protected on its eastern side by a rock sill that connects with the north inlet jetty and extends approximately 2,700 feet to the north.

The wave climate within Mispillion River and Cedar Creek is substantially different from the wave climate in Delaware Bay. Whereas the wave climate in Delaware Bay consists of both wind-driven waves and offshore swells that propagate through the bay mouth, the wave climate in the river and creek consists solely of wind-driven waves. According to a calibrated wave model used to simulate existing conditions at Mispillion Inlet, waves are predominantly from the east with an average wave height of 1.3 feet and an average peak period of 5.8 seconds. Approximately 70 percent of the waves are smaller than 1.5 feet while less than 1 percent are larger than 3 feet. The wave rose indicates that the largest waves, with heights greater than 2.5 feet, are from the northeast and are wind-generated waves. The maximum wave height simulated at Mispillion Inlet was 3.6 feet, with a period of 5.1 seconds, occurring on February 4, 1998, during a winter nor'easter (Moffatt & Nichol, 2008).

### **3.3.3**      *Wetlands*

No wetlands are within the Project area, which is primarily sandy beach/dune and open water habitats. The Project area is located within the MNCA (Figure 1-1), which consists of over 10,000 acres of sandy beach and dune, tidal and palustrine wetlands, upland forest, and

agricultural fields in the central Delaware Bay shore. Estuarine wetlands along Delaware Bay typically consist of tidal brackish waters diluted by freshwater runoff from the land.

Over the past century, the MNCA has experienced significant alterations to the natural hydraulic and hydrologic regimes of its tidal and palustrine wetlands. Alterations include grid ditching for saltmarsh mosquito control, creation of drainage ditches for agricultural lands, creation of Greco's Canal (located approximately 1.5 miles north of the Project area) originally intended for navigation, and development of roadways (Figure 1-1). Between 1985 and 2005, an inlet opened naturally approximately two miles north of Mispillion Harbor, directly connecting Delaware Bay with Greco's Canal and allowing for a greater influx of saltwater into the system. The combined effects of anthropogenic alterations and inlet formation have stressed the tidal marsh system within the MNCA and surrounding areas and converted a large area of marsh (nearly 500 acres) to open water. This open water area is adjacent to the Delaware Bay shoreline and is trending toward further expansion. Expansion of open water in this area has significantly decreased the resiliency of the marsh system as a whole, and decreased the capacity of the marsh to attenuate floodwaters and storm surge and respond to sea level rise through accretion (Appendix A).

### 3.4 Biological Resources and Vegetation

The USFWS online Information for Planning and Conservation (IPaC) system produced a report indicating that the red knot (*Calidris canutus rufa*) is the only federally-listed threatened or endangered species present within the Project area. Appendix C contains the IPaC query run on May 24, 2016. The red knot is listed as threatened at the federal level and endangered at the state level. However, no critical habitat is present for the red knot, as none has been designated for this species.

- **Red Knot.** The adult red knot grows to approximately 10 to 11 inches in height with a wingspan of approximately 20 inches. In the spring, adults are finely mottled above with gray, black, and light ochre, running into stripes on their crown; the throat, breast, and sides of the head are cinnamon-brown and a dark gray line is present through the eye. The abdomen and undertail coverts are white and their uppertail coverts white with black bars. In the winter, adults are pale, ashy gray above with white underparts and a lightly streaked and speckled breast.

Red knots migrate long distances between nesting areas in mid- and high-arctic latitudes and southern nonbreeding habitats as far north as the coastal United States (low numbers) and southward to southern South America. Populations including the subspecies *rufa* migrate in large flocks northward through the contiguous United States mainly from March through early June and back southward during July and August. The migration stopover sites of the *rufa* subspecies are mainly along the Atlantic coast of South America (mainly Chile, Argentina, and Brazil) and the Atlantic and Gulf of Mexico coasts of North America, including staging areas on the coasts of Hudson Bay in northeastern Canada and James Bay, which is located on the southern end of Hudson

Bay. Red knots that forage along the beaches of Delaware Bay during the spring come mostly from South America and have strong fidelity to migration stopover sites (USFWS 2016; NatureServe 2015a). Mispillion Harbor has the highest concentration of red knots during spring migration than all other beaches along the Delaware Bay, containing 18 percent of the Bay-wide population.

Though not considered as threatened or endangered by federal or state agencies, Atlantic horseshoe crabs (*Limulus polyphemus*) play an integral role in shorebird migration, including that of the red knot. Horseshoe crab females each lay upwards of 80,000 eggs on the sandy beaches of Delaware Bay, including Back Beach, during the spawning season in May or early June and many shorebirds, red knots in particular, rely on the horseshoe crab eggs produced during this window as their primary food source during their migration to breeding grounds in the arctic (Conserve Wildlife Foundation of New Jersey [CWF] 2016a).

Communication with DEDFW's Species Conservation & Research Program (SCRP) indicated that other Delaware special status species may also be present in the Project area: the American oystercatcher (*Haematopus palliatus*) and the diamondback terrapin (*Malaclemys terrapin*) (Appendix B). The American oystercatcher is listed as endangered in Delaware and the diamondback terrapin is ranked as SU, which indicates that it may be a species of conservation concern but there is inadequate data to determine its status. The Northeast Fish and Wildlife Diversity Technical Committee considers the diamondback terrapin a species of regional concern that may warrant federal protection in the future (Therres 1999).

- **American Oystercatcher.** American oystercatchers are large shorebirds (growing to approximately 18 inches tall) with a large, straight, laterally compressed red-orange bill and moderately long neck and legs. The head, neck, and back are black to dark brown; the wings are dark with a broad white stripe and the tail is dark with a large white patch at the base.

Oystercatchers are found on rocky and sandy seacoasts and islands; at river mouths and estuaries, especially where rocks are exposed at low tide; and on mudflats and salt ponds. They nest on the ground in open sites often on high parts of sandy beaches, or among rocks (NatureServe 2015b). SCRP has documented oystercatchers nesting on the rock wall and Back Beach on the eastern bank of the Mispillion River.

- **Diamondback Terrapin.** The diamondback terrapin is a medium-sized turtle that varies in length from approximately 4 to 5½ inches in males and 6 to 9 inches in females. Terrapin coloration varies highly between individuals, but all have a gray, brown, or black carapace with a diamond-shaped pattern and a lighter, greenish-yellow plastron. The skin is light to dark gray with black spots and other dark markings. Both males and females have a light colored upper mandible and females have a short, narrow tail while males have a relatively long, thick tail.

Diamondback terrapins exclusively inhabit coastal salt marshes, estuaries, tidal creeks, and ditches with brackish water that are bordered by *Spartina* spp. grass (CWF 2016b). They are the only turtle in the world that is specially adapted to spend its entire life in this type of water. From mid-May through mid-July, female terrapins emerge from the water to lay eggs on sandy and sparsely vegetated beaches and from early-August through mid-September and mid-March through late-May, hatchlings emerge from nests and spend the first years of their life in the adjacent marshes.

In addition to federal and state threatened and endangered species, the IPaC query indicated that certain migratory birds of conservation concern may use the Project area for breeding, overwintering, during migration, or may be present year-round. The Migratory Bird Treaty Act (MBTA) (40 Stat; 755 as amended; 16 U.S.C. 703-712) is a federal law implemented to protect migratory birds. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed therein. The MBTA does not discriminate between live or dead birds and offers full protection to any bird parts, including feathers, eggs, and nests.

According to the IPaC query, migratory bird species that may be present include the American bittern (*Botaurus lentiginosus*), bald eagle (*Haliaeetus leucocephalus*), black rail (*Laterallus jamaicensis*), black skimmer (*Rynchops niger*), horned grebe (*Podiceps auritus*), Hudsonian godwit (*Limosa haemastica*), least bittern (*Ixobrychus exilis*), pied-billed grebe (*Podilymbus podiceps*), short-billed dowitcher (*Limnodromus griseus*), and snowy egret (*Egretta thula*). As noted in the letter of communication from DNREC to SCRP, these species may also include obligate marsh nesting birds such as the clapper rail (*Rallus crepitans*), marsh wren (*Cistothorus palustris*), willet (*Tringa semipalmata*), and saltmarsh sparrow (*Ammodramus caudacutus*) (Appendix B).

Communication with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) Office of Habitat Conservation indicated that the Mispillion River provides migration, spawning, and forage habitat for anadromous fishes, which require a time-of-year restriction for in-water work from March 1 to June 30 to allow these species passage to upstream spawning areas. The letter to NOAA NMFS from DNREC can be found in the NWP Application included in Appendix B.

Common species of wildlife typical of coastal saltmarsh and estuarine habitat, such as the Atlantic ghost crab (*Ocypode quadrata*), fiddler crab (*Uca* spp.), marsh rice rat (*Oryzomys palustris*), and common raccoon (*Procyon lotor*), would also be expected to be present within the Project area.

### **3.5 Human Health and Safety**

Design criteria evaluated in the 2008 Moffat & Nichol report suggested there is a potential for a catastrophic breach north of the stone wall and potential for the entire Mispillion River to redirect its course north of the rock wall. As previously discussed, this area north of the stone wall has already been breached by storm damage. A catastrophic breach could result in dramatic

effects to properties outside of the Project area, including nearby facilities managed by the DEDFW, complete loss of the back beach area, and possible effects on the nearby USFWS Prime Hook project discussed in Section 2.1 (currently estimated as a \$38 million investment). The study identified that surrounding communities and farmlands could also be affected by a breach of the rock wall as the ability of the system to maintain adequate tidal flow during and immediately after storms and spring tides would become a safety issue as a result of repeated flooding to homes, infrastructure, and businesses in local communities. In addition, the current configuration of the inlet presents a hazard to both recreational and commercial vessel navigation. Shoaling is an issue for many of the commercial vessels using the Mispillion Inlet, as sand continuously accretes at the mouth of the inlet, causing frequent delays while vessels wait to clear the shoal at the inlet's mouth (Moffatt & Nichol 2008). Response times for oil spill emergency cleanup and containment crews could be delayed during lower tide stages if further shoaling accumulates in the Mispillion River channel (USACE 2016).

### **3.6 Cultural Resources**

Projects receiving federal funding and permitting are required to undergo a review for compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (CFR 800). DNREC searched the Delaware and National Registers of Historic Places and consulted with the Delaware Division of Historical and Cultural Affairs State Historic Preservation Officer (SHPO) on the proposed Project. This consultation included a field visit by DNREC and SHPO staff to survey the site.

Correspondence from DNREC to the SHPO is included in Appendix B. Both DNREC and the SHPO noted that the National Register-listed 1873 Mispillion Lighthouse and Beacon Tower is located in the immediate vicinity of the Project (approximately 0.1 mile west of the rock wall structure to be restored as part of the Proposed Action). The Mispillion Lighthouse was originally built in 1831, with a second 65 ft. structure built in the gothic revival architecture style in 1873. The lighthouse served the Mispillion Inlet until it was deactivated in 1929.

The SHPO noted that much of the landscape in the vicinity of the Project area had been altered recently through natural process, as was documented during a field investigation on August 26, 2015. The SHPO located the remains of a structure that was depicted on a ca. 1895 atlas during the site visit; however, they determined that the implementation of the Proposed Action would not disturb this structure (Appendix B).

#### **3.6.1 Tribal Resources and Consultation**

Publications by Jay Custer of the University of Delaware's Center for Archaeological Research (1984, 1989) have provided a general context for the prehistoric overview of the project area. These descriptions divide the prehistory of the Delaware River Valley into chronological time periods.

Several specific historical Maritime themes of Delaware Bay are discussed in detail in the following sections. There are four cultural periods generally recognized by Custer (1984) for the

Delaware River Valley; Paleo-Indian (c. 14,000 B.P. - 8,500 B.P.), Archaic (c. 8,500 B.P. - 5,000 B.P.), Woodland I (c. 5,000 B.P. - A.D. 1,000), and Woodland II (c. A.D. 1,000 - A.D. 1,600). Each period corresponds to environmental episodes that were marked by broad climatic changes, thereby affecting the productivity and distribution of environmental resources available to people over time.

The Delaware SHPO did not advise DNREC to reach out to federally-recognized tribes (Delaware Nation of Oklahoma, Delaware Tribe of Indians, and Stockbridge Munsee) as similar project activities at this site have been implemented by DNREC in the past and no impacts to tribal resources were anticipated. DOI did conduct consultation with the above mentioned federally recognized tribes to determine whether any tribal resources may be present and, if so, how to avoid and/or mitigate impacts to these resources.

DOI submitted letters and copies of the draft environmental assessment and appendices to the Delaware Nation of Oklahoma, Delaware Tribe of Indians, and Stockbridge Munsee on March 16, 2017, providing a 30 day review and response time period and 15 days for mail transportation. DOI received certified mail confirmation of each tribe receiving the letter and affirmative responses from the Delaware Tribe of Indians and Stockbridge Munsee. DOI also left phone messages with the Delaware Tribe of Oklahoma and received no response.

The Stockbridge Munsee Tribe responded that the project site is not in an area of interest for the tribe. The Delaware Tribe of Indians requested to be informed of any discoveries that could relate to tribal resources as well as updates on project progress, to which the DOI, NFWF and DNREC have agreed. These communications are attached in Appendix D.

### **3.7 Socioeconomics, Environmental Justice, and Protection of Children**

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires federal agencies to examine Proposed Actions to determine whether they will have disproportionately high and adverse human health or environmental effects on minority or low income populations.

Executive Order 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, seeks to protect children from disproportionately incurring environmental health risks or safety risks that might arise as a result of federal policies, programs, activities, and standards. Environmental health risks and safety risks include risks to health and safety attributable to products or substances that a child is likely to come in contact with or ingest.

The Project area is within the MNCA, which is bound by the Murderkill River to the north, Mispillion River to the south, and the town of Milford to the west; it includes the unincorporated community of Thompsonville and the Town of Slaughter Beach. The population of Milford is 35 percent minority with approximately 28 percent of the population categorized as children younger than 21 years of age (U.S. Census Bureau n.d.(a)). Approximately 14 percent of the population in Milford lives below the poverty level (U.S. Census Bureau n.d.(b)).

The area around the Mispillion River and inlet is home to a variety of businesses that support the state's fishing and shipping industries as well as to in- and out-of-state port authorities. The area supports variety of industries such as tourism, agricultural product distribution, such as soybeans and corn for the poultry industry, and launch services for ships in the Delaware Main Channel. A lightering area is also located in the inlet with supplies and resources to support personnel changes for vessels utilizing the Delaware Bay. Public and commercial assets associated with Mispillion Harbor include the DEDFW DuPont Nature Center, the DEDFW aquatic education facility, two public boat ramps, a commercial marina and docking facilities. The only maritime service provider for tanker vessels using Delaware Bay's main navigation channel and the nearby Atlantic Ocean is based in Mispillion Harbor (USACE 2016). Domestic and international commerce associated with the main channel and the Philadelphia Port Complex, approximately 60 miles north of the Project area, are dependent on the supply service's reliable passage between Mispillion Harbor and the Delaware Bay (Appendix A).

### **3.8 Land Use, Recreation, and Coastal Zone Management**

#### **3.8.1 Land Use and Recreation**

The proposed Project is located within the MNCA, directly adjacent to the Mispillion River and Cedar Creek confluence which flows immediately into the Delaware Bay. The MNCA is collectively owned and managed by the DEDFW, DWL, TNC and several private landowners actively engaged in conservation management of their lands. The MNCA consists of over 10,000 acres extending from Milford, Delaware to the Delaware Bayshore between Bombay Hook and PHNWR, and includes 10 protected miles of sandy beach and dune, wetlands, upland forest, and agricultural fields in the central Delaware Bayshore.

The Project area is located within a state-dedicated Nature Preserve under Delaware State Code, Title 7, Chapter 73 (Appendix B), also known as the Mispillion Harbor Reserve Nature Preserve. State-designated Nature Preserves include Natural Areas, which are defined as those areas of land or water which either retains or has re-established its natural character; or has unusual flora or fauna; or has biotic, geologic, scenic, or archaeological features of scientific or educational value. In addition, because of the presence of listed species and their habitat, the Project area is also located within a State Natural Heritage Site, which the USACE has categorized as Designated Critical Resource Waters.

General recreational uses of the proposed Project site and surrounding area include fishing, wildlife viewing, kayaking, and recreational boating. The Mispillion Inlet provides also important access to the Delaware Bay for commercial and recreational fishermen. DEDFW owns and manages multiple public facilities near the Project area: the DuPont Nature Center, a public aquatic education facility in the Mispillion Harbor that serves local school and youth group, ecotourist, and general public visitation; a public boat ramp on Cedar Creek; and a public boat ramp on the Mispillion River approximately 10 miles upstream from the Project site in the town of Milford, Delaware. The education center and public boat ramps are managed with USFWS federal aid funds, and both ramps support key recreational boating and fishing access to

Delaware Bay. The harbor and inlet, managed by USACE, also support access to Delaware Bay for commercial marina, docking facilities, and a maritime supply delivery service located on Cedar Creek (Moffat & Nichol 2008). The maritime supply service is the only operation that delivers supplies and personnel to domestic and international vessels using the main channel in Delaware Bay and headed to ports in Philadelphia, Pennsylvania, Trenton, New Jersey, Camden, New Jersey, and Wilmington, Delaware (Appendix A).

### **3.8.2 Coastal Zone Management**

The Project is located within the Delaware Coastal Zone as promulgated by the Delaware Coastal Zone Act (Title 7, Chapter 70). The Delaware Coastal Zone Act regulations are intended to promote improvement of the environment within the coastal zone while also providing industry with the flexibility to remain competitive within the global marketplace.

## **3.9 Air Quality and Noise**

### **3.9.1 Air Quality**

Ambient air quality is protected by federal and state regulations. The U.S. Environmental Protection Agency (USEPA) has developed National Ambient Air Quality Standards (NAAQS) for certain air pollutants, and air quality standards for each state cannot be less stringent than the NAAQS. The USEPA's NAAQS set the concentration limits that determine the attainment status for each criteria pollutant. Currently, the northern section of Kent County, Delaware, is considered part of the Philadelphia-Wilmington-Trenton nonattainment area. Kent County is listed in nonattainment NAAQS for 8-hour ozone (1997 standard) and 1-hour ozone (1979 standard) only (USEPA 2015).

### *Climate Change*

EO 13653, *Preparing the United States for the Impacts of Climate Change*, requires federal agencies, including the DOI, to integrate considerations of the challenges posed by climate change effects into their programs, policies, rules and operations to ensure they continue to be effective, even as the climate changes. Agencies must develop, implement, and update comprehensive plans that integrate consideration of climate change into agency operations and overall mission objectives. In 2009, the DOI issued Secretarial Order 3289, which includes the requirement that each DOI bureau and office consider and analyze potential climate change impacts when undertaking long-range planning exercises, setting priorities for scientific research and investigations, developing multi-year management plans, and making major decisions regarding potential use of resources under the DOI's purview.

In 2014, DNREC's Division of Energy and Climate developed the state's Climate Change Impact Assessment, which provided a summary of the potential impacts of climate change to the state and presented a foundation for development of mitigation and adaptation planning strategies for the state (DNREC 2012). The report noted that statewide, between 8 percent and 11 percent of the state's land area could be inundated by sea level rise by the year 2100. While

direct impacts would likely occur in areas near tidal waters, the entire state would likely be affected by increased costs of maintaining public infrastructure, decreased tax base, loss of recreational opportunities, or loss of community character. The report also noted that sea level rise could exacerbate shoreline erosion, damaging dune habitat, leaving infrastructure along the coastline vulnerable to storm damage, and require a considerable amount of additional funding to be allocated towards beach nourishment to offset these losses. In addition, a sea level rise of 0.5 meter could result in the potential inundation of 81 percent of the state's acreage of impounded wetlands. Also, between 39 percent and 78 percent of the state's 50 miles of dams, dikes, and levees and 97 percent of the state's tidal wetlands could be impacted by a sea level rise of 0.5 meter by 2100. DNREC concluded that the highest concentration of potential impact would be focused in Kent County, whose dikes primarily protect wildlife areas. Saltwater intrusion of wells, groundwater, and streams was also cited as a concern for communities in Delaware as a result of sea level rise. Finally, the report noted that reduction or loss of wetland habitats within the protected boundaries of the state's National Wildlife Refuges (NWRs) can impact populations of species that depend on the habitat located in these areas. Species may be forced to redistribute if refuge wetlands no longer meet their needs and may relocate in wetlands that are not afforded the same protection and management.

On September 12, 2013, Governor Markell implemented Executive Order 41 – *Preparing Delaware for Emerging Climate Impacts and Seizing Economic Opportunities from Reducing Emissions* – which directed state agencies to improve resiliency, develop strategies for adaptation and preparedness, and set goals for greenhouse gas reductions. The Adaptation Workgroup formed under the Executive Order recommended DNREC design and implement restoration activities to slow and prevent continued loss of coastal beach, marsh, and forest habitats (State of Delaware Cabinet Committee on Climate and Resilience, 2014)

### **3.9.2 Noise**

Noise and sound can directly or indirectly affect health, enjoyment, and well-being. High levels of noise can cause hearing loss, interfere with communication, disturb concentration, and cause stress. Moderate and low levels of noise can disturb sleep and annoy sensitive receptors. Typically, noise is defined as unwanted sound, which can be based on objective effects (e.g., hearing loss, damage to structures) or subjective judgments (e.g., community or individual annoyance). Sound is usually represented on a logarithmic scale with a unit called the decibel (dB). Sound on the dB scale is referred to as the sound level.

Communication interference begins at background noise levels much lower than levels that can cause hearing loss. Sentence intelligibility is one method of determining communication interference when background or intruding noise is broad spectrum. This is usually the case when there are multiple noise sources. Disturbance noise can either disturb or aid concentration depending on its characteristics. Even moderate levels of intruding noise can be distracting if they are sporadic, have a dominant frequency, or are identified with an undesirable source.

## **4.0 ENVIRONMENTAL CONSEQUENCES**

### **4.1 Geology and Sediment**

#### **No Action Alternative**

Under the No Action Alternative, there would be no change to the geology or soil classifications in the Project area; however, sand and tidal marsh substrate would continue to be lost during tidal drift, high tides, and storm surges, and sediment would continue to enter into the waterway. As discussed in Section 3.2, the breach at the north end of the Harbor would continue to erode, resulting in the daily erosional loss of tidal marsh and beach habitat. If the breach widens, Mispillion River would likely redirect from its flow through the stabilized inlet, resulting in rapid sedimentation at the confluence of the two rivers and the inlet, impacting sediment concentrations needed for the salt marsh restoration within the Project area. The No Action Alternative could lead to more extensive restoration needs in the future and is not consistent with the purpose and need for this Project.

#### **Proposed Action**

The proposed Project activities include:

- Restoration of an existing stone dike (approximately 2,300 feet) and the installation of new stone groins (groins A, B, and C in the South Terminal Groin and groins D, E, and F in the North Terminal Groin (Figure 1-2)) using approximately 12,000 tons of stone, Delaware Department of Transportation (DOT) standard riprap gradation acceptable; and
- Placement of approximately 45,000 to 60,000 cubic yards of sandy fill in subaqueous lands for beach creation (Appendix B).

The USACE recommends material placed on the beach as nourishment sand should be similar in texture to that on the natural beach to ensure stability (USACE 1984). The beach nourishment sand for the Proposed Action should conform to Delaware Department of Transportation (DelDOT) specifications for fine aggregate (Moffatt & Nichol 2015). Sand would be excavated to install the North Terminal Groin (approximately 400 cubic yards [cy]), stockpiled on site, placed back to previous grades, and tied into the top of the dune after the North Terminal Groin is installed. Approximately 60,000 cy of beach nourishment adjacent to the stone dike and along Mispillion River (Figure 1-2) would be hydraulically piped and placed according to the design using methods at the discretion of the Project contractor. Methods could include hydraulic or mechanical methods or a combination thereof (DNREC Pre-Bid Meeting Minutes, 2016). The beach nourishment plan has been designed with a very gradual 20:1 slope that ties into the stone dike and terminates into the main channel, taking into consideration the natural history needs of horseshoe crabs and red knots. Sand would likely need to be graded using a low pressure bulldozer after the sand has been placed. General and Project-specific special conditions of the

approved USACE NWP 27 would be used to minimize sand removal from the Project area (Appendix B).

A hydrodynamic model showed that the groin structures would trap sediment, but in fairly small quantities. When the inclusion of fill was simulated, the groins still induced the accumulation of some sediment (sand) and prevented the erosion of any additional sediment. The sedimentation rate on the north side is less than the rate on the south side of the groin, indicating that more sediment would accumulate during flood tide (Moffatt & Nichol 2015). The modeling showed that installation of the North and South Terminal groins (Figure 1-2) did not appear to affect the flow regime outside of their immediate area; velocities west of the structures, through the body of the river, increased only slightly, most pronounced during flood tide indicating that erosion west of the structure field would likely not be significant (Moffatt & Nichol 2015).

As discussed in section 3.3.2, DNREC submitted their application for a USACE NWP 27 (Aquatic Habitat Restoration, Establishment, and Enhancement Activities) to the USACE Philadelphia District on December 18, 2015, to conduct earthmoving and restoration activities associated with the Proposed Action. The proposed work activities were approved by the USACE on April 1, 2016, provided the work is conducted in compliance with the NWP 27 general conditions and Project-specific special conditions, including the following:

- #10 – “Mechanical equipment used to execute the work authorized shall be operated in such a way as to minimize turbidity that could degrade water quality”;
- #13 – “All material to be used as fill shall be obtained from an upland source. The fill material shall be free of oil and grease, wood, general refuse, plaster, and other pollutants, and shall contain no broken asphalt”; and
- #14 – “Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date”.

There would be no adverse impacts to geology or sediment in the Project area as part of the Proposed Action. Movement of sediments would cause the bathymetry of the harbor and inlet and the shoreline profile of the beach to vary, but these changes would be positive and consistent with the purpose and need for the Proposed Action by protecting beach habitat, preserving navigation channels in the harbor, and maintaining tidal flow in the surrounding coastal marsh and aquatic systems, increasing resiliency in the coastal environment.

## **4.2 Water Resources and Wetlands**

### **4.2.1 Flood Zones**

#### **No Action Alternative**

Under the No Action Alternative, flood stage levels and frequency of flooding in the Project area would remain consistent with existing conditions. If the Proposed Action does not occur, the harbor shorelines would be increasingly vulnerable to storm surges and would continue to erode, degrading and reducing habitat for shorebirds and crabs and increasing the likelihood of flooding in the surrounding areas. The expansion of open water in and around the Project area would decrease the capacity of the marshes adjacent to the Project area to attenuate floodwaters and storm surge from future storm events (Appendix A).

#### **Proposed Action**

Under the Proposed Action, hydrologic connections would be maintained and appropriate flow and salinity would be managed to sustain system-wide restoration efforts to better withstand future coastal storms and sea level rise. By maintaining adequate tidal flow through the coastal system during and immediately after storms and spring tides, flood risk to adjacent human communities and agricultural lands would be reduced.

### **4.2.2 Surface Water and Hydrology**

#### **No Action Alternative**

Under the No Action Alternative, tidal exchange would continue to occur daily though the breach at the north end of the Harbor making this area more vulnerable to the formation of an inlet and placing the navigation channel at risk, which is inconsistent with the purpose and need to increase resiliency of the structures and beaches in and around the proposed Project area. If the breach widens, Mispillion River will redirect from its flow through the stabilized inlet and reduce the hydrologic flow into the tidal wetlands to the south.

#### **Proposed Action**

The Proposed Action would be engineered to protect beach habitat and navigation channels in the harbor and tidal flow in the surrounding coastal marsh and aquatic systems. A hydrodynamic model was developed and calibrated to obtain a more complete view of tidal currents in the Inlet system (Moffatt & Nichol 2008). The model shows that maximum velocity through the jetties is significantly higher than that found in either Mispillion River or Cedar Creek. Velocity is higher during flood tide and peaks at the confluence of Cedar Creek and Mispillion River. It does not appear that the groins would affect the flow regime outside of their immediate area. Velocities were decreased between the groins. The northernmost groin is in the deepest water and therefore has the most effect on flow in the area. The southernmost groin has little effect on flow through the channel (Moffatt & Nichol 2015).

As discussed in section 3.3.2, Project dredge and fill activities associated with the Proposed Action were approved on April 1, 2016 under an NWP 27. USACE-authorized Project-specific special conditions regarding water quality can be found in Appendix B.

Temporary degradation of water quality would likely occur at both the dredging site and the beach nourishment site due to re-suspension of silt material. The elevated turbidity levels are generally short-lived given that the disturbed sediment is sand, which is expected to settle rapidly and cause less turbidity and oxygen demand than finer-grained sediments.

The proposed Project to restore the beach and dune system that protects tidal flow in the surrounding coastal marsh and aquatic systems and the navigation channel of Mispillion Harbor would have long-term, highly beneficial effects for riverine and coastal ecology and habitats in and around the Project area. This action is consistent with the purpose and need to implement a coordinated system-wide approach to restoration and resiliency strategies for coastal tidal marshes and streams and sandy beach habitat.

#### **4.2.3 Wetlands**

##### **No Action Alternative**

Under the No Action Alternative, no short-term changes in wetlands are anticipated as there are no wetlands occurring directly within the Project area. The proposed Project area is primarily sand beach/dune and open water. Tidal wetlands are located adjacent to the Project area. These features would likely continue to be degraded though expansion of open water as a result of the No Action Alternative.

##### **Proposed Action**

The Proposed Action would create a positive impact to the area surrounding the Project site by maintaining hydrologic connections and managing appropriate flow and salinity between Mispillion Harbor and the marsh system to the north and south, including the PHNWR. Adequate tidal flow and associated sediment concentrations are necessary to maintain the marsh platform elevation needed to sustain a *Spartina alterniflora* marsh and would help attenuate floodwaters and storm surge and respond to sea level rise through accretion of trapped sediments (Appendix A).

#### **4.3 Biological Resources and Vegetation**

##### **No Action Alternative**

Under the No Action Alternative, ongoing degradation of the vital migratory stopover foraging habitat for the federally threatened red knot and associated spawning habitat for horseshoe crabs would continue unabated. Short-term changes would consist of continued habitat loss and a likely continuation of the documented reduction in the presence of red knots in the Back Beach area. Long-term impacts of the No Action Alternative would likely include the complete loss of

the Back Beach habitat as a result of redirection of the Mispillion River's flow through the current breach at the north end of the Harbor.

### **Proposed Action**

In the short term, the Proposed Action would increase foraging habitat for red knots and spawning habitat for horseshoe crabs through restoration of approximately 3,000 feet of beach and dune habitat. Over the long term, the Proposed Action would improve resiliency of the Back Beach sandy shoreline habitat through the planting of beach grass and installation of the northern extension of the rock sill. The overall effects of the Proposed Action likely include sustained or increased use of the area by red knots and horseshoe crabs.

USFWS evaluated the potential effects of the Project to the threatened red knot and provided comments in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 USC 1531 *et seq.*). The USFWS letter to DNREC is included in Appendix B as part of the NWP Application. The USFWS concluded that the Project as proposed is not likely to adversely affect the federally threatened red knot given that it has incorporated appropriate time-of-year restrictions and will result in improved habitat for red knots.

The Project is designed to avoid disturbing red knots by not allowing Project activities from April 15 to June 7, when they are active in the area. Sand placement will only occur after July 1 to avoid disturbing spawning horseshoe crabs while red knots are present. DNREC would typically recommend a time-of-year restriction of April 15 to August 30 to ensure that horseshoe crabs could use the beach areas to spawn; however, the shorter time time-of-year restriction is necessary to ensure restoration and protection of a critically important beach area for future horseshoe crab spawning. USFWS stated they concur with the approval of a shortened time-of-year restriction.

Since the Project occurs in a critical stopover area for migrating red knots, the USFWS has recommended "post-construction" monitoring to document that (1) the Project goals of restoring and maintaining the beach are being met, (2) red knots and horseshoe crabs are continuing to use the restored beach, and (3) invasive plants such as phragmites (*Phragmites australis*) are not introduced through "construction" activities.

The Project may have a short-term impact on state-level special status species due to the potential shortened time-of-year restriction work windows necessary to facilitate Project completion. Restoration of the stone dike and placement of sand during restoration of Back Beach may disrupt the spawning activities of horseshoe crabs and nesting activities of American oystercatchers and diamondback terrapins. However, the long-term benefits of the Project would outweigh the short-term impacts.

SCRIP provided Project-related comments and recommendations pertaining to red knots, horseshoe crabs, American oystercatchers, diamondback terrapins, and marsh-nesting birds (Appendix B). They recognize that it may not be possible for the Project to meet all standard

time-of-year restrictions typically recommended to protect the species using the habitats found in the Project area. However, SCRCP further recognizes the long-term importance and benefits of the Project and therefore has approved of the Project given the following recommendations.

For red knots, to avoid interrupting feeding activity during a critical stage in their migration, SCRCP recommends that Project activities not be conducted between April 15 and June 7.

For horseshoe crabs, as noted above, SCRCP agreed to a shortened time-of-year restriction relative to horseshoe crab spawning. SCRCP recommends that work on the stone dike not occur between April 15 and June 7 and placement of sand for the beach restoration and restoration of the groins not occur between April 15 and June 1. Additionally, the barge and crane used for placing stone on the dike to raise its elevation should not come closer than 100 to 150 feet from the dike; work on the stone dike should start in the middle, where horseshoe crabs do not typically spawn, and continue outward so that more commonly used spawning areas along the dike can be avoided during the month of June, and if it appears that lethal impacts to horseshoe crabs cannot be avoided, SCRCP recommends ceasing Project activities near times of high tide for two days before and after new and full moons during the month of June. Finally, to avoid long-term impacts to horseshoe crabs, the stone for the dike should be arranged/chinked such that horseshoe crabs will not become entrapped.

For American oystercatchers, if work cannot be conducted outside of the oystercatcher nesting season, which runs from March 15 through July 31, SCRCP makes the following recommendations:

1. The Project area should be monitored for oystercatcher presence starting no later than April 15 and continuing throughout the nesting season so long as oystercatchers are present within or adjacent to the Project area.
2. The Project manager should coordinate closely with SCRCP so that all contingencies, including the need for federal migratory bird permits, can be explored if oystercatcher nesting activity progresses within the Project area.
3. If oystercatchers are observed establishing a nesting territory on the stone dike, Project managers should place materials such as plastic sheeting on the dike to attempt to deter the birds from creating a nest there.
4. If oystercatchers do create a nest on the dike or the sand within or in close proximity to the work area, the timing of nest initiation and hatching should be documented such that dates of hatching and fledging can be precisely determined.
5. Once fill placement is completed, planting of new vegetation on the newly established beach should be kept to a minimum to prevent suitable oystercatcher nesting habitat from being overrun by thick vegetation.

For diamond back terrapins, SCRCP recommends that nesting females be protected by not working with heavy equipment on the beach areas from May 15 through July 15. If large rock structures are placed between nest sites and the water, terrapins may become trapped in the rocks and possibly die from heat stress or drown if they become entrapped in the rocks in the water. Therefore, SCRCP recommends that the stone groins be arranged/chinked so they do not entrap terrapins.

For marsh nesting birds, effects on the marsh habitat are expected to be relatively minor given that the pipe would be installed either using low-impact equipment or manually walked into place, and any depressions of the marsh would be restored to the existing grade. Nonetheless, to ensure that marsh nesting birds are provided with sufficient time to complete their nesting cycle, SCRCP recommends that the pipe be installed prior to April 1 and disturbance of the marsh habitat should not occur between April 15 and August 30. Although fledgling birds would likely be present within the Project area, most affected species are precocial and would be capable of avoiding the area during the work period. Should work within the marsh be necessary prior to July 31, SCRCP recommends contacting them for guidance.

Finally, there should be no significant affects to anadromous fishes using the Mispillion River for migration, spawning, or forage habitat. NOAA Fisheries approved of the proposed work window of March 1 through June 7 for in-water work and the DNREC Fisheries Section stated the Project should have no significant impact on listed fish species and would be beneficial for fisheries as a whole once the Project is completed.

#### **4.4 Human Health and Safety**

##### **No Action Alternative**

The No Action Alternative would not prevent flooding of the surrounding communities during intense storm events. In addition, implementation of this alternative would not reduce continued shoaling of the Mispillion Inlet, which would continue to impede vessel navigation through the inlet.

##### **Proposed Action**

The proposed Project would have beneficial impacts to human health and safety by reducing potential flooding of nearby communities following storm events and would allow for safe navigation for vessels utilizing the Mispillion Inlet. No hazardous materials would be used during development or operation of the proposed Project. All waste materials generated during Project activities would be disposed of offsite in an appropriately licensed landfill. There is no anticipation of solid waste being generated by Project activities.

#### **4.5 Cultural Resources**

DNREC performed a search of the Delaware and National Registers of Historic Places and determined that the National Register-listed 1873 Mispillion Lighthouse and Beacon Tower is located in the immediate vicinity of the proposed Project.

The Delaware Tribe of Indians requested to be informed of any discoveries that could relate to tribal resources as well as updates on project progress, to which the DOI, NFWF and DNREC have agreed (see Appendix D).

##### **No Action Alternative**

The No Action Alternative would have no impact on historic properties.

##### **Proposed Action**

The Delaware Office of Historical and Cultural Affairs (DHCA) determination of No Adverse Effect to the Mispillion Lighthouse and Beacon Tower or any other historic properties as a result of the Proposed Action is located in Appendix B. They noted that the Proposed Action may have a positive effect on the nearby historic properties by protecting the Mispillion Lighthouse and Beacon Tower from future storm damage. The HCA also determined that the Proposed Action would not diminish the historical characteristics or use of the identified properties, nor any of the physical features that contribute to the historic significance of the properties.

#### **4.6 Socioeconomics, Environmental Justice, and Protection of Children**

##### **No Action Alternative**

The No Action Alternative would have no impact on low income or minority populations, or populations younger than 21 years of age.

##### **Proposed Action**

The Project site is not located in an area of low income or within an area of high minority populations. Therefore implementation of the Proposed Action would not have high or adverse impacts to low income or minority populations. In addition, implementation of the Proposed Action would not have disproportionate or adverse impacts on populations younger than 21 years.

Activities associated with the Project would result in minor, temporary positive impacts to local businesses due to purchases made by the workforce during Project activities and expenses associated with the acquisition of material goods and equipment.

## **4.7 Land Use, Recreation, and Coastal Zone Management**

### **4.7.1 Land Use and Recreation**

#### **No Action Alternative**

The No Action Alternative has the potential to negatively impact navigation of vessels through the Mispillion Inlet through the continued deterioration of infrastructure and accrual of sediment in the navigation channel. In addition, implementation of this alternative would not be consistent long-term with management of the area as a MNCA as a Nature Preserve as the “natural character” and habitats in the area would continue to deteriorate through continued flooding. There would likely be no short-term impacts to recreational activities as a result of the No Action Alternative. Long-term, minor impacts to wildlife viewing and other activities may occur due to potential changes in the wildlife habitat and landscape in the Project area.

#### **Proposed Action**

The Delaware Office of Nature Preserves (ONP) evaluated the Proposed Action for potential impacts to the Mispillion Harbor Reserve Nature Preserve (Appendix B, ONP correspondence). ONP did not cite any concerns or issues with implementation of the Proposed Action as long as the recommendations issued by SCRIP, as described in Appendix B and Section 4.3 were followed. Short-term impacts to navigational and recreational use of the area may occur during Project activities. Implementation of the Proposed Action would have long-term beneficial impacts to navigational uses in the area through improving access to the Mispillion Harbor through the inlet. Enhancement of habitat and beach areas within the Mispillion Harbor Nature Preserve would be consistent with the current land use in the Project area and would create beneficial long-term impacts to the preserve.

### **4.7.2 Coastal Zone Management**

The DNREC Department of Coastal Programs (DCP) issued a federal consistency concurrence for the USACE NWP 27 during review of the permit program, which occurs every five years. The DNREC DCP determined that this Project does not require individual coastal zone review. The DCP’s letter to DNREC is included as part of the NWP Application in Appendix B.

## **4.8 Air Quality and Noise**

#### **No Action Alternative**

Under the No Action Alternative, no development or restoration activities would occur and therefore, there would be no impacts to air quality or noise.

#### **Proposed Action**

The Proposed Action may result in potential short-term impact to air quality due to emissions from Project equipment. Project activities are anticipated to take approximately 7 months to complete. Noise levels may be slightly elevated during site development and restoration

activities due to site equipment and trucking traffic. Elevated noise levels would be limited to daytime working hours and would be short term commensurate with Project activities.

#### **4.9 Climate Change**

As discussed in Section 4.1, a natural inlet opened approximately 2 miles north of Mispillion Harbor between 1985 and 2000, forming a connection from the Delaware Bay with the Greco's Canal and allowing for a greater influx of saltwater into the Mispillion River system. This process ultimately decreased the resiliency of the marsh system and the ability of the system to attenuate floodwaters and storm surge in response to sea level rise. Additional artificial structures in the area allow for saltwater to reach far inland when driven by coastal storms, sea level rise, and high tide events resulting in flooding to roadways and low-lying areas. In addition, the increased salt levels in soils adjacent to the marsh results in decreased agricultural productivity and can cause mortality to coastal forests.

##### **No Action Alternative**

Implementation of the No Action Alternative would not address potential concerns raised by DNREC and other entities regarding sea level rise and saltwater intrusion. In addition, capacity for the infrastructure currently in place to attenuate floodwaters and storm surge as a result of sea level rise would continue to deteriorate.

##### **Proposed Action**

Implementation of the Proposed Action would create long-term beneficial impacts to the Project area in response to sea level rise as a result of global climate change. Restoration of the beach and stone dike would build on the resiliency of the surrounding natural systems by enabling these systems and the existing community infrastructure to more effectively manage storm surge, saltwater intrusion, and floodwaters as a result of sea level rise.

## **5.0 CUMULATIVE EFFECTS**

CEQ regulations stipulate that a cumulative effects analysis consider the potential impacts to the environment potentially resulting from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The continual deterioration of the infrastructure in Mispillion Harbor could lead to a catastrophic breach north of the rock wall, potentially leading to the redirection of the Mispillion River. If this occurs there would be a high potential for damage to properties and infrastructure in surrounding areas, as well as damage to critical species habitat adjacent to the Project area. The Proposed Action would restore the rock wall and re-establish flow of the river, preventing a catastrophic failure of the existing infrastructure.

No adverse cumulative effects are anticipated as part of the Proposed Action. Long-term beneficial cumulative effects are expected in terms of enhanced coastal resiliency. The proposed Project is expected to benefit the regional system of wetlands and ecosystems, building upon the success of the MNCA to conserve and restore the lands, waters, and natural communities within and around the MNCA. In addition, the objectives of this Project would increase the resiliency of the lands and waters from MNCA south to Mispillion Harbor and PHNWR. Implementation of the Project would support ongoing community and agency efforts in this area.

## **6.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT**

### **6.1 Agency Coordination**

The MNCA Partnership, consisting of the DEDFW, DWL, and TNC, is the core group of partners working on the Project. USFWS also agreed to serve on the Project team. Together, these partners guide the Project modeling process and restoration plan development. The partners coordinate with the DNREC Watershed Assessment Program, DNREC Delaware Coastal Programs (DCP), and others to provide peer review at major milestones and to ensure that the best available data are used for scenario modeling. Representatives of the following federal, state, and local agencies and Project team members were consulted during Project planning and development of this EA:

- U.S. Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Department of the Interior (DOI)
- National Oceanic and Atmospheric Administration (NOAA)
- Delaware Department of Natural Resources and Environmental Control (DNREC)
- Delaware Division of Fish and Wildlife
- Delaware Division of Historic and Cultural Affairs (DHCA)
  
- Delaware Wild Lands (DWL)
- The Nature Conservancy (TNC)
- National Fish and Wildlife Foundation (NFWF)
- Saltmarsh Habitat & Avian Research Program
- The Kent Conservation District
- The Town of Slaughter Beach
- Delaware Alliance of Bay Communities
- Moffatt & Nichol

### **6.2 Public Involvement**

Resource agencies, abutters (owners of properties adjacent to the Project), and other stakeholders have been involved throughout the feasibility and conceptual design planning stages of the Project. The Project is undergoing local, state, and federal permitting processes, as described in Section 7.0 of this document. Each permit process requires extensive environmental and planning agency circulation, as well as ample public notice and involvement. In addition, the final beach nourishment and rock sill design and Project development schedule are subject to

public notices. Therefore, suitable opportunities exist for a wide variety of specialists, regulators, and residents to comment on and condition the Project's potential short- and long-term impacts.

The 2008 Moffatt & Nichol report was reviewed by a team of scientists, managers, and stakeholders, and the final beach nourishment, rock sill design, and Project schedule was vetted with stakeholders. The Town of Slaughter Beach and the Alliance of Bay Communities have shown support for the proposed work. Ducks Unlimited, Delmarva Ornithological Society, and American Bird Conservancy also support efforts to increase resiliency in Mispillion Harbor and the MNCA.

To ensure community support, the Project partners have engaged with neighboring property owners to solicit feedback on proposed restoration alternatives. These stakeholders have already been engaged in the process through outreach by members of the MNCA Partnership, described in Section 6.1. In addition, adjacent property owners whose properties adjoin the waterbody and may be affected by the Project were contacted and included in state and federal applications.

Letters of support for the Project were submitted to DOI and NFWF by the following entities:

- U.S. Senator Thomas Carper (Delaware)
- U.S. Senator John Carney (Delaware)
- Governor Jack A. Markell (Delaware)
- American Bird Conservancy
- Delaware Alliance of Bay Communities
- Delmarva Ornithological Society
- Delaware State University, NOAA Educational Partnership Program (NOAA-EPP)  
Environmental Cooperative Science Center (ECSC)
- Ducks Unlimited
- Delaware Wild Lands (DWL)
- USFWS Prime Hook National Wildlife Refuge
- Town of Slaughter Beach
- The Nature Conservancy (TNC)
- University of Delaware

Finally, DNREC administers Youth Conservation Corps and internship programs, and has plans to apply for an AmeriCorps environmental program grant to support Project needs. DNREC would engage applicants of these programs for monitoring and community outreach and

engagement opportunities related to the Project objectives. It is also anticipated that there would be both undergraduate internship and graduate student opportunities through existing cooperative research agreements with the University of Delaware and Delaware State University.

## 7.0 COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LAWS

The proposed Project has been evaluated for consistency with applicable federal, state, and local laws, regulations, and programs. In addition to this EA, the following permits and/or consultations are also required by local, state and federal agencies:

- Clean Water Act, Section 404, Nationwide Permit 27 (CENAP-OP-R-2016-19-85) (USACE)
- Subaqueous Land Permit (No. SP-489/15) and Clean Water Act 401 Water Quality Certification (No. WQ-490/15) (DNREC Division of Fish and Wildlife [DEDFW])
- Coastal Zone Management Federal Consistency Determination (DNREC Coastal Management Program)
- Delaware Wildlife Species Conservation and Research Program Environmental Review (DNREC Species Conservation and Research Program [SCRIP])
- Endangered Species Act, Section 7 (87 Stat.884, as amended 16 U.S.C. 1531 *et seq.*) Consultation (USFWS and NOAA Fisheries Habitat Conservation Division)
- Migratory Bird Treaty Act (40 Stat; 755 as amended; 16 U.S.C. 703-712 *et seq.*) Consultation (USFWS)
- National Historic Preservation Act Section 106 Consultation (DNREC, Division of Historical and Cultural Affairs) and
- Consultation with Federally Recognized Tribes (National Historic Preservation Act, 16 U.S.C. 470 and 36 CFR Part 800; CEQ NEPA Regulations 40 CFR 1501.2(d)(2); and EO 13175: Consultation and Coordination with Indian Tribal Governments) (Department of the Interior, Office of Environmental Policy and Compliance)

Consultations with regulatory agencies, including DHCA, DNREC, USFWS, NOAA, USACE, and state wildlife officials have been held to confirm the soundness of the Project and the ability to receive permits. Approvals have already been obtained from USACE, USFWS, NOAA, and DNREC to ensure all work is compatible with the nesting needs of the red knot and horseshoe crabs. Refer to Appendix B for agency consultation and permit authorizations received for this Project.

## 8.0 LIST OF PREPARERS

The following contributed to the development of this EA:

### *U.S. Department of the Interior (DOI)*

<b>Name</b>	<b>Role</b>	<b>Phone</b>	<b>Email</b>
Lindy Nelson	Regional Environmental Officer	215-597-5378	Lindy_Nelson@ios.doi.gov
Valincia Darby	Regional Environmental Protection Specialist	215-597-5378	Valincia_Darby@ios.doi.gov

### *Delaware Department of Natural Resources and Environmental Control (DNREC)*

<b>Name</b>	<b>Role</b>	<b>Phone</b>	<b>Email</b>
Karen Bennett	Administrator for Outreach, Licensing and Grants Management Section, Delaware Division of Fish and Wildlife	(302) 739-9124	karen.bennett@state.de.us
Jeremey Ashe	Habitat Restoration Project Manager (Delaware Bayshore), Delaware Division of Fish & Wildlife	(302) 735-3601	Jeremey.ashe@state.de.us

### *Cardno, Inc.*

<b>Name</b>	<b>Role</b>	<b>Project Responsibility</b>
Jennifer Wallace	Project Manager	Project Management
Bruce Hart	Senior NEPA Coordinator	EA Review and Coordination
Beth Moisan	Senior NEPA Planner	EA Review
Stephanie Briggs	Geology/Sediment/Water Resources	Environmental Assessment
John Brewer	Biological Resources	Environmental Assessment
Nancy Beisser	Technical Editor	Technical Editor
Dan Call	GIS	Figure Preparation
Anna Clare	GIS	Figure Preparation

## 9.0 REFERENCES

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## **APPENDICES**

Appendix A DNREC's proposal for the Hurricane Sandy Coastal Resiliency Competitive Grant Program, submitted to National Fish and Wildlife Foundation (NFWF) Federal Financial Assistance Grant Number: 43281

Appendix B Pre-Construction Notification and Authorization Request to the Army Corps of Engineers under Nationwide Permit 27 (DNREC's application to the USACE, 2015)

Appendix C IPaC query for the proposed Project (run on May 24, 2016)

Appendix D Documentation on Consultation with Federally Recognized Tribes

**APPENDIX A DNREC's proposal for the Hurricane Sandy Coastal Resiliency Competitive Grant Program, submitted to National Fish and Wildlife Foundation (NFWF)**

**Federal Financial Assistance Grant Number: 43281**



EasyGrantsID: 43281  
 National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants  
 Program 2013, Full Proposal  
 Title: Restoring Delaware Bay’s Wetlands and Beaches in Mispillion Harbor Reserve and Milford  
 Neck Conservation Area  
 Organization: Delaware Department of Natural Resources

**Grant Information**

**Title of Project**

Restoring Delaware Bay’s Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

**Total Amount Requested** \$ 4,500,000.00  
**Matching Contributions Proposed** \$ 1,519,205.00  
**Proposed Grant Period** 02/15/ 2015 - 02/15/ 2017

**Project Description**

Implement a system-wide approach to evaluate, design, and construct restoration and resiliency strategies along the central Delaware Bayshore. Project will enhance community and ecosystem resiliency by generating a restoration plan and restoring the beach and dune system.

**Project Abstract**

The Delaware Department of Natural Resources will restore the beach and dune system that protects tidal flow and the navigation channel of Mispillion Harbor to increase the shoreline’s resiliency. This project will build the resiliency of these natural systems and the human communities that depend upon them through planning, designing, and constructing a suite of restoration strategies within and along the tidal wetlands and sandy beaches of the Delaware Bay shoreline. The natural coastal systems of the central Delaware Bayshore provide invaluable habitat for significant populations of migratory and nesting shorebirds, marsh birds, waterfowl, Neotropical songbirds, and other resident fauna, while also protecting productive farmlands and critical infrastructure like Mispillion Harbor. In addition, the hydrodynamics and salinity diffusion within the tidal marsh system of Milford Neck Conservation area will be modeled under current conditions and with potential restoration alternatives to identify the response of the wetlands to restoration. The research will result in the preparation of a restoration plan that outlines management activities and associated costs based on one or more preferred alternatives.

**Organization and Primary Contact Information**

Organization Delaware Department of Natural Resources  
 Organization Type State or Local Government  
 Organization Web Address www.dnrec.delaware.gov  
 Organization Phone  
 Street Line 1 89 Kings Hwy SW  
 Street Line 2  
 City, State, Country, Postal Code Dover, Delaware, North America - United States 19901  
 Region (if international)  
 Organization Congressional District District 1 (DE)

**Primary Contact** Mrs. Shelley DiBona  
 Position/Title Program Manager II



NFWF

EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

Street Line 1  
Street Line 2  
City, State, Country, Postal Code

89 Kings Hwy  
Dover, Delaware, North America - United States, 19901

Region (if international)  
Phone and E-mail

302-739-9098 x ; shelley.dibona@state.de.us

**Keywords**

Conservation Action; Conservation Threat; Major Habitat Type; Species

**Sub-keywords**

Action - Land/Water Management; Action - Livelihood, Economic & Other Incentives; Bird - Shorebird - *Calidris canutus* (Red Knot); Bird - Shorebird - *Haematopus palliatus* (American Oystercatcher); Coastal - Coastal beaches, dunes and shoreline; Coastal - Estuaries and Bays; Species - Bird; Species - Invertebrate; Threat - Climate Change & Severe Weather

**Other Keyword(s)**



NFWF

EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

### Project Location Information

Project Location Description	Mispillion Harbor Reserve and Milford Neck Conservation Area, Kent County, Delaware
Project Country(ies)	North America - United States
Project State(s)	Delaware
Project Congressional District(s)	District 1 (DE)

### Permits and Approvals

Permits/Approvals Description:	Permit applications will be made for USACE 404 Individual Permit and State Wetlands and Subaqueous Lands permits, including 401 Water Quality Certification, Coastal Zone Management Federal Consistency Determination, NHPA Section 106 review, ESA Section 7 review and NEPA documentation. A preliminary meeting with DNREC's Wetlands Permitting Program Manager has already been held and a Joint Permitting Process meeting will occur in spring 2014 with USACE and other state and federal agencies.
Permits/Approvals Status:	Intend to Apply
Permits/Approvals Agency-Contact Person:	Craig Rhoads
Permits/Approvals Submittal-Approval Date:	5/29/2015 12:00:00 AM



EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay’s Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

**Salaries and Benefits**

	<b>Units</b>	<b>Cost Per Unit</b>	<b>Total</b>
Env. Program Manager II	37.5	\$49.57	\$1,858.88
Env. Scientist IV	15	\$40.07	\$601.05
F&W Regional Mgr	37.5	\$46.99	\$1,762.13
Env. Scientist III	15	\$34.99	\$524.85
Env. Scientist II	160	\$30.57	\$4,891.20

<b>Total Salaries and Benefits</b>			<b>\$9,638.11</b>
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Salaries listed above include fringe benefits at a rate of 54.76%

Env. Program Mgr II - federal aid coordinator will be administering the grant and managing the budget

Env. Scientist IV - Gamebird Biologist providing technical support on the project.

F&W Regional Mgr- State employee responsible for managing lands at Mispillion and Milford Neck will be responsible for providing technical input, attending meetings and oversight of construction.

Env. Scientist III - Fisheries Scientist who will be providing technical assistance and input on time of year restrictions as it pertains to ecorestoration and impacts to fish species.

Env. Scientist II - Wetland scientist assisting with permitting and providing technical assistance.

**Equipment**

	<b>Units</b>	<b>Cost Per Unit</b>	<b>Total</b>

<b>Total Equipment</b>			<b>\$0.00</b>
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**Contractual Services**

	<b>Units</b>	<b>Cost Per Unit</b>	<b>Total</b>



EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay’s Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

	Units	Cost Per Unit	Total
Contractor 1 TBD: Shoreline Restoration Services	1	\$4,187,535.00	\$4,187,535.00
Contractor 2 Kent Conservation District: Habitat Restoration Project Management	1	\$50,392.89	\$50,392.89
Contractor 3 TNC: Milford Neck Conservation Area Restoration Planning & Design Services	1	\$247,250.00	\$247,250.00
Contractor 4 DWL: Milford Neck Conservation Area Restoration Design Services	1	\$4,250.00	\$4,250.00

<b>Total Contractual Services</b>			<b>\$4,489,427.89</b>
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Contractor 1 TBD - The State of DE currently has 4 firms under contract for "Shoreline and Waterway Management Coastal Engineering" services; one of these firms is being selected to complete ALL shoreline design, engineering and restoration work on the ground (including sand, rock sill, mobilization of equipment and labor) under a single task order.

Contractor 2 - The Kent Conservation District is under contract to the State of DE to provide a contractual Bayshore Habitat Restoration Program Manager to oversee all technical aspects of this grant on behalf of the State of DE.

Contractor 3 - The Nature Conservancy (TNC) will be under contract to the State of DE to coordinate the development of resiliency restoration design alternatives for Milford Neck Conservation Area, which includes lands owned by TNC, Delaware Wild Lands (DWL) and the State of DE. TNC will subcontract with an engineering firm (TBD) who will model and develop restoration alternatives for Milford Neck on behalf of TNC, DWL and the State of DE.

Contractor 4 - Delaware Wild Lands (DWL) will be under contract to the State of DE to participate in the review and selection of resiliency restoration alternative designs within Milford Neck Conservation Area.

**Supplies and Materials**

	Units	Cost Per Unit	Total

<b>Total Supplies and Materials</b>			<b>\$0.00</b>
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**Printing**

	Units	Cost Per Unit	Total



EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants  
Program 2013, Full Proposal

Title: Restoring Delaware Bay’s Wetlands and Beaches in Mispillion Harbor Reserve and Milford  
Neck Conservation Area

Organization: Delaware Department of Natural Resources

	Units	Cost Per Unit	Total

<b>Total Printing</b>			<b>\$0.00</b>

**Travel**

	Units	Cost Per Unit	Total

<b>Total Travel</b>			<b>\$0.00</b>

**Other**

	Units	Cost Per Unit	Total
Indirect Cost (15% of Federal Salary)	1	\$934.00	\$934.00

<b>Total Other</b>			<b>\$934.00</b>

<b>Budget Grand Total</b>			<b>\$4,500,000.00</b>
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EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

## Activities and Outcomes

Funding Strategy: Habitat Restoration

Activity / Outcome: Sandy - Beach habitat quality improvements - Acres restored

Description: Enter the number of acres restored

Required: Recommended

Acres restored - Current: 0

Acres restored - Grant Completion: 7.5

Notes: This outcome provides additional habitat in the Mispillion Harbor to support spawning horseshoe crabs and imperiled Red Knots.

Funding Strategy: Habitat Restoration

Activity / Outcome: Sandy - Beach habitat quality improvements - Miles restored

Description: Enter the number of miles restored

Required: Recommended

Miles restored - Current: 0

Miles restored - Grant Completion: 0.57

Notes: This outcome provides additional habitat in the Mispillion Harbor to support spawning horseshoe crabs and imperiled Red Knots.

Funding Strategy: Habitat Restoration

Activity / Outcome: Sandy - Erosion control - # structures installed

Description: Enter the number of structures installed, replaced, upgraded or repaired to reduce erosion or wetland/marsh lost.

Required: Recommended

# structures installed - Current: 0.00

# structures installed - Grant Completion: 490.00

Notes: To ensure longer-term resiliency of the sandy shoreline habitat required by spawning crabs and migratory shorebirds, beach restoration work will be coupled with construction of a northern extension of 500 linear feet to the existing rock sill, protecting the navigation channel in the Mispillion River portion of the harbor and preventing the river from creating a new inlet into Delaware Bay.

Funding Strategy: Planning, Research, Monitoring

Activity / Outcome: Development of restoration and resiliency plans, that include stakeholder involvement, for the Milford Neck Conservation Area and Mispillion Harbor and Inlet.

Description: Other Metric

Required: Optional



NFWF

EasyGrantsID: 43281

National Fish and Wildlife Foundation – Hurricane Sandy Coastal Resiliency Competitive Grants Program 2013, Full Proposal

Title: Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area

Organization: Delaware Department of Natural Resources

Other Metric - Description: Utilizing research, monitoring and plans developed prior to Hurricane Sandy (including two landcover, vegetation and elevation inventories; the Phase II Study of the Milford Neck Conservation Area: Past and Future Trends in Vegetation Cover and Hydrology; Milford Neck Conservation Area: A Framework for Coordinated Management; and Coastal Engineering Assessment of Restoration Alternatives for Mispillion Harbor and Inlet), our project will produce current comprehensive restoration and resiliency plans for the Mispillion Harbor and Inlet and the Milford Neck Conservation Area. These plans will be available for immediate implementation as funds are available to increase the resiliency of habitats in the project area and decrease the vulnerability of the adjacent coastal communities.  
Notes:

Funding Strategy: Capacity, Outreach, Incentives

Activity / Outcome: Sandy - Outreach/ Education/ Technical Assistance - # people reached

Description: Enter the number of people reached by outreach, training, or technical assistance activities

Required: Recommended

# people reached - Current: 20.00

# people reached - Grant Completion: 100.00

Notes:



# NFWF

## Hurricane Sandy Coastal Resiliency Competitive Grants Program Full-proposal Project Narrative

### Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck

**A. Geographic Context:** This project will be implemented along the Delaware Bayshore at Mispillion Harbor Reserve and adjacent Milford Neck Conservation Area (MNCA) in southeastern Kent County, Delaware (Fig. 1). Mispillion Harbor is renowned as globally significant for the extraordinary concentration of spawning horseshoe crabs and migratory shorebirds each spring – including Red Knot, a species currently considered for listing under the U.S. Endangered Species Act. Great numbers of horseshoe crabs and shorebirds are found here because of the harbor’s sandy beaches and calm waters when surf conditions elsewhere in Delaware Bay may be turbulent. Milford Neck’s expansive tidal marshes interspersed with tidal pools and streams are important for a diversity of nesting, wintering and roosting migratory waterfowl, shorebirds, marsh birds and wading birds. The expansive forest immediately adjacent to the marsh is one of the most important sites on the Delmarva Peninsula for migratory songbirds during spring and fall migration.

We will use an existing coastal engineering assessment of restoration alternatives to guide construction of resiliency strategies to protect beach habitat and navigation channels in the harbor and tidal flow in the surrounding coastal marsh and aquatic systems. Hydrodynamic and water-quality modeling of existing conditions and conceptual alternatives will be used to develop a restoration plan for the MNCA, located immediately north of the harbor. These projects support a system-wide approach to evaluating, planning, designing and constructing restoration and resiliency strategies for coastal tidal marshes and streams and sandy beach habitat along the central Delaware Bayshore. This project area is a resiliency hub formed by a nearly contiguous corridor of 27,650 acres of protected lands owned and managed by the Delaware Division of Fish and Wildlife (DEDFW), Delaware Wild Lands (DWL), The Nature Conservancy (TNC), U.S. Fish and Wildlife Service (USFWS), Delaware State Parks, and preserved private conservation and farmlands. Projects proposed in Mispillion Harbor and MNCA are connected with Prime Hook National Wildlife Refuge (PHNWR) via Slaughter Canal and Cedar Creek, and thus these projects will supplement and leverage Disaster Relief Act funding being used to restore and increase resiliency of the tidal marsh and barrier beach ecosystem in PHNWR (Fig. 2).

The Mispillion Harbor Reserve is a unit of Milford Neck Wildlife Area, owned and managed by DEDFW. The harbor is formed by the confluence of the Mispillion River and Cedar Creek, which together flow into Delaware Bay through an inlet stabilized by a mile-long jetty system built and maintained by the U.S. Army Corps of Engineers (USACE). The harbor itself is bounded by more than 200 acres of sandy beach, dune and tidal salt marsh, and is protected on its eastern side by a rock sill that connects with the north inlet jetty and extends approximately 2,700 feet to the north (Fig. 3 and 4).

Multiple public assets will be protected and multiple community and regional economic benefits will be realized by increasing the resilience of the harbor. DEDFW owns and manages multiple public facilities: a public aquatic education facility in the harbor serving local school and youth group, ecotourist and general public visitation (approximately 15,000 people annually); a public boat ramp on Cedar Creek a half-mile upstream; and a public boat ramp on the Mispillion River about 10 miles upstream in the City of Milford. The education center and public boat ramps are managed with USFWS federal aid funds and both ramps support key recreational boating and fishing access to Delaware Bay. The harbor and inlet, managed by USACE, also support access to Delaware Bay for commercial marina, docking facilities and a maritime supply delivery service located on Cedar Creek. The maritime supply service is the only operation that delivers supplies and personnel to domestic and international vessels using the main channel in Delaware Bay and headed to ports in Philadelphia, Trenton, Camden and Wilmington.

In addition, the surrounding residents, communities and farmlands will also benefit from efforts to restore Mispillion Harbor and maintain adequate tidal flow through the coastal system during and immediately after storms and spring tides. The Town of Slaughter Beach is located immediately south of the harbor along the Delaware Bay. Slaughter Beach has a maximum population of 600+ with more than 350 residential units, a volunteer fire company, general store, popular public beach access, picnic pavilion, interpretive signs, public restrooms and other public recreation facilities. The town serves the region by supporting school and nature center programs, fishing, wildlife viewing, kayaking and other recreational uses of the beach and bay. The tidal marsh bordering the west side of Slaughter Beach is owned and managed by the DEDFW and Delaware Nature Society, with some private ownership of the marsh interspersed. PHNWR owns and manages tidal marsh and beach to the southwest and south of town. Slaughter Canal is tidal and is directly connected to the coastal impoundment units undergoing restoration at

PHNWR. The canal flows north on the outgoing tide through the marsh west of town, joining Cedar Creek less than two miles south of the harbor. Coastal flooding in Slaughter Beach typically originates from the marsh side of the town, and therefore ensuring flow through Slaughter Canal, Cedar Creek and out the Mispillion Inlet is vitally important to minimizing the effects of coastal flooding on the town.

The MNCA (Fig. 5) consists of over 10,000 acres of sandy beach and dune, tidal and palustrine wetlands (including forested wetlands), upland forest and agricultural fields in the central Delaware Bayshore resiliency hub. MNCA is collectively owned and managed by the DEDFW, DWL, TNC and several private landowners actively engaged in conservation management of their lands. MNCA is bound by the Murderkill River to the north, Mispillion River to the south and the communities of Milford Neck and Thompsonville to the west. The population of Milford Neck is generally economically and socially disadvantaged with disproportionately lower investment in infrastructure. These communities, including numerous farmers who depend upon productive agricultural lands bordering the wetland systems of Milford Neck, will directly benefit from the development and eventual implementation of a hydrologic restoration plan for the area. Maintaining hydrologic connections and managing appropriate flow and salinity between Mispillion Harbor and the marsh system to the north and south, including Prime Hook, will be critical for sustaining system-wide restoration efforts and will support Disaster Relief Act mitigation investments at PHNWR [U.S. Department of Interior (USDOI) Hurricane Sandy Mitigation Funds Project No. 15].

## **B. Project Narrative:**

- a. Project Goals:** The primary goal of these projects is to implement a coordinated system-wide approach to evaluating, planning, designing and constructing restoration and resiliency strategies for coastal tidal marshes and streams and sandy beach habitat along the central Delaware Bayshore. Another goal is to build upon the success of the Milford Neck Conservation Area Partnership, a coalition of DEDFW, DWL, and TNC collaborating across property lines to conserve and restore a mosaic of lands, waters, and natural communities within the MNCA. The objectives of this project will leverage new and existing landscape-scale research to guide the development and implementation of science-based management strategies, increasing the resiliency of the lands and waters from MNCA south to Mispillion Harbor and PHNWR. Flood risk to adjacent human communities and agricultural lands will be reduced. Navigation channels supporting regional commerce and recreational access to Delaware Bay will be preserved. **Specific objectives, outputs and outcomes include:**

- (1) Restore the most vulnerable shoreline in Mispillion Harbor to increase resiliency of important habitat for spawning horseshoe crabs and migratory shorebirds including Red Knot, and to protect the tidal flow and navigation channels of Mispillion River and Cedar Creek.** The beach and dune at the north end of the existing rock sill has been severely eroded by repeated coastal storms since prior to 2007 (Fig.4). Tidal exchange occurs daily through the breach, degrading and reducing habitat for shorebirds and crabs, making this area more vulnerable to the formation of an inlet and placing the navigation channel at immediate risk. If the breach widens sufficiently, the Mispillion River will redirect from its flow through the stabilized inlet resulting in rapid sedimentation at the confluence of the two rivers and the inlet, and reduce the hydrologic flow into the tidal wetlands to the south. This could have serious negative impacts on the wetland rehabilitation work by USFWS within Units II and III of PHNWR by affecting tidal flow, salinity levels and sediment concentrations needed for salt marsh restoration. To address immediate vulnerabilities and resiliency needs, approximately 3,000 feet of beach and dune habitat will be restored by placing approximately 200,000 cubic yards of sand along the harbor side of the existing rock sill and north along the bay shoreline to fill the breach and rebuild beach and dunes able to withstand future coastal storms and sea level rise. Beach grass will be planted to stabilize the restored dune. To ensure longer-term resiliency of the sandy shoreline habitat required by spawning crabs and migratory shorebirds, beach restoration work will be coupled with construction of a 490-foot northern extension of the existing rock sill, protecting the navigation channel in the Mispillion River portion of the harbor and preventing the river from creating a new inlet into Delaware Bay. Success will be defined by sustained or increased use of the harbor shoreline by horseshoe crabs and migratory shorebirds; maintained suitable beach habitat requiring nourishment only every 10 or more years; sustained safe passage of recreational and commercial vessels through the inlet and into Delaware Bay with dredging required only every 5-10 years; and sustained hydrologic support of restoration efforts at PHNWR through continued tidal flow through Slaughter Canal, Cedar Creek and the Mispillion Harbor inlet to Delaware Bay. An opportunity exists for the beneficial use of sand derived from USACE maintenance dredging of the channel to sustain the shore downdrift of the stabilized inlet of the economically important Mispillion Inlet and Harbor.

- (2) Coordinate immediately with the U.S. Army Corps of Engineers (USACE) to evaluate**

**additional vulnerability and flood risk management strategies for Mispillion Harbor and the Inlet as a State of Delaware preferred area for the USACE North Atlantic Coast Comprehensive Study.** USACE is scheduled to begin this analysis in late January / early February 2014 concurrent with this grant application. We have requested an update of existing wave, hydrodynamic, sediment transport and morphological modeling, and re-evaluation of habitat restoration alternatives. Restoration alternatives to be evaluated include structural and non-structural options previously identified for the harbor and inlet in the report “Coastal Engineering Assessment of Habitation Restoration Alternatives at Mispillion Inlet” prepared by Moffat & Nichol for the Delaware Department of Natural Resources and Environmental Control (DNREC; January 2008). Recommended restoration options include the addition of groins and beach fill along the harbor side of the existing rock sill and along Osprey Beach on the south side of the harbor, and repair of the jetties along the inlet. We are also requesting that the USACE evaluate projected system-wide hydrologic impacts – including impacts on the USDOJ investment in PHNWR restoration – if the Mispillion River flows out of the harbor into Delaware Bay just north of the existing rock sill, a scenario that is possible if resiliency objectives described above in objective 1 are not implemented immediately. The Mispillion River significantly contributes to maintaining the navigation channel and tidal flow through the existing inlet to Delaware Bay. Past breaches that allowed the Mispillion River to enter Delaware Bay north of the stabilized inlet resulted in rapid sedimentation where Cedar Creek enters inlet. Loss of the volume and velocity contributed by Mispillion River will have adverse impacts on tidal flow through Cedar Creek and Slaughter Canal. An evaluation will be used to identify additional resiliency options that can be implemented through future funding opportunities. Success will be defined by finalizing a plan to be implemented with future funding opportunities and resiliency options that will further contribute to outcomes identified in Objective 1. [We have removed contractual costs for this objective from the budget as a result of our reduced grant award, and plan to encourage USACE to update the 2008 restoration alternatives study.]

**(3) Develop hydrodynamic and salinity models for Milford Neck Conservation Area to determine how the tidal marsh and adjacent wetland systems currently respond to freshwater inflows and changes in salinity.** Over the past century, the MNCA has experienced significant alterations to the natural hydraulic and hydrologic regimes of its tidal and palustrine wetlands. Alterations include grid ditching for saltmarsh mosquito control, construction of drainage ditches for agricultural lands, creation of a large canal (Grecos Canal) originally intended for navigation, and construction of roadways. Between 1985 and 2005, an inlet opened naturally approximately two miles north of Mispillion Harbor, directly connecting Delaware Bay with Grecos Canal and allowing for a greater influx of saltwater into the system. The combined effects of anthropogenic alterations and inlet formation have stressed the tidal marsh system and converted a large area of marsh (nearly 500 acres) to open water. This open water area is adjacent to the Delaware Bay shoreline and is trending toward further expansion. Expansion of open water has significantly decreased the resiliency of the marsh system as a whole, and decreased the capacity of the marsh to attenuate floodwaters and storm surge and respond to sea level rise through accretion. The area’s many artificial conveyances allow for channelized flow of saltwater driven by coastal storms, sea level rise, and high tide events to reach far inland. The result is sustained flooding on roadways and in low-lying areas during storms and high levels of salt in the soils of lands bordering the marsh, decreasing agricultural productivity and causing significant and increasing mortality to coastal forests. The hydrodynamic model will be used to guide the development of restoration alternatives to address these impacts, leading to outcomes and indicators of success described in Objective 4 below.

**(4) Develop restoration alternatives vetted by the Milford Neck Conservation Area Partnership to be analyzed for their impact to the wetlands, and produce a restoration plan that outlines management activities and associated costs based on one or more preferred alternatives.** Success for this project can be defined as the production of a restoration plan that will reduce the anthropogenic hydraulic and hydrologic stressors of the wetlands and adjacent uplands, encourage the recolonization of native marsh vegetation in degraded areas, prevent saltwater intrusion and flooding of inland areas, and is supported by the stakeholders of MNCA and the surrounding communities. If success is achieved, the Milford Neck Conservation Area Partnership can implement the recommendations of the plan through future funding provided by NFWF Hurricane Sandy Coastal Resiliency Competitive Grants Program or other funding opportunities. Such an approach will provide benefits to fish and wildlife as well as surrounding human communities. Removing the artificial hydraulic and hydrologic stressors of the wetlands will allow natural processes, including accretion and sheetflow, to occur across the wetland proper. This will encourage the redevelopment of habitat diversity, improve the ability of the bayfront

wetlands to tolerate and respond to storm-driven inundation and sea level rise, and buffer important palustrine wetlands and upland forest from saltwater intrusion and inundation. The integrity of these habitats is essential to support the biodiversity of MNCA, including significant populations of migratory and nesting shorebirds, marsh birds, waterfowl, Neotropical songbirds, and estuary-dependent fishes and shellfish. In addition, such an approach will help to reduce the impacts of regular flooding on roadways and low-lying areas within the adjacent communities, and buffer the communities and agricultural lands to lessen the impact of saltwater intrusion associated with coastal storms and sea level rise.

- b. **Priority:** The U.S. Department of Interior's **Americas Great Outdoors** (AGO) program and former Secretary Salazar himself visited in 2012 to officially recognize the Delaware Bayshore as a keystone project area for conservation and outdoor recreation. Today, the **Delaware Bayshore Initiative** continues protecting and restoring habitat, enhancing recreation and education opportunities that foster support for conservation, and working to involve Bayshore residents in ways that will help strengthen their communities economically, culturally, and environmentally.

The mid to lower Delaware Bayshore from the MNCA and Mispillion Harbor extending south to PHNWR is characterized by a remarkable diversity of species associated with the area's Coastal Plain landscape. This area supports extensive habitat key for sustaining many of these species: sandy beaches and dunes, high and low salt marshes, tidal streams and intertidal mudflats, shrub-scrub, young forest and other early successional habitats, and mature palustrine and upland forest. Milford Neck has the second largest contiguous block of forest remaining in Delaware, and radar studies show that the forest on Milford Neck ranks among the highest and most persistently used in the state by migratory songbirds during spring and fall migration. Expansive tidal marshes provide important habitat for a variety of marsh-nesting birds and post-breeding wading birds as well as shorebirds and waterfowl year-round. Sandy beaches in Mispillion Harbor support the highest density of horseshoe crab eggs compared to anywhere else in Delaware Bay. Horseshoe crab eggs are a vital food source for migratory shorebirds including the Red Knot, a species proposed for listing under the U.S. Endangered Species Act. In the spring, migratory shorebirds congregate in the protected harbor to feed, particularly when weather conditions reduce the availability of horseshoe crab eggs elsewhere throughout the bay. Roosting areas in the marsh near key beach foraging sites, including the MNCA and PHNWR, are also vitally important to shorebirds during high tide, storms and at night.

The organizations of the Milford Neck Conservation Area Partnership (DEDFW, DWL and TNC), along with other conservation partners such as USFWS, Ducks Unlimited, The Conservation Fund and Delmarva Ornithological Society, have identified Milford Neck and Mispillion Harbor as one of the most important areas in the state for habitat conservation and restoration. Partnership efforts have resulted in the investment of nearly \$10 million of state, Federal (including North American Wetland Conservation Act grants), and private funds in conservation and restoration activities. Agricultural lands of Milford Neck are some of the most productive in the state. Farmlands protected by state agricultural preservation easements comprise 7,600 acres – or 42% – of the farmland within the resiliency hub.

The Delaware Bay and its coastal lands and waters – including Mispillion Harbor and MNCA – are widely recognized as an area of outstanding national, hemispheric, and global ecological significance: Delaware Bay is part of the Western Hemisphere Shorebird Reserve Network recognized as a *Site of Hemispheric Importance* because over half-million shorebirds use the bay as a migratory stopover annually; the Delaware Bay Estuary is designated as a *Wetland of International Significance* by the Ramsar Convention on Wetlands; the Delaware Coastal Zone as an *Important Bird Area of Global Significance*. Our project objectives will advance priority goals and objectives of multiple conservation plans and initiatives including: Atlantic Coast Joint Venture Waterfowl Implementation Plan habitat goal of enhancing and restoring over 40,000 acres of habitat in Delaware within the Delaware Bayshore Waterfowl Focus Area; Atlantic Flyway Shorebird Conservation Business Strategy: A Call to Action Phase I objective of increasing the amount of protected and adequately managed shorebird habitat in focal areas across the flyway by 50,000 acres; Partners-in-Flight Bird Conservation Region 30 Mid-Atlantic Coastal Plain and North American Waterbird Conservation Plan: Mid-Atlantic Region, and multiple habitat priorities and associated species population objectives identified in these plans; NFWF-funded Delaware River Basin Priority Conservation Areas and Recommended Conservation Strategies developed by TNC, Partnership for the Delaware Estuary and Natural Lands Trust identified Milford Neck as a priority conservation area for Forest, Agriculture Lands, Tidal Marsh, Shoreline and Marsh Room-to-Move; Preparing for Tomorrow's High Tide: Recommendations for Adapting to Sea Level Rise in Delaware identifies resources of high concern which will be addressed by resiliency strategies planned and implemented for Mispillion Harbor

and MNCA.

In addition to the project area's biological importance, **several community and local and regional economic impacts signify this area is a priority for resiliency evaluation, planning and restoration.** Several community and economic benefits are described above in "Geographic Context." Public and commercial assets associated with Mispillion Harbor draw visitors to the area from near and far, including the public education center in the harbor, two public boat ramps and commercial marina and docking facilities. The only maritime service provider for vessels using the bay's main navigation channel is based in Mispillion Harbor. Domestic and international commerce associated with the main channel and the Philadelphia Port Complex, the fifth largest port complex in the U.S., is dependent on the supply service's reliable passage between Mispillion Harbor and the bay. The Town of Slaughter Beach and its residents support restoration efforts in the harbor and welcome additional USACE evaluation of the hydrologic relationship between the harbor and inlet and tidal marshes surrounding their community. The communities and residents of Milford Neck and Thompsonville, particularly economically disadvantaged residents of this rural area, will benefit from the development of a restoration plan that aims to increase the resiliency of the ecosystem that protects their properties, farmland and network of roads. Restoration plans developed for Milford Neck will consider ways to reduce flooding and saltwater impacts on public and private property and transportation and utility infrastructure supporting local residents and others that visit the area to hunt, fish and view wildlife. The agricultural community between Murderkill River and Mispillion Harbor, especially farms bordering tidal marsh will benefit from planning and restoration that maintain tidal flow and prevent saltwater intrusion.

This project's multi-objective effort is appropriate because it will increase the resiliency of coastal systems that support important ecological functions as well as community and economic functions of the area, in the context of anticipated sea level rise and frequent coastal storms. The approach proposed to increase the resiliency of Mispillion Harbor by immediately nourishing the beach and extending the rock sill is appropriate given the level of vulnerability and risk that this area of the harbor experiences with each coastal storm, and potential impact to affected resources and communities if the north end of the harbor fails. This restoration work is informed by a detailed scientific analysis and report produced by Moffatt & Nichol (M&N), an engineering firm specializing in coastal, harbor and port modeling analysis and design. The M&N analysis entailed five steps: an assessment of existing conditions at Mispillion Harbor, development of a wave model, a hydrodynamic model, a sediment-transport and morphological model, and development and evaluation of the habitat restoration alternatives. The wave model was constructed using the Delft3D suite of models to take into account both offshore swells and local wind-generated waves. Additional evaluation by USACE of restoration alternatives recommended in the M&N report as part of the North Atlantic Coast Comprehensive Study is appropriate given the potential cost of adding multiple structural options in the harbor, and changes in shoreline morphology and a new restoration objective that includes ensuring adequate tidal exchange and flow through Slaughter Canal to support PHNWR restoration. With respect to project objectives for MNCA, development of hydrologic and salinity models is appropriate given the lack of rigorous systematic modeling and analysis for this area. The proposed planning and design approach for Milford Neck will be based on sound science that informs the development and evaluation of restoration alternatives and ultimately a restoration plan vetted by partners with associated costs based on one or more preferred alternatives. The approach proposed mirrors that of numerous wetland restoration projects including the ongoing efforts at PHNWR funded through USDOJ Hurricane Sandy Mitigation Funds and the study produced for Mispillion Harbor and Inlet. In each case, current conditions are carefully examined, restoration scenarios are modeled, restoration alternatives are vetted, and preferred alternatives are selected to guide plan development. We will use the best available data as input into cutting-edge models to guide our process.

- c. **Sustained Benefits:** This project will be engineered to increase resilience to coastal storm surge and sea level rise in Mispillion Harbor Reserve over the next 30 years or longer. Within that period, because of the added protection of the extended rock sill, we anticipate minimal re-investment in beach nourishment volume and costs approximately every 10 years to supplement the volume of fill placed during this proposed project period. Existing monitoring projects that assess annual shorebird numbers, distribution in the harbor and bay, and physical condition of individual birds will also assist in monitoring habitat function. The evaluation of additional structural and nonstructural features will incorporate site-specific existing and updated wave, hydrodynamic, and sediment transport and morphological modeling to reinforce built structures. Sea level rise inundation models will be incorporated into the updated analysis. Over the long-term, additional restoration alternatives selected for construction will be expected to reduce costs by

minimizing the frequency and amount of replenishment required to protect against the probability of breaching and significant erosion, and to minimize the need for maintenance dredging. Restoration alternatives will be vetted by wildlife, fisheries, shoreline/waterway and other resource science and management experts and stakeholders. Sustainability of project benefits for MNCA will be incorporated as part of the planning and design process to develop restoration alternatives. The alternatives scoping exercise conducted by the Milford Neck Conservation Area Partnership will consider numerous environmental stressors including sea level rise and increased coastal storms and will be designed to decrease re-investment once restoration activities are initiated with future funding.

- d. Leveraging:** Proposed restoration in Mispillion Harbor and planning and design for future implementation of restoration alternatives at MNCA leverages resiliency efforts along nearly 20 miles of shoreline on the Delaware Bayshore including the following project-specific investments. This project enhances and maintains the necessary hydrology of the Prime Hook National Wildlife Refuge Coastal Tidal Marsh / Barrier Beach Restoration project funded (\$19M) through USDOJ Hurricane Sandy Mitigation Funds. The work proposed will maintain the Mispillion River channel through the existing inlet, avoiding a complete breach of the river north of the existing rock sill directly into Delaware Bay and a significant alteration of the volume and velocity of flow through the harbor and inlet that would otherwise negatively impact the hydrodynamics of Cedar Creek and Slaughter Canal and, ultimately, restoration efforts at PHNWR. Tidal flow and associated sediment concentrations are necessary to maintain the marsh platform elevation needed to sustain a *Spartina alterniflora* marsh. We are also coordinating with and leveraging the USACE's use of Hurricane Sandy/Disaster Relief Act funds to evaluate additional vulnerability and flood risk management strategies for Mispillion Harbor and Inlet (described in project objective 2 above). We will be coordinating with USACE to provide sediment through Regional Sediment Management and Beneficial Use options. Dredged materials needed for this project will be contributed through navigation dredging at this project site, the cost of which will be covered by USACE. We will also provide at least \$1,503,130 of Delaware's Bond Bill and other state cash funds as match, and \$16,075 of match from state salary and fringe.

Other concurrent investments to be implemented in the project area include: Natural Resource Damage Assessment (NRDA) funds (\$45,389) obligated for shoreline restoration for shorebirds on the Swain Tract along the north shore of Cedar Creek in the harbor; NRDA (\$126,400) and State Wildlife Grant federal funds (\$4,687) will be used to restore roosting habitat for Red Knot on the Fitzgerald Tract directly adjacent to the Mispillion Harbor; DNREC's Community Water Quality Improvement Grant Program recently funded (\$107,448) a bio-based hybrid living shoreline project proposed by the Partnership for the Delaware Estuary (PDE) on DEDFW land in Mispillion Harbor in front of the DEDFW education center. Land acquisitions were recently completed on more than 55 acres in the Mispillion Harbor Reserve, including more than \$30,000 raised by Delmarva Ornithological Society's annual Bird-A-Thon program. Additional land protection projects in and around the harbor are planned for completion during the next 2-3 years with \$1M in Delaware Open Space Program funds allocated for Mispillion Harbor Reserve. The project objectives for MNCA mirror steps taken at PHNWR. Using similar models developed for PHNWR, the Milford Neck Conservation Area Partnership will work together to evaluate modeling results and restoration alternatives that meet resiliency goals for the area. MNCA is nearly contiguous with PHNWR via tidal marsh and creeks connecting to Mispillion River and the harbor, Cedar Creek and the tidal marsh and Slaughter Canal west of the Town of Slaughter Beach south to PHNWR. Restoration work recently completed to address impacts from existing hydrologic conditions include TNC's \$100,000 investment of funding from the State of Delaware Greenhouse Gas Reduction Project Grant Program to reforest approximately 60 acres of farmland to native mixed species hardwoods and shrubs.

- e. Speed to Functionality:** Beach nourishment and rock sill construction will be completed within two years of signing a grant agreement. The added volume of sand and extended rock sill will immediately prevent storm surge and spring tides from breaching into the harbor, and will prevent Mispillion Harbor from developing a new inlet on the north side of the harbor. Increases in habitat quantity and quality for horseshoe crab spawning will occur within 1-2 years of beach nourishment. Red Knot abundance and weight gain in the harbor will respond immediately to availability of horseshoe crab eggs during spring migration. Annual shorebird monitoring can verify the speed of Red Knot response to increased habitat resiliency. Additional restoration alternatives evaluated by USACE during this project period will not be constructed for 1-2 years and can be funded through future Hurricane Sandy funding or other funding sources. Once constructed, these additional resiliency features will be immediately functional, increasing habitat and reducing future impacts of storm surge and erosion. Because project objectives for MNCA are limited to planning and design at this time, functionality will not be attained through this funding

opportunity; however, it is anticipated that functionality can be achieved within 2-5 years of implementing the restoration plan.

- C. Youth and/or Veteran Engagement:** DNREC administers Youth Conservation Corps and internship programs, and plans to apply for an AmeriCorps environmental program grant to support our project needs. We will engage applicants of these programs in monitoring (described below in Monitoring and Measuring Performance) and community outreach and engagement opportunities related to our project objectives. We also anticipate both undergraduate internship and graduate student opportunities through existing cooperative research agreements with University of Delaware (UD) and Delaware State University (DSU). UD's Delaware Environmental Institute (DENIN) conducts research and coordinates partnerships that integrate environmental science, engineering, and policy. DENIN offers undergraduate interdisciplinary research internships in cooperation with government, industry and nonprofit sectors. DSU is a grantee under NOAA's Educational Partnership Program (EPP) and a cooperator with NOAA's Environmental Cooperative Science Centers (CSC) established at Minority Serving Institutions. DSU and NOAA's EPP and CSC are developing the next generation workforce and impacting national Science, Technology, Engineering and Mathematics workforce statistics by fostering student engagement in natural resource, environmental science and management enterprises. Our project objectives will provide youth 15-25 in these programs with opportunities to prepare for a career in these fields. Safety standards and protocols established for these programs will be followed. State procurement procedures require solicitation of bids from certified minority, veteran and/or women business enterprises. We cannot determine involvement of veteran engagement in design or construction phases until the contractual process is implemented and vendors are selected.
- D. Collaboration and Partnerships:** The *Coastal Engineering Assessment of Restoration Alternatives for Mispillion Harbor and Inlet* (funded by DNREC) was reviewed by a team of scientists, managers and stakeholders. Now that we are preparing to implement resiliency strategies, the final beach nourishment and rock sill design and construction schedule will be vetted with stakeholders and permits will be subject to public notices. The Town of Slaughter Beach and the Alliance of Bay Communities support the proposed work. Ducks Unlimited, Delmarva Ornithological Society and American Bird Conservancy also support efforts to increase resiliency in Mispillion Harbor and MNCA. The Milford Neck Conservation Area Partnership, consisting of the DEDFW, DWL, and TNC, is the core group of partners working on the project, and USFWS has agreed to serve on our project team (see below). Together, these partners will guide the modeling process and restoration plan development by committing staff resources towards accomplishing the objectives. The partners will also reach out to Watershed Assessment Program, Delaware Coastal Programs, and others to provide peer review at major milestones and to ensure that the best available data is used for scenario modeling. To ensure community support, the partners will engage with neighboring property owners to solicit feedback on proposed restoration alternatives. These stakeholders have already been engaged in the process through outreach by members of the Milford Neck Conservation Area Partnership. Additional funds leveraged and provided as match are described above in "Leveraging" section.
- E. Work Plan & Logistics:**
- a. Project Team:** Other managers and scientists will participate as specific expertise or logistics assistance are needed. Team members listed below form the core project team.  
**Delaware Department of Natural Resources and Environmental Control: Karen A. Bennett, Delaware Bayshore Initiative Coordinator:** Ms. Bennett will provide overall project coordination. Ms. Bennett has 19 years of professional experience in the field of wildlife conservation, including natural heritage and endangered species program administration, grant management, team project coordination and facilitation, planning, policy, research, surveys, monitoring, management and outreach, and private lands habitat restoration programs. **Craig Rhoads and Rob Hossler, Div. of Fish & Wildlife, Program Managers, Habitat and Species Conservation and Management/Research:** Mr. Rhoads and Mr. Hossler will review preliminary and final designs as well as oversee project construction. Both serve as members of the Milford Neck Conservation Area Partnership and will assist in development of scope of services, selection and analysis of restoration alternatives and restoration plan. Collectively Mr. Rhoads and Mr. Hossler have over 40 years of habitat restoration and species management experience involving tidal wetlands and coastal impoundments. **Tony Pratt, Shoreline and Waterway Management Section Administrator:** Mr. Pratt leads the State of Delaware's efforts on shore restoration and waterway maintenance, and works closely with USACE on shore and waterway projects in Delaware. He has several decades of experience in project design development, contracting and construction. **Charles E. Williams, Shoreline and Waterways Section Program Manager:** Mr. Williams is the lead planner for the Section. He provides planning, project development and administration, policy and coastal engineering contract oversight and technical expertise on a statewide basis for projects and initiatives

undertaken by the Section. **Ariane Nichols, Shoreline and Waterway Management Section Scientist:** Ms. Nichols is the lead scientist for the Section on acquiring all necessary permit approvals (federal, State, local) for shoreline and waterway management projects throughout the State and on all environmental restoration projects and initiatives (SAVs, wetlands, island creation) undertaken by the Section. **Kim McKenna, Shoreline and Waterway Section Geologist:** Ms. McKenna is the lead scientist for the Section on shore dynamics, coastal erosion, sediment source investigation for beach nourishment and technical oversight of geotechnical documents. She has a Master's Degree in coastal geology. **Delaware Wild Lands: Katherine F. Hackett, Executive Director:** Ms. Hackett is a member of the Milford Neck Conservation Area Partnership and will provide technical assistance for MNCA project objectives via a contract with DNREC. She will assist with development of scope of services, selection and analysis of restoration alternatives and restoration plan. Ms. Hackett has 25 years of experience working in conservation. She is responsible for the planning, implementation, administration, integration, coordination, and fundraising for all DWL's habitat restoration projects. **Andrew Martin, Field Ecologist/Program Manager:** Mr. Martin is a member of the Milford Neck Conservation Area Partnership and will assist in the selection and analysis of restoration alternatives and development of the restoration plan. Mr. Martin serves as the lead in the development and implementation of DWL's habitat restoration projects. **The Nature Conservancy: Brian Boutin, PhD, Director of Conservation Programs:** Dr. Boutin serves as Project Manager via a contract with DNREC for MNCA project objectives. Coordinates members of the Milford Neck Conservation Area Partnership for definition of a scope of work, contractor selection, and regular progress meetings among partners and the contractor, and ensures all contractual obligations are met. Dr. Boutin has experience developing and implementing large-scale restoration and management of multimillion dollar projects. **John Graham, Land Steward:** Mr. Graham serves as member of Milford Neck Conservation Area Partnership Advisory Council and as such, provides input to all relevant project activities. Mr. Graham has nearly 15 years of experience managing and developing restoration projects at Milford Neck Preserve. **U.S. Fish and Wildlife Service: Al Rizzo, Project Leader:** Mr. Rizzo will represent the USFWS, providing technical assistance to the project team. Mr. Rizzo is an ARCPACS Certified Soil Scientist. He is currently Project Leader for the Coastal Delaware NWR Complex which encompasses 27, 000 acres along the Delaware Bayshore, and formerly spent 20 years in the Service's private lands program implementing wetland and upland habitat restoration projects. **U.S. Army Corps of Engineers: J. Bailey Smith:** Mr. Smith is a Regional Technical Specialist with the USACE Storm Risk Management Planning Center of Expertise managing plan formulation efforts for the Hurricane Sandy North Atlantic Coast Comprehensive Study and Delaware Estuary RSM efforts. He previously oversaw the USACE Agency Technical Review for the post-Katrina Louisiana/Mississippi coastal restoration study.

**b. Work Plan:**

**Mispillion Harbor Reserve Restoration / Resiliency:** At all steps, the Project Team will review and approve work of consultant and construction contractor. DNREC has decades of experience leading and providing oversight of shoreline restoration, beach nourishment, and engineering and construction of structures for coastal shoreline protection. DNREC's process for contracting coastal engineering services includes four coastal engineering firms under an existing statewide contract to implement all stages of planning, engineering design, permitting and construction, including the firm that developed the modeling and habitat restoration alternatives for Mispillion Harbor. Coordination with the USACE to evaluate additional vulnerability and flood-risk management strategies for Mispillion Harbor and Inlet as a State of Delaware preferred area for the North Atlantic Coast Comprehensive Study will continue into February 2014; until that time, we are unable to provide specific milestones for Objective 2. **Milestone 1 – Month 1:** DEDFW signs project agreement with NFWF. **Milestone 2 – Month 2:** Project team finalizes scope of work and selects from one of four engineering firms on state contract for "Professional Services for Shoreline and Waterway Management Coastal Engineering" to include surveys, engineering design, final construction plans and costs, permitting, subcontractor construction selection and supervision, construction and Certification of Completion. Selected consultant signs task order. **Milestone 3 – Month 3-6:** Consultant completes site investigations to assess the condition of harbor beaches, shorelines and channels including geotechnical investigation and bathymetric surveys to determine rock and sand volume needs and sources; performs engineering analysis; prepares design drawings with preliminary construction cost estimates; develops final construction documents, technical specifications and final construction costs. **Milestone 4 – Month 7-12:** Consultant completes permit application for USACE 404 Individual Permit and State Wetlands and Subaqueous Lands permit application, including 401 Water

Quality Certification, Coastal Zone Management Federal Consistency Determination, NHPA Section 106 review, ESA Section 7 review and NEPA documentation. Public notices issued by permitting agencies and permits issued. **Milestone 5 – Month 13-15:** Consultant manages construction bidding phase pursuant to 29 Del. C. §§6981, including attending pre-bid meeting to answer questions and bid award. Construction contract awarded and executed. **Milestone 6 – Month 16-22:** Consultant manages construction contractor, supervises construction onsite to ensure work is in accordance with design plans and to provide quality assurance to ensure contractor performance is in compliance with contract specifications. Consultant prepares as-built plans and Certificates of Completion. Extra time is incorporated in the construction phase to allow for possible weather delays.

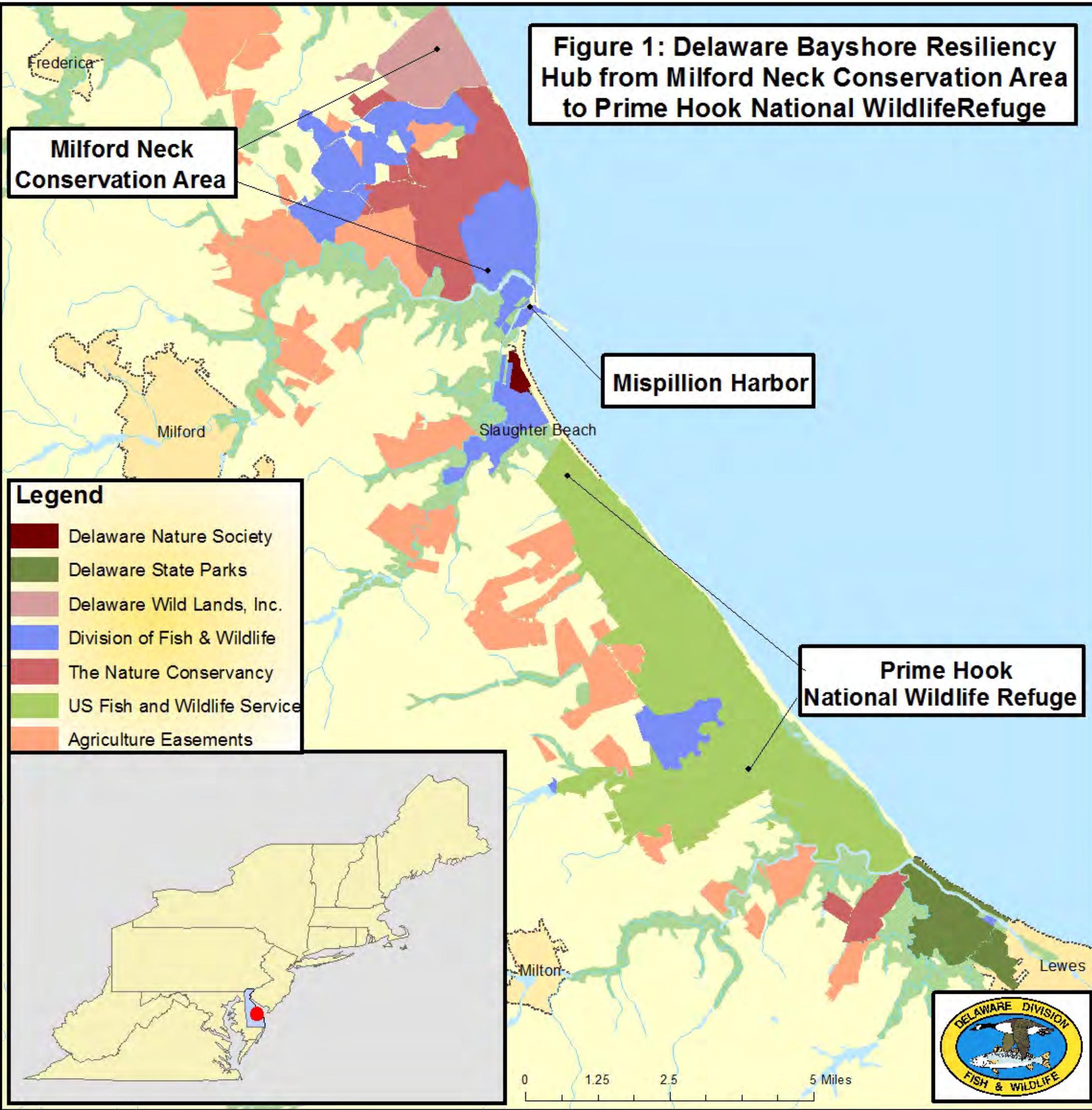
**Milford Neck Conservation Area Planning and Design: Milestone 1 – Month 1:** Sign professional services contracts with TNC and DWL for project management and technical assistance services. **Milestone 2 – Month 2: Develop scope of work and select contractor.** Project Team develops scope of work for subcontractor proposal solicitation, including modeling needs, expectations and desired components of the hydrologic restoration plan. An appropriate subcontractor will be selected based upon qualifications and expertise. Selection of the subcontractor will be done by the Project Team and will be supervised by TNC. **Milestone 3 – Month 3-4: Analysis of existing datasets and monitoring programs.** Existing datasets pertinent to the MNCA will be researched by the contractor, including bathymetric and topographic data, current and tide measurements, water quality measurements, etc. Available data will be used in the subsequent modeling effort to develop the model grid, initial/boundary conditions, and calibration standards. This activity will be completed by the contractor and will be overseen by the Project Team. **Milestone 4 – Month 5-7: Development and calibration of hydrodynamic and salinity models.** In order to determine how the tidal marsh and adjacent wetlands respond to freshwater flows and changes in salinity, numerical hydrodynamic and salinity models will be developed. Model runs for existing conditions will be used to calibrate the models and to address questions regarding existing hydrodynamics (circulation) as well as salinity distribution within MNCA. This activity will be conducted by the contractor with oversight by the Project Team. **Milestone 5 – Month 8-12: Development and analysis of restoration alternatives.** Project Team with the aid of the will develop restoration alternatives to be evaluated as part of an alternatives analysis. Changes in circulation and flushing time, as well as transport, diffusion rates, and pathways of salinity inside the tidal marsh and adjacent wetlands will be evaluated for each project alternative. This activity will be conducted by the contractor with oversight by the Project Team. **Milestone 6 – Month 13-20: Hydrologic restoration plan.** Based on the information gained in the previous tasks and with input from and oversight by the Project Team, the contractor will prepare a hydrologic restoration plan for the preferred alternative scenario(s) that outlines the horizontal geometry of project activities and site plans depicting plan and cross-section views of proposed project features. The restoration plan will also describe preliminary construction costs.

- c. **Monitoring and Measuring Performance:** Although the proposed objectives for MNCA is for planning and design, existing monitoring programs will be leveraged to support pre-construction monitoring. DNREC has over 25 stations in the MNCA that were monitored for tidal wetland condition in 2012. These stations used the Mid-Atlantic Tidal Rapid Assessment Method (MidTRAM), which includes measures of soil bearing capacity/soil compaction, vegetation composition, vegetation height/thickness, measures of shoreline hardening, presence of hummocks/breaking up, salinity, rating of marsh stability, and depth of organic layer. Additional options to reassess the tidal wetlands during the project period will be explored, including options for establishing permanent stations for measuring progress. DNREC collaborates with partners to implement annual shorebird and horseshoe crab monitoring along the Delaware Bayshore, including Mispillion Harbor and MNCA. The multi-partner led Saltmarsh Habitat & Avian Research Program (SHARP; [www.tidalmarshbirds.org](http://www.tidalmarshbirds.org)) will also be used for pre- and post-construction monitoring throughout the project area. SHARP will be re-sampling approximately 1,700 points from Maine to Virginia in 2014 with USDOJ Hurricane Sandy Mitigation Funds Project No. 32. The SHARP team is seeking additional funding that will add new sampling locations to non-USDOJ sites slated for Hurricane Sandy recovery actions, such as the work we are proposing. Topographical surveys using Real-Time Kinematic Global Positioning System will be conducted annually to assess the condition of the nourished beach. Each survey type provides quantifiable measures to evaluate trends and changes.
- d. **Return on Investment:** The return on investment to USDOJ, taxpayers and the coupled human-natural system is high because investing immediately to stabilize and increase the resiliency of Mispillion Harbor will have direct economic benefits associated with agriculture, fishing, birding and other wildlife

watching. The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation found that 344,000 Delaware residents and nonresidents 16 or more years old fished, hunted, or watched wildlife in Delaware, and state residents and nonresidents spent \$325 million on wildlife recreation in Delaware. This work also indirectly supports international commerce in Delaware Bay, which supports the fifth largest port complex in the U.S. and generates \$81 million in tax revenues for DE, PA and NJ. All ships using the Delaware Bay channel are provisioned with supplies and personnel delivered only by a maritime service stationed in Cedar Creek at Mispillion Harbor. Efforts to increase resiliency of habitat in the harbor ultimately benefits navigation and access to ships in the bay anchorage near Mispillion Inlet. As millions of dollars of federal funds have been invested in the MNCA through NAWCA funding to purchase lands and cooperative agreements with the USFWS Partners for Fish and Wildlife program to restore upland forest, further financial commitment will ensure that the longstanding USDOJ investments in MNCA remain intact and functional. Investment in this project will also reduce the need to invest in expensive upgrades to infrastructure, including roads, bridges, and water conveyance structures, as eventual on-the-ground measures will improve flood storage and diminish much of the channelized flow. These investments will improve habitat and diversity within natural systems and mitigate impacts to adjacent human communities and farmlands as a result of hydrologic modifications and conditions.

- e. **Risk:** Project objectives proposed for Mispillion Harbor have a low risk of failure. The project team's ownership and long tenure in managing and monitoring these lands includes decades of experience managing coastal engineering projects and understanding the repairs and upgrades needed to increase resiliency of this coastal system. An existing modeling study produced by an experienced coastal engineering firm, *Coastal Engineering Assessment of Habitation Restoration Alternatives at Mispillion Inlet*, will guide restoration. The probability of negative impacts is low, given that the project is designed to benefit the coupled human-natural system by incorporating sediment transport processes to maximize habitat resiliency while minimizing the need for frequent dredging. Project objectives proposed for MNCA will take a science-based approach to ensuring future restoration success. Using adaptive management, project components will be periodically assessed based upon a suite of success criteria with strategies adjusted as necessary, ensuring a low probability of project failure. As best available data will be used to model the impacts of restoration on the wetlands, we will have the opportunity to predict and thus lessen any potential negative impacts on the coupled human-natural system resilience.
- f. **Permits and Approvals:** Upon completion of engineering and design for Mispillion Harbor Reserve we will apply for all necessary permits from the U.S. Army Corp of Engineers (404 Individual Permit) and DNREC's Division of Water, Wetlands and Subaqueous Lands section (State Wetlands and Subaqueous Lands Permit, 401 Water Quality Certification) and Delaware Coastal Program (Coastal Zone Management federal consistency). DEDFW owns the land in Mispillion Harbor where the restoration work will be performed. We do not anticipate any complications in acquiring permits given our history of working in coordination with permitting programs within DNREC. We have held a preliminary meeting with DNREC's Wetlands Permitting Program Manager to discuss the project and timeline for permits. A Joint Permitting Process meeting will be scheduled in spring 2014 with USACE and other state and federal agencies to finalize details for the permit application. We will coordinate with USACE and USFWS to complete federal compliance including NEPA documentation, ESA Section 7 and NHPA Section 106. For the MNCA project objectives, we propose only planning and design activities, thus permits will not be required for work undertaken with this funding opportunity. However, the resultant hydrologic restoration plan will be the basis for future permit applications to conduct the identified work. See milestones above for additional details.
- g. **Safety:** All OSHA guidelines will be followed by design, construction and monitoring staff and contractors. Access to waters immediately adjacent to restoration areas may be restricted during construction. Equipment will be secured at state or private docking facilities at Cedar Creek or other nearby local ports with security. Natural resources enforcement agents provide a regular presence on the water in Mispillion Harbor Reserve, and because of commercial interests based in the harbor vicinity, there is a vigilant presence and cooperative effort to maintain safety and security in the harbor. For the MNCA project objectives, we propose only planning and design activities, thus safety of all involved is not anticipated to be an issue.

**Figure 1: Delaware Bayshore Resiliency Hub from Milford Neck Conservation Area to Prime Hook National Wildlife Refuge**



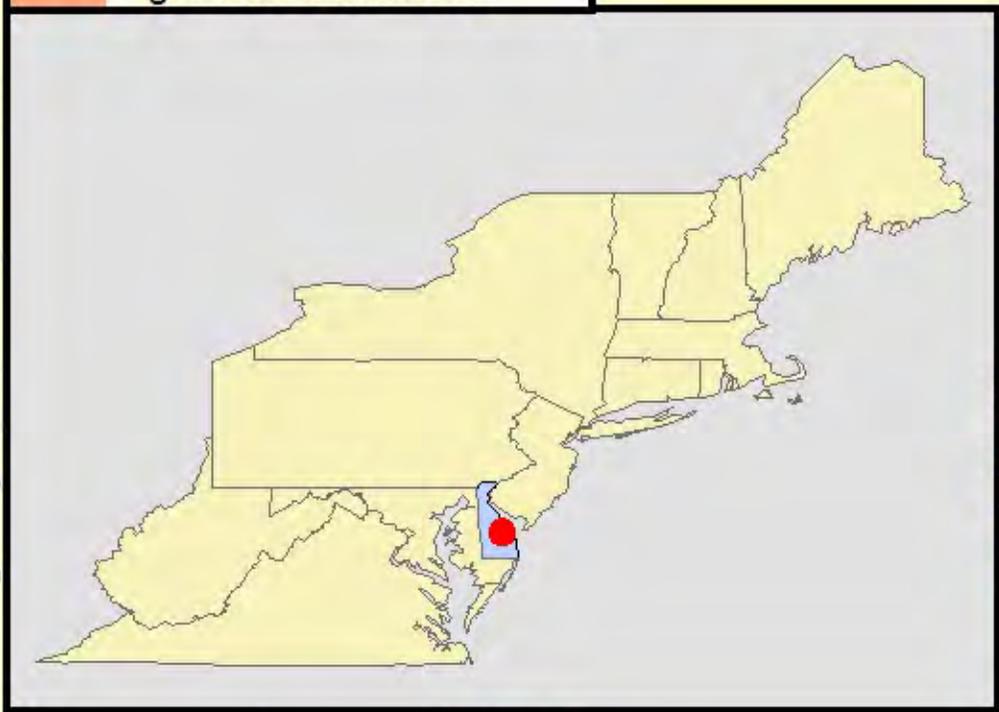
**Milford Neck Conservation Area**

**Mispillion Harbor**

**Prime Hook National Wildlife Refuge**

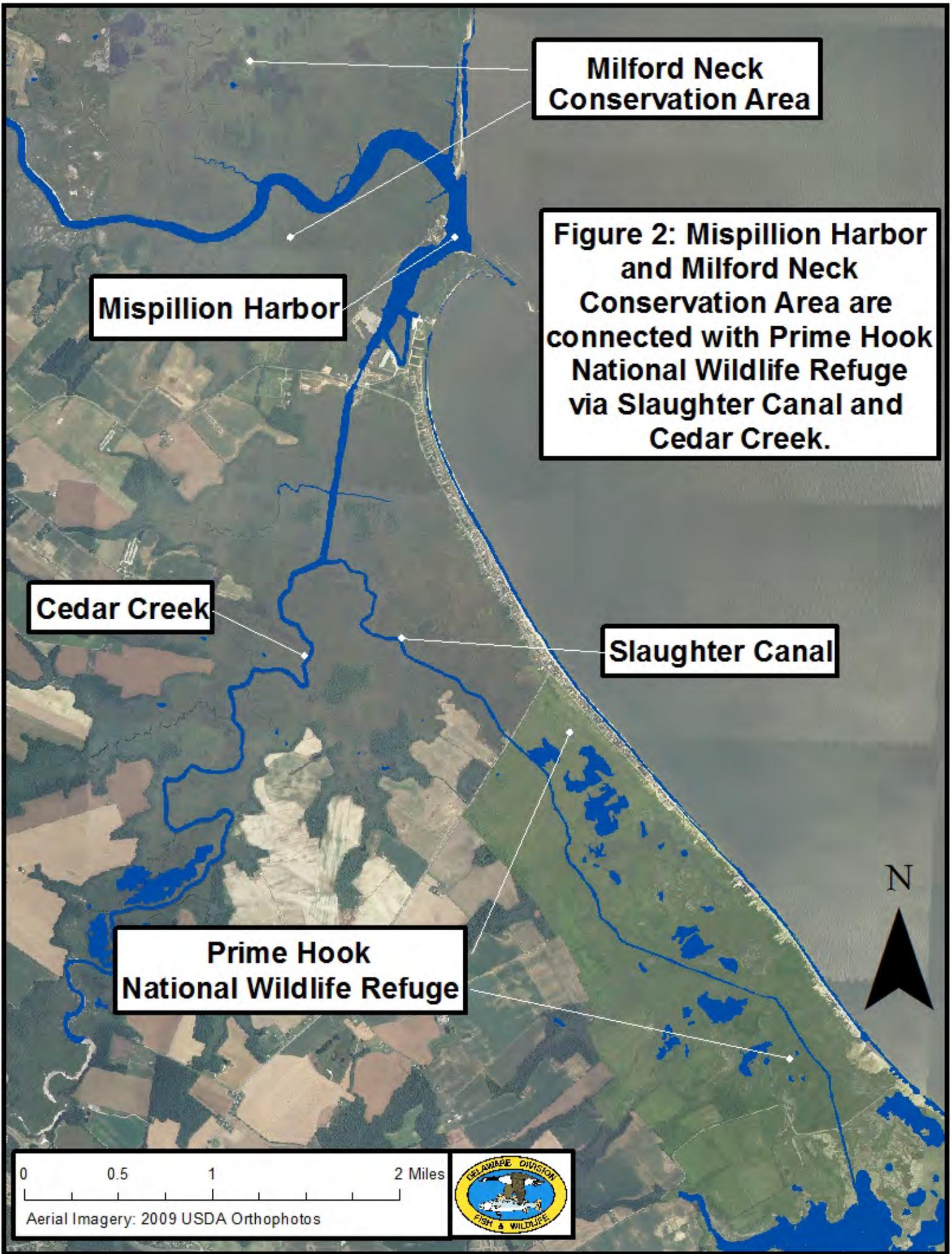
**Legend**

- Delaware Nature Society
- Delaware State Parks
- Delaware Wild Lands, Inc.
- Division of Fish & Wildlife
- The Nature Conservancy
- US Fish and Wildlife Service
- Agriculture Easements



0 1.25 2.5 5 Miles





**Milford Neck Conservation Area**

**Mispillion Harbor**

**Figure 2: Mispillion Harbor and Milford Neck Conservation Area are connected with Prime Hook National Wildlife Refuge via Slaughter Canal and Cedar Creek.**

**Cedar Creek**

**Slaughter Canal**

**Prime Hook National Wildlife Refuge**

0 0.5 1 2 Miles

Aerial Imagery: 2009 USDA Orthophotos



**Figure 3: The Mispillion Harbor is bounded by sandy beach, dune, and tidal salt marsh.**

**See Figure 4.**

**Mispillion River**

**Mispillion Harbor**

**Cedar Creek**



**Rock Sill**

**Mispillion Inlet**

**Osprey Beach**

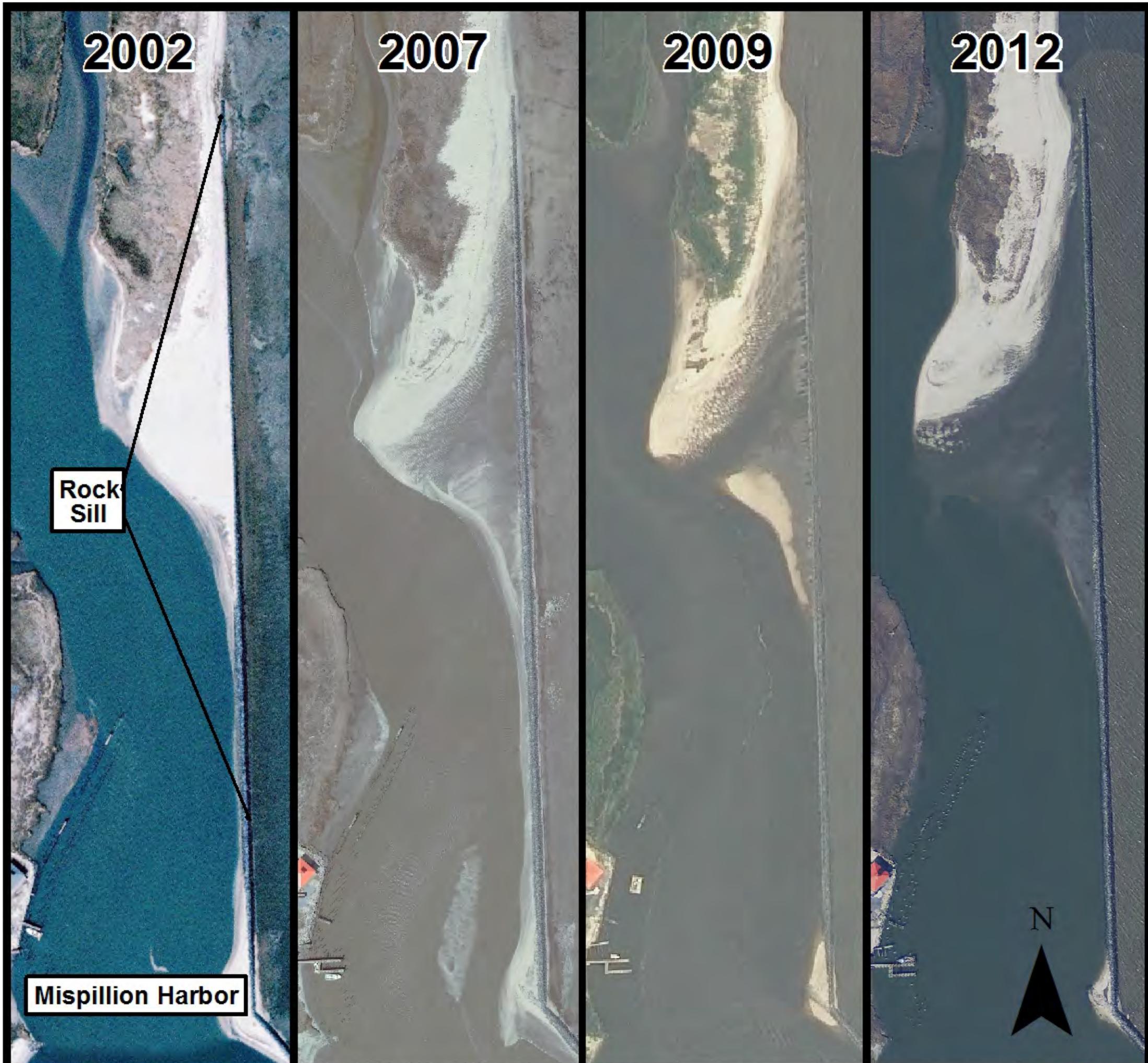
**Legend**

- Bays and Coves; Tidal Open Water; Waterways/Streams/Canals
- Mixed Forest
- Non-tidal Scrub/Shrub Wetland
- Pasture
- Tidal Emergent Wetland; Tidal Scrub/Shrub Wetland
- Tidal Shoreline

0 0.125 0.25 0.5 Miles

Aerial Imagery: 2009 USDA Orthophotos





**Figure 4: The beach and dune at the north end of the existing rock sill has been severely eroded by repeated coastal storms since prior to 2007.**

0 0.125 0.25 0.5 Miles

Aerial Imagery: 2009 USDA Orthophotos



# Figure 5: Milford Neck Conservation Area



## Legend

- Delaware Wild Lands, Inc.
- State of Delaware
- The Nature Conservancy

**Big Stone Beach Road**

**Grecos Canal**

**Mispillion Harbor**

0 0.5 1 2 Miles

Aerial Imagery: 2012 MrSID





STATE OF DELAWARE  
OFFICE OF THE GOVERNOR  
TATNALL BUILDING, SECOND FLOOR  
WILLIAM PENN STREET, DOVER, DE 19901

JACK A. MARKELL  
GOVERNOR

PHONE: 302-744-4101  
FAX: 302-739-2775

January 31, 2014

Mr. David O'Neill  
Vice President, Conservation Programs  
National Fish & Wildlife Foundation  
1133 15th St NW #1100  
Washington, DC 20005

Attn: Hurricane Sandy Coastal Resiliency Competitive Grants Program

Dear Mr. O'Neill:

The State of Delaware is pleased to submit requests for the 2013 Hurricane Sandy Resiliency Grant Program in our proposals titled "*Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck*" and "*Delaware Bayshore Coastal System Resiliency: Mahon River to St. Jones River.*"

Nearly two years ago, former U.S. Department of Interior Secretary Ken Salazar visited the First State to join me in announcing the "Delaware Bayshore Initiative" as one of 100 keystone conservation and recreation projects recognized by President Obama's *America's Great Outdoors* Initiative. The Secretary was amazed by our Bayshore's expansive coastal marshes, sandy beaches, forests and farmland. More than half of the 220,000 acres between the First State National Monument in the City of New Castle and Cape Henlopen State Park near the City of Lewes are protected as state wildlife areas, state parks, national wildlife refuges and preserved private conservation lands and farmlands.

Despite our incredible legacy of land protection along the Bayshore, Hurricane Sandy taught us all the unexpected lesson that while our coastal areas provide significant natural protection, they are not as resilient as they should be, putting our rich natural and agricultural resources in jeopardy, and exposing our coastal communities to significant damage. Together with our conservation partners and our Bayshore communities, we are finding innovative ways to restore what has been damaged and ensure the grandeur of the Delaware Bayshore landscape is resilient to sea level rise and that our Bayshore communities are safe in spite of coastal storms like Hurricane Sandy that will no doubt visit our shores again.

Delaware is honored to be the steward of one of the Bayshore's crown jewels, Mispillion Harbor – a globally important and internationally recognized stopover site for the imperiled Red Knot and other migratory shorebirds. The Harbor's remarkable concentration of spawning horseshoe

Harbor's navigation channel and the support it provides to commercial shipping. A maritime supply facility, operating out of Mispillion Inlet, is the only service that delivers supplies and personnel to domestic and international vessels using the Delaware Bay main channel. By funding the resiliency measures in our proposal, we are assisting in the recovery of the Red Knot and indirectly providing support to the region's shipping economy. Ships heading to the Ports of Wilmington, Philadelphia, Trenton, and Camden generate \$81 million in tax revenues for DE, PA and NJ and support an import value of more than \$41 billion annually.

Milford Neck's expansive tidal marshes and upland forests along our Bayshore coast are among the most important on the Delmarva Peninsula for migratory birds. The region's productive farmlands support the local economy and generations of land stewards that are an integral part of Delaware's coastal heritage.

Immediately following Hurricane Sandy, we identified our most vulnerable habitats and strategic places for immediately adding coastal risk-reduction measures, including both nature-based and structural features. Failing water control structures, eroded impoundment levees, and breaches in fragile coastal dunes are among our most urgent restoration needs. Several of our most vulnerable tidal marsh systems altered by ditching and fragmented by roads with insufficient drainage infrastructure are creating complex flooding problems for our coastal communities. These tidal marsh-human community systems must be evaluated in order to develop the most cost-effective solutions for increasing habitat resiliency while also decreasing the vulnerability our Bayshore communities.

- By extending the existing rock sill in Mispillion Harbor by 500 feet and adding nearly 200,000 cubic yards of sand, we will preserve the navigation channel through Mispillion Inlet and preserve the most important beach habitat for spawning horseshoe crabs and foraging Red Knots.
- By replacing failing water control structures and an emergency spillway at coastal wetland impoundments at Little Creek and Ted Harvey State Wildlife Areas, we will restore our ability to manage water levels effectively to benefit a diversity of fish and wildlife and reduce coastal flooding risks to surrounding communities.
- Studies of the tidal wetlands between the Mahon River and the St. Jones River, and in the Milford Neck Conservation Area will inform the development of effective habitat restoration strategies and reduce chronic flooding problems experienced by Bayshore communities.
- Beneficial reuse of dredge material from the Delaware Bay Main Channel Deepening Project will restore tidal salt marsh along an impoundment levee at Little Creek Wildlife Area, preventing a catastrophic failure of this levee.
- Shoreline modeling at Port Mahon will guide the development of restoration alternatives to improve severely degraded shoreline habitat to benefit spawning horseshoe crabs and migratory shorebirds.

National Fish and Wildlife Foundation

January 31, 2014

Page 3

This grant opportunity brings our State agency together with project partners including The Nature Conservancy, Delaware Wild Lands, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and many supporting conservation and community partners. Working collaboratively, we will improve the viability and productivity of our natural habitats and agricultural lands, protect community infrastructure, and create employment opportunities for the private sector including youth and veterans.

Each part of our projects will have long-lasting and positive effects on coastal resiliency, wetlands resources, wildlife habitat, and the economic and environmental stability of Delaware's coastal areas. These effects provide direct benefits the species which rely on these fragile coastal systems and to all people, from Delawareans living in our coastal communities to visitors that travel here to share our rich natural diversity and heritage.

I look forward to working with the Department of Interior and the National Fish and Wildlife Foundation to complete these critical projects.

Sincerely,



Jack A. Markell  
Governor

cc: Secretary Collin O'Mara, Department of Natural Resources and Environmental Control



*Shaping the future for birds*

January 29, 2014

David O'Neill  
Vice President, Conservation Programs  
National Fish and Wildlife Foundation  
1133 Fifteenth St., N.W., Suite 1100  
Washington, D.C. 20005

Dear David

I am writing in support of the State of Delaware Division of Fish and Wildlife's (DEDFW) Hurricane Sandy Coastal Resiliency Competitive Grants Program proposal entitled "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck".

This area is a truly global treasure for bird conservation, and includes several American Bird Conservancy global Important Bird Areas. These areas are of particularly critical importance to the eastern "*rufa*" subspecies of the Red Knot and have become a mecca for birdwatchers as well as birds.

The program proposed by the State of Delaware is critical to improving habitat for this and other shorebirds and has ABC's wholehearted support.

I very much hope that you will be able to support it too.

Sincerely,

Michael J. Parr  
Vice President for Program Development

Delaware Alliance of Bay Communities

401 North Bayshore Drive

Milton, DE 19968



Pickering Beach, Kitts Hummock, South Bowers Beach  
Little Creek, Slaughter Beach, Prime Hook Beach, Broadkill Beach  
Agricultural, Maritime, and Ecological Communities  
[www.delabc.com](http://www.delabc.com)

January 29, 2014

Delaware Bayshore Initiative Coordinator  
DE Division of Fish & Wildlife  
89 King's Hwy  
Dover, DE 19901

Dear Ms. Bennett:

I am writing in support of the State of Delaware Division of Fish and Wildlife's (DEDFW) Hurricane Sandy Coastal Resiliency Competitive Grants Program proposal entitled "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck".

The development, integration, and implementation of projects that address the vulnerability and vital interplay between the economic and environmental stability of Delaware's coastal areas is of the utmost importance to Delaware's coastal communities. Of equal importance is the need to work collaboratively and collectively to increase the economic and environmental resiliency of Delaware's coastal areas. DEDFW's proposal directly addresses the urgent need to develop a system-wide and landscape-level approach to the planning, designing, evaluating, and construction of resiliency strategies that incorporates the needs and goals of diverse stakeholders from coastal community residents, commercial entities, and private entrepreneurs to municipalities, public and private land managers including long-time farmers and nonprofit conservation organizations.

The Alliance of Bay Communities is pleased to support DEDFW on this project proposal to restore the most vulnerable shoreline in Mispillion Harbor to increase resiliency of important habitat and to protect the tidal flow and navigation channels of Mispillion River and Cedar Creek. Coastal flooding in Slaughter Beach typically originates from the marsh side of the town. Therefore, ensuring flow through Slaughter Canal, Cedar Creek and out the Mispillion Inlet is vitally important to minimizing the effects of coastal flooding on the town. Tidal exchange is now occurring daily through a breach at the north end of the Harbor, further degrading and reducing habitat for shorebirds and horseshoe crabs, and making this area more vulnerable to the formation of a new inlet and placing the navigation channel at immediate risk. If the breach widens sufficiently, the Mispillion River will redirect from its flow through the stabilized inlet resulting in rapid sedimentation at the current confluence of the two rivers and the inlet, and will reduce the hydrologic flow into the tidal wetlands to the south.

The harbor and inlet, managed by USACE, also support access to Delaware Bay for commercial marina and docking facilities and a maritime supply delivery service located on Cedar Creek. The maritime supply service is the only such operation that delivers supplies and personnel to domestic and international vessels using the main channel in Delaware Bay. In addition to commercial and recreational maritime benefits, the surrounding residents, communities and farmlands will also benefit from efforts to restore Mispillion Harbor and maintain adequate tidal flow through the coastal system during and immediately after storms and spring tides.

Completion of urgent restoration work for the Mispillion Harbor and further studies to evaluate additional vulnerabilities and flood risk management strategies for the harbor and the inlet, will have long-lasting and positive effects on the resiliency of our coastal wetland resources, wildlife habitats and the economic stability of our coastal communities.

If I can provide any additional information that would be helpful in your consideration of DEDFW's request for Hurricane Sandy Coastal Resiliency funding, please do not hesitate to contact me (email, telephone).

Sincerely,

A handwritten signature in blue ink, appearing to read 'James W. Bailey', with a large, stylized flourish extending to the right.

James W. Bailey  
Chairman



## Delmarva Ornithological Society

PO Box 4247  
Wilmington, DE 19807

Karen Bennett  
Delaware Bayshore Initiative Coordinator  
DE Division of Fish and Wildlife  
Delaware Department of Natural Resources  
89 Kings Highway  
Dover, DE 19901

January 30, 2014

RE: DEDFW Hurricane Sandy Coastal Resiliency Competitive Grants Program Proposal

Dear Ms. Bennett,

I am writing in support of the State of Delaware Division of Fish and Wildlife's (DEDFW) Hurricane Sandy Coastal Resiliency Competitive Grants Program proposal entitled "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck".

The Delmarva Ornithological Society (DOS) is an *all-volunteer*, 501(c)(3) grassroots nonprofit organization dedicated to bird study, education, and conservation in our region. Our community includes over 450 members in Delaware and surrounding states and we have just celebrated our 50th year of supporting birding and bird conservation in the region. DOS has worked collaboratively with DEDFW on multiple land acquisition and habitat protection projects, in particular through our signature conservation fundraiser, the Delaware Bird-a-Thon, which has generated nearly a quarter of a million dollars over the past 7 years for the protection of coastal habitat for migratory shorebirds and other imperiled coastal species.

In the wake of Sandy, and in the face of sea level rise and the threat of coastal storms of increasing severity, the *globally* critical habitats of the Delaware Bayshore from Mispillion Harbor to Milford Neck are in peril. This small area of coastline includes the primary spring staging area for the *rufa* Red Knot (recently proposed for listing under the ESA), expansive tidal marshes that host significant breeding populations of several bird species of regional and national concern, and some of the best remaining contiguous forest habitat in the Delmarva region, which serve as critical migratory stopover habitat for neotropical migrant songbirds.

We strongly support the proposed project. The collaborative development of much-needed hydrodynamic and salinity models for the Milford Neck Conservation Area (MNCA) will guide restoration of high quality marsh and forest habitat that is already being degraded by salt water intrusion. Likewise, restoration of the most vulnerable shoreline at Mispillion Harbor Reserve will increase resiliency of this critical habitat for spawning horseshoe crabs and the shorebirds that rely on them.

DOS is proud of our partnerships with DEDFW, an agency that has demonstrated the clear initiative needed to lead the Delaware environmental community in collaborative planning and cooperative implementation of projects that will increase the economic and environmental resiliency of Delaware's coastal areas, benefiting birds and other wildlife, as well as protecting and enhancing the value of these areas for public recreational and commercial use, including hunting, fishing, birding, and ecotourism.

Delmarva Ornithological Society is pleased to support DEDFW and project partners Delaware Wild Lands (DWL), The Nature Conservancy in Delaware (TNC), and the U.S. Fish and Wildlife Service (USFWS) on this project.

If I can provide any additional information that would be helpful in your consideration of DEDFW's request for Hurricane Sandy Coastal Resiliency funding, please do not hesitate to contact me ([mjsarver@gmail.com](mailto:mjsarver@gmail.com), 724-689-5845).

Sincerely,

A handwritten signature in cursive script that reads "Matthew Sarver". The signature is written in dark ink on a light-colored background.

Matthew Sarver

DOS Conservation Committee Chair



# DELAWARE STATE UNIVERSITY

## Department of Agriculture and Natural Resources

28 January 2014

Dear Ms. Bennett:

This letter is to express my full support for your proposed project *Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck*. I am excited about the potential for your agency to partner with our program in order to engage students in applied restoration activities. Experiential learning is invaluable in the natural sciences and the proposed partnership with our program has the potential to expose students to applied restoration of a natural system of global importance.

The purpose of the NOAA Educational Partnership Program (NOAA-EPP) Environmental Cooperative Science Center (ECSC) is to recruit and train the next generation of environmental scientists with an emphasis on the engagement of students from under-represented groups. Our program's curricula and research projects focus on the protection, management, restoration, and monitoring of coastal ecosystems particularly in light of projected sea-level rise. Therefore, your proposal's objectives align neatly with our mission. Further, the Delaware State University campus is adjacent to the Mispillion – Milford Neck corridor providing the potential for experiential learning right in our own backyard.

Several of our students have been conducting original research at the St. Jones River Delaware National Estuarine Research Reserve managed by your agency and NOAA. The implementation of your proposed project will allow students to expand their focus to nearby coastal systems and incorporate restoration as a potential treatment in their research design. In addition, our staff, including graduate students, has expertise in evaluating the effect of sea level rise and monitoring contaminants through trophic interactions within coastal systems. For example, we are currently using avian blood triglyceride and  $\beta$ -Hydroxybutyrate levels in combination with geospatial and stable isotope analyses to evaluate the potential effect of sea level rise on Gulf Coast barrier island ecosystems. If desired, this type of integrated ecosystem approach could be used by current or future students and faculty to help monitor and evaluate the success of the proposed Mispillion – Milford Neck restoration activities while providing meaningful research opportunities for NOAA-EPP ECSC students.

In sum, I am very excited about your proposal. I am grateful you have considered collaboration with Delaware State University's students and I look forward to working with you in the near future.

Sincerely,

A handwritten signature in black ink, appearing to read "Ch. M. Heckscher", with a long horizontal flourish extending to the right.

Christopher M. Heckscher, Ph.D.  
Associate Professor of Environmental Science  
Institutional Project Director, NOAA-EPP ECSC Program

January 28, 2014

Attn: Hurricane Sandy Coastal Resiliency Competitive Grants Program  
National Fish & Wildlife Foundation  
1133 15th St NW #1100  
Washington, DC 20005

Re: *Letter of Support - Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck*

To Whom It May Concern:

I am writing to express Ducks Unlimited's (DU) support for the *Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck* project. This project is being proposed by the Delaware Department of Natural Resources and Environmental Control, Division of Fish and Wildlife (DFW) in response to the Hurricane Sandy Coastal Resiliency Competitive Grants Program Request for Proposals from NFWF. Thank you for your consideration of this support.

Ducks Unlimited (DU) is a non-profit founded in 1937 to conserve, restore, and manage wetlands and associated habitat for North America's waterfowl. DU has more than 500,000 members in the United States and has conserved more than 13 million acres of waterfowl habitat in the last 77 years.

The activities that will be accomplished through DFW's proposal will contribute significantly to the resiliency of waterfowl and their habitat in the northeastern United States. This project is of particular interest to DU because of the abundance of waterfowl habitat located at the Mispillion Harbor Reserve, Milford Neck Conservation Area, and other hydrologically connected areas such as Prime Hook NWR. Collectively, these areas represent one of the largest contiguous protected wetland complexes on the entire North Atlantic coast. Protected coastal wetland complexes such as this are critical to the sustainability of waterfowl populations as they provide vital foraging, breeding, and roosting habitat. DU strongly supports this project.

DU is hopeful NFWF and other reviewers will look favorably on providing funding for this grant request. If I can be of further assistance during the proposal review process, please feel free to contact me at [jmcperson@ducks.org](mailto:jmcperson@ducks.org) or 410.643.7635 x20.

Sincerely,



Jake McPherson  
Regional Biologist



January 29, 2014

Ms. Karen Bennett  
DNREC  
89 Kings Highway  
Dover, DE 19901

Dear Ms. Bennett:

I am writing in support of the State of Delaware Division of Fish and Wildlife's (DEDFW) Hurricane Sandy Coastal Resiliency Competitive Grants Program proposal entitled "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck".

The development, integration, and implementation of projects that address the vulnerability and vital interplay between the economic and environmental stability of Delaware's coastal areas is of the utmost importance. Of equal importance is the need to work collaboratively and collectively to increase the economic and environmental resiliency of Delaware's coastal areas. DEDFW's proposal directly addresses the urgent need to develop a system-wide and landscape-level approach to the planning, designing, evaluating, and construction of resiliency strategies that incorporates the needs and goals of diverse stakeholders from commercial entities to private entrepreneurs to long-time farmers to nonprofit conservation organizations to municipalities to public and private land managers to education-related and ecotourism groups.

Delaware Wild Lands (DWL) is pleased to partner with DEDFW and The Nature Conservancy in Delaware (TNC) on this project and work collaboratively to develop hydrodynamic and salinity models for the Milford Neck Conservation Area. These models will inform the work of the partnership and provide the scientific foundation necessary to effectively restore and enhance the Milford Neck Conservation Area, one of Delaware's most interesting, dynamic, and diverse natural resources. Once complete, the models and subsequent restoration plan will guide long-term investments of DWL, TNC, and DEDFW at Milford Neck and position the partnership to seek and secure additional funding for restoration.

DEDFW and DWL have worked successfully on numerous wetlands and habitat restoration projects throughout Delaware, with the goal of enhancing habitat and facilitating the many benefits provided by wetlands and marsh systems. Completion of the hydrodynamic modeling and restoration plan for the Milford Neck Conservation Area, and other projects included in this proposal, will have long-lasting and positive impacts on coastal resiliency, wetlands resources, wildlife habitat, and the economic and environmental resiliency and stability of Delaware's coastal areas.

**Eugene H. Bayard, Esq.**  
*President*

**Richard S. Fischer**  
*Vice President*

**Blaine T. Phillips, Esq.**  
*Secretary*

**C. Porter Schutt, III**  
*Treasurer*

**Katherine F. Hackett**  
*Executive Director*

**Kathleen H. Harvey**  
*Program Manager*

**Andrew S. Martin**  
*Field Ecologist / Program Manager*

**Peter S. Martin**  
*Field Ecologist*

**Ronald J. Haas**  
*Project Manager*

**Deborah P. Turner**  
*Administrative Assistant*

---

#### DIRECTORS

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Blaine T. Phillips, Esq.

C. Porter Schutt, III

Eli R. Sharp

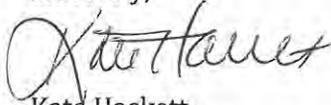
Robert W. Tunnell, III

Ms. Karen Bennett

January 29, 2014

If I can provide any additional information that would be helpful in your consideration of DEDFW's request for Hurricane Sandy Coastal Resiliency funding, please do not hesitate to contact me ([khackett@dewildlands.org](mailto:khackett@dewildlands.org), 302-378-2736).

Sincerely,

A handwritten signature in cursive script that reads "Kate Hackett". The signature is written in dark ink and is positioned above the printed name.

Kate Hackett

Executive Director



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE



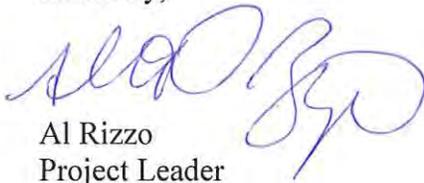
Coastal Delaware NWR Complex  
Prime Hook National Wildlife Refuge  
11978 Turtle Pond Road  
Milton, DE 19968  
(302) 684-8419

January 27, 2014

Karen A. Bennett  
Delaware Bayshore Initiative Coordinator  
DE Division of Fish and Wildlife, DNREC  
89 Kings Highway  
Dover, DE 19901

This letter is to confirm that the Coastal Delaware National wildlife Refuge Complex Wildlife Refuge supports your Mispillion River-Milford Neck NFWF proposal. The proposed Mispillion Harbor restoration component in particular, will compliment the massive salt marsh restoration effort underway at Prime Hook National Wildlife Refuge. Tidal flow from the Delaware Bay to the refuge through the Mispillion Harbor, Cedar Creek and Slaughter Canal are critical for the survival and resiliency of the restored salt marsh. In addition, the hydrodynamic modeling proposed for the Milford Neck Conservation Area will enable the project team to develop a resiliency strategy based on state of the art science that will ultimately maintain healthy marshes and riparian forests adjacent to the refuge. The Service is committed to assisting our conservation partners in this endeavor.

Sincerely,

  
Al Rizzo  
Project Leader

Town of Slaughter Beach  
A Horseshoe Crab Sanctuary  
357 Bay Ave  
Slaughter Beach, De 19963-4911  
www.townofslaughterbeach.com



Dear Ms. Bennett:

I am writing in support of the State of Delaware Division of Fish and Wildlife's (DEDFW) Hurricane Sandy Coastal Resiliency Competitive Grants Program proposal entitled "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck".

The development, integration, and implementation of projects that address the vulnerability and vital interplay between the economic and environmental stability of Delaware's coastal areas is of the utmost importance to Delaware's coastal communities. Of equal importance is the need to work collaboratively and collectively to increase the economic and environmental resiliency of Delaware's coastal areas. DEDFW's proposal directly addresses the urgent need to develop a system-wide and landscape-level approach to the planning, designing, evaluating, and construction of resiliency strategies that incorporates the needs and goals of diverse stakeholders from coastal community residents, commercial entities, and private entrepreneurs to municipalities, public and private land managers including long-time farmers and nonprofit conservation organizations.

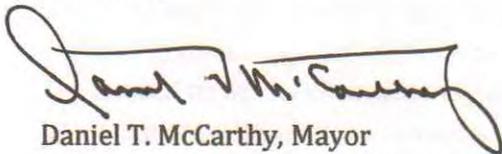
The Town of Slaughter Beach is pleased to support DEDFW on this project proposal to restore the most vulnerable shoreline in Mispillion Harbor to increase resiliency of important habitat and to protect the tidal flow and navigation channels of Mispillion River and Cedar Creek. Coastal flooding in Slaughter Beach typically originates from the marsh side of the town. Therefore, ensuring flow through Slaughter Canal, Cedar Creek and out the Mispillion Inlet is vitally important to minimizing the effects of coastal flooding on the town. Tidal exchange is now occurring daily through a breach at the north end of the Harbor, further degrading and reducing habitat for shorebirds and horseshoe crabs, and making this area more vulnerable to the formation of a new inlet and placing the navigation channel at immediate risk. If the breach widens sufficiently, the Mispillion River will redirect from its flow through the stabilized inlet resulting in rapid sedimentation at the current confluence of the two rivers and the inlet, and will reduce the hydrologic flow into the tidal wetlands to the south.

The harbor and inlet, managed by USACE, also support access to Delaware Bay for commercial marina and docking facilities and a maritime supply delivery service located on Cedar Creek. The maritime supply service is the only such operation that delivers supplies and personnel to domestic and international vessels using the main channel in Delaware Bay. In addition to commercial and recreational maritime benefits, the surrounding residents, communities and farmlands will also benefit from efforts to restore Mispillion Harbor and maintain adequate tidal flow through the coastal system during and immediately after storms and spring tides.

Completion of urgent restoration work for the Mispillion Harbor and further studies to evaluate additional vulnerabilities and flood risk management strategies for the harbor and the inlet, will have long-lasting and positive effects on the resiliency of our coastal wetland resources, wildlife habitats and the economic stability of our coastal communities.

If I can provide any additional information that would be helpful in your consideration of DEDFW's request for Hurricane Sandy Coastal Resiliency funding, please do not hesitate to contact me (email, telephone).

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel T. McCarthy". The signature is fluid and cursive, with a large loop at the end.

Daniel T. McCarthy, Mayor  
The Town Council of Slaughter Beach

January 29, 2014

Karen A. Bennett  
Delaware Bayshore Initiative Coordinator  
Delaware Department of Natural Resources and Environmental Control  
Division of Fish and Wildlife  
89 Kings Highway  
Dover, DE 19901

Dear Ms. Bennett,

The Delaware Chapter of The Nature Conservancy would like to express its full support for the "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck" project proposed under the National Fish and Wildlife Foundation's Hurricane Sandy Coastal Resiliency Competitive Grants Program.

The mission of The Nature Conservancy is to conserve the lands and waters on which all life depends. In Delaware, this has been accomplished through the permanent protection of over 30,000 acres, including the 2,801 acre Milford Neck Preserve which is located in the heart of the Milford Neck Conservation Area. The beaches, marshes, and upland forest of this preserve provide critical habitat for numerous migrating shorebirds, waterfowl, Neotropical songbirds, horseshoe crabs, and estuary-dependent fishes, as well as a host of resident fauna. In addition, when fully functional, these habitats buffer the adjacent agricultural community from coastal storms, flooding, and sea level rise.

The research and subsequent restoration plan proposed in this project will provide direct benefits to the Milford Neck Preserve by identifying hydrologic stressors and proposing alternatives to address them. This will result in healthier habitats which provide more value to the species that depend on them. It will also provide a resilient buffer for the productive agricultural lands and economically disadvantaged populations that border the Milford Neck Conservation Area.

The Delaware Chapter of The Nature Conservancy is looking forward to working with the Delaware Division of Fish and Wildlife and Delaware Wild Lands to achieve the goals and objectives laid out in this proposal. The Nature Conservancy will commit resources to assist with the completion of tasks as outlined in the Department's application to the National Fish and Wildlife Foundation. The Nature Conservancy has also valued this opportunity to provide input into the proposed "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck" project.

Best regards,



Richard I.G. Jones, Jr.  
Delaware State Director



**Department of Entomology and Wildlife Ecology**

College of Agriculture and Natural Resources

250 Townsend Hall

Newark, DE 19716-2160

*Ph:* (302) 831-2526

*Fax:* (302) 831-8889

Dr. Christopher Williams  
253 Townsend Hall  
302-831-4592  
ckwillia@udel.edu

January 31, 2014

Dear Delaware Division of Fish and Wildlife,

This letter is to confirm that I support your NFWF proposal entitled, "Delaware Bayshore Coastal System Resiliency: Mispillion Harbor to Milford Neck" that will implement a coordinated system-wide approach to evaluating, planning, designing and constructing restoration and resiliency strategies for coastal tidal marshes and streams and sandy beach habitat along the central Delaware Bayshore. As you are aware, I have conducted waterfowl assessments along the Delaware Bayshore for a number of years and your work, if funded, will augment previous habitat management goals as well as my previous assessments on these lands collected prior to and during Hurricane Sandy. I support your efforts and if you need additional assistance with assessments of Delaware's waterfowl resources (and the quality of the habitat they are occupying post restoration), I would be happy to do that for you. All of this continued effort to promote a healthy tidal marsh system will provide critical for long-term waterfowl populations. I thank you for your interest to conduct these restorations and assessments on your land.

All my best,

A handwritten signature in black ink that reads "Christopher K. Williams".

Dr. Christopher K. Williams  
Associate Professor of Wildlife Ecology  
Waterfowl and Upland Gamebird Research Program

Congress of the United States  
Washington, DC 20510

April 30, 2014

The Honorable Sally Jewell  
Secretary  
U.S. Department of Interior  
1849 C Street, N.W.  
Washington DC 20240

Dear Secretary Jewell,

We are writing to express our strong support for Delaware's grant applications submitted to the 2013 Hurricane Sandy Resiliency Grant Program: "*Delaware Bayshore Coastal System Resiliency – Mispillion Harbor to Milford Neck*" and "*Delaware Bayshore Coastal System Resiliency – Mahon River to St. Jones River.*"

Two years ago, we worked with the Department of Interior to make Delaware's Bayshore Initiative one of 100 keystone conservation and recreation projects recognized by President Barack Obama's *America's Great Outdoors* Initiative. Our "Delaware Bayshore Initiative" is striving to protect and restore a landscape of 200,000 acres of critical wildlife habitat, enhance recreation opportunities compatible with conservation goals, and strengthen local communities whose economic and social well-being depend on healthy, resilient bayshore ecosystems. The initiative builds upon the First State's long history of protecting our Bayshore coastal area. More than forty years ago, Delaware's former Governor Russell Peterson had the foresight to protect our state's coastal zone from industrial development and today Governor Markell's administration is taking the next step by investing in habitat restoration, improving climate resilience, and expanding low-impact recreational opportunities.

As a result of decades of partnerships among state and federal agencies, conservation partners, and private landowners, more than half of the 200,000 acres between the National Park Service's First State National Monument in the City of New Castle and Cape Henlopen State Park near the City of Lewes are protected today as state wildlife areas, state parks, national wildlife refuges, and preserved private conservation lands and farmlands. This tapestry of conservation lands offers some of the best birding, waterfowl hunting, hiking, kayaking, and fishing in the entire nation and plays an increasingly significant role in our burgeoning ecotourism economy.

Given the global ecological significance of this region, we are working hard to make our Bayshore's public lands, private conservation investments, farmland and coastal communities more resilient in the face of climate-induced sea-level rise and the effects of more intense coastal storms like Hurricane Sandy. Delaware's applications aim to accomplish this goal by implementing urgent repair and restoration in three critical conservation areas, including Mispillion Harbor and coastal wetland impoundments of Ted Harvey and Little Creek state wildlife areas, to increase the resiliency of coastal habitat and reduce the flood risk to adjacent human communities. These applications also aim to develop resiliency restoration alternatives in three key areas of the central Bayshore, including tidal marshes of Milford Neck Conservation Area, tidal marshes between the Mahon River and St. Jones River, and the Port Mahon shoreline.

Resiliency work planned for Mispillion Harbor – a globally important and internationally recognized stopover site for the imperiled Red Knot and other migratory shorebirds – will not only assist in the Red Knot's recovery, but will also provide important support for the U.S. Department of Interior's \$40-million

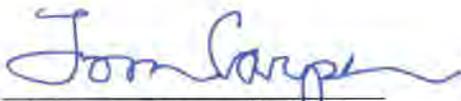
investment in Hurricane Sandy mitigation funds to the south at Prime Hook National Wildlife Refuge. The refuge's marshes are connected to Mispillion Harbor and its inlet to Delaware Bay through a network of tidal streams behind Slaughter Beach; mitigation work planned for Prime Hook requires a functioning hydrological connection with Mispillion Inlet. Funding the resiliency measures in Mispillion Harbor also indirectly provides support to the region's shipping economy. A maritime supply facility, operating out of the harbor and inlet, is the only service that delivers supplies and personnel to domestic and international vessels using the Delaware Bay main channel. Ships heading to the Ports of Wilmington, Philadelphia, Trenton, and Camden generate \$81 million in tax revenues for DE, PA and NJ and support an import value of more than \$41 billion annually.

Resiliency projects planned for Little Creek Wildlife Area, Ted Harvey Conservation Area, Milford Neck Conservation Area, surrounding tidal marshes and the shoreline of Port Mahon, will improve habitat for myriad species of conservation concern and preserve the state's hunting, fishing and wildlife-viewing economy, as well as reduce flood risk to residential communities including Little Creek, Kitts Hummock, Pickering Beach and farmland along the central Bayshore coast.

Delaware's grant applications demonstrate a cooperative, proactive approach to increasing resiliency and preparing for anticipated sea-level rise and intense coastal storms. The projects are well designed and ready for construction. Not only do both proposals enjoy broad support from conservation partners and local coastal communities, as evidenced by the numerous letters of support, Governor Jack Markell also personally endorsed both of these grant applications as a key elements of his efforts to improve the resilience of critical habitat in Delaware. Significant state and partner financial resources will match both proposals, and coordination with federal agencies such as U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers is already underway to leverage programmatic capacity and investments in federal projects and assets.

We hope that you will visit us in Delaware to experience our rich natural resources and see firsthand the progress that we are making in close partnership with the Department of Interior. We appreciate the leadership that you have shown in making this opportunity available to those areas affected by Hurricane Sandy, and respectfully request that you and your review team approve funding for Delaware's projects.

Sincerely,



Senator Thomas Carper



Senator Chris Coons



Representative John Carney

**APPENDIX B Pre-Construction Notification and  
Authorization Request to the Army Corps of Engineers  
under Nationwide Permit 27  
(DNREC's application to the USACE, 2015)**



**STATE OF DELAWARE**  
**DEPARTMENT OF NATURAL RESOURCES**  
**& ENVIRONMENTAL CONTROL**  
**DIVISION OF FISH & WILDLIFE**  
89 Kings Highway  
Dover, Delaware 19901

**OFFICE OF THE  
DIRECTOR**

**Phone: (302) 739-9910**  
**Fax: (302) 739-6157**

December 18, 2015

John Brundage and/or Michael Yost  
Dover Field Office  
U.S. Army Corps of Engineers  
1203 College Park Drive Suite 103  
Dover, DE 19904

Dear Mr. Brundage and/or Yost:

The Delaware Division of Fish and Wildlife, Wildlife Section is providing preconstruction notification (PCN) and requesting authorization from the Army Corps of Engineers under Nationwide Permit 27 to proceed with maintaining previously authorized stone dikes and beach as part of a restoration project. The proposed project is within the state-owned Milford Neck Conservation Area located within the Mispillion Harbor. The project is immediately adjacent to the Mispillion River and Cedar Creek confluence of the Mispillion Harbor which flows immediately into the Delaware Bay (Northing 4311178.22m, Easting 472887.83m). The anticipated start date of the project is June 8, 2016. The project is anticipated to take 6-7 months to construct.

Please see the following attachments:

- 1) Completed form #4345 with further details attachment
- 2) 60% design and basis of design specifications for the project
- 3) Correspondence from Delaware Division of Fish and Coastal Programs regarding critical resource waters
- 5) Correspondence from U.S. Fish and Wildlife Service regarding federally listed threatened or endangered species. (See "further details attachment" for more details)
- 6) Correspondence from Delaware Division of Fish and Wildlife Environmental Review Coordinator
- 7) Correspondence with NOAA Fisheries
- 8) Correspondence from State of Delaware Historical and Cultural Affairs regarding listing on National Register of Historical Places.

Please note the following contact information:

- a) contact person – Jeremy Ashe, Habitat Restoration Project Manager
- b) mailing address – Wildlife Section  
89 Kings Highway  
Dover, DE 19901
- c) telephone number – (office) (302)735-3601, (cell) (302) 632-5404.

Please feel free to contact me if you should have any questions or require additional information.

Sincerely,

12/18/2015

Jeremy Ashe  
Habitat Restoration Project Manager

*We Bring You Delaware's Great Outdoors  
through Science and Service*

Find us on Facebook <http://www.facebook.com/DelawareFishWildlife>



**U.S. ARMY CORPS OF ENGINEERS  
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT**  
33 CFR 325. The proponent agency is CECW-CO-R.

OMB APPROVAL NO. 0710-0003  
EXPIRES: 28 FEBRUARY 2013

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please **DO NOT RETURN** your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

**PRIVACY ACT STATEMENT**

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

**(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)**

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE
--------------------	----------------------	------------------	------------------------------

**(ITEMS BELOW TO BE FILLED BY APPLICANT)**

5. APPLICANT'S NAME First - Jeremy      Middle - Brandon      Last - Ashe Company - Delaware Division of Fish and Wildlife E-mail Address - jeremy.ashe@state.de.us			8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required) First -                      Middle -                      Last - Company - E-mail Address -		
6. APPLICANT'S ADDRESS: Address- 89 Kings Highway City - Dover                      State - DE                      Zip - 19901      Country - Kent			9. AGENT'S ADDRESS: Address- City -                                      State -                                      Zip -                                      Country -		
7. APPLICANT'S PHONE NOs. w/AREA CODE a. Residence                      b. Business                      c. Fax (408) 202-5935                      (302) 632-5404                      NA			10. AGENTS PHONE NOs. w/AREA CODE a. Residence                      b. Business                      c. Fax		

**STATEMENT OF AUTHORIZATION**

11. I hereby authorize, Jeremy Ashe to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

  
SIGNATURE OF APPLICANT

12-18-2015  
DATE

**NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY**

12. PROJECT NAME OR TITLE (see instructions) Mispillion Harbor Stone Dike and Beach Restoration			
13. NAME OF WATERBODY, IF KNOWN (if applicable) Mispillion River/Cedar Creek		14. PROJECT STREET ADDRESS (if applicable) Address (Adjacent to) 2992 Lighthouse Road	
15. LOCATION OF PROJECT Latitude: +N Northing 4311178.22m      Longitude: -W Easting 472887.83m		City - Milford                                      State- DE                                      Zip- 19963	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) State Tax Parcel ID 5-00-16500-01-0400-00001                      Municipality Section -                                      Township -                                      Range -			

17. DIRECTIONS TO THE SITE

From Dover DE take DE-1 South, exist DE-36 E/Cedar Beach Rd (Left), turn Lighthouse Rd (Left), and this will take you to the Dupont Nature Center. The project is across the Mispillion River. See attached design for map.

18. Nature of Activity (Description of project, include all features)

The Delaware Division of Fish and Wildlife, Wildlife Section is providing preconstruction notification (PCN) and requesting authorization from the Army Corps of Engineers under Nationwide Permit 27 to proceed with restoration of a previously authorized stone dike and to restore a beach that was previously nourished in 2009. The proposed project is within the southern portion of the state-owned Milford Neck Conservation Area and the Mispillion Harbor Complex. The project is located in Kent County and immediately west of the Delaware Bay (Northing 4311178.22m , Easting 472887.83m)(Design Sheet G-001). The start date of the project is June 8, 2016, with an estimated project duration of approximately 7 months. The project will restore the existing stone dike (Approx 2300'), add new groins (north/south terminal groins, and A-F groins), add sand to restore beach, and raise elevation of a man made ditch. The primary goal of this project is to restore the beach and stone dike (protects beach and harbor) to allow horseshoe crab spawning and red knot (federally threatened) foraging. Habitat restoration at this site is critical as it is a hot spot for these species. (See attached for more details)

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purposes of this beach/stone dike restoration project are to restore critical habitat for horseshoe crab spawning and red knot foraging. It has been documented that this area is a hot spot for Delaware Bay for crab spawning and red knot foraging. However, due to storm damage a breach North of the stone dike has resulted in daily loss of habitat due to erosion. Yearly monitoring and banding efforts suggest that this beach has seen a decline over the years due to loss of habitat. Doing nothing could result in the complete loss of this critical habitat. Design criteria evaluated hydrodynamic modeling data which suggested there is a potential for a catastrophic breach north of the rock wall and potential for the entire Mispillion to redirect its course north of the rock wall. This could result in dramatic effects to habitat outside the project area as well. Therefore, the design of this project is focused on being resilient to future storms, preventing a catastrophic breach of the Mispillion River, and restoring as much beach as possible for crab spawning and red knot foraging. (see attached for more details)

**USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

20. Reason(s) for Discharge

Discharges for this project are limited to excavating out sand to install the North Terminal Groin (approx 400 cy) and sand placement to restore the beach (45,000 to 60,000 cy). The sand excavated will be placed back after the North Terminal Groin is installed. All other sand placement will be hydraulically piped and placed according to the design (see cross sections c-302, c-303, and c-304) (see attached for more details). Sand will likely need to be graded using a low pressure bull dozer after the sand has been placed. BMPs will be used to minimize sand from leaving the designed area. All areas for discharged are sub-aqueous lands with no emergent or SAV aquatic vegetation. Approximately 12,000 tons of DelDot Class R7/R4 will be used for the groins and stone dike restoration.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type	Type	Type
Amount in Cubic Yards	Amount in Cubic Yards	Amount in Cubic Yards
sand 45,000-60,000		

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres  
or  
Linear Feet Approx 3000'

23. Description of Avoidance, Minimization, and Compensation (see instructions)

We have worked with USFWS, State Wetlands, State species experts, and others to design a restoration project to minimize and avoid impacts to species (see recommendations). Construction time line and methods also were considered and worked out with these groups. Any impacts that could not be avoided will be reconciled by the restoration of the beach and stone dike as the design life of this project is 30 years. Completing this project is essential for red knots in particular. Once this project is completed it will give state and federal agencies time to develop other restoration sites to help the recovery of this species.

24. Is Any Portion of the Work Already Complete?  Yes  No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See attached

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - Dover State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED

\* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

 12/18/15  
SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than \$10,000 or imprisoned not more than five years or both.



**Further Detail Attachment: (See basis of design and design for further information)**

The purpose of the project is to restore horseshoe beach nesting habitat and provide suitable foraging habitat for red knot and other shorebirds that rely on horseshoe crab eggs as a food source. Additionally, this project has been designed to maintain confluence of the Mispillion River and Cedar Creek out the Mispillion Inlet. In a 2008 Hydrodynamic Modeling Study, data suggest that the Mispillion River is highly vulnerable to breaching the existing stone dike and undermining the whole system. If this occurs it is likely that the reach habitat will be lost.

Going back before the 1980s this site looked very differently. The stone dike was once an entire sand/beach system that was utilized by horseshoe crabs and shorebirds. During the 1980s a breach occurred and subsequent breaches of the Mispillion River that eroded the beach. In an effort to maintain the Mispillion/Cedar Creek confluence out the Mispillion Inlet the State of Delaware installed a stone dike. Current conditions of the stone dike (geotechnical ,topo, hydrodynamic modeling studies) have suggested that the Mispillion is at risk of a catastrophic breach. The result could be a complete breach of Mispillion north the existing stone dike resulting in the complete loss of back beach (habitat for horseshoe crabs and shorebirds) and possible effect on USFWS Prime Hook project (38 million dollar Federal Investment). Currently a small breach has occurred and yearly loss of back beach has been observed. We see less and less sand for species to spawn and forage. In an effort to avoid this issue, the Division of Fish and Wildlife obtained a grant to design a system that would be more resilient to coastal storms and provide habitat restoration for horseshoe crabs and shorebirds (see attached 60% design).

The 2008 Modeling Study was the primary driver for restoration alternatives for this system. Additionally, the input from USFWS, DFW, Coastal Programs, Heritage Programs, Wetland Section, USACE, Watershed Stewardship, a design has been drafted for permit review. The basis of the design is detailed (see attached).

**North Terminal Groin:** The Mispillion River is eroding back beach daily through a breach at the north stone dike. We propose adding a north terminal groin ("Dog Leg"). This will stop future breaches from Nor'easter's and prevent future erosion.

**The South Terminal Groin:** This is a logical location to add a groin as there is an existing sand bar that is exposed at low tide. This would allow the sand to be locked into the system and prevent erosion.

**The Stone Dike:** The proposal is to raise the stone dike, add crown, and side slope (river side). The elevation was chosen based on wave modeling to prevent overtopping. Additionally, this is slightly higher than when the original stone dike was installed (there has been some settling since 1980s)

**Other Groins:** These groins are used to hold sand in place and keep the force from the river into the main channel.

**Restoring the Existing Ditch:** This ditch is known as Greco's Canal and was dug out to move vegetables from the north to the south. A breach north of Mispillion Harbor has naturally filled in the ditch and is vegetated primarily with *Spartina sp.* We expect that this ditch will naturally restore (fill in) on its own but expediting the process is mutually beneficial for the marsh and this project. We propose to restore the ditch to allow natural recurrent of *Spartina sp.* Our design does not indicate that this ditch is a contributing factor to the natural marsh drainage as most of the water drains out a ditch due west (about 200 yards up river). Filling in this ditch will also act as a natural buffer from the Delaware Bay and the Mispillion River. Modeling suggests that this is a critical ditch that should be restored to tidal elevations to allow a natural marsh buffer. By not restoring the ditch the Mispillion River would have a direct access to the Delaware Bay.

**Beach Restoration:** The beach has been designed with horseshoe crab and red knots natural history needs in mind. The beach has a very gradual 20:1 slope that ties into the stone dike and terminates into the main channel.

Outcomes of this project are expected to be the following.

- 1) Restoration of back beach and beach habitat for horseshoe crabs and red Knots along the entire stone dike. This will resemble what was lost in the 1980s.
- 2) Restoration of the stone dike (Approx. 2300 LF)
- 3) Installation of approximately 900 LF of new rock groins
- 4) Fill of approximately 60,000 cubic yards of sand to restore beach habitat.
- 5) Restoration of habitat to be resilient to coastal storms and minimize future maintenance.









Charles Auman

3018 Lighthouse Road ,Milford DE 19963

Joseph and Pamela Giershick

129 W Howard St, Stowe DE 19464

Frank Evans

333 Bridge St, Spring City PA 19475

Barry and Barbara Hoch

229 Manatawny Rd, Boyertown PA 19512

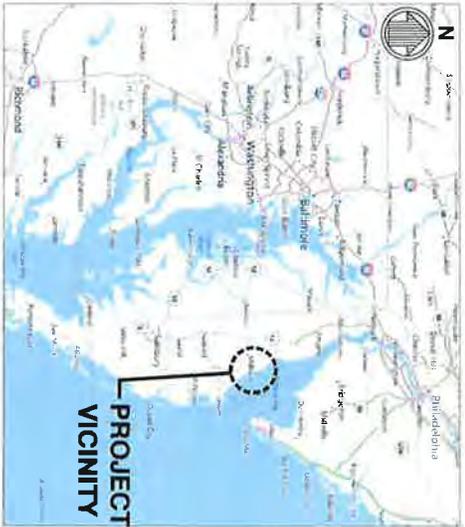


# DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

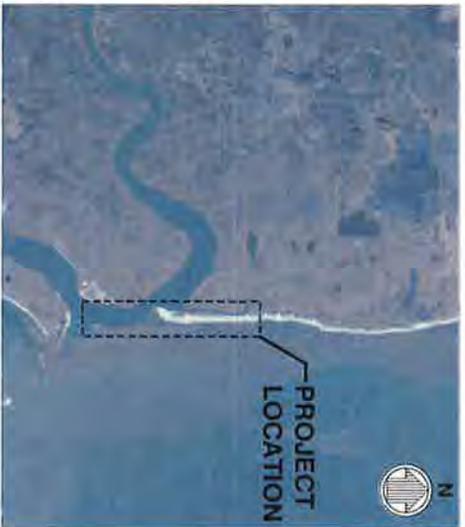
DOVER, DELAWARE

## MISPILLION COMPLEX PROJECT BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES

### CONTRACT No. NAT201501/MISPILLION



VICINITY MAP  
NTS



LOCATION MAP  
NTS

60% RESUBMITTAL  
NOVEMBER 2016  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALE: SHEET B302 24.25" X 34" DRAWING

<p>Sheet Reference No <b>G-001</b></p> <p>INDEX 1 OF 15</p>	 <p>2700 LIGHTHOUSE POINT EAST BOX 312 BALTIMORE, MD 21224 410-753-1500</p> <p>DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL 89 KINGS HIGHWAY DOVER, DE 19901</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Designed by <b>PKC</b></td> <td>Date NOV 2 2015</td> </tr> <tr> <td>Drawn by <b>PKC</b></td> <td>MAN Project No. 8482-03</td> </tr> <tr> <td>Reviewed by <b>PKC</b></td> <td>Drawing code NAT201501/MISPILLION</td> </tr> <tr> <td>Submitted by <b>MORRIS &amp; NICHOL</b></td> <td>Drawing Scale PKC www.f11.com SHEETS</td> </tr> </table>	Designed by <b>PKC</b>	Date NOV 2 2015	Drawn by <b>PKC</b>	MAN Project No. 8482-03	Reviewed by <b>PKC</b>	Drawing code NAT201501/MISPILLION	Submitted by <b>MORRIS &amp; NICHOL</b>	Drawing Scale PKC www.f11.com SHEETS	<p><b>MISPILLION COMPLEX PROJECT</b> BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES DOVER, DELAWARE</p> <p><b>TITLE SHEET WITH VICINITY AND LOCATION MAPS</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Rev</th> <th>Description</th> <th>Date</th> <th>Appr</th> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>	Rev	Description	Date	Appr												
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Rev	Description	Date	Appr																									



**INDEX OF DRAWINGS**

INDEX NO.	SHEET NO.	SHEET TITLE
<b>GENERAL</b>		
1	G-001	TITLE SHEET WITH VICINITY AND LOCATION MAPS
2	G-002	INDEX OF DRAWINGS, LESSUD, ABBREVIATIONS AND GENERAL NOTES
3	G-101	PLAN - EXISTING CONDITIONS
<b>CIVIL</b>		
4	C-101	PLAN - GENERAL ARRANGEMENT
5	C-102	PLAN - GENERAL SITE - SOUTH
6	C-103	PLAN - GENERAL SITE - NORTH
7	C-201	SECTIONS - TYPICAL GROUND SHEET 1 OF 2
8	C-302	SECTIONS - TYPICAL GROUND SHEET 2 OF 2
9	C-303	GROSS SECTIONS - BEACH FILL SHEET 1 OF 2
10	C-304	GROSS SECTIONS - BEACH FILL SHEET 2 OF 2
11	C-305	PLAN - GROSS SECTION LOCATIONS
12	C-306	GROSS SECTIONS - SHEET 1 OF 4
13	C-307	GROSS SECTIONS - SHEET 2 OF 4
14	C-308	GROSS SECTIONS - SHEET 3 OF 4
15	C-309	GROSS SECTIONS - SHEET 4 OF 4

**GENERAL NOTES**

- NOTES BELOW ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS IN ADDITION TO GENERAL NOTES.
- VERTICAL DATUM IS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAV88). HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD 83), DELAWARE STATE PLANE COORDINATE SYSTEM.

**TOTAL DATUM - MISPELLION INLET**

MEAN HIGHER HIGH WATER (MHHW)	2.58 FEET
MEAN HIGH WATER (MHW)	2.16 FEET
NORTH AMERICAN VERTICAL DATUM (NAV88)	0.00 FEET
MEAN TIDE LEVEL (MTL)	-0.15 FEET
NATIONAL GEODETIC VERTICAL DATUM (NGVD)	-2.47 FEET
MEAN LOW WATER (MLW)	-2.83 FEET
MEAN LOWER LOW WATER (MLLW)	-2.93 FEET

- THE HYDROGRAPHIC SURVEY WAS PERFORMED BY MORRIS & RITCHEY ASSOCIATES, INC. DURING MAY-JUNE 2015. THE REFERENCE DATUM GPS K1A IS LOCATED AT N 404,889.27, E 643,097.42, ELEVATION 13.64 NAV88. ADDITIONAL TOPOGRAPHIC DATA OBTAINED FROM USACE SURVEY DATA DATED FROM 1955 TO 2007.
- THE CONTRACTOR SHALL ABIDE BY ALL APPLICABLE ENVIRONMENTAL PROTECTION STANDARDS, PERMITS, LAWS AND REGULATIONS.
- ALL SAFETY REGULATIONS ARE TO BE STRICTLY FOLLOWED.
- CONTRACTOR SHALL TAKE ALL NECESSARY STEPS AND ACTIONS REQUIRED UNDER THE DELAWARE CONSTRUCTION REGULATIONS AND REGULATIONS ADOPTED THEREIN, BUT NOT LIMITED TO, DELAWARE DEPARTMENT OF OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AND NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH).
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ACTUAL SITE CONDITIONS PRIOR TO COMMENCEMENT OF ANY WORK.

**DESIGN SPECIFICATIONS AND REFERENCE**

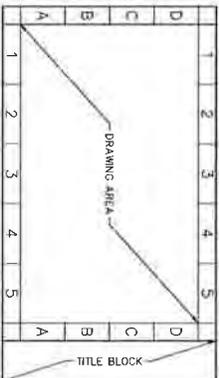
- ROCK MANUAL, THE USE OF ROCK IN HYDRAULIC ENGINEERING (2nd EDITION), CMAA
- STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2001 DELAWARE DEPARTMENT OF TRANSPORTATION

**PROJECT INFORMATION**

- REFERENCE DOCUMENTS - THE FOLLOWING DOCUMENTS WERE UTILIZED IN PREPARING THIS DESIGN:
- MISPELLION RIVER, DELAWARE BEACH CLOSURE, 1993 USACE
  - CONCH BAR BEACH, KENT COUNTY, DELAWARE BEACH REPAIR, 1985

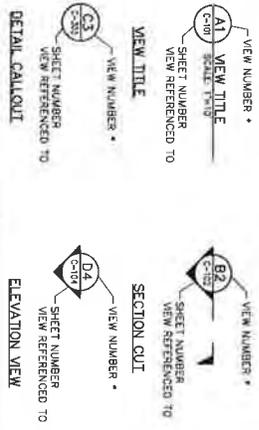
**SEQUENCE OF CONSTRUCTION**

- CONSTRUCT NORTH TERMINAL GROUND ROCK STRUCTURE
  - EXCAVATE SAND TO LIMITS SHOWN TO CONSTRUCT FULL GROUND SECTION AND STOCKPILE ON SITE FOR RE-USE
  - PLACE GEOTEXTILE, DELDOT R-4 CORE STONE AND DELDOT R-7 ARMOR STONE
  - PLACE SAND FROM EXCAVATION BACK TO PREVIOUS GRADES, AND TIE-IN TO TOP OF DUNE
- CONSTRUCT SOUTH TERMINAL GROUND ROCK STRUCTURE
  - PLACE GEOTEXTILE, DELDOT R-4 CORE STONE AND DELDOT R-7 ARMOR STONE
  - REPAIR/RE-EXISTING STONE DIKE
  - PLACE DELDOT CLASS R-4 STONE ON INSIDE TO FILL VOIDS AND CREATE SMOOTH SURFACE
  - PLACE GEOTEXTILE ON TOP OF R-4 STONE
  - PLACE DELDOT CLASS R-7 STONE GEOTEXTILE AND ON CREST OF EXISTING STONE DIKE
- PLACE SAND BEHIND REHABILITATED STONE DIKE BETWEEN NORTH TERMINAL GROUND AND SOUTH TERMINAL GROUND. PLACE SAND WEST OF BEACH BOUND AND IN SPOOLS CANALS
- CONSTRUCT INSIDE ROCK GROUNDS X THROUGH Y
  - PLACE GEOTEXTILE ON TOP OF NEW SAND FILL, PLACE DELDOT R-4 CORE STONE AND DELDOT R-7 ARMOR STONE



**DRAWING AREA COORDINATE SYSTEM (DACS)**

- VIEW NUMBER IS BASED ON THE (DACS) LOCATION OF THE LOWER-LEFT EXTENTS OF THE VIEW ON THE REFERENCED SHEET. WHEN REFERENCING DRAWING OF THIS PROJECT, THE SHEET NUMBER AND VIEW NUMBER MUST BE QUOTED TOGETHER IN THE FOLLOWING FORM: "VIEW NO./SHEET NO." (A1/C-301)



**ABBREVIATIONS**

APPROX	APPROXIMATE	MIN	MINIMUM
BLDG	BUILDING	MISC	MISCELLANEOUS
BLDG	BUILDING	MLW	MEAN LOW WATER
BTM	BOTTOM	MLWN	MEAN LOWER LOW WATER
CF	CUBIC FEET	MON	MONUMENT
CE	CENTRELINE	MTL	MEAN TIDE LEVEL
CL	CLEARANCE	N	NORTH
CON	CONSTRUCTION	NAV88	NORTH AMERICAN VERTICAL DATUM 1988
CONT	CONTINUOUS	NGVD	NATIONAL GEODETIC VERTICAL DATUM 1988
CTS	CENTRES	NIC	NOT IN CONTACT
CY	CUBIC YARDS	NIS	NOT TO SCALE
DBL	DOUBLE	NO	NO
DI	DIAMETER	OD	OUTSIDE DIAMETER
DISCON	DISCONTINUOUS	POB	POINT OF BEGINNING
DISCON	DISCONTINUOUS	PPF	POUNDS PER SQUARE FOOT
DRAWING	DRAWING	PSI	POUNDS PER SQUARE INCH
EAST	EAST	PT	POINT OF TANGENT
EA	EACH FACE	RDY	REQUIRED
EF	END POINT	REQD	REQUIRED
ELEV. BL	ELEVATION	R	RIGHT
EO	END POINT	S	SOUTH
EQ	EQUAL	SEC	SECOND
EXIST	EXISTING	SEC	SECTION
EXP	EXPANSION	SH	SHOULDER
F	FEET	SHT	SHEET
FABR	FABRIC	SHT	SHEET
FT	FEET	SPA	SPACES
HORIZ	HORIZONTAL	STA	STATION
IN	INCHES	STD	STANDARD
INFO	INFORMATION	STR	STRIP
INPT	INCHES	TBR	TO BE REMOVED
KIP	KIPS PER SQUARE INCH	TC	TURBIDITY CURTAIN
KS	KIPS PER SQUARE INCH	TP	TURBIDITY POINT
LB	POUNDS	TYP	TYPICAL
LDAR	LIGHT RADAR	U/S	UNDERGROUND
LD	LENGTH	UN	UNLESS OTHERWISE NOTED
LONG	LONG	W	WEST
LG	LONG	W/	WEST
LI	LEFT	WP	WORK POINT
LI	LEFT		
MAX	MAXIMUM		
MHW	MEAN HIGH WATER		
MHHW	MEAN HIGHER HIGH WATER		

**LEGEND**



**60% RESUBMITTAL**  
 NOT TO BE USED FOR CONSTRUCTION



**MISPELLION COMPLEX PROJECT**  
 BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
 DOVER, DELAWARE

**INDEX OF DRAWINGS, LEGEND, ABBREVIATIONS AND GENERAL NOTES**

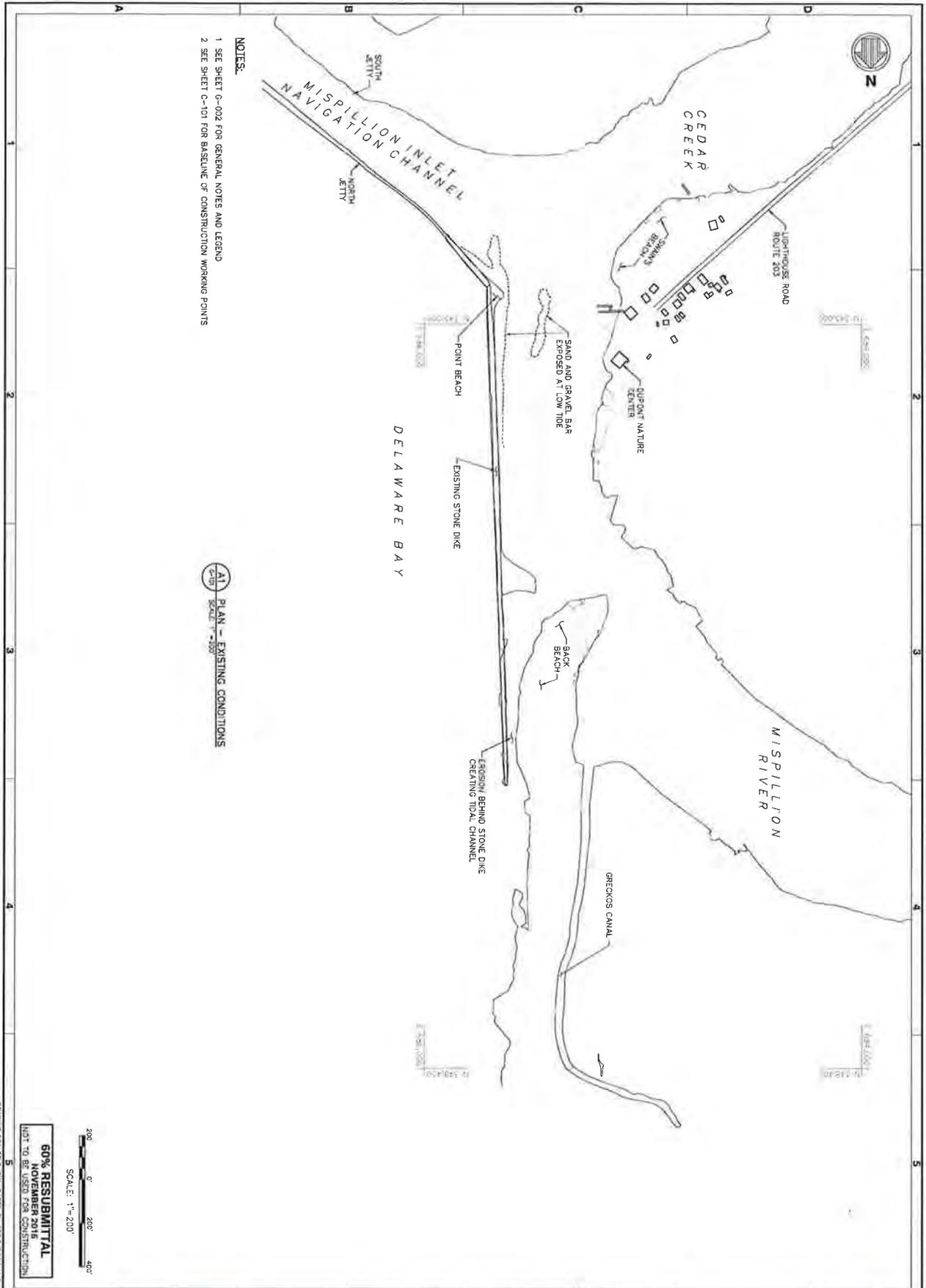
DATE: 08/20/2015  
 DRAWING NO: 002-03  
 SHEET NO: 2 OF 15

DESIGNED BY: PAK  
 CHECKED BY: PAK  
 DRAWN BY: PAK  
 REVISIONS: 1

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL  
 1900 CONVENT ROAD  
 DOVER, DE 19901

2700 LIGHTHOUSE POINT EAST, 5th FLOOR  
 BALTIMORE, MD 21224  
 410-563-7300

Sheet Reference No. **G-002**  
 2 OF 15



- NOTES:**
1. SEE SHEET G-002 FOR GENERAL NOTES AND LEGEND
  2. SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS

**PLAN - EXISTING CONDITIONS**

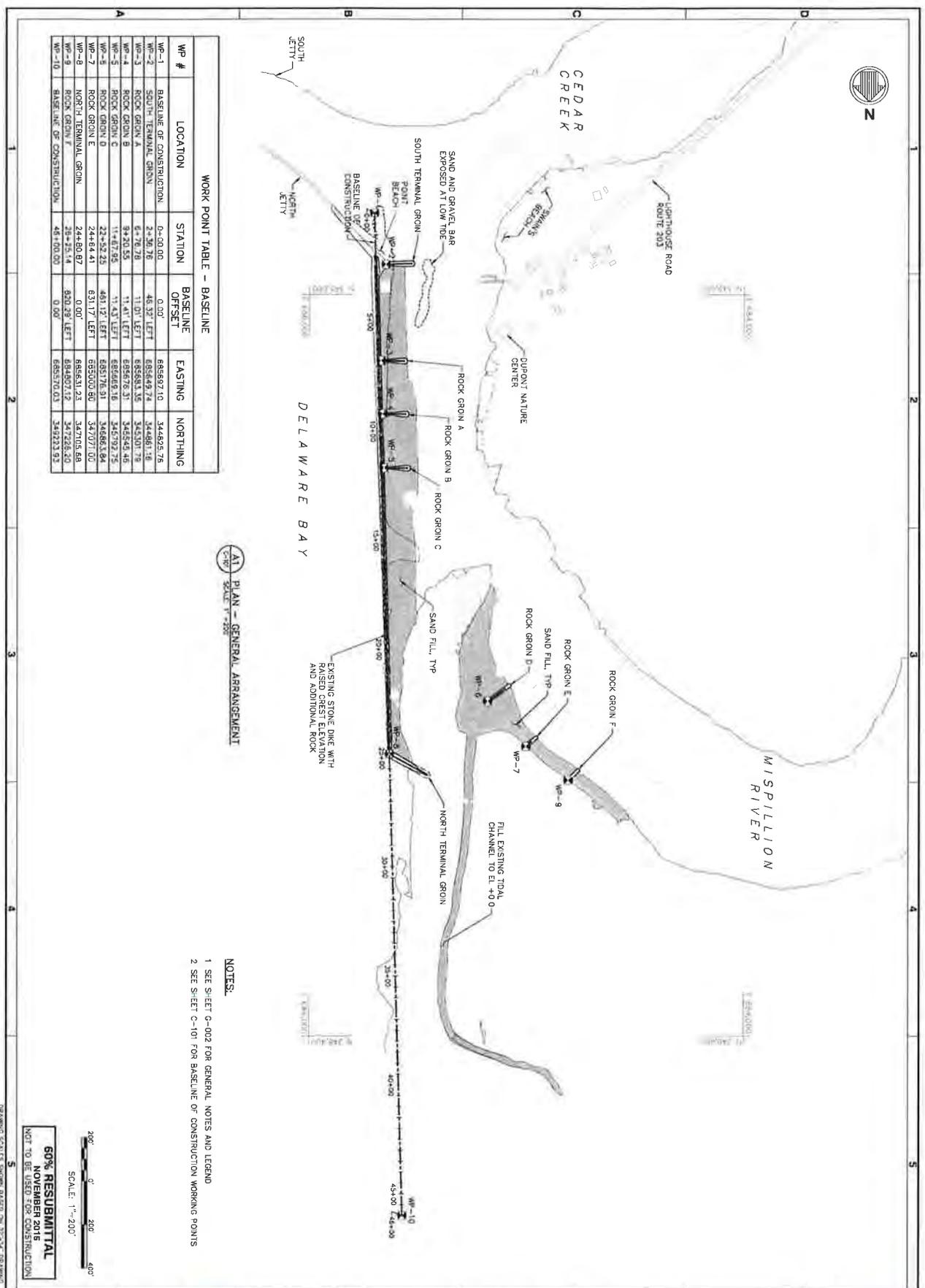
SCALE: 1" = 200'

200' 0' 200' 400'

**60% RESUBMITTAL**  
 NOVEMBER 2015  
 NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALE: SHEET BASED ON 20' X 30" DRAWING

<p>2700 LIGHTHOUSE POINT EAST,        STE. 801        BALTIMORE, MD 21224        410-581-7500</p>	<p>Designed by: PKC        Date: 04/2015</p>	<p><b>MISPILLION COMPLEX PROJECT</b>        BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES        DOVER, DELAWARE</p>	
	<p>Drawn by: MRF/JSS        Set by: PKC        #48-1-03</p>		
<p>DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL        80 KING'S HIGHWAY        DOVER, DE 19801</p>		<p><b>PLAN - EXISTING CONDITIONS</b></p>	
<p>Sheet Reference No  <b>G-101</b></p>	<p>Scale</p>	<p>North Arrow</p>	<p>North Arrow</p>



**WORK POINT TABLE - BASELINE**

WP #	LOCATION	STATION	BASELINE OFFSET	EASTING	NORTHING
WP-1	BASELINE OF CONSTRUCTION	0+00.00	0.00'	685597.10	344825.76
WP-2	SOUTH TERMINAL GROIN	2+36.78	46.32' LEFT	685449.74	344861.18
WP-3	ROCK GROIN A	6+76.78	11.01' LEFT	685483.36	345301.75
WP-4	ROCK GROIN B	9+20.55	11.41' LEFT	685476.31	345545.46
WP-5	ROCK GROIN C	11+47.95	11.43' LEFT	685468.16	345792.75
WP-6	ROCK GROIN D	22+52.25	48.12' LEFT	685176.91	346863.84
WP-7	ROCK GROIN E	24+64.41	0.00'	685002.80	347071.00
WP-8	NORTH TERMINAL GROIN	24+60.67	0.00'	685651.23	347105.68
WP-9	ROCK GROIN F	25+25.14	620.29' LEFT	684927.12	347228.20
WP-10	BASELINE OF CONSTRUCTION	45+00.00	0.00'	685570.03	348223.92

**PLAN - GENERAL ARRANGEMENT**  
SCALE: 1"=200'

- NOTES:**
- SEE SHEET C-002 FOR GENERAL NOTES AND LEGEND
  - SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS

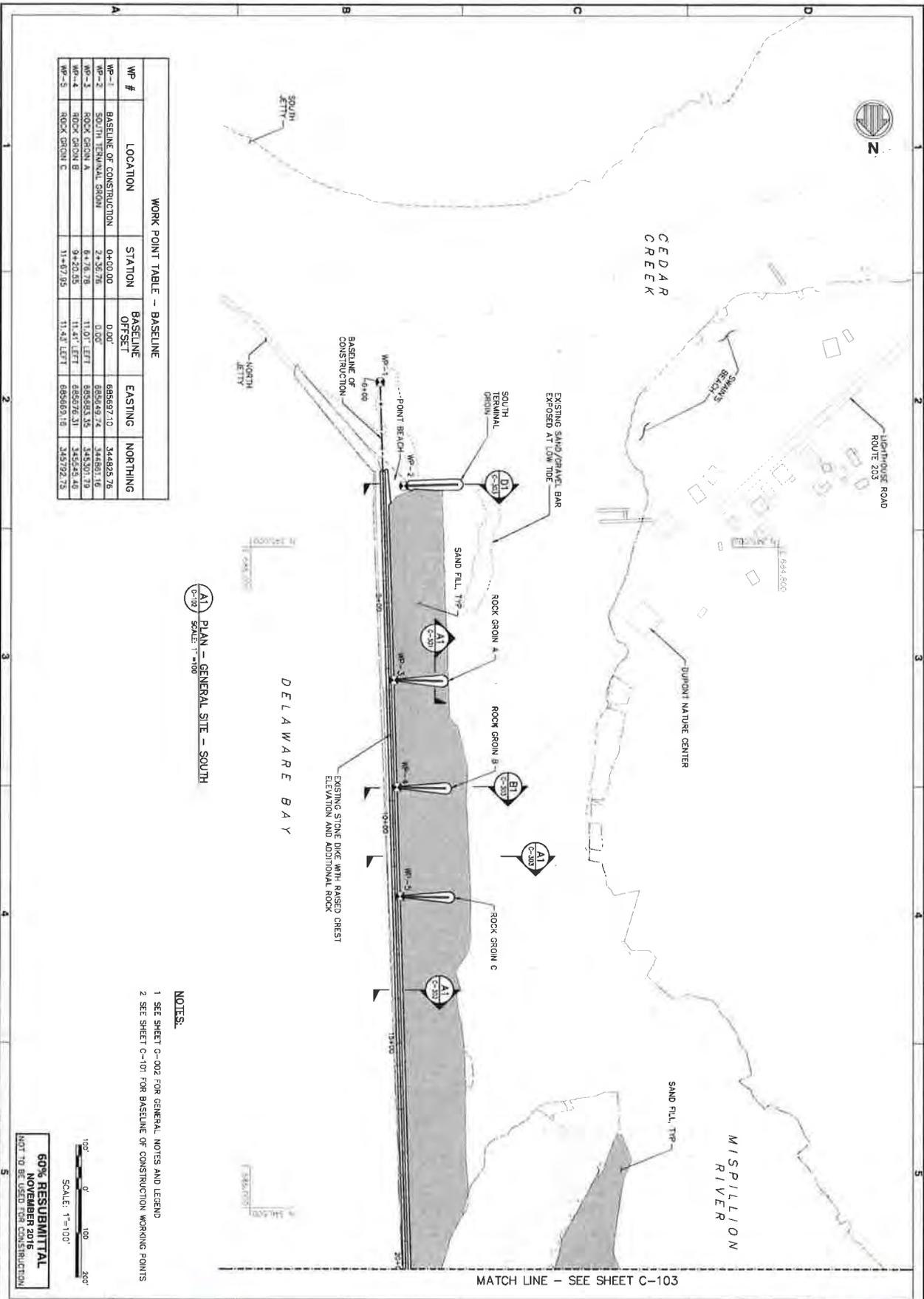
200' 0' 200' 400'

SCALE: 1"=200'

**60% RESUBMITTAL**  
NOVEMBER 2016  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALE SHOWN BASED ON 21"X34" DRAWING

 2700 LIGHTHOUSE POINT EAST, 105 BR BALTIMORE, MD 21224 410-553-3000	Design by: PKW Date: 10/2015 Drawn by: MSF/VJS Date: 04/2016 Checked by: PKW Date: 04/2016 Submitted by: MSF/VJS Date: 04/2016	<b>MISPILLION COMPLEX PROJECT</b> BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES DOVER, DELAWARE  <b>PLAN - GENERAL ARRANGEMENT</b>	
Sheet Revision No. <b>C-101</b> OF 16			



**WORK POINT TABLE - BASELINE**

WP #	LOCATION	STATION	BASELINE OFFSET	EASTING	NORTHING
WP-1	BASELINE OF CONSTRUCTION	0+00.00	0.00'	685627.10	344825.76
WP-2	SOUTH TERMINAL DRAIN	2+32.78	0.00'	685628.15	344825.76
WP-3	ROCK GROIN A	6+32.78	11.00' LEFT	685628.15	344301.78
WP-4	ROCK GROIN B	9+40.45	11.40' LEFT	685628.31	343242.43
WP-5	ROCK GROIN C	11+47.95	11.40' LEFT	685628.18	343792.73

(A1) PLAN - GENERAL SITE - SOUTH  
SCALE: 1"=100'

- NOTES:**
- 1 SEE SHEET C-002 FOR GENERAL NOTES AND LEGEND
  - 2 SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS

100' 0' 100' 200'  
SCALE: 1"=100'

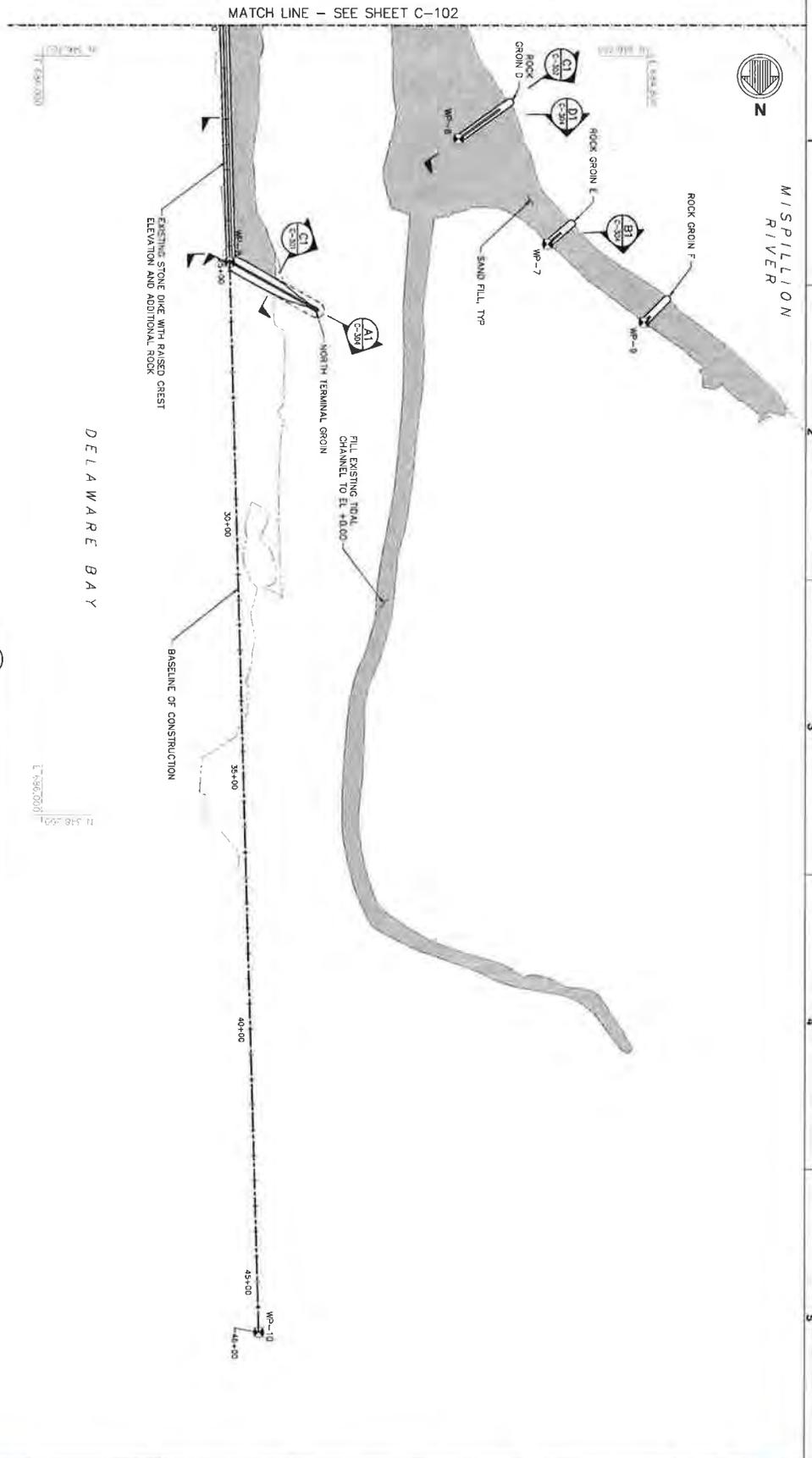
**60% RESUBMITTAL**  
NOVEMBER 2016  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALE: SHOWN BASED ON 21"x34" DRAWING

 <p>2700 LIGHTHOUSE POINT EAST, BALTIMORE MD 21224 410-581-7200</p>	<p>Prepared by: <b>PKC</b> Date: <b>02/20/15</b></p> <p>Checked by: <b>WRF/VSS</b> Date: <b>03/03/15</b></p> <p>Reviewed by: <b>PKC</b> Date: <b>03/03/15</b></p> <p>Drawn by: <b>WRF/VSS</b></p> <p>Scale: <b>1"=100'</b></p> <p>Sheet: <b>3</b> of <b>13</b></p>	<p style="text-align: center;"><b>M MISPELLION COMPLEX PROJECT</b> <b>BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES</b> <b>DOVER, DELAWARE</b></p> <p style="text-align: center;"><b>PLAN - GENERAL SITE - SOUTH</b></p>	 <p style="text-align: center;">DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL 89 KINGS HIGHWAY DOVER, DE 19901</p>
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MISPILLION RIVER



WORK POINT TABLE - BASELINE

WP #	LOCATION	STATION	BASELINE OFFSET	EASTING	NORTHING
WP-6	ROCK GROIN D	22+52.25	461'12" LEFT	689776.97	346863.84
WP-7	ROCK GROIN E	24+84.41	631'17" LEFT	689506.80	347071.00
WP-8	NORTH TERMINAL GROIN	24+80.87	0.00'	689451.23	347105.86
WP-9	ROCK GROIN F	24+25.14	630'28" LEFT	689407.12	347226.20
WP-10	BASELINE OF CONSTRUCTION	49+00.00	0.00'	689376.03	348223.53

PLAN - GENERAL SITE - NORTH  
SCALE: 1"=100'

NOTES:

1. SEE SHEET G-002 FOR GENERAL NOTES AND LEGEND
2. SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS



60% RESUBMITTAL  
NOVEMBER 2015  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALES SHOWN BASED ON 27"x36" DRAWING

Sheet  
Revision No.  
**C-103**  
INDEX: 5 OF 15

**mettler & metcal**  
2700 LIGHTHOUSE POINT EAST,  
BALTIMORE, MD 21224  
410-563-7800

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL  
89 KING HIGHWAY  
DOVER, DE 19901

Drawn by: PWK  
Date: 05/20/15  
Checked by: WRF/VSS  
Reviewed by: PWK  
Submitted by: MERRILL & MCCOY

Scale: 1"=100'  
Date: 05/20/15  
Project Name: MISPILLION RIVER  
Project No: 15-001

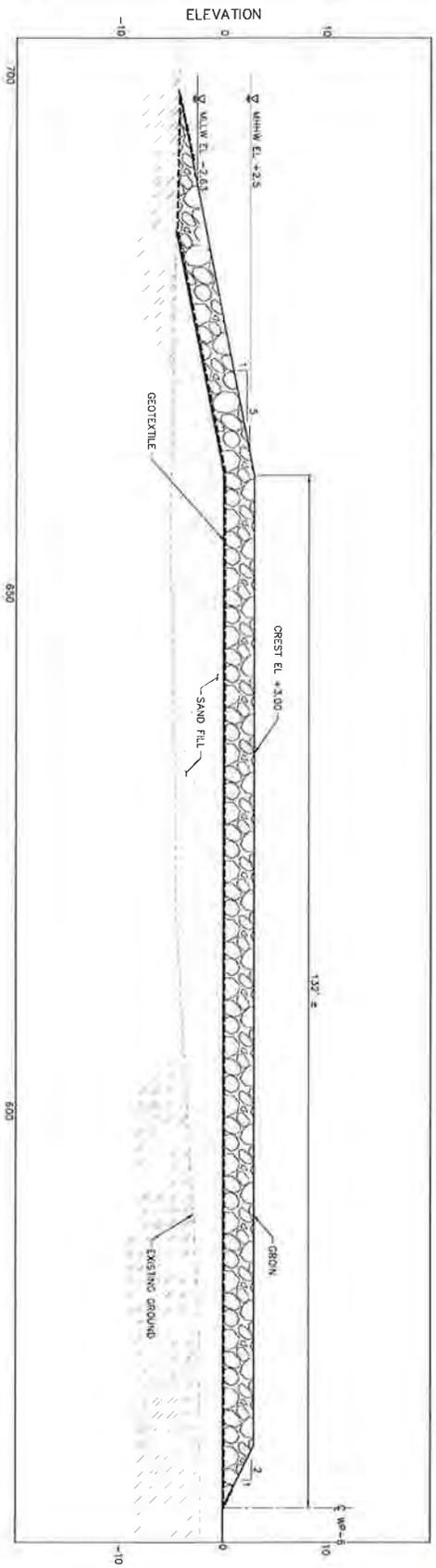
MISPILLION COMPLEX PROJECT  
BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
DOVER, DELAWARE

**PLAN - GENERAL SITE - NORTH**

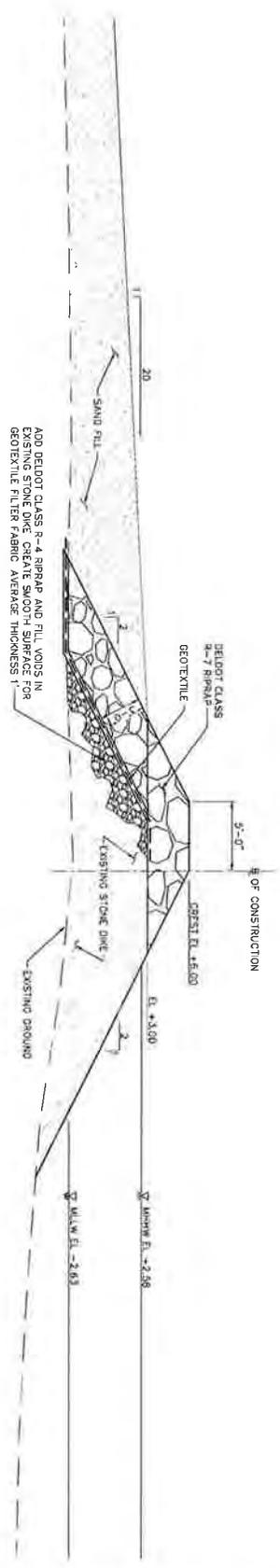
Date	By	Appr.





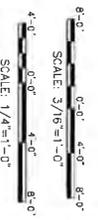


(C1) PROFILE - GROIN AT SAND FILL  
SCALE: 3/16" = 1'-0"



(A1) SECTION - TYPICAL STONE DIKE REHABILITATION  
SCALE: 1/4" = 1'-0"

- NOTES**
1. SEE SHEET G-002 FOR GENERAL NOTES AND LEGEND
  2. SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS



60% RESUBMITTAL  
NOVEMBER 2016  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALES SHOWN BASED ON 27" X 42" DRAWING



**WILMINGTON COMPLEX PROJECT**  
BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
DOVER, DELAWARE

**SECTIONS - TYPICAL GROIN**  
SHEET 2 OF 2

Designed by: PKW	Date: 08/11/2015
Drawn by: WVS/VSS	W&A Project No: 8452-03
Reviewed by: PKW	Starting code: 84221002/WVS/LLJ/M
Submitted by: MORRIS & NICHOL	Drawing title: Profile view 1.1 (D 3412)

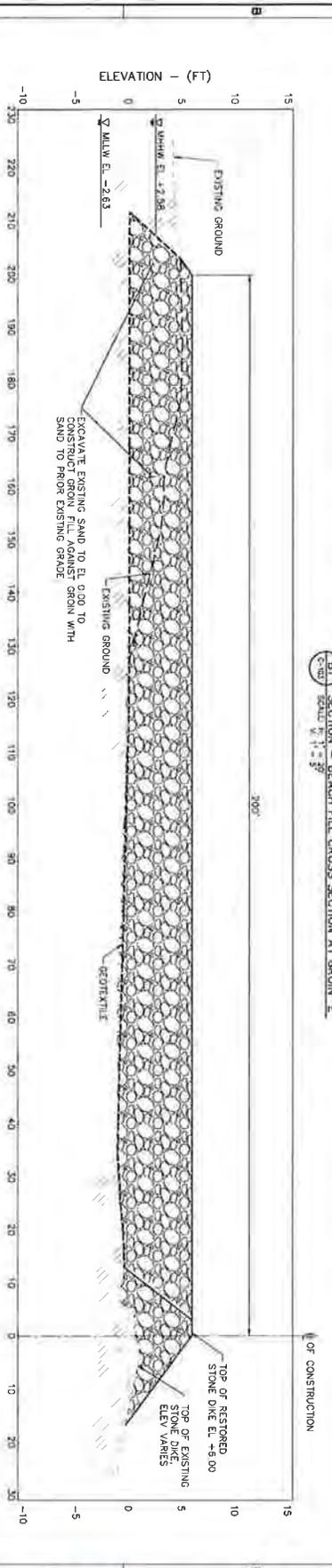
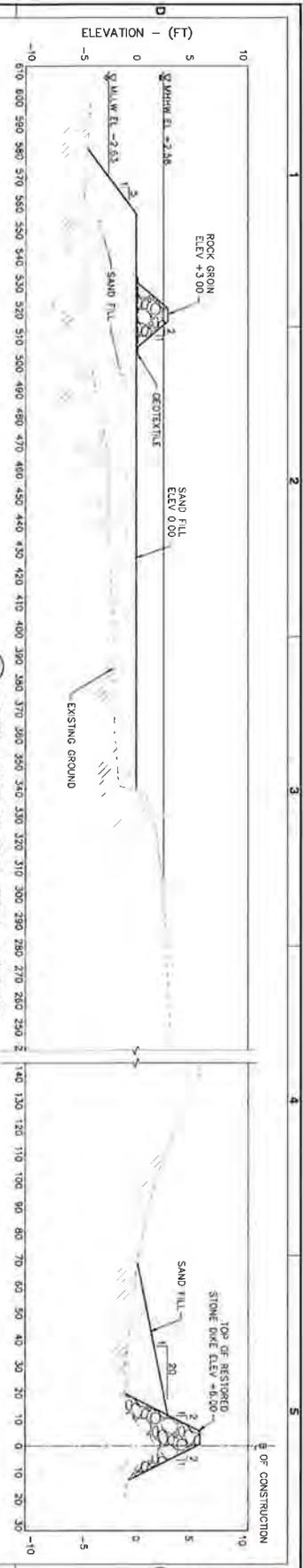
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**MORRIS & NICHOL**

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DOVER, DE 19901

Sheet  
Revisions No  
**C-302**  
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- NOTES:
- SEE SHEET C-002 FOR GENERAL NOTES AND LEGEND.
  - SEE SHEET C-101 FOR BASELINE OF CONSTRUCTION WORKING POINTS.

01 PROFILE - NORTH TERMINAL GROM  
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MIFILLON COMPLEX PROJECT  
BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
DOVER, DELAWARE

CROSS SECTIONS - BEACH FILL  
SHEET 2 OF 2

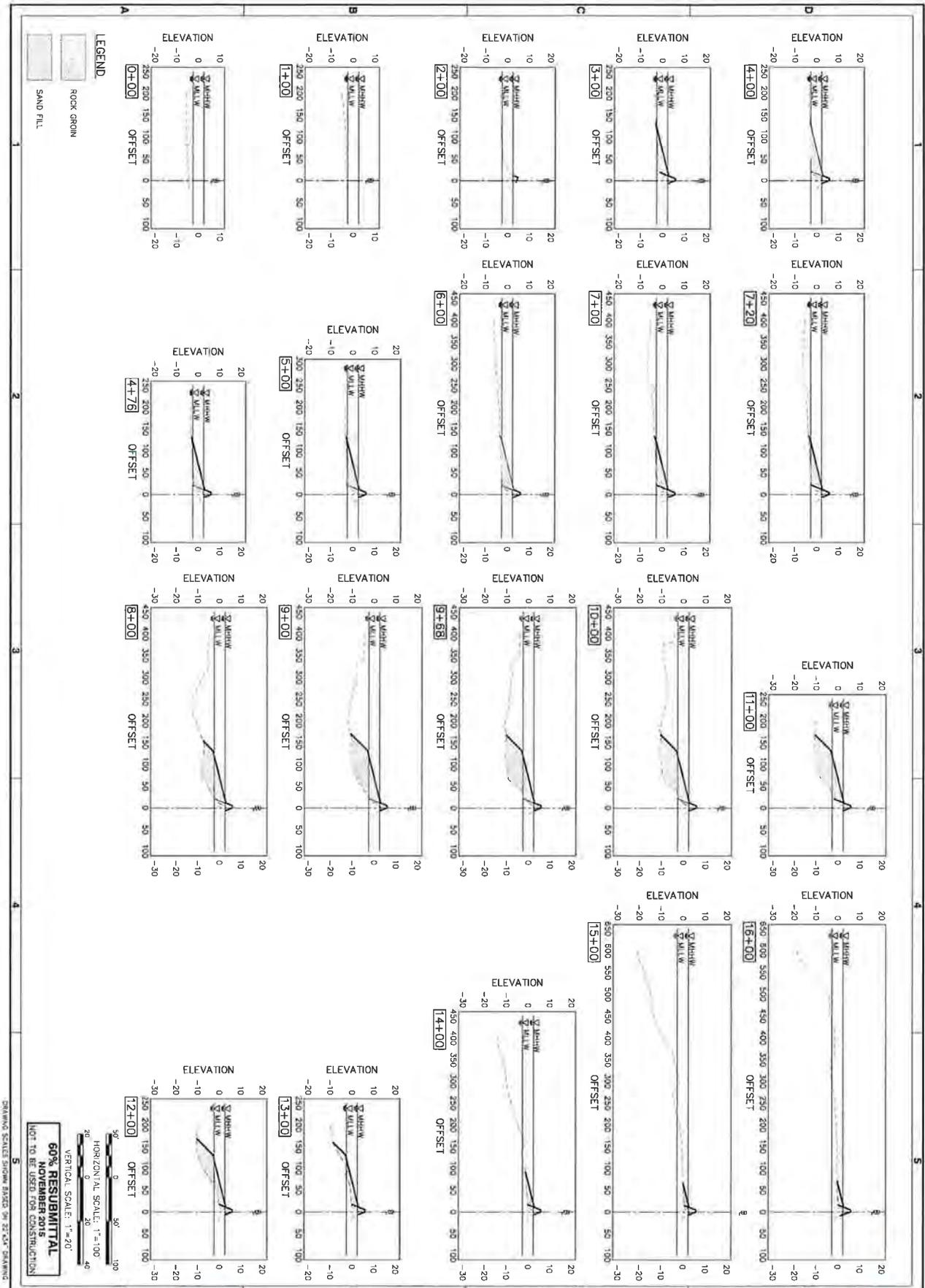
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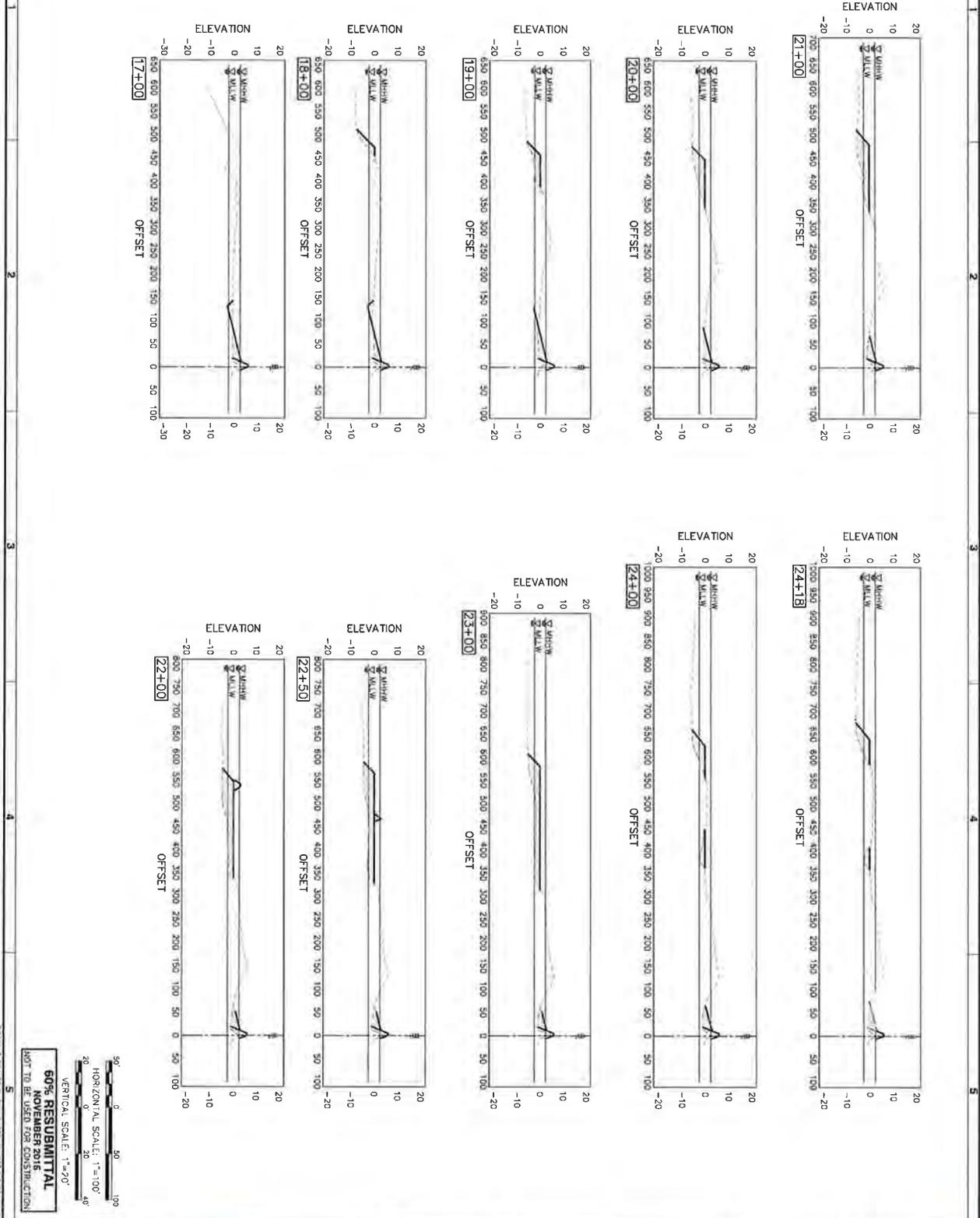
	<p><b>MISPELLION COMPLEX PROJECT</b> BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES DOVER, DELAWARE</p>	<p><b>CROSS SECTIONS</b> SHEET 1 OF 4</p>	<p>Drawn by: JCV/2015 Checked by: JCV/2015 Designed by: JCV/2015 Reviewed by: JCV/2015 Submitted by: JCV/2015 Vertical &amp; Horiz. Scale: 1"=20'</p>	<p>2700 LIGHTHOUSE POINT EAST 1505 W. 5th ST BALTIMORE, MD 21224 410-563-7300</p> <p>DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL 888 KNICKNECK HIGHWAY DOVER, DE 19901</p>	<p>Sheet Reference No <b>C-306</b></p> <p>INDEX: 12 OF 15</p>
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**LEGEND**

ROCK GRGIN

SAND FILL



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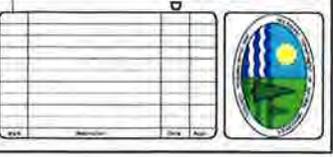
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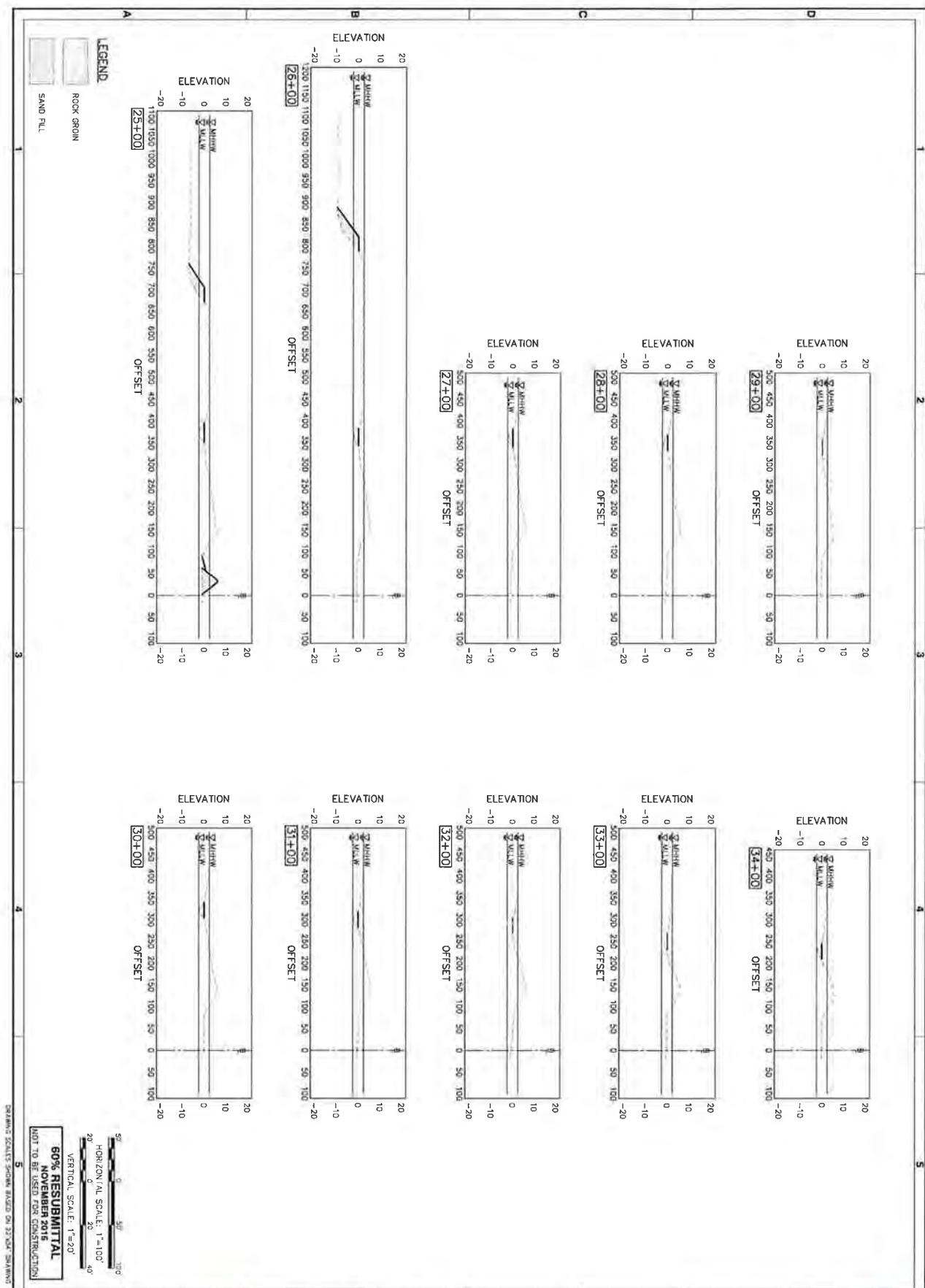
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**MSPILLION COMPLEX PROJECT**  
**BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES**  
**DOVER, DELAWARE**

**CROSS SECTIONS**  
**SHEET 2 OF 4**





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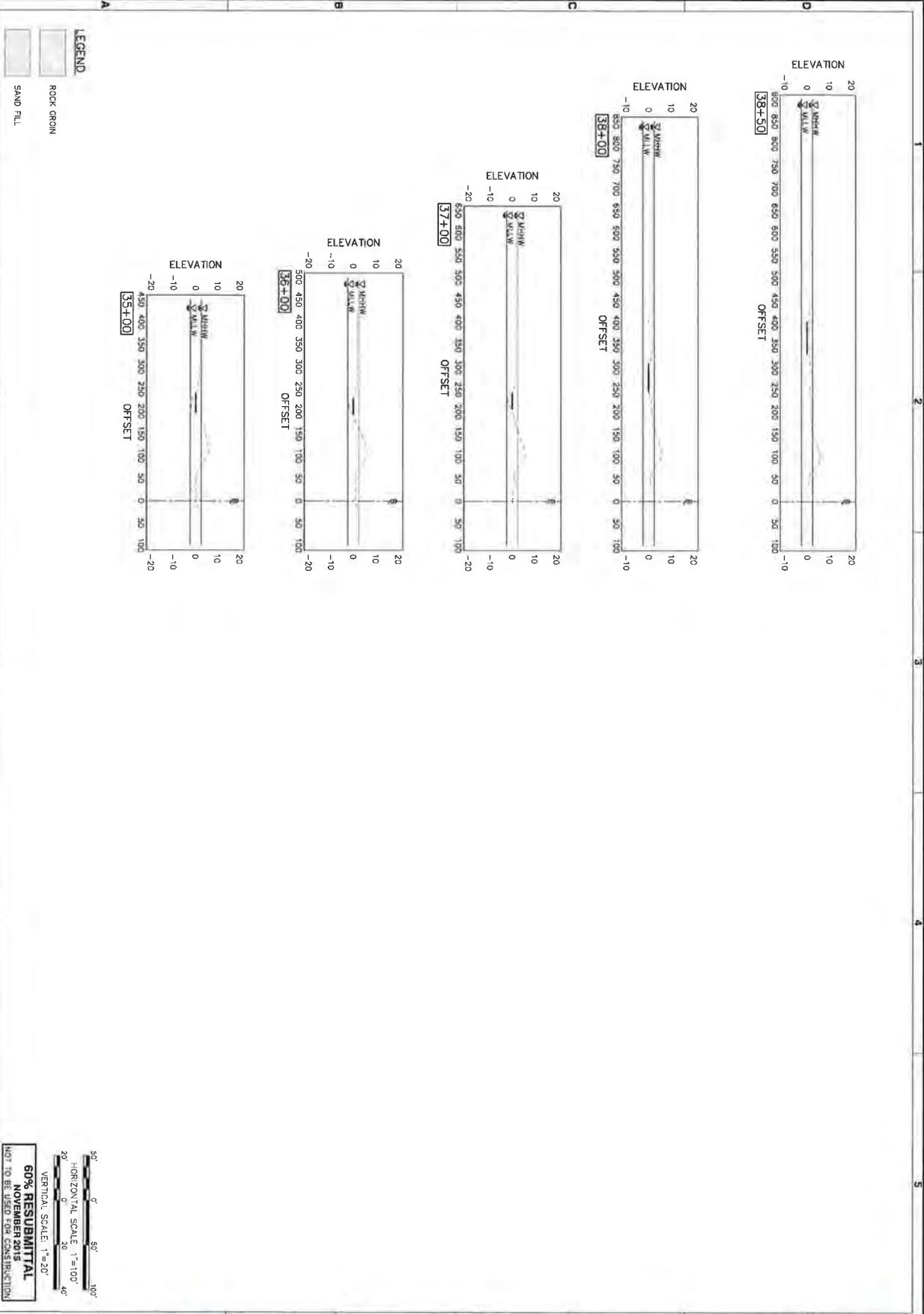
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 Drawing Title: **MISSILLON**  
 Drawing Scale:  
 Project No.: **8782-03**  
 Designer: **MWH & MDC**

**MISSILLON COMPLEX PROJECT**  
**WYACH HIGHWAY/RIE AND ROCK PROTECTION STRUCTURES**  
**DOVER, DELAWARE**  
**CROSS SECTIONS**  
**SHEET 3 OF 4**

NO.	DATE	BY	CHKD





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Prepared by: PAK Date: NOV 2015	Drawn by: PAK Date: NOV 2015
Checked by: PAK Date: NOV 2015	Design Notes: MISPELLION COMPLEX PROJECT BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES DOVER, DELAWARE

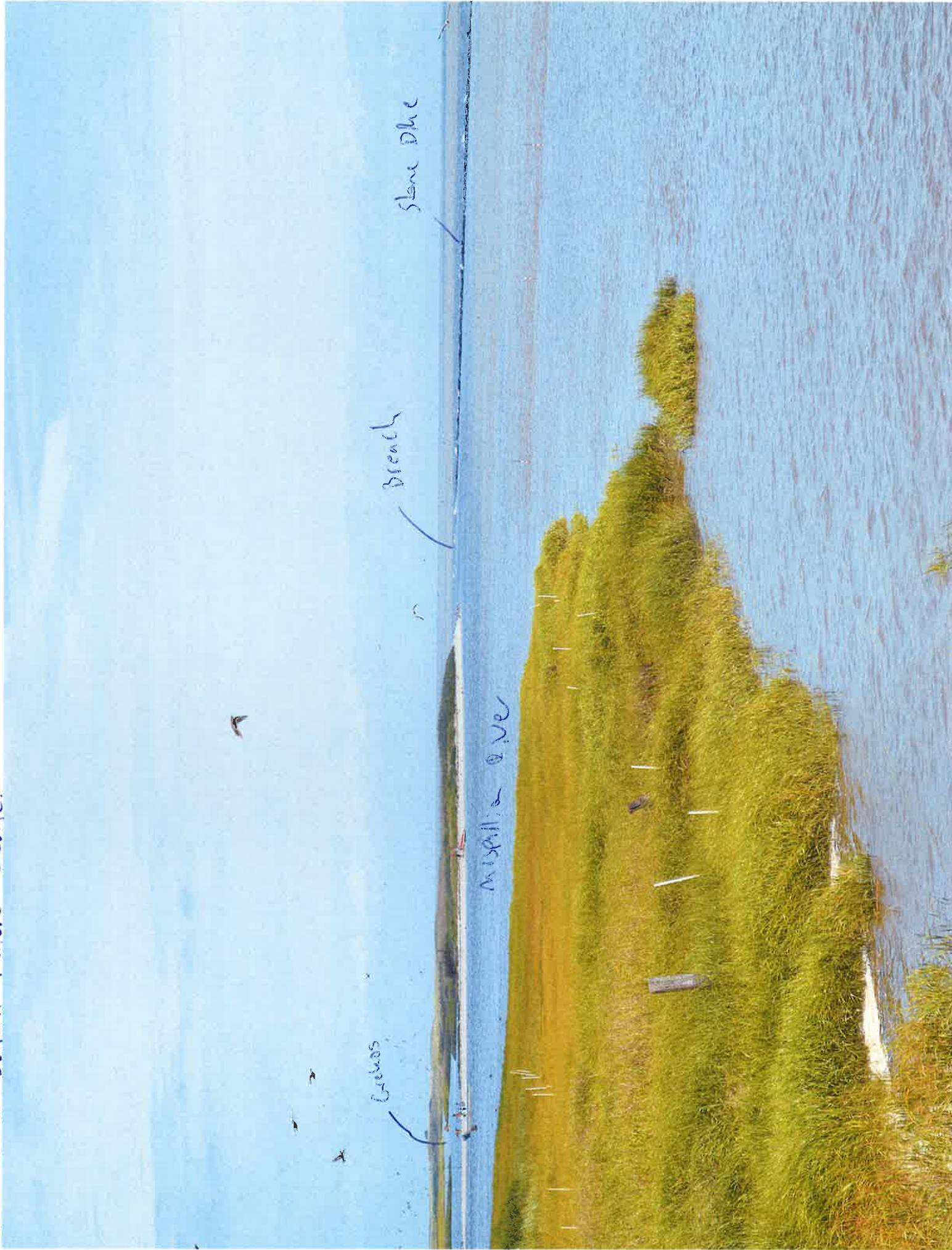
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View From DuPont Nature Center





North Beach along Stone Dike





Buck Beach looking South





Bide Beach looking North





**Delaware Department of Natural Resources and  
Environmental Control (DNREC)**



***Mispillion Complex Project  
Beach Nourishment and Rock Protection Structures  
60% Submittal***

***BASIS OF DESIGN  
November 10, 2015***

Prepared By:



**Moffatt & Nichol**

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## 1. INTRODUCTION

The Delaware Department of Natural Resources and Environmental Control (DNREC) tasked Moffatt & Nichol (M&N) to provide coastal engineering services for habitat restoration and shoreline protection at the Mispillion Complex in Kent and Sussex counties. The project includes rehabilitation of the existing stone dike, construction of new rock groins and placement of sand for beach nourishment adjacent to the stone dike and along the Mispillion River. The goal of the project is to restore and increase habitat for both American Horseshoe Crabs (*Limulus polyphemus*) and shorebirds, specifically the threatened species Rufa Red Knot (*Calidris canutus rufa*). Stabilizing the shoreline is the main focus to achieve this goal.

## 2. SITE LOCATION

The Mispillion Complex is located northeast of Milford, DE in the southern Delaware Bay at approximate latitude 38° 57' N and longitude 75° 19' W (Figure 2-1). The complex includes the Mispillion River and Cedar Creek that connect at Mispillion Inlet and provide access for tidal flow and navigation into the Delaware Bay (Figure 2-2). As shown in Figure 2-2, the Mispillion River flows southeast past a sand shoal called Back Beach where the horseshoe crabs and shorebirds congregate during the springtime, then south along the stone dike towards the inlet. Erosion has occurred behind the stone dike at the north end, and tidal flow has created a channel between the stone dike and the beach. This eroded area has increased potential for breaching to the Mispillion River from a major storm with high water and large waves. A breach would subsequently cause undesirable changes to the hydrodynamics of the system, as well as possibly completely eroding the sand beach used by the shorebirds and crabs.

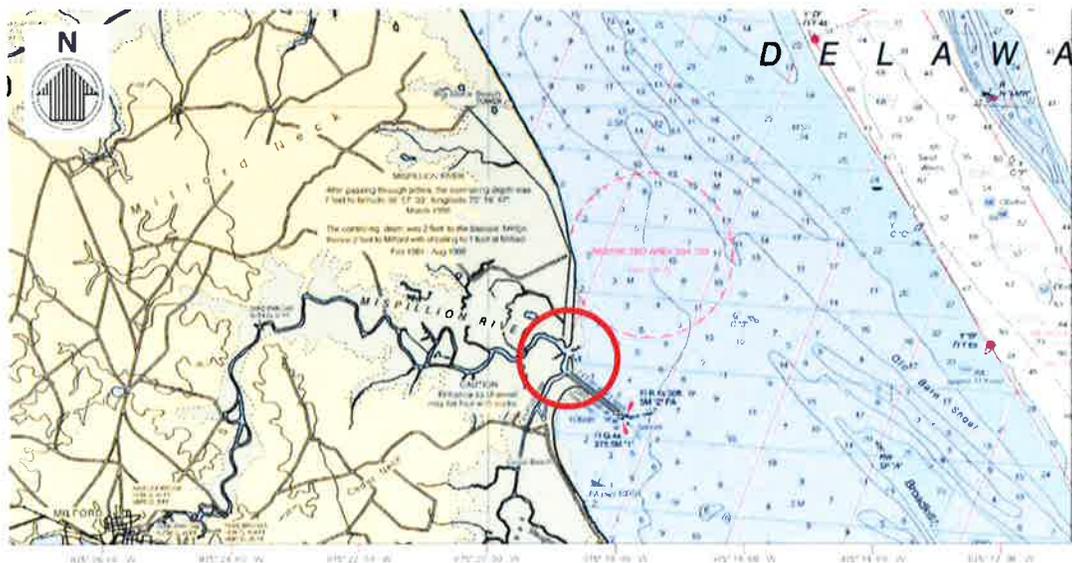


Figure 2-1. Mispillion Complex Project Location (excerpt from NOAA Chart 12304)



Figure 2-2. Aerial View of Mispillion Complex Project Location

### 3. ENVIRONMENTAL CRITERIA

The following environmental criteria provide the basis for the design for the beach nourishment and rock structures.

#### 3.1 PROJECT DATUMS

Vertical datum is set in reference to North American Vertical Datum of 1988 (NAVD88). Horizontal datum is the North American Datum of 1983 (NAD 83), Delaware State Plane Coordinate System.

#### 3.2 TOPOGRAPHY AND BATHYMETRY

Topography was obtained from a LIDAR topography survey from 2007 performed by USGS. Bathymetry was obtained from USACE surveys conducted in 2005 and 2006. Topographic and hydrographic surveys were performed for this project by Morris & Ritchie Associates (MRA) in May, June and September 2015. The reference datum GPS K1A is located at N 404,689.27 E 643,087.42.

The elevation is 13.64' NAVD88. The topography and bathymetry information are shown in Figure 3-1. The area surveyed by MRA is outlined in red.

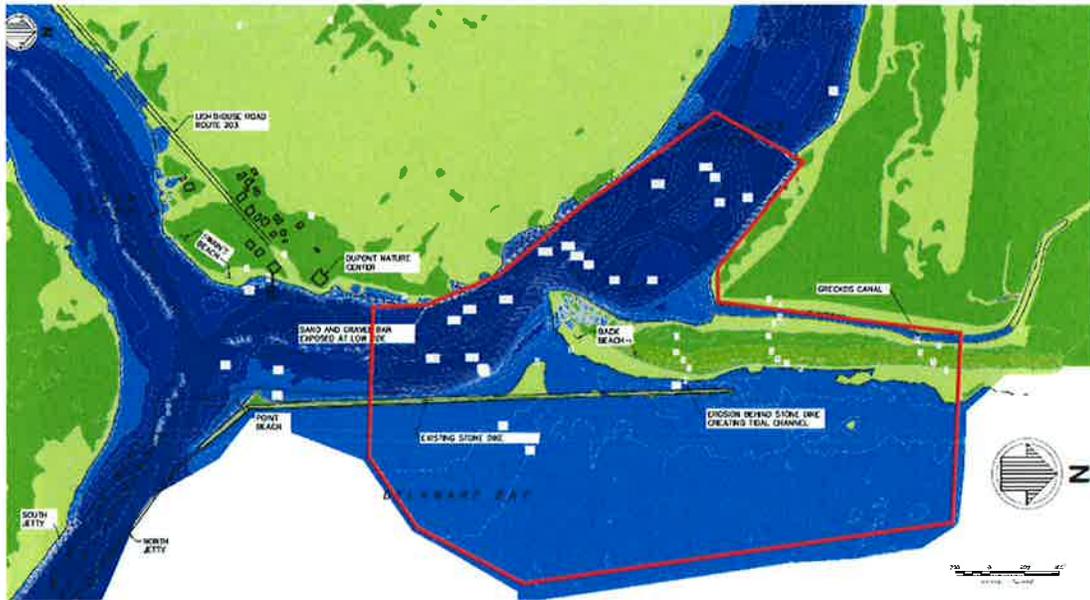


Figure 3-1. Topography and Bathymetry (ft NAVD 88)

### 3.3 WATER LEVELS

The tidal range in the Delaware Bay and Delaware River increases with distance upstream from the mouth at the Atlantic Ocean. At the ocean, the tide range is on the order of 4.1 feet; at the head of tides in Trenton, NJ, the tide range is typically around 8.5 feet. High water at Trenton lags high water at the ocean by approximately 6.5 hours. In the Bay, the tides are semidiurnal, dominated by the M2 tidal constituent (Cook, 2004).

The National Oceanographic and Atmospheric Administration (NOAA) operates and maintains many water level data collection stations throughout the Delaware Bay (COOPS, 2006a). Two active stations, Lewes, DE and Brandywine Shoal Light, DE, are located near Mispillion Inlet. Brandywine Shoal Light is approximately 11 miles east of Mispillion Inlet and Lewes is approximately 15 miles south-southeast (Figure 3-2). Table 3-1 summarizes the tidal datums for the 1983-2001 tidal epoch at the two stations.

NOAA tidal datums at Mispillion Inlet Benchmark F-30, which were determined from measurements taken between April 1983 and November 1984 at the inner end of the jetties inside the Inlet, are only available for the previous tidal epoch, 1960 to 1978 (Table 3-2). Additionally, Benchmark F-30 was used to determine NAVD88 and NGVD29 elevations relative to MLW during this epoch. F-30 is a tidal benchmark set in the steel light tower near Mispillion Inlet (see Figure 3-2 and Figure 3-3 for the location) that was surveyed-in in 1962 and is maintained by NOAA (NGS Data Sheet, 2007). The tidal range (MHW to MLW) at Mispillion Inlet, based on these data, is 4.6 feet. Tidal range between MHHW and MLLW is 5.3 feet. Dams limit the extent of tidal influence of both Mispillion River and Cedar Creek. Mispillion River is

dammed in downtown Milford, DE and Cedar Creek is dammed 1.25 miles north of where it passes under Route 1. Both locations are shown in Figure 3-3.

**Table 3-1. NOAA Tidal Datums – Tidal Epoch 1983 to 2001 (feet)**

<b>Station</b>	<b>Lewes, DE (NOAA 8557380)</b>	<b>Brandywine Shoal Light, DE (NOAA 8555889)</b>
MHHW	4.66	5.36
MHW	4.23	4.91
NAVD88	2.62	
MSL	2.23	2.55
MTL	2.20	2.54
MLW	0.16	0.17
MLLW	0.00	0.00

**Table 3-2. NOAA Tidal Datums – Tidal Epoch 1960 to 1978 (feet)**

<b>Station</b>	<b>Mispillion Inlet, DE (NOAA 8556198)</b>
MHHW	2.58
MHW	2.16
NAVD88	0
MTL	-0.15
NGVD29	-0.78
MLW	-2.47
MLLW	-2.63

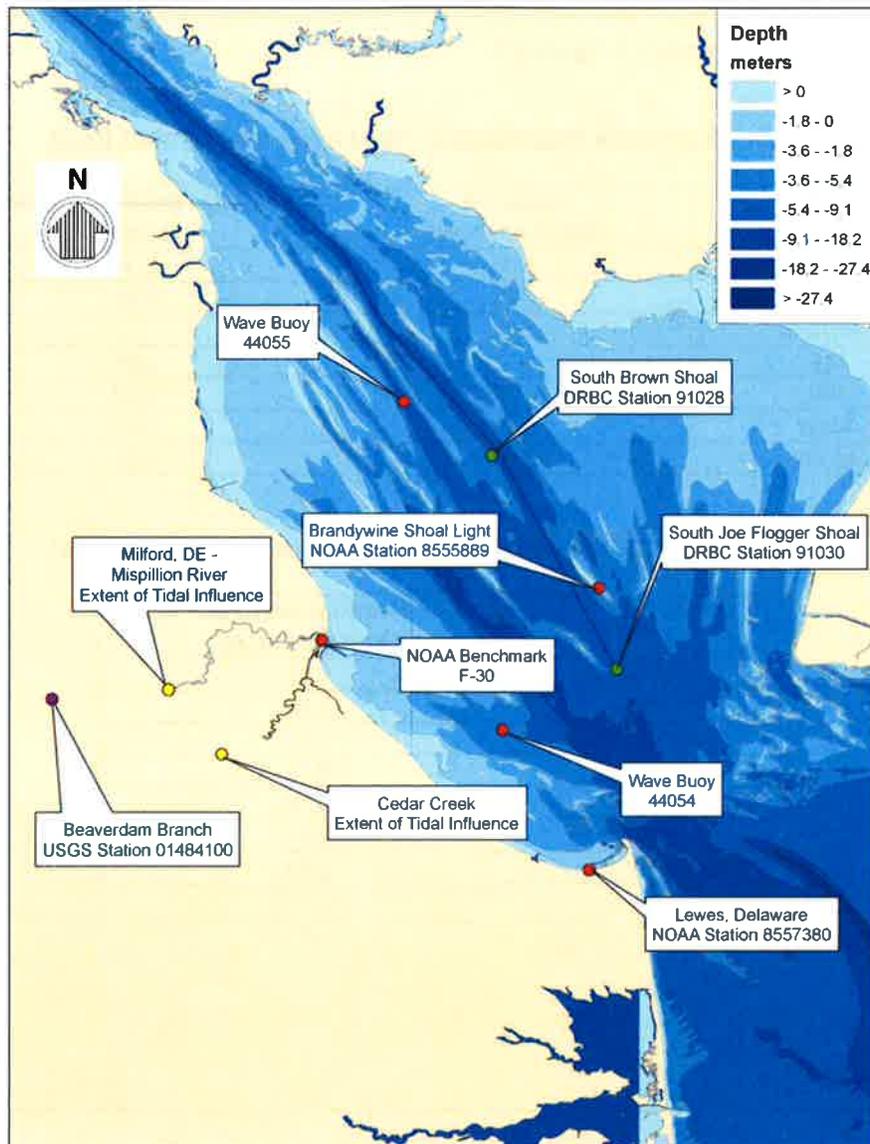


Figure 3-2. Location of Data Collection Stations in the Delaware Bay

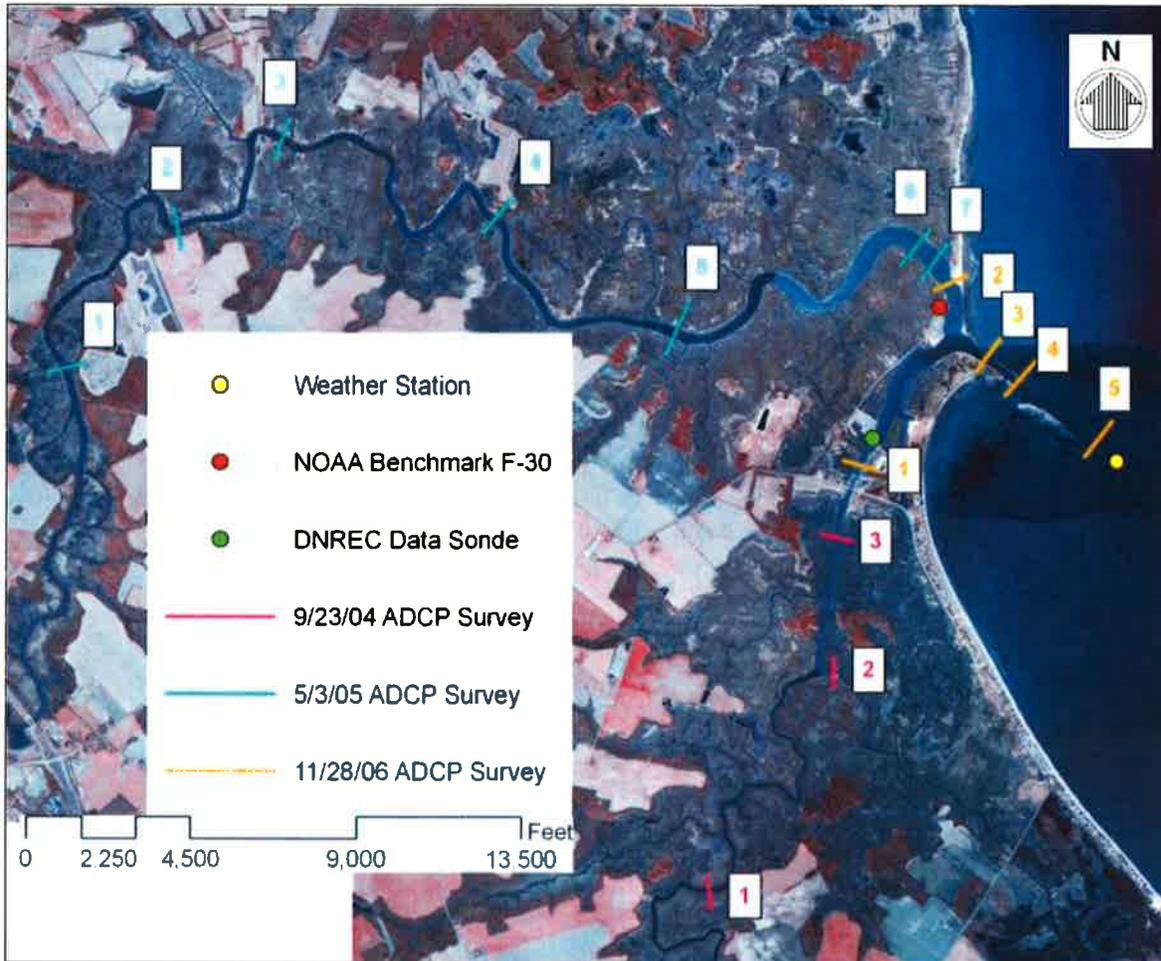


Figure 3-3. Location of Data Collection Stations near Mispillion Inlet

### 3.3.1 SEA LEVEL RISE

Based on water level observations at Lewes, Delaware between 1919 and 1999, NOAA has estimated sea level rise to be 3.41 mm/yr (or 1.12 feet per 100 years) in this area (COOPS, 2014).

### 3.4 TIDES AND CURRENT

Currents in Mispillion River and Cedar Creek have been measured through several surveys completed by DNREC using an over-the-side (OTS) Acoustic Doppler Current Profiler (ADCP). The ADCP surveys provide snapshots of not only velocity but also of tidal discharge through the river. On November 18, 2006, a comprehensive survey of tidal discharge and velocity through Mispillion Inlet, Mispillion River, and Cedar Creek was undertaken during neap tide conditions. Flow discharge estimates were computed by measuring velocity across a river transect using the ADCP and then spatially integrating the measurements. Because OTS ADCP measurements cannot accurately capture velocities at the top and bottom of the water column and along very shallow banks, the discharge through these areas was

estimated based on the shape of the bottom profile. Overall error associated with discharge measurement is approximately +/-15% (Wolanksi, 2006).

Measurement transect locations, shown in Figure 3-3, were chosen to be representative of each portion of the river-inlet system. Transect 1 is in Cedar Creek, Transect 2 is in Mispillion River, Transect 3 is at the mouth of the River, Transect 4 is in Mispillion Inlet where the jetties are in relatively good condition, and Transect 5 is at the seaward tip of the jetties where they provide minimal flow training. The data, which were collected between low and high tides, are summarized in Figure 3-4.

During this survey, discharge through the Mispillion River was on average three times as large as the discharge through Cedar Creek. The largest peak flow measured, 9,300 cfs, was at Transect 3. The transects taken at the seaward tip of the jetties do not necessarily capture all of the flow in and out of the Inlet because there is a noticeable discharge through the jetties. The same became true at Location 4 as the tide rose and water began pouring through the permeable structure. An extensive survey of Mispillion River discharge was performed on May 3, 2005. The transects used are shown and labeled in Figure 3-3 and results are shown in Figure 3-5. An ADCP survey of Mispillion River and Cedar Creek was performed on September 23, 2004. The results are shown in Figure 3-6.

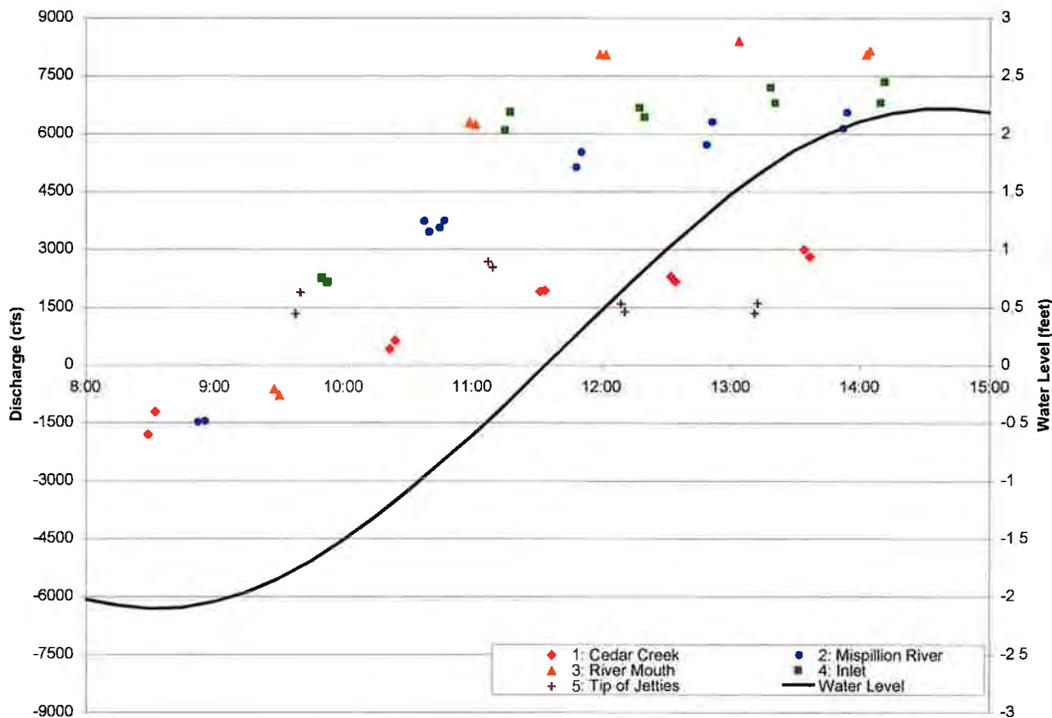


Figure 3-4. ADCP Discharge Measurements, November 28, 2006

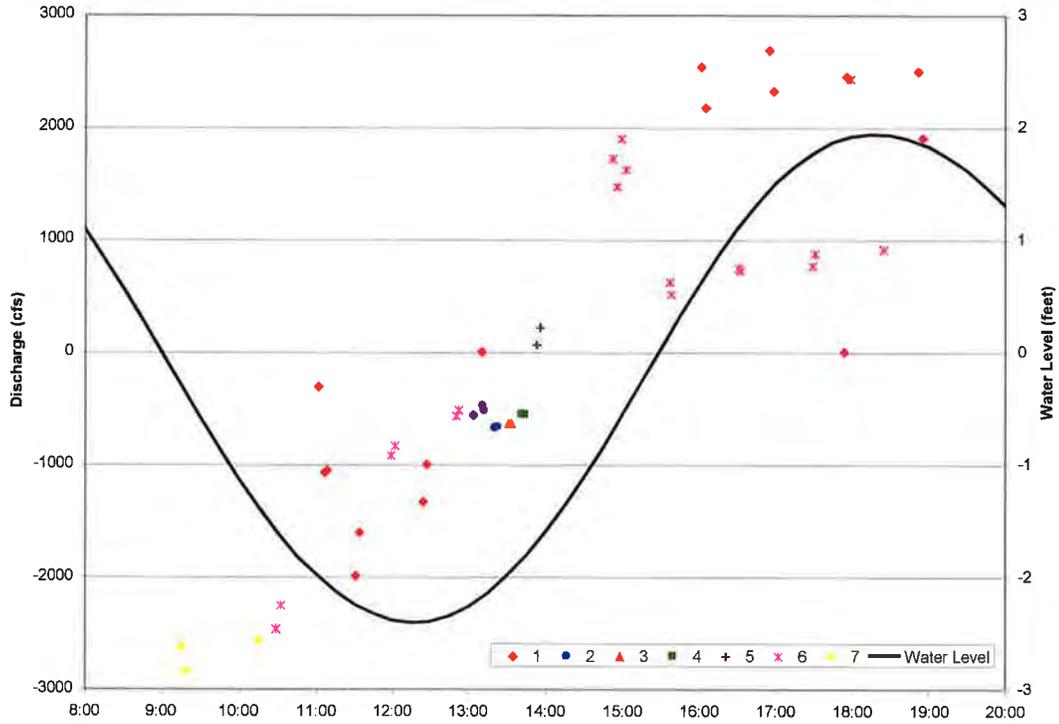


Figure 3-5. ADCP Discharge Measurements, May 3, 2005

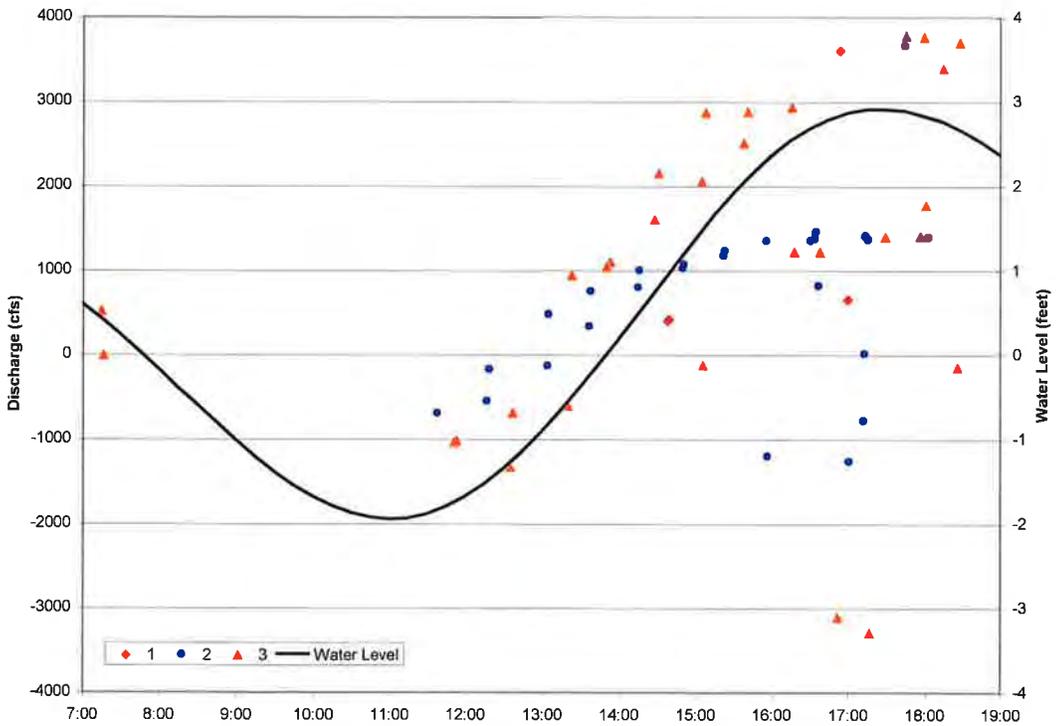


Figure 3-6. ADCP Discharge Measurements, September 23, 2004

While these surveys are useful, the data were gathered at limited locations over a limited time period. A hydrodynamic model was developed and calibrated in order to obtain a more complete view of tidal currents in the Inlet system (Moffatt & Nichol 2008). The model shows that maximum velocity through the jetties is significantly higher than that found in either the Mispillion River or Cedar Creek. Velocity is higher during flood tide and peaks at the confluence of Cedar Creek and Mispillion River. The maximum is approximately 3 ft/s during flood tide, and 2.5 ft/s during ebb tide. Velocity magnitude at Osprey Beach near the jetty tends to be relatively higher and remains fairly low adjacent to the beach fronting Cedar Creek. Velocity through Cedar Creek is slightly higher during flood tide, but remains lower than 2 ft/s throughout a typical tidal cycle. In the vicinity of this Mispillion River project, the peak velocity in the channel occurs on the flood tide and is less than 3 ft/s (Figure 3-7).

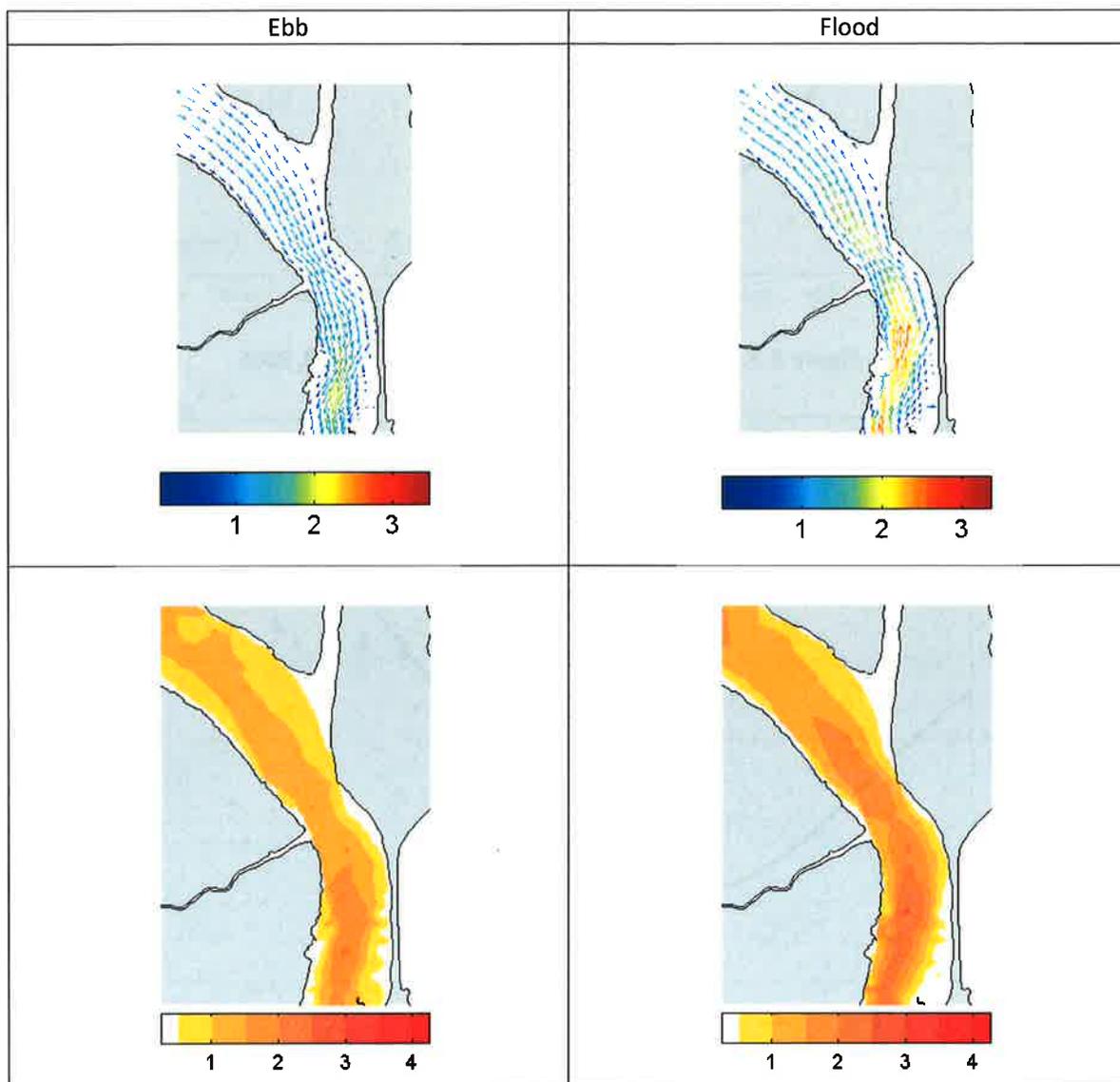


Figure 3-7. Maximum Velocity in Mispillion River (ft/s)

Modeling of the stabilization and restoration of the east shoreline of the Mispillion River along the existing stone dike was performed to evaluate their performance. Within the hydrodynamic and morphological model, groin structures and sand fill were as placed approximately as shown in Figure 3-8. Hydrodynamic simulations were performed only with fill, while the morphological simulations were performed both with and without fill.

Changes in velocity due to the proposed structures along the East Shoreline of Mispillion River were observed to be confined to the immediate area surrounding the groins. Maximum velocities and changes from baseline conditions are shown in Figure 3-9. Impacts were not observed downstream of the restoration project (closer to the Inlet), in Cedar Creek, or upstream in Mispillion River. It does not appear that the structures will affect the flow regime outside of their immediate area. Velocities were decreased between the groins. The northern-most groin is in the deepest water and therefore has the most effect on the flow in the area. The southern-most groin has little effect on the flow through the channel.



Figure 3-8. Overview of Mispillion River: East Shoreline Restoration

Velocities west of the structures, through the body of the river, increase only slightly. This effect is most pronounced during flood tide and is at most 0.2 ft/s. This indicates that erosion of the structure field will likely not be significant. In addition, it is noted that these increases in velocity are confined to the area near the northern-most groin. There is a small increase in velocity located in the immediate vicinity of the tip of the north groin, which raises some concern about scour at the tip of the structures.

The morphological impacts are presented in Figure 3-10; the left panel presents results without fill and the right panel presents them with fill. Morphological changes without fill indicate that the groin structures do trap some sediment but that this is a fairly small quantity. The change in hydrodynamics and the slight increase in velocities through the channel cause a very slight scour through the channel. When the inclusion of fill is simulated, the groins still induce the accumulation of some sediment (sand) and prevents the erosion of any additional sediment, and slight scour within the channel also occurs.

Figure 3-12 shows the time rate of sedimentation without fill on the north and south sides of the northern-most groin along the Mispillion River. These points are shown in Figure 3-12. These curves show that the sedimentation rate on the north side is less than the rate on the south side of the groin. This indicates that more sediment tends to accumulate during flood tide.

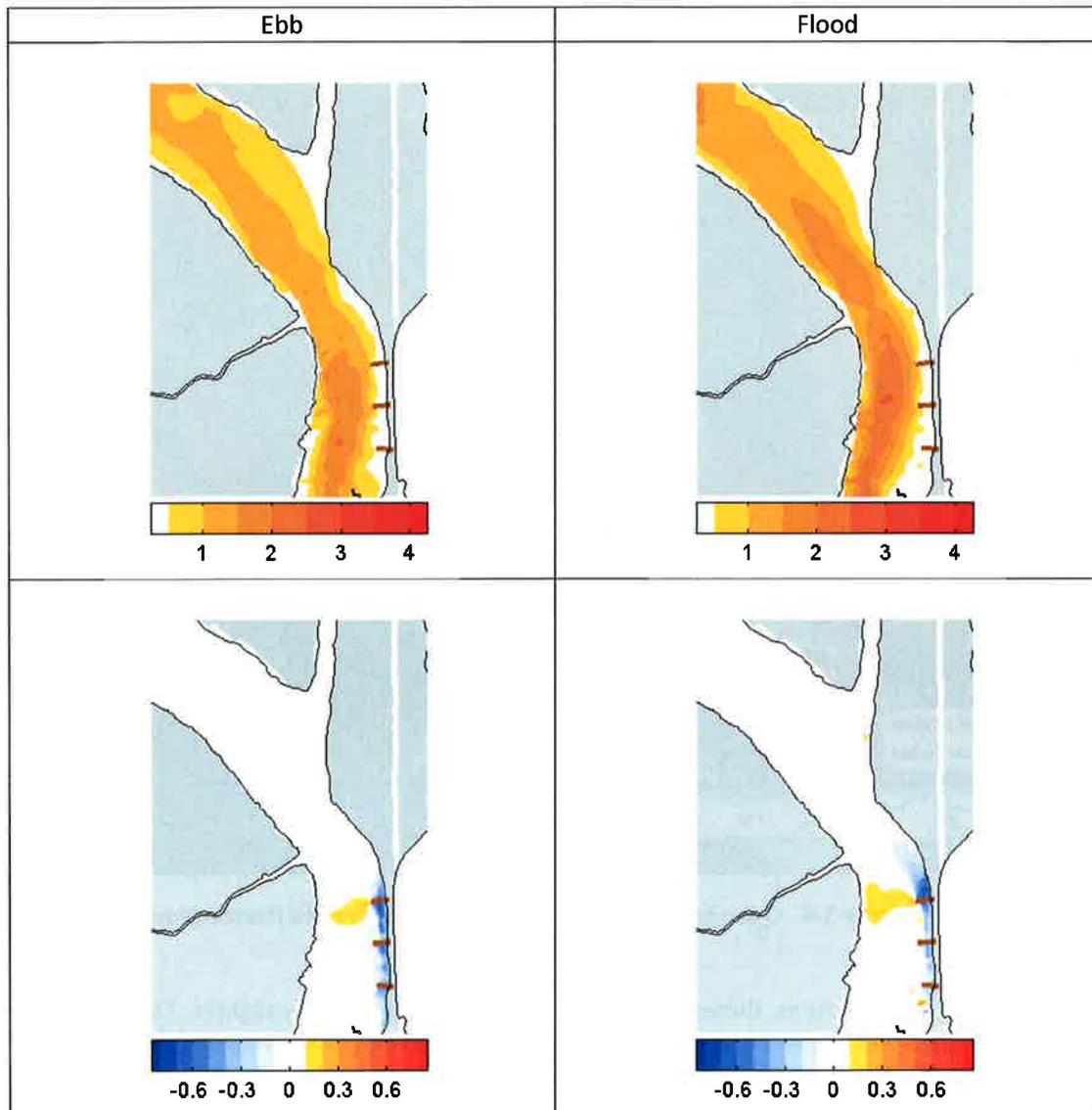


Figure 3-9. Mispillion River, East Shoreline: Max. Velocity and Change in Max. Velocity (ft/s)

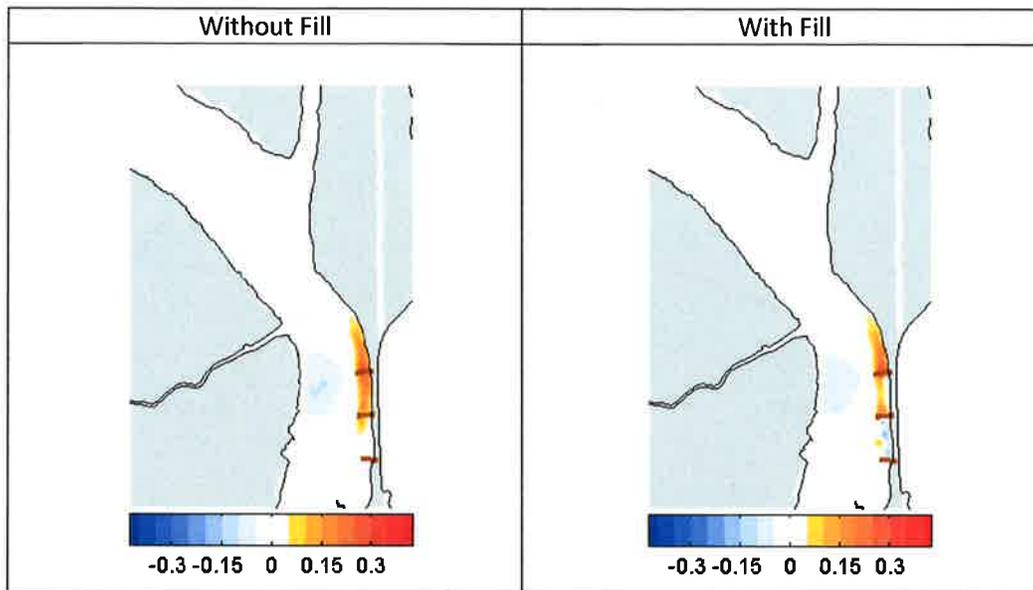


Figure 3-10. Mispillion River, East Shoreline: Erosion and Sedimentation (ft)

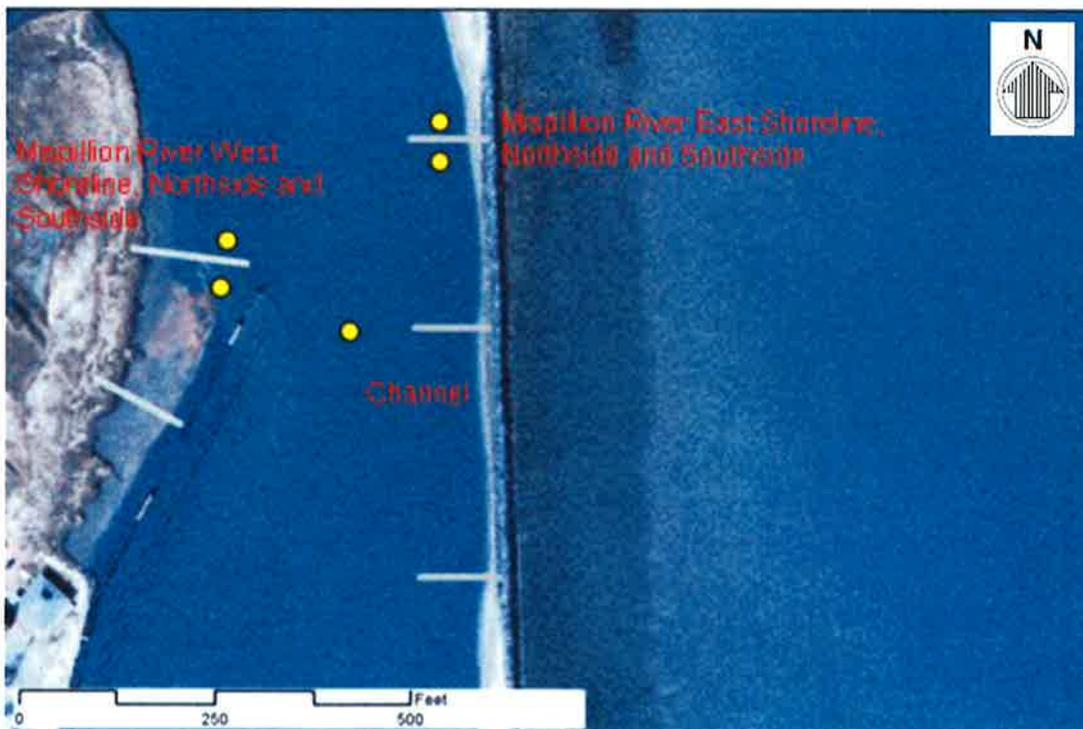
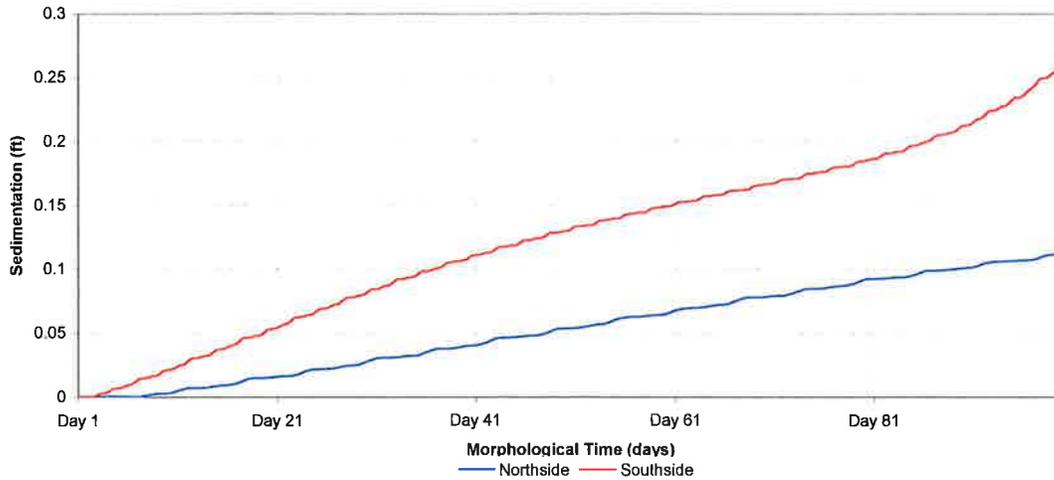


Figure 3-11. Sedimentation Analysis Points for Mispillion River



**Figure 3-12. Mispillion River, East Shoreline: Sedimentation Rate**

The groins along the eastern side of Mispillion River effectively maintain a pre-filled sand beach. The natural tendency of the groin field is to accrete sand, especially near the northern-most groin. It is worth noting that the groins do induce erosion within the channel of Mispillion River but that the impact is small.

Modeling of the groins and sand fill west of Back Beach is currently underway; results will be presented in future submittals. It is anticipated that results will be similar to the model results for the east shoreline.

An Acoustic Doppler Current Profiler (ADCP) equipment was deployed in the Greckos Canal Tidal Channel for two weeks from June 16, 2015 through June 29, 2015. The purpose of the deployment was to measure current velocity and direction to assess hydrodynamic conditions from the channel and discharge into the Mispillion River. The ADCP equipment was deployed at the location shown in Figure 3-13. Orientation of the 90 to 100 ft wide channel at high tide is north to south, whereas the orientation of the 20 ft wide channel at low tide is 335° (NNW) to 155° (SSE). There is a significant shoal area of very soft sediment.

Data are presented in Figure 3-14 and Figure 3-15. Typical maximum current speed is about 25 cm/sec (0.8 ft/sec) for both flood and ebb tide. Flood tide is generally north and ebb tide is predominantly south, however, wind effects cause the current direction to vary significantly. Maximum flood tide was measured as 50 cm/sec (1.6 ft/sec) between 36 degrees magnetic (24 degrees true) and 81 degrees magnetic (69 degrees true). Maximum ebb tide was generally slower and measured as 25 cm/sec (0.8 ft/sec) between 135 and 160 degrees magnetic (123 to 148 degrees true). Discharge from the Greckos Canal channel into the Mispillion River is computed to be a maximum of about 200 CFS, which is significantly lower than the maximum of 9,300 cfs noted above for the river.

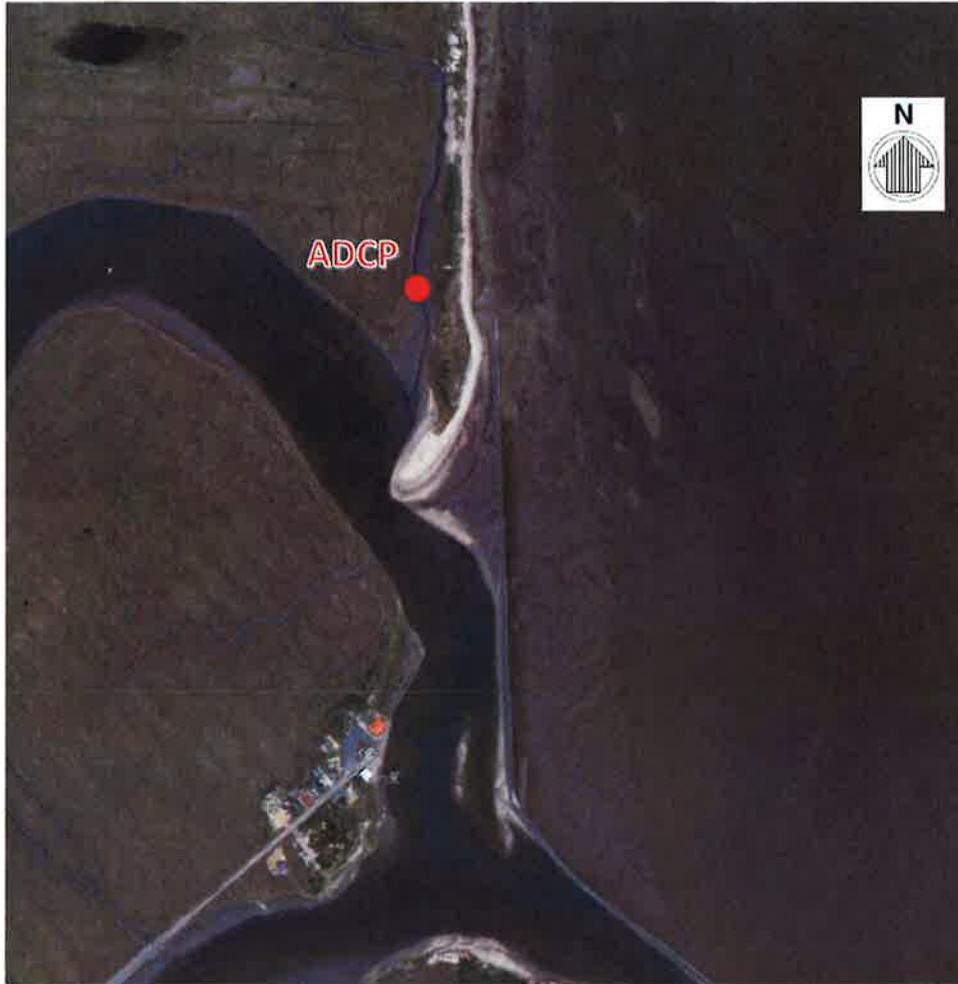


Figure 3-13. Approximate Location of ADCP Equipment Deployed in Greckos Canal

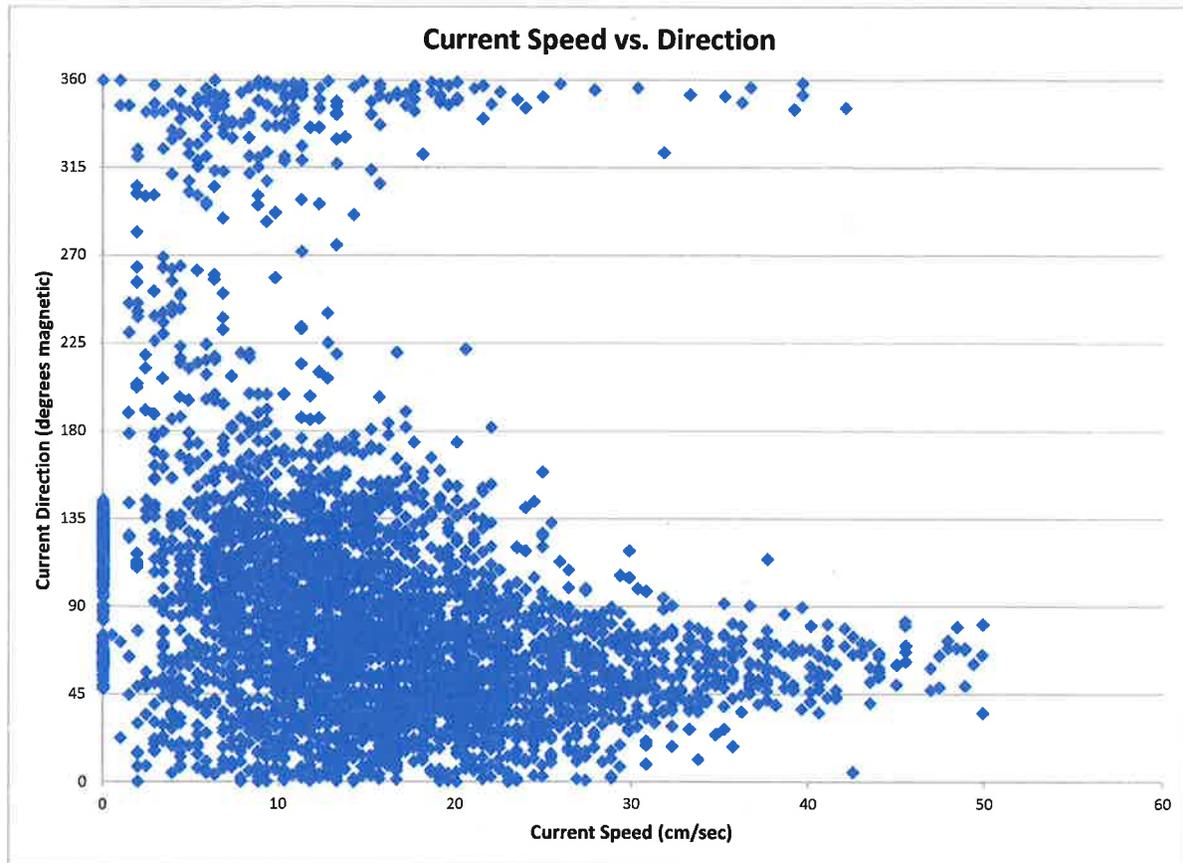


Figure 3-14. Comparison of Current Speed vs. Direction in Greckos Canal

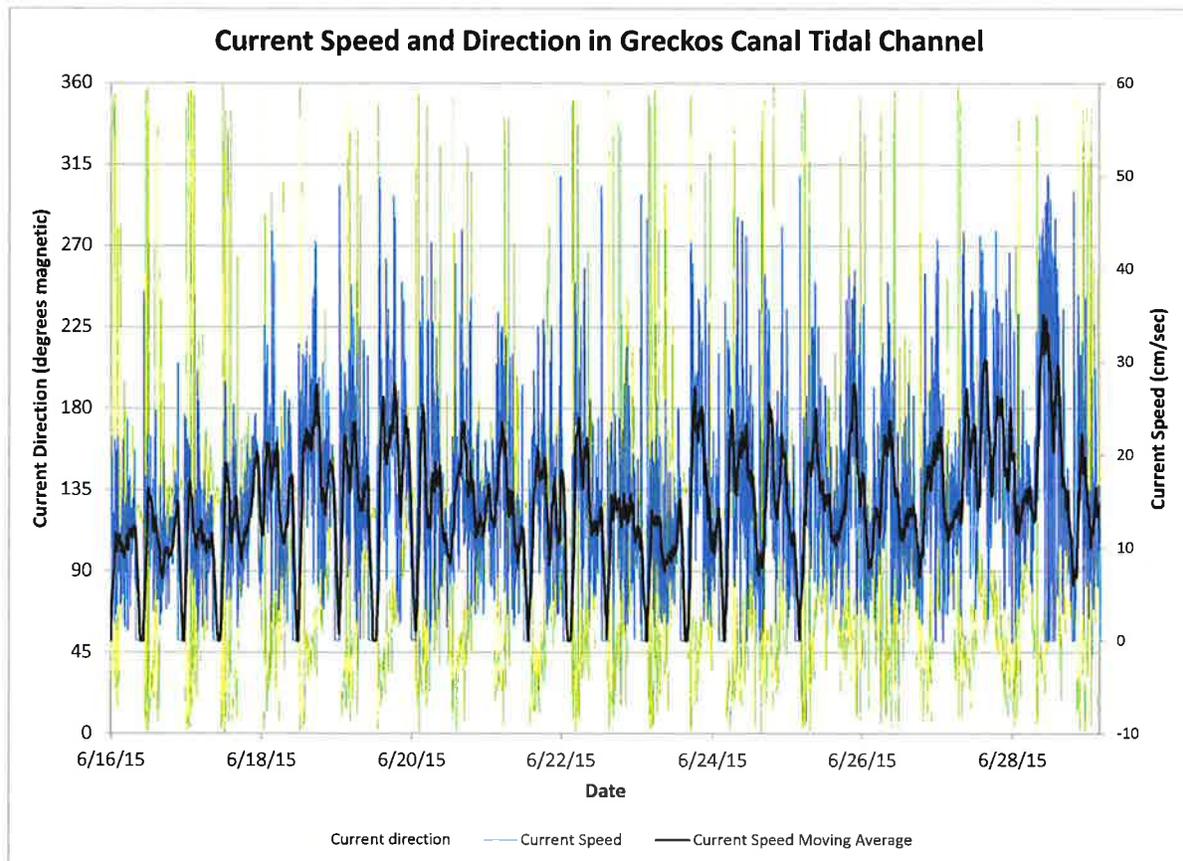


Figure 3-15. Time Series of Current Speed vs. Direction in Greckos Canal

### 3.5 WIND

DNREC installed a weather gage at the tip of the north Mispillion Inlet jetty (location shown in Figure 3-3). Data collected between November 27, 2006 and June 15, 2007 is shown in Figure 3-16 through Figure 3-18. The average wind speed during this time was 10 miles per hour and the dominant direction was from the south-southwest. The maximum wind speed measured was 35 miles per hour from the southeast. The weather gage did not collect wind data for an approximately one week period at the end of May.

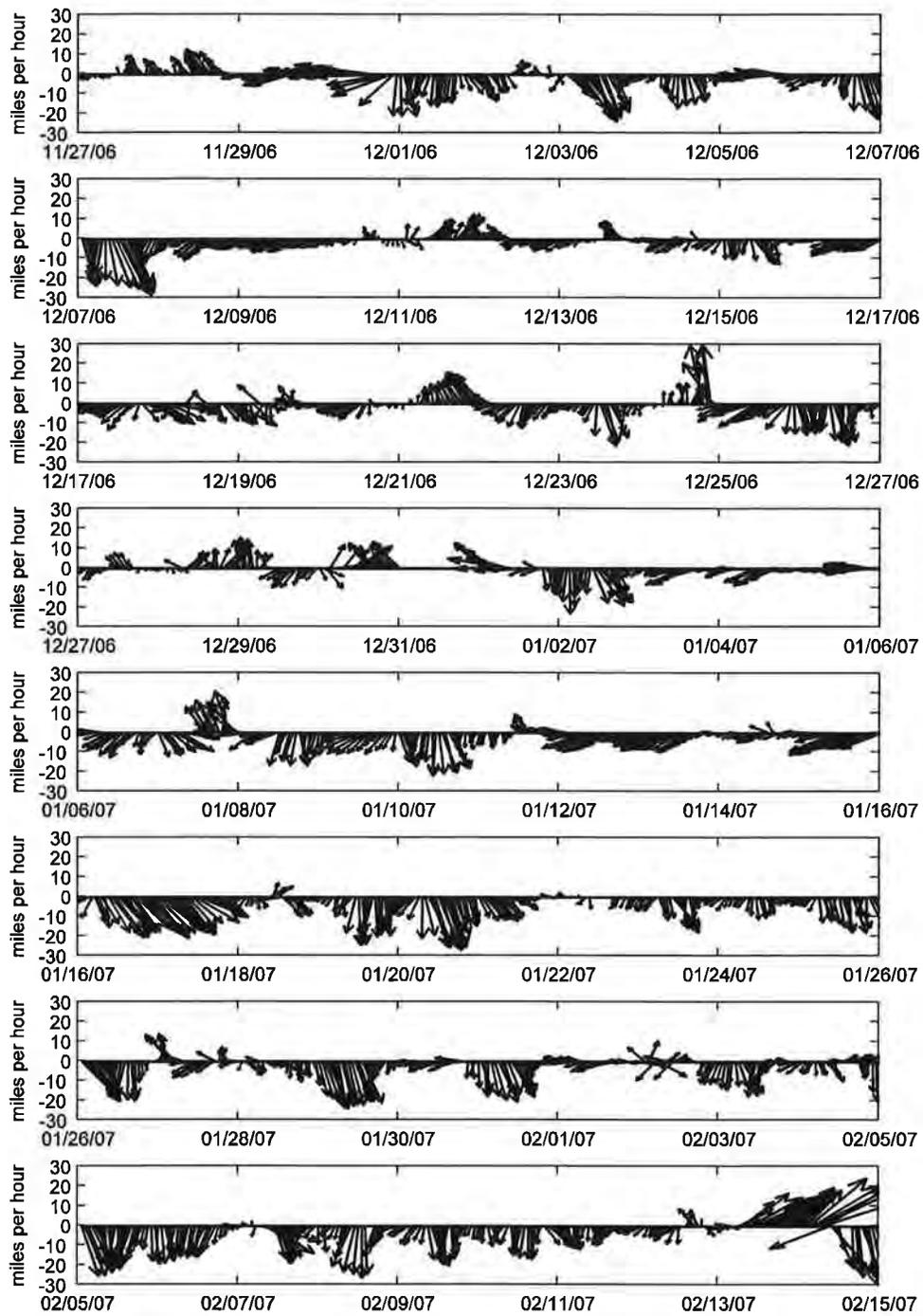


Figure 3-16. Wind speed and Direction at Mispillion Inlet

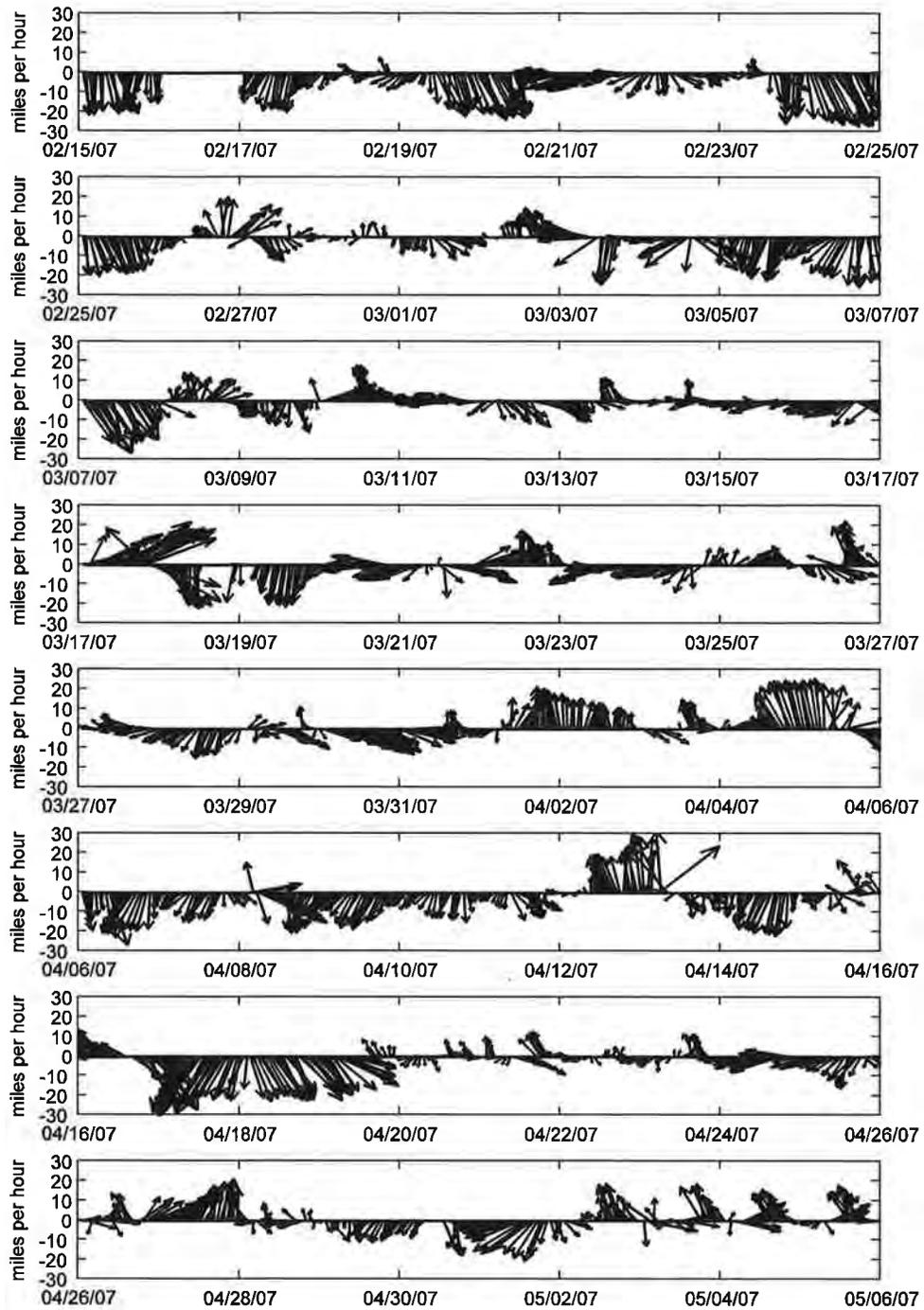


Figure 3-17. Wind Speed and Direction at Mispillion Inlet

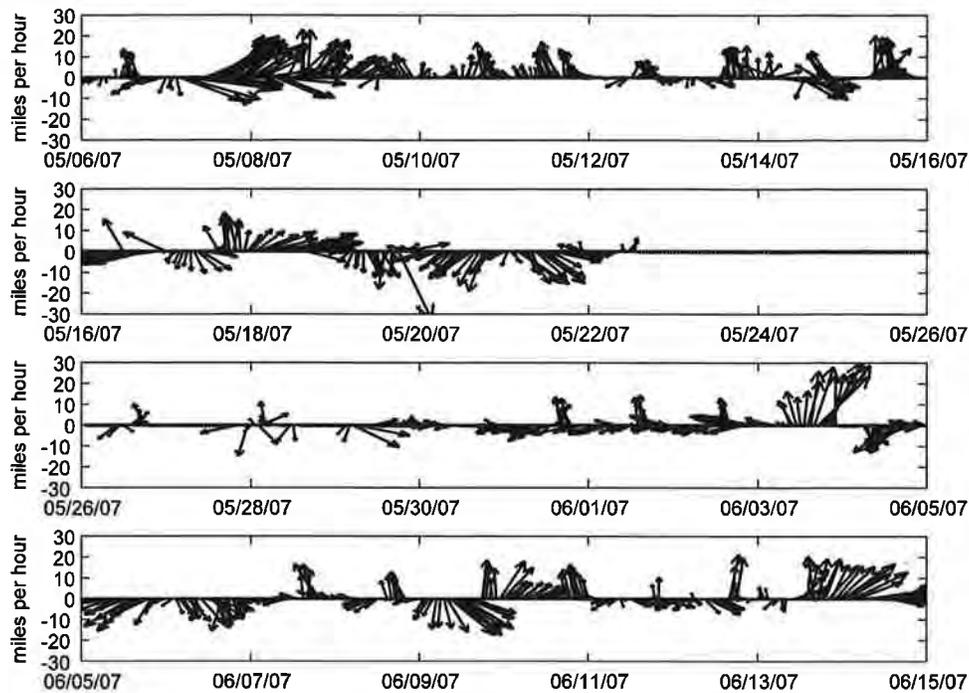


Figure 3-18. Wind Speed and Direction at Mispillion Inlet

### 3.6 WAVES

The Mike21 spectral wave (SW) model was developed to evaluate wave conditions at the Mispillion site. The model was used to produce a wave hindcast for a period 02/2005 – 12/2014. The model was forced offshore of Delaware Bay with spectra extracted from WaveWatch III model developed by NOAA. Spatially varying wind fields were derived from NCEP Climate Forecast System hindcast data. The simulations were performed at mean high water (MHW) elevations derived using NOAA's VDatum software.

#### 3.6.1 ANNUAL WAVE CONDITIONS

Annual wave roses and percent exceedance of significant wave heights and joint distributions of significant wave heights and wave peak periods were derived from the 10-year hindcast results. The extraction locations are shown in Figure 3-19. The elevation of MHW is approximately 0.71 meters above MSL at the site. The statistics for each station are presented in Table 3-3. The annual wave rose is presented in Figure 3-20.

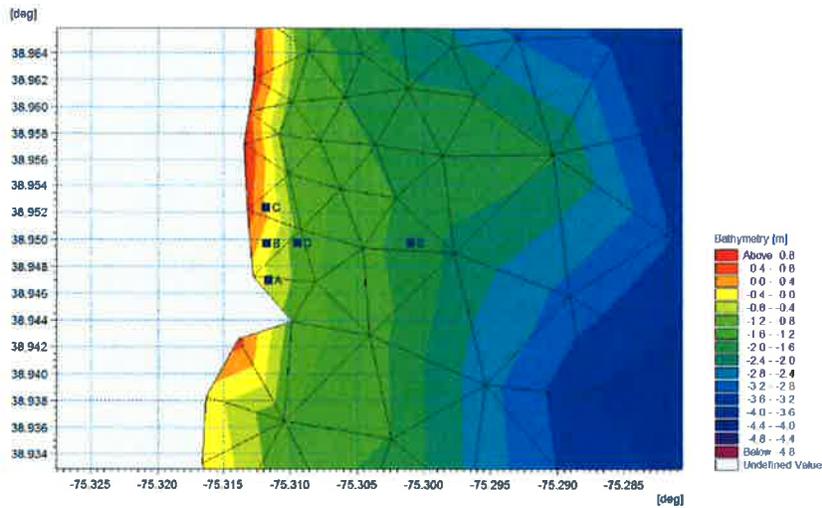


Figure 3-19. Mike21 SW Extraction Points

Table 3-3. Annual Significant Wave Height Statistics (in meters, at MHW)

Statistics	A	B	C	D	E
25%	0.06	0.06	0.06	0.06	0.08
50%	0.09	0.07	0.09	0.09	0.13
75%	0.13	0.1	0.12	0.13	0.2
90%	0.18	0.14	0.16	0.18	0.27
95%	0.21	0.15	0.19	0.22	0.32
99%	0.3	0.21	0.27	0.31	0.48
Max	0.63	0.41	0.54	0.64	0.93

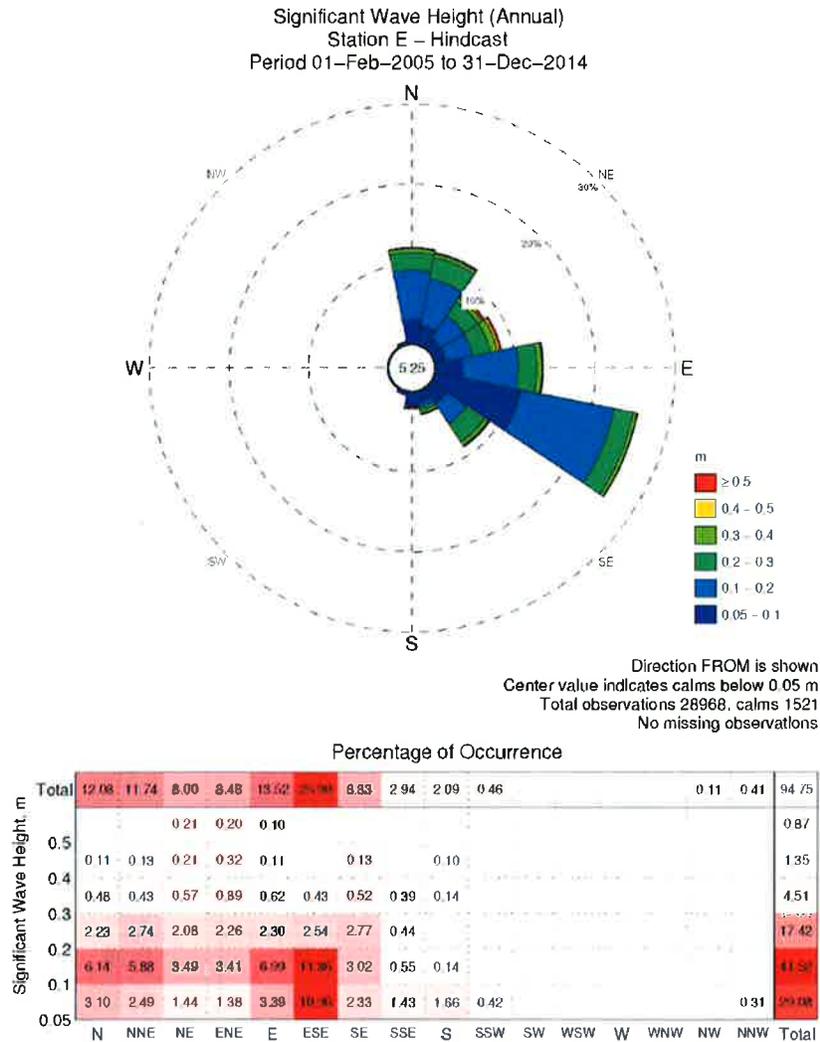


Figure 3-20. Wave Rose at Station E

### 3.6.2 EXTREME WAVE CONDITIONS

The model results were extracted at the stations shown in Figure 3-19. Extreme value analysis was performed following methodology by Goda. The peak-over-threshold method was used to identify extreme values for significant wave heights from the 10-year hindcast. Several extreme value probability distributions were tested and the best-fit probability was selected for each location. The best-fit extreme significant wave height values for various return periods is shown in Table 3-4 and the 95% non-exceedance significant wave height values are shown in Table 3-4. Figure 3-21 through Figure 3-25 show graphs of the results presented in the two tables.

**Table 3-4. Best-Fit Extreme Significant Wave Height Values**

Return Period, years	A	B	C	D	E
0.5	0.44	0.31	0.4	0.45	0.68
1	0.49	0.34	0.44	0.51	0.75
2	0.54	0.37	0.48	0.56	0.82
5	0.59	0.41	0.52	0.62	0.9
10	0.64	0.43	0.56	0.66	0.95
25	0.69	0.47	0.6	0.72	1.03
50	0.73	0.49	0.63	0.76	1.09
100	0.77	0.52	0.67	0.8	1.14
200	0.81	0.54	0.7	0.85	1.2
500	0.87	0.57	0.74	0.9	1.28
1000	0.91	0.6	0.78	0.95	1.33

**Table 3-5. 95% Non-Exceedance Extreme Significant Wave Height Values**

Return Period, year	A	B	C	D	E
0.5	0.46	0.33	0.41	0.48	0.71
1	0.52	0.36	0.46	0.54	0.79
2	0.58	0.4	0.51	0.6	0.87
5	0.65	0.44	0.56	0.67	0.97
10	0.7	0.47	0.61	0.73	1.04
25	0.77	0.51	0.66	0.8	1.14
50	0.82	0.55	0.71	0.85	1.21
100	0.87	0.58	0.75	0.91	1.28
200	0.92	0.61	0.79	0.96	1.36
500	0.99	0.65	0.85	1.03	1.45
1000	1.04	0.68	0.89	1.09	1.52

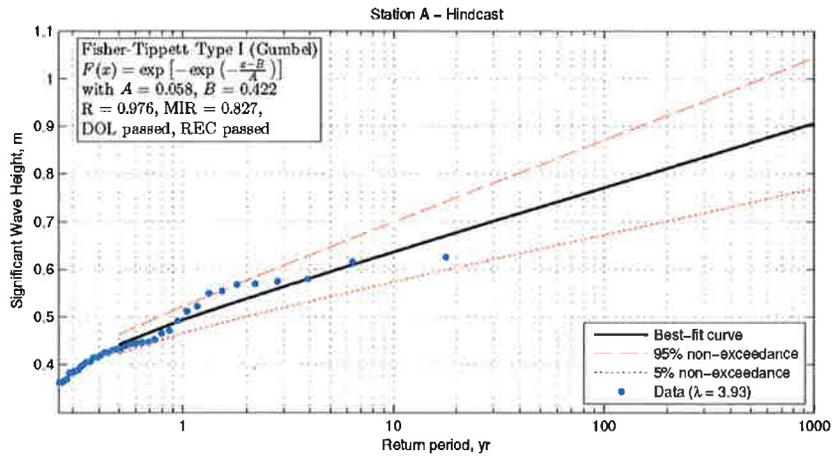


Figure 3-21. Extreme Value Analysis Results for Station A

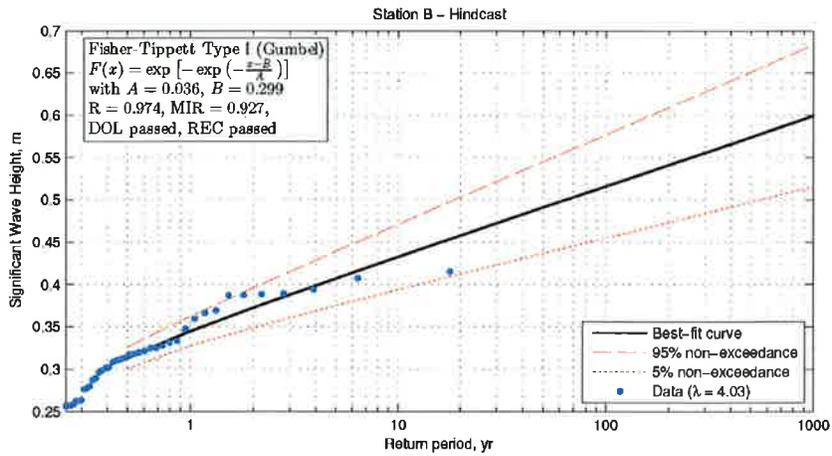


Figure 3-22. Extreme Value Analysis Results for Station B

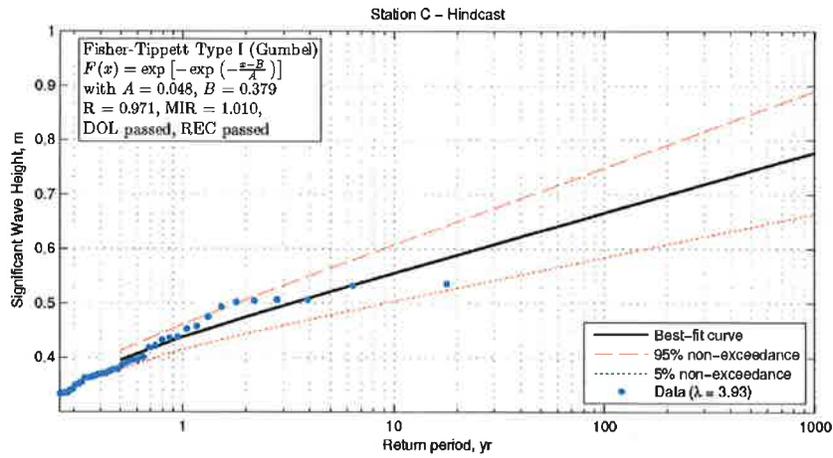


Figure 3-23. Extreme Value Analysis Results for Station C

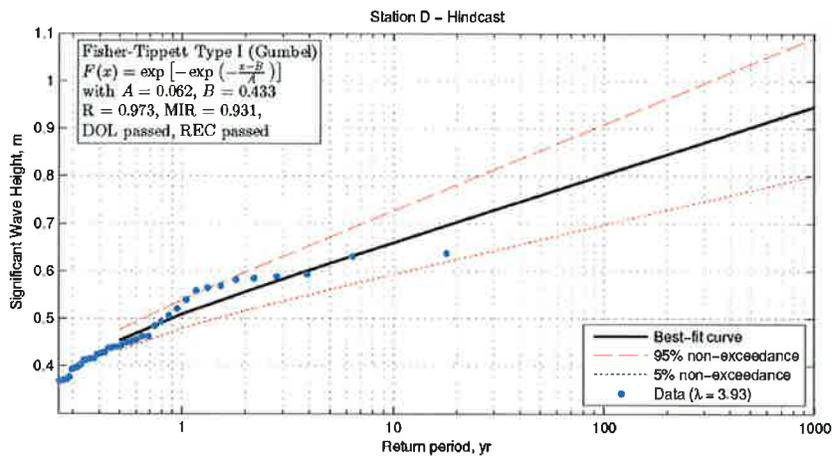


Figure 3-24. Extreme Value Analysis Results for Station D

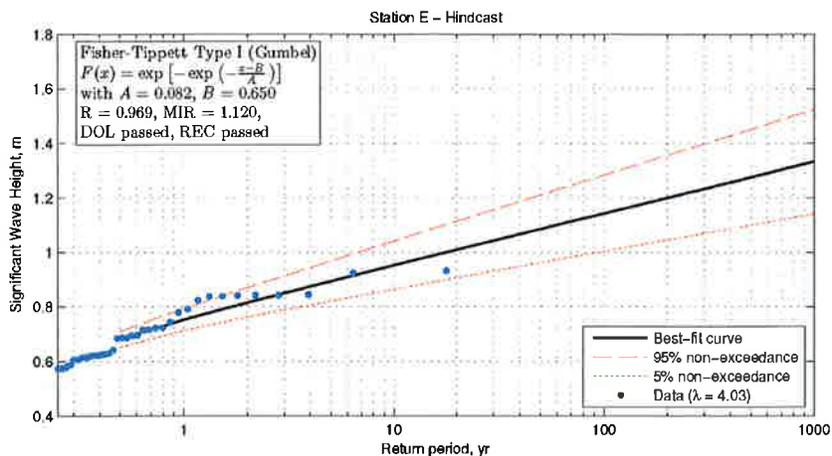


Figure 3-25. Extreme Value Analysis Results for Station E

### 3.6.3 ARMOR STONE SIZING

The wave hindcasts were used to compute required armor stone size for the stone dike and north terminal groin. The analysis included all locations A through E, however, the coastal rock structures are located in water depths associated with locations B and C. Table 3-6 presents the results of the computations.

Table 3-6. Armor Stone Size (pounds) per Return Period (years)

Return Period	Wave Location				
	A	B	C	D	E
0.5	67	18	47	72	341
1	100	25	67	116	492
2	144	35	92	165	633
5	200	51	125	241	781
10	271	61	165	305	882
25	360	85	213	422	1058
50	445	100	256	517	1202
100	543	125	322	599	1330
200	616	144	380	687	1492
500	724	176	468	781	1725
1000	801	213	570	882	1881

The previous construction for the stone dike used armor stone with a W50 weight between 320 to 540 pounds, with a maximum weight between 1,300 and 2,100 pounds. Locations A, B and C which are closest to the existing stone dike indicate that the required armor stone based on the hindcast calculated for this project is comparable to the prior construction in 1985. Based on this, it is determined that DeIDOT standard riprap gradations are acceptable for the project.

## 4. STRUCTURAL CRITERIA

### 4.1 STRUCTURE DESIGN LIFE

Based on industry standards, all coastal structure shoreline improvements will be designed for a service life of 30 years. During this time the structures may require some maintenance, however, the structures should be free of major repairs.

### 4.2 SUBSURFACE CONDITIONS

A geotechnical investigation was conducted including collecting soil borings for foundation information and beach sand samples for grain size distribution analysis. The report containing the data are presented in Appendix A.

### 4.3 EROSION

Historical shoreline erosion at the north side of the existing sill is 390 ft, from 1969 to 2015 as shown in Figure 4-1. The historic erosion rate is approximately 9 ft/year.

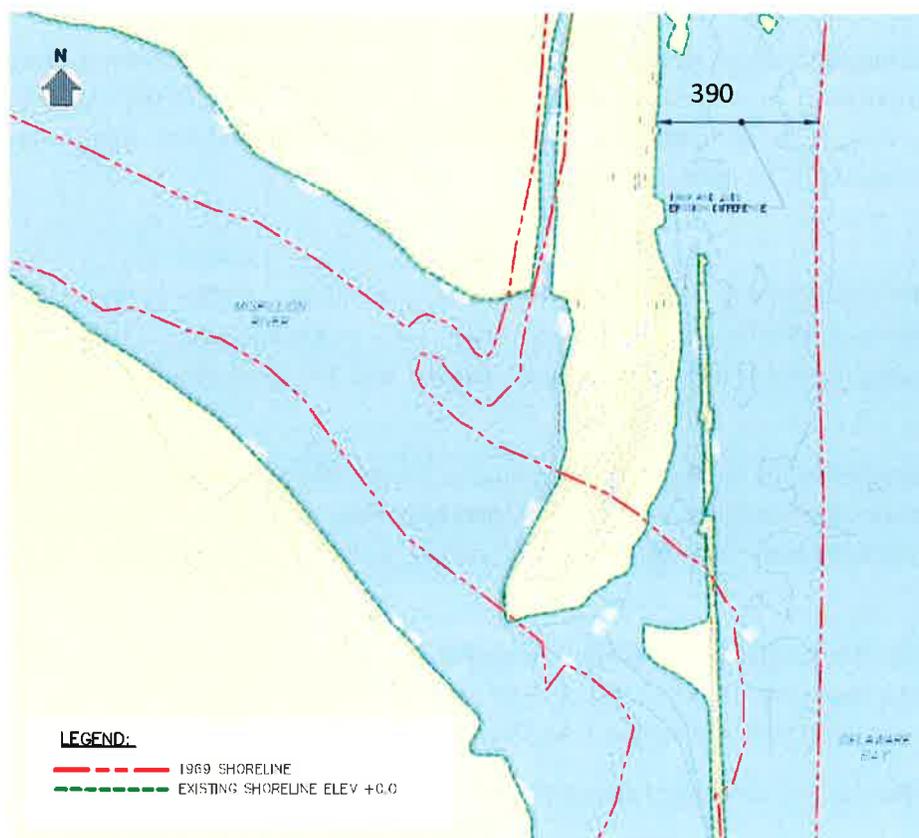


Figure 4-1. Historical Erosion North of Existing Stone Dike

## 5. DESIGN REFERENCES, STANDARDS, AND CODES

The following references, standards, and codes are used where appropriate and are recommended as a basis for the design:

- a) U.S. Army Corps of Engineers (USACE), *Coastal Engineering Manual*, EM 1110-2-1100, 2002
- b) The Rock Manual. The use of rock in hydraulic engineering (2<sup>nd</sup> Edition). CIRIA; CUR; CETMEF. C883 CIRIA, London, 2007.
- c) Standard Specifications for Road and Bridge Construction. Delaware Department of Transportation, 2001.
- d) US Army Corps of Engineers, Philadelphia (USACE). Mispillion River, Delaware, Breach Closure, 1993. IFB DACW61-93-B-0049.
- e) Conch Bar Breach, Kent County, Delaware, Breach Repair Plan, Profile and Sections, 1985.

## 6. MATERIAL PROPERTIES

The following material and design specifications are recommended as minimum parameters for the proposed project. All materials shall be new and of the best quality of their respective kinds as described or if not stated, to be at least in accordance with the relevant American Society for Testing and Materials (ASTM) standards.

### 6.1 ROCK

Armor Stone for Stone Dike and North Terminal Groin: Riprap shall be Delaware Department of Transportation (DelDOT) Class R-7. This rock shall have a maximum size of 30 inches (2,600 pounds), 15 to 50 percent smaller than 18 inches (600 pounds), and 0 to 15 percent smaller than 9 inches (70 pounds).

Armor Stone for South Terminal Groin and Interior Groins: Riprap shall be Delaware Department of Transportation (DelDOT) Class R-6. This rock shall have a maximum size of 24 inches (1,300 pounds), 15 to 50 percent smaller than 12 inches (165 pounds), and 0 to 15 percent smaller than 6 inches (20 pounds).

Core Stone: Riprap shall be Delaware Department of Transportation (DelDOT) Class R-4. This rock shall have a maximum size of 12 inches (9165 pounds), 15 to 50 percent smaller than 6 inches (20 pounds), and 0 to 15 percent smaller than 3 inches (3 pounds).

See specifications for additional information.

### 6.2 SAND

Sand gradation for the beachfill shall conform to DelDOT specifications: SECTION 804 FINE AGGREGATE as shown below.

Table 6-1. Sand Gradation for Beachfill

Sieve Size	Percent Passing
3/8" (9.5 mm)	100
No. 4 (4.75 mm)	95 - 100
No. 50 (0.300 mm)	5 - 30
No. 100 (0.150 mm)	1 - 10
No. 200 (0.075 mm)	0 - 4

## 7. REFERENCES

1. Center for Operational and Oceanographic Products and Services (COOPS). [http://tidesandcurrents.noaa.gov/sltrends/sltrends\\_station.shtml?stnid=8557380](http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8557380). Mean Sea Level Trend, 8557380 Lewes, Delaware. National Oceanic and Atmospheric Administration - Tides & Currents. Retrieved 15 October 2015.
2. Cook, T.L. (2004) "Observations of Sediment Transport in the Delaware Estuary during Spring Runoff Conditions." Master of Science Thesis, University of Delaware.
3. US Army Corps of Engineers, Philadelphia District. Project Fact Sheet: Cedar Creek, Sussex County, DE. September 2006.
4. US Army Corps of Engineers, Philadelphia District. Project Fact Sheet: Mispillion River, Sussex County, DE. September 2006.



**From:** [Arndt, Tricia K. \(DNREC\)](#)  
**To:** [Ashe, Jeremy \(DNREC\)](#)  
**Subject:** RE: Mispillion 60% Design  
**Date:** Thursday, October 22, 2015 4:14:55 PM  
**Attachments:** [image001.png](#)

---

Hi Jeremy,

DCP federal consistency concurrence has been issued for NWP 27 during the review of the permit program which occurs every 5 years. Therefore your project does not require individual CZM review, and you can go forth and do great things.

If the project had required an individual permit from the Corps, review would be required.

Trish

---

**From:** Ashe, Jeremy (DNREC)  
**Sent:** Thursday, October 22, 2015 1:45 PM  
**To:** Arndt, Tricia K. (DNREC)  
**Subject:** Mispillion 60% Design

Tricia,

Do you need to provide an environmental review for a NWP 27 USACE application for our NFWF (Federal \$) project at Mispillion?

If so can you please provide me an environmental review for the attached 60% design. It would be great to have one if needed ASAP as I'll be putting the permit application together shortly.

Due to timeline and budgetary constraints we need to start this project after June 7th 2016 and the project must be completed Feb 15 2017. Restoration is expected to take a minimum of 6-7 months to raise the rock wall, fill beach, install rock groins, and fill in ditch.

Molly has attended meetings with me describing the project in terms of construction and you were at JPP when I discussed the project.

If you have further questions I will be happy to answer them.

Jeremy Ashe  
Habitat Restoration Project Manager (Delaware Bayshore)  
Delaware Division of Fish & Wildlife  
89 Kings Highway  
Dover, DE 19901  
Office (302) 735-3601  
Mobile (302) 632-5404

**Delaware Division of Fish & Wildlife**

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**From:** Ashe, Jeremy (DNREC)

**Sent:** Wednesday, July 22, 2015 11:25 AM

**To:** Bennett, Karen (DNREC) ([Karen.Bennett@state.de.us](mailto:Karen.Bennett@state.de.us)); Rhoads, Craig L. (DNREC) ([Craig.Rhoads@state.de.us](mailto:Craig.Rhoads@state.de.us)); Hossler, Robert (DNREC); Holmes, Virgil (DNREC); Brown, Tyler (DNREC); Pratt, Tony P. (DNREC); Arndt, Tricia K. (DNREC); 'Al Rizzo'; 'michael.d.yost@usace.army.mil'; 'john.g.brundage@usace.army.mil'; 'Brian Boutin'; 'nigel.clark@bto.org'; 'gregory\_breese@fws.gov'; McKenna, Kimberly (DNREC); Michels, Stewart (DNREC); Smailer, Steven M. (DNREC); DiBona, Shelley A. (DNREC); Gonzon, Anthony T. (DNREC) ([Anthony.Gonzon@state.de.us](mailto:Anthony.Gonzon@state.de.us)); Jones, William L (DNREC); Rogerson, Joseph E. (DNREC); 'Kotulak, Pete'; Zarebicki, Paul M. (DNREC); Ellwood, Molly (DNREC); Fleming, Kate M. (DNREC); Boswell, Maura; Kwong, Ivy; Canizares, Rafael

**Subject:** Mispillion Meeting

Here are the meeting notes from the meeting we had on 7/21/15.

I did my best to convey all the questions/comments. Ill compile a final list and give to MN ASAP.

Please have any additional ones to me by August 3<sup>rd</sup>.

Here are the next steps for this project.

- Pete K. will work with the modeling to address questions in the attached doc and move toward to 60% design phase.
- 60% design will trigger permit application process, but need to know if we need an IP or can use NWP 27. Time is of essence in permit phase in order to move toward construction within grant time frame. Grant ends February 15, 2017.
- Another large meeting of this caliber is not expected to occur in the near future. Coordination with me is critical if you have any comments or concerns. I will convey all comments and concerns to appropriate folks (ex: Moffat & Nichol).

You all have my email and phone so don't hesitate to ask questions.

Jeremy Ashe

Habitat Restoration Project Manager (Delaware Bayshore)

Delaware Division of Fish & Wildlife

89 Kings Highway

Dover, DE 19901

Office (302) 735-3601

Mobile (302) 632-5404

**Delaware Division of Fish & Wildlife**

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# 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>

December 16, 2015

Mr. Jeremy Ashe  
Delaware Bayshore Habitat Restoration Project Manager  
Delaware Department of Natural Resources and Environmental Control  
89 Kings Highway  
Dover, DE 19901

*Re: "Not Likely to Adversely Affect" determination for rufa red knot for Mispillion Harbor Restoration Project*

Dear Mr. Ashe:

The U.S. Fish and Wildlife Service (Service) has reviewed this project based on your letter and attachments dated October 27, 2015, and a meeting with you and other staff from Delaware Department of Natural Resources and Environmental Control (DNREC) on December 1, 2015. At that meeting you described the purpose, need, and goals of the project, and information and modeling used in the design. You also provided the Service, via e-mail on December 1, 2015, with aerial photographs that demonstrate the loss of beach in the area over time and a 2008 report which outlines the information and modeling used to analyze different restoration alternatives. The Service has reviewed all of these materials and has evaluated the potential effects of this project to the threatened rufa red knot (*Calidris canutus rufa*, red knot). The comments provided below are in accordance with Section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Mispillion Harbor has the highest concentration of red knots during spring migration than all other beaches along the Delaware Bay, containing 18 percent of the Bay-wide population. Migrating red knots stop to feed on horseshoe crab eggs at Mispillion Harbor to restore their energy reserves before resuming migration to their Arctic nesting area. The Mispillion River has several man-made features that provide a unique protected area. A rock sill protects Back Beach from waves and provides a protected area where horseshoe crabs can spawn on any high tide and under almost any weather conditions. In addition, the water that drains into the Mispillion River, just north of Back Beach, comes from a marsh with shallow water that warms up quickly, which may enable horseshoe crabs to spawn early. The result is an area with very high numbers of horseshoe crab eggs and very high numbers of red knots.

There is a breach in the rock sill at Back Beach that is expected to continue to erode. To the north there is also a risk of a breach at a man-made ditch (Graco Canal). If there was a breach in this area, the Mispillion River would tend to change channels and flow east to the Delaware Bay

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rather than bending south. If the Mispillion River changed course and no longer went south through the channel, the sand dynamics of the Mispillion Harbor would change dramatically.

The purpose of this proposed project is to restore the rock sill and secure important habitat areas used by red knots and horseshoe crabs and minimize the potential for further degradation. If the project is not implemented, a breach would cause undesirable changes to hydrodynamics of the system, as well as completely eroding Back Beach. Because this beach is one of the most important stop-over areas for the red knot, there is a critical need to restore and maintain the area.

Moffett and Nichol were contracted to study the hydrology of the site and offer alternatives for accomplishing these goals (Moffett and Nichol, 2008). DNREC incorporated that information and conducted additional evaluations (DNREC, 2015) to develop a final design of the project that includes: 1) installation of a “dog leg” or bend in the rock sill that will help prevent breaching at Back Beach; 2) raising the existing rock sill to a 6-foot elevation NAVD88 for approximately 1,200 feet; 3) placing sand and groins to hold the sand at Back Beach; and 4) fill a manmade ditch (Graco Canal) to restore continuous marsh buffer and prevent a breach from occurring into Delaware Bay.

The project is designed to avoid disturbing red knots by not allowing project activities from April 15 to June 7 when red knots are active in the area. Any sand placement will only occur after July 1 to avoid disturbing horseshoe crabs. DNREC typically would recommend a time of year restriction of April 15 to August 30 to ensure that horseshoe crab can utilize the beach areas to spawn, however, they are allowing a shorter time of year restriction because they believe the project is necessary to ensure the restoration and protection of a critically important beach area for horseshoe crab spawning. The Service concurs with that recommendation since red knots will no longer be in Mispillion Harbor feeding on horseshoe crab eggs at that time.

The project as proposed is not likely to adversely affect the federally threatened red knot. It has incorporated appropriate time of year restrictions and will result in improved habitat for red knot. Since the project occurs in a critical stop-over area for red knot, the Service recommends that some post-construction monitoring occur to document: 1) that the project goals of restoring and maintaining beach are being met; 2) that red knots and horseshoe crabs are still using the beach; and 3) that invasive plants such as phragmites are not introduced through construction activities reducing habitat for red knots and horseshoe crabs, and potentially encouraging predators of red knot such as fox or raccoon to inhabit the area. If phragmites or other undesirable vegetation becomes established, efforts should be made to control plants before they spread. We recommend that a preliminary post-construction monitoring plan be drafted for discussion among the agencies before the project is completed in February 2017.

Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered. We appreciate the opportunity to provide information relevant to threatened and endangered fish and wildlife resources. This Endangered Species Act determination does not exempt this project from obtaining all permits and approvals that may be required by other state or Federal agencies.

If you have any questions or concerns regarding this letter, please contact Julie Slacum of my Endangered Species staff at (410) 573-4595 or by email at [julie\\_thompson@fws.gov](mailto:julie_thompson@fws.gov).

Sincerely,

A handwritten signature in blue ink, appearing to read "Genevieve LaRouche".

Genevieve LaRouche  
Field Supervisor

cc: Kate Fleming, Delaware Division of Fish and Wildlife (DNREC), Dover, DE

Literature Cited

2008. Coastal Engineering Assessment of Habitat Restoration Alternatives at Mispillion Inlet, Sussex County, Delaware. Prepared for Delaware Department of Natural Resources and Environmental Control. Submitted by: Moffatt and Nichol, New York, New York. 161 pp.

2015. Delaware Department of Natural Resources and Environmental Control. Mispillion Complex Project Beach Nourishment and Rock Protection Structures 60% Submittal. Basis of Design. 30 pp.



STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES  
& ENVIRONMENTAL CONTROL  
DIVISION OF FISH & WILDLIFE  
89 Kings Highway  
Dover, Delaware 19901

OFFICE OF THE  
DIRECTOR

Phone: (302) 739-9910  
Fax: (302) 739-6157

December 1, 2015

Jeremy Ashe  
DNREC-Division of Fish and Wildlife  
98 Kings Highway  
Dover, Delaware 19901

Dear Mr. Ashe,

Re: DNREC-DFW 2015 Mispillion Complex Project

Thank you for contacting the Species Conservation and Research Program (SCRP) about information on rare, threatened and endangered species, unique natural communities, and other significant natural resources as they relate to the above referenced project.

Mispillion Harbor, where this project is proposed, provides critically important habitat for migratory shorebirds, including the federally threatened red knot (*Calidris canutus rufa*), as they stop over in Delaware to acquire food resources and reach their optimum body condition (weight gain) before migrating to their Arctic nesting grounds. Each year, red knot and other shorebirds stop here to feed on horseshoe crab eggs. This site is largely protected from wind-driven wave energy, making it particularly unique because horseshoe crabs are able to spawn on any high tide and under virtually any weather condition. As such, this habitat supports by far the greatest density of horseshoe crab eggs in comparison to all of Delaware Bay's horseshoe crab spawning beaches. However, for years, Mispillion Harbor has been losing sand, and therefore has been losing critically important habitat for both migratory shorebirds and horseshoe crabs.

The primary purpose of the project is to rebuild and restore critically important and unique habitat for horseshoe crabs spawning and red knot feeding. This project is imperative to reduce the impacts and threat of further habitat loss as a result of climate change, including sea level rise and increasing frequency and severity of coastal storm events. In order to complete the project SCRPN recognizes that it may not be possible to meet all standard time of year restrictions that would typically be recommended to protect the species utilizing these habitats. However, we have weighed the long-term importance and benefits of the restoration project against the short-term impacts and make the following recommendations, which are broken into three sections according to proposed project activities (stone dike, beach restoration and groins, and channel fill).

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## Stone Dike

### Red Knot

In order to avoid interrupting red knot activity during this critical stage of their migration, SCRP recommends a time of year restriction of project activities between April 15<sup>th</sup> to June 7<sup>th</sup>. Note that because the federally threatened red knot may be affected, Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) may be necessary. Please contact Julie Thompson with the USFWS at 410-573-4595 or [Julie\\_Thompson@fws.gov](mailto:Julie_Thompson@fws.gov).

### Horseshoe Crabs

Typically, our program would recommend a time of year restriction of April 15<sup>th</sup> to August 30<sup>th</sup> to ensure that horseshoe crabs are not negatively affected by the project. However, this project is necessary to ensure the restoration and protection of a critically important horseshoe crab spawning beach. As such we feel that a time of year restriction of April 15<sup>th</sup> to June 7<sup>th</sup>, which corresponds to the time of year restriction recommended for shorebirds, would be appropriate (note that we recommend a different time of year restriction for the beach restoration and groins portions of the project discussed below). It is our understanding that the barge and crane will not need to come closer than 100-150 ft. in order to place rock on the stone dike. It is also our understanding that horseshoe crabs do not typically spawn in the area of the stone dike (excluding the terminal groin areas). As such, we recommend that work on the dike starts in the middle and continues outward so that the terminal groin areas can be avoided for the month of June. However, if, despite these conditions, it appears that lethal impacts to horseshoe crabs cannot be avoided during rock placement (including equipment staging), we strongly urge ceasing such activities near times of high tide within two days (+/-) of the new or full moons through the end of June.

Finally, in order to avoid long-term impacts to horseshoe crabs, the stone should be arranged/chinked in such a way that horseshoe crabs will not become entrapped.

### American Oystercatchers

Delaware lists American oystercatchers (*Haematopus palliatus*) as state endangered. SCRP has documented this species nesting on the rock wall on the eastern bank of the Mispillion River. SCRP understands that the anticipated end result of this project will result in protection of beach nesting habitat for oystercatchers and that, once completed, nesting opportunities on the rock wall will be undiminished. Typically, our program recommends avoiding work in oystercatcher nesting habitat during the nesting season which runs from mid-March through the end of July. If work cannot be conducted outside of this time of year, SCRP makes the following recommendations:

1. We recommend that the site should be monitored for oystercatcher presence starting as early as is practicable during the nesting season (no later than April 15). Monitoring should continue throughout the nesting season, or, until the project is completed, so long as oystercatchers are present within or adjacent to the project area.
2. We recommend that the project manager coordinate closely with SCRP as the project start date approaches so that all contingencies, including the need for any federal migratory bird permits, can be explored if oystercatcher nesting activity at the site progresses.

3. We recommend that if oystercatchers are observed establishing a nesting territory on the wall, project managers should place materials on the wall (e.g. plastic sheeting) that would deter the birds from laying a nest there.
4. We recommend that, if oystercatchers do lay a nest within or in close proximity to the work area, timing of nest initiation and hatching should be documented such that dates of hatching/fledging can be precisely determined.

### Terrapins

The diamondback terrapin (*Malaclemys terrapin*) is a brackish water turtle found in the state's coastal inland bays, Delaware Bay and its tidal brackish tributaries. This species is ranked as "SU" in Delaware, which indicates that it may be a species of conservation concern, but there is inadequate data to determine its status. The Northeast Fish and Wildlife Diversity Technical Committee consider the Diamondback terrapin a species of regional concern<sup>1</sup>, and one that may warrant federal protection in the future.

Adult terrapins spend most of their time in water but, from mid-May to mid-July, female terrapins will emerge from the water to lay eggs on sandy and sparsely vegetated beaches, and from early-August to mid-September and mid-March to late May, hatchlings will emerge from nests and spend the first couple years of their life in adjacent marshes, eventually entering the bays where they will spend the majority of their lives. If there are large rock structures placed between the nest sites and the water, terrapins have the potential to become entrapped in the rocks. If they are unable to escape, they will die from heat stress (if on dry land) or may drown if they become entrapped in the rocks in the water. As such, it will be essential that the stone dike be arranged/chinked in such a way that they do not entrap the terrapins.

### State Natural Area/Nature Preserve

The project area falls within a Nature Preserve. Nature Preserves are Natural Areas that have been formally dedicated under Delaware State Code, Title 7, Chapter 73. Each Nature Preserve is dedicated by means of Articles of Dedication that are legally binding, run with the land in perpetuity, and outline restrictions specific to that Nature Preserve. 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 Eileen Butler, Natural Areas Program Manager, at (302) 739-9235.

### State Natural Heritage Site

Because federally protected and state-rare species and habitats are present, this project is within a State Natural Heritage Site. State Natural Heritage Sites and Delaware National Estuarine Research Reserves are identified as "Designated Critical Resource Waters" by the Army Corps of Engineers (ACOE), and as

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<sup>1</sup> Therres, G.D. 1999. Wildlife species of regional conservation concern in the northeastern United States. *Northeastern Wildlife* 54:93-100

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 Army Corps of Engineers for activities on this property.

If you propose to use Nationwide Permit No. 3, 13, 18, 29, 39 or 42 the State of Delaware has denied 401 Water Quality Certification (WQC) and Coastal Zone Federal Consistency Concurrence (CZM) for these Nationwide Permits in Designated Critical Resource Waters. In order to use any of these six Nationwide Permits at this site you must apply for a project-specific Water Quality Certification (WQC) and Coastal Consistency Determination (CZM) from the appropriate offices at DNREC. To obtain the application materials and for all information regarding WQC, contact DNREC's Wetlands and Subaqueous Lands Section at 302/739-9943. For information pertaining to CZM, contact DNREC's Coastal Programs at 302/739-9283.

If you propose to use Nationwide Permit No. 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, or 44, this Designated Critical Resource Water designation may require you to obtain authorization through some other nationwide or general permit, or an individual permit from the Army Corps of Engineers. You should review the Nationwide Permit General Conditions and Regional Conditions for Delaware (see, in particular, Nationwide Permit General Condition No. 19) to determine what notification requirements or restrictions might be applicable for your activity. Please contact the Army Corps of Engineers at 215/656-6728 if you have questions or require additional information regarding the Nationwide Permit Program.

## **Beach Restoration and Groins**

### Red Knot

In order to avoid interrupting red knot activity during this critical stage of their migration, SCRP recommends a time of year restriction of project activities between April 15<sup>th</sup> to June 7<sup>th</sup>. Note that because the federally threatened red knot may be affected, Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS) may be necessary. Please contact Julie Thompson with the USFWS at 410-573-4595 or [Julie.Thompson@fws.gov](mailto:Julie.Thompson@fws.gov).

### Horseshoe Crabs

Typically, our program would recommend a time of year restriction of April 15<sup>th</sup> to August 30<sup>th</sup> to ensure that horseshoe crabs are not negatively affected by the project. However, given that this project is necessary to ensure the restoration and protection of a critically important horseshoe crab spawning beach, we feel that a time of year restriction of April 15<sup>th</sup> to July 1<sup>st</sup> would be appropriate (note that we recommend a different time of year restriction for the rock wall portion of the project discussed above). If this time of year restriction cannot be met, please contact Stewart Michels for further guidance ([Stewart.Michels@state.de.us](mailto:Stewart.Michels@state.de.us)).

Next, we understand and support that sand of similar grain size to that which currently exists will be utilized in this project.

Finally, it is our understanding that stone will be utilized to create the groins along the restored beach. In order to avoid long-term impacts to horseshoe crabs, the stone should be arranged/chinked in such a way that horseshoe crabs will not become entrapped.

### American Oystercatchers

Delaware lists American oystercatchers (*Haematopus palliatus*) as state endangered. SCRCP has documented this species nesting on Back Beach on the eastern bank of the Mispillion River. Additionally, there is suitable oystercatcher nesting habitat on the Delaware Bay beach at Mispillion. SCRCP understands that the anticipated end result of this project will result in improved nesting habitat for oystercatchers. Typically, our program recommends avoiding work in oystercatcher nesting habitat during the nesting season which runs from mid-March through the end of July. If work cannot be conducted outside of this time of year, SCRCP makes the following recommendations:

1. We recommend that the site be monitored for oystercatcher presence starting as early as is practicable during the nesting season (no later than April 15). Monitoring should continue throughout the nesting season, or, until the project is completed, so long as oystercatchers are present within or adjacent to the project area.
2. We recommend that the project manager coordinate closely with SCRCP as the project start date approaches so that all contingencies, including the need for any federal migratory bird permits, can be explored if oystercatcher nesting activity at the site progresses.
3. We recommend that, if oystercatchers do lay a nest within or in close proximity to the work area, timing of nest initiation and hatching should be documented such that dates of hatching/fledging can be precisely determined.
4. Once fill placement is completed, we recommend that planting of vegetation on the newly established sand should be kept to a minimum so that suitable oystercatcher nesting habitat is not overrun by thick vegetation. Oystercatchers will avoid nesting in habitat that is overly vegetated.

### Terrapins

The diamondback terrapin (*Malaclemys terrapin*) is a brackish water turtle found in the state's coastal inland bays, Delaware Bay and its tidal brackish tributaries. This species is ranked as "SU" in Delaware, which indicates that it may be a species of conservation concern, but there is inadequate data to determine its status. The Northeast Fish and Wildlife Diversity Technical Committee consider the Diamondback terrapin a species of regional concern<sup>2</sup>, and one that may warrant federal protection in the future.

Adult terrapins spend most of their time in water but, from mid-May to mid-July, female terrapins will emerge from the water to lay eggs on sandy and sparsely vegetated beaches, and from early-August to mid-September and mid-March to late May, hatchlings will emerge from nests and spend the first

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<sup>2</sup> Therres, G.D. 1999. Wildlife species of regional conservation concern in the northeastern United States. *Northeastern Wildlife* 54:93-100

couple years of their life in adjacent marshes, eventually entering the bays where they will spend the majority of their lives. Due to the long time of year in which terrapins may be impacted by construction activities, it would be best if adult female terrapins are deterred from nesting in the sandy beach areas of the construction zones. However, it would be difficult if not impossible, to deter these terrapins from accessing nesting habitat within the project area. Protection of the adult females is critical, as it takes many years for terrapins to reach reproductive age and the survival of adult females is critical to maintaining populations. As such, we recommend that nesting females be protected by not working with heavy equipment during the nesting season (mid-May to mid-July) on nesting beaches.

If there are large rock structures placed between the nest sites and the water, terrapins have the potential to become entrapped in the rocks. If they are unable to escape, they will die from heat stress (if on dry land) or may drown if they become entrapped in the rocks in the water. As such, it will be essential that the stone groins be arranged/chinked in such a way that they do not entrap the terrapins.

#### State Natural Area/Nature Preserve

The project area falls within a Nature Preserve. Nature Preserves are Natural Areas that have been formally dedicated under Delaware State Code, Title 7, Chapter 73. Each Nature Preserve is dedicated by means of Articles of Dedication that are legally binding, run with the land in perpetuity, and outline restrictions specific to that Nature Preserve. 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 Eileen Butler, Natural Areas Program Manager, at (302) 739-9235.

#### State Natural Heritage Site

Because federally protected and state-rare species and habitats are present, this project is within a State Natural Heritage Site. State Natural Heritage Sites and Delaware National Estuarine Research Reserves are identified as "Designated Critical Resource Waters" by the Army Corps of Engineers (ACOE), 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 Army Corps of Engineers for activities on this property.

If you propose to use Nationwide Permit No. 3, 13, 18, 29, 39 or 42 the State of Delaware has denied 401 Water Quality Certification (WQC) and Coastal Zone Federal Consistency Concurrence (CZM) for these Nationwide Permits in Designated Critical Resource Waters. In order to use any of these six Nationwide Permits at this site you must apply for a project-specific Water Quality Certification (WQC) and Coastal Consistency Determination (CZM) from the appropriate offices at DNREC. To obtain the application materials and for all information regarding WQC, contact DNREC's Wetlands and Subaqueous Lands Section at 302/739-9943. For information pertaining to CZM, contact DNREC's Coastal Programs at 302/739-9283.

If you propose to use Nationwide Permit No. 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, or 44, this Designated Critical Resource Water designation may require you to obtain authorization through some other nationwide or general permit, or an individual permit from the Army Corps of Engineers. You should review the Nationwide Permit General Conditions and Regional Conditions for Delaware (see, in

particular, Nationwide Permit General Condition No. 19) to determine what notification requirements or restrictions might be applicable for your activity. Please contact the Army Corps of Engineers at 215/656-6728 if you have questions or require additional information regarding the Nationwide Permit Program.

## **Channel Fill**

### Marsh nesting birds

Several marsh nesting bird species do nest in the marshes surrounding the project site. However, a review of our database indicates that no rare or endangered marsh nesting bird species occur within the channel fill project area. SCRCP understands that the anticipated end result of this project will result in the protection of the existing marsh habitat. Species expected to occur within the project area include clapper rail, marsh wren, willet and saltmarsh sparrow - all obligate marsh-nesting species. It is SCRCP's understanding that channel fill and other marsh-disturbing activities are unlikely to begin until after July 1. It is also SCRCP's understanding that there is some potential for these activities to begin earlier as the project timeline moves forward and other tasks are completed. According to correspondence provided by you, the channel will be filled by pumping material into it and the fill material is expected to be sand or a sandy fill material. Impacts to the marsh habitat to install the pipe are anticipated to result from low impact equipment or walked into place and any disturbance to the marsh will be restored to the existing grade.

To ensure that marsh-nesting birds are provided with sufficient time to complete their nesting cycle, SCRCP recommends that no disturbance to the salt marsh habitat occur between April 15 and August 30. If work must begin prior to July 31, we recommend that you contact SCRCP for additional guidance. Although fledgling birds will likely be present within the project area, most affected species are precocial and capable of avoiding the area during the work period. We do not anticipate the presence of significant number of nests with eggs after July 31 although incomplete nests may still be present within the project area. In addition, regardless of when the fill work is anticipated to begin, SCRCP also recommends that the pipe be installed prior to April 1 to reduce the overall impacts to nesting species.

### State Natural Area/Nature Preserve

The project area falls within a Nature Preserve. Nature Preserves are Natural Areas that have been formally dedicated under Delaware State Code, Title 7, Chapter 73. Each Nature Preserve is dedicated by means of Articles of Dedication that are legally binding, run with the land in perpetuity, and outline restrictions specific to that Nature Preserve. 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 Eileen Butler, Natural Areas Program Manager, at (302) 739-9235.

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,

*Katherine M Fleming*

**Kate Fleming**

Wildlife Biologist/Environmental Review Coordinator

(302) 735-8658; fax: (302) 653-3431; [Kate.Fleming@state.de.us](mailto:Kate.Fleming@state.de.us)

**From:** [Butler, Eileen M. \(DNREC\)](#)  
**To:** [Ashe, Jeremy \(DNREC\)](#)  
**Subject:** RE: Mispillion Complex Environmental Review  
**Date:** Thursday, December 17, 2015 2:50:37 PM  
**Attachments:** [image001.png](#)

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Sorry Jeremy! The Office of Nature Preserves has no issues with this project as long as recommendations and restrictions suggested by the Division of Fish and Wildlife Species Conservation and Research Program (SCRP) are adhered to. The Mispillion Complex is known as the Mispillion Harbor Reserve Nature Preserve, due to the resources managed and monitored by the Division of Fish and Wildlife and as such, this Office defers to the opinion of the SCRCP for this project.

Thank you for offering the opportunity for my comment.

Eileen

*Eileen M. Butler*  
Natural Areas Program Manager  
Office of Nature Preserves  
Department of Natural Resources  
And Environmental Control  
Division of Parks & Recreation  
89 Kings Highway  
Dover, DE 19901  
Phone: 302-739-9239  
Fax: 302-739-7026  
[Eileen.Butler@state.de.us](mailto:Eileen.Butler@state.de.us)

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**From:** Ashe, Jeremy (DNREC)  
**Sent:** Thursday, December 17, 2015 2:34 PM  
**To:** Butler, Eileen M. (DNREC)  
**Subject:** RE: Mispillion Complex Environmental Review

Any update on the below email?

Jeremy Ashe  
Habitat Restoration Project Manager (Delaware Bayshore)  
Delaware Division of Fish & Wildlife  
89 Kings Highway  
Dover, DE 19901  
Office (302) 735-3601  
Mobile (302) 632-5404

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**From:** Ashe, Jeremy (DNREC)  
**Sent:** Wednesday, December 02, 2015 10:29 AM  
**To:** Butler, Eileen M. (DNREC)  
**Subject:** FW: Mispillion Complex Environmental Review

Hi Eileen,

Thanks for taking my call. As discussed, attached are Kates comments, our design, and a brief description of what/why we want to do this project.

The Mispillion Harbor restoration project goals are to restore and existing stone dike, beach, install new groins, and fill a manmade ditch. The project is trying to maintain the existing conditions which are ideal for horseshoe crab spawning and red knot foraging. Unfortunately, conditions within the system are being diminished and use by these species is less each year. This project will restore the necessary infrastructure and habitat to allow these species to utilize this habitat for years to come.

Let me know if you have any further questions or concerns.

Jeremy Ashe  
Habitat Restoration Project Manager (Delaware Bayshore)  
Delaware Division of Fish & Wildlife  
89 Kings Highway  
Dover, DE 19901  
Office (302) 735-3601  
Mobile (302) 632-5404

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**From:** Fleming, Kate M. (DNREC)  
**Sent:** Wednesday, December 02, 2015 10:11 AM  
**To:** Ashe, Jeremy (DNREC)  
**Cc:** Butler, Eileen M. (DNREC); [Julie\\_Thompson@fws.gov](mailto:Julie_Thompson@fws.gov); Keller, Cherry <[cherry\\_keller@fws.gov](mailto:cherry_keller@fws.gov)> ([cherry\\_keller@fws.gov](mailto:cherry_keller@fws.gov)); Michels, Stewart (DNREC); Bailey, Matthew (DNREC); Gonzon, Anthony T. (DNREC)  
**Subject:** RE: Mispillion Complex Environmental Review

Hi All,

Eileen Butler called to clarify that the Mispillion Complex project falls within a Nature Preserve, which has a higher level of protection than a State Natural Area. I have updated the comments to reflect the change. I discussed the project briefly with Eileen but Jeremy, please give her a call to fill her in further.

Thanks again everyone,  
Kate

Kate Fleming  
Wildlife Biologist/Environmental Review Coordinator  
Delaware Division of Fish and Wildlife  
4876 Hay Point Landing Road  
Smyrna, DE 19977  
Phone: (302) 735-8658  
Fax: ( 302) 653-3431  
**Delaware Division of Fish & Wildlife**

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**From:** Fleming, Kate M. (DNREC)  
**Sent:** Tuesday, December 01, 2015 4:05 PM  
**To:** Ashe, Jeremy (DNREC)  
**Cc:** Butler, Eileen M. (DNREC); [Julie.Thompson@fws.gov](mailto:Julie.Thompson@fws.gov); Keller, Cherry <[cherry\\_keller@fws.gov](mailto:cherry_keller@fws.gov)> ([cherry\\_keller@fws.gov](mailto:cherry_keller@fws.gov)); Michels, Stewart (DNREC); Bailey, Matthew (DNREC); Gonzon, Anthony T. (DNREC)  
**Subject:** Mispillion Complex Environmental Review

Mr. Ashe.

Please see the attached comments regarding the proposed Mispillion Complex project and feel free to contact me with any questions.

Thanks,  
Kate

Kate Fleming  
Wildlife Biologist/Environmental Review Coordinator  
Delaware Division of Fish and Wildlife  
4876 Hay Point Landing Road  
Smyrna, DE 19977  
Phone: (302) 735-8658  
Fax: ( 302) 653-3431  
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**From:** [Michelle Magliocca - NOAA Federal](#)  
**To:** [Ashe, Jeremy \(DNREC\)](#)  
**Subject:** Re: Mispillion Project Review Request  
**Date:** Tuesday, November 03, 2015 3:29:03 PM

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Hi Jeremy,

Sorry for the delay. I would be comfortable with work starting around June 7th as long as your Fisheries folks are okay with it.

Thanks,  
Michelle

On Tue, Oct 27, 2015 at 8:03 AM, Ashe, Jeremy (DNREC) <[Jeremy.Ashe@state.de.us](mailto:Jeremy.Ashe@state.de.us)> wrote:

One more thing about the rock wall. According to the plans all of the rock wall to be installed is above mean low low water elevation. About half of it is above mean high high water.

Would that constitute in water work? And if so would there be any flexibility on the back end of the TOYR to be somewhere near June 7<sup>th</sup>?

Jeremy Ashe

Habitat Restoration Project Manager (Delaware Bayshore)

Delaware Division of Fish & Wildlife

89 Kings Highway

Dover, DE 19901

Office [\(302\) 735-3601](tel:(302)735-3601)

Mobile [\(302\) 632-5404](tel:(302)632-5404)



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**From:** Ashe, Jeremy (DNREC)  
**Sent:** Monday, October 26, 2015 4:30 PM  
**To:** Michelle Magliocca - NOAA Federal  
**Subject:** Re: Mispillion Project Review Request

Would adding rock to the wall be considered in water work?

If so any flexibility to start early/mid June?

Thanks for the quick turnaround.

*Sent from my Verizon Wireless 4G LTE DROID*

Michelle Magliocca - NOAA Federal <[michelle.magliocca@noaa.gov](mailto:michelle.magliocca@noaa.gov)> wrote:

Jeremy,

Thanks for the project information. The Mispillion River provides migration, spawning, and forage habitat for anadromous fish. In-water work should be avoided from March 1 to June 30 to allow these species passage to their upstream spawning areas. Beach fill should be avoided from April 16 through August 30 to protect horseshoe crab spawning.

Michelle

On Mon, Oct 26, 2015 at 9:05 AM, Ashe, Jeremy (DNREC) <[Jeremy.Ashe@state.de.us](mailto:Jeremy.Ashe@state.de.us)> wrote:

Michelle,

I sent you a project review request for Ted Harvey on Friday and I would appreciate if you could do the same for Mispillion. This project was presented at the Jan 15<sup>th</sup> JPP in Dover. And July 21 in Dover for a special meeting with DNREC wetlands section, DNREC environmental review, DNREC Coastal Programs, USFWS, and USACE. My apologies for not including NOAA to that meeting.

Attached you will find the 60% design for the project.

The project goal is restoring breach habitat for spawning horseshoe crabs and foraging/roosting habitat for red knot. We plan on raising an existing rock wall to NAVD88 6' (an approximate 3' lift for approx. 1200'), dog leg north end of wall into sand dune, add sand fill to the beach (not dredged, hauled in from upland site, approx. 80,000 cubic yards), fill with approx. 30,000 cubic yards a manmade ditch to Spartina marsh elevations, and add t-groins for beach stability.

Major erosion of the beach and a breach on the north end of the rock wall has resulted in loss of habitat for spawning horseshoe crabs and foraging/roosting red knots. This area is THE HOTSPOT for horseshoe crabs and red knots for Delaware Bay. Another super storm like Sandy could result in total loss of this habitat. Therefore, the Division of Fish and Wildlife has obtained funds from National Fish and Wildlife Foundation (Federal Funds) to restore the beach.

The project is expected to take 6 months to complete and our grant runs out Feb 15, 2015. Therefore we need to start construction when the red knots leave (June 7, 2016). This will allow us to complete the project and accounts for weather delays. The construction will start with the rock wall, dog leg, then the beach, and then the t-groins. The filling of the manmade ditch can be completed at any time in terms of construction success.

The basis of the design for the elevations for the rock wall are to minimize erosion due to storms and filling the manmade ditch is to protect the marsh from a possible breach and add as a buffer. Modeling has suggested that the Mispillion River is vulnerable to a major breach if the rock wall is not raised and if the ditch is not filled. The ditch is rather shallow (less than a foot and has minimal drainage capabilities). The ditch used to run further north but has filled in on its own. This project would just expedite the process.

If you have questions please feel free to call or email and we can work through them.

Consultation with our Fisheries Section has lead us to believe that this project will have no impact on listed fish species and would be beneficial for the fisheries as a whole once it is completed.

It would be great to hear back from you with your thoughts so I can include them with my NWP 27 application to the USACE.

Jeremey Ashe

Habitat Restoration Project Manager (Delaware Bayshore)

Delaware Division of Fish & Wildlife

89 Kings Highway

Dover, DE 19901

Office [\(302\) 735-3601](tel:3027353601)

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**Michelle Magliocca**

*NOAA Fisheries*

*Habitat Conservation Division*

*177 Admiral Cochrane Drive*

*Annapolis, MD 21401*

*410-573-4559*

[www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)



--

**Michelle Magliocca**

*NOAA Fisheries*

*Habitat Conservation Division*

*177 Admiral Cochrane Drive*

*Annapolis, MD 21401*

*410-573-4559*

[www.nmfs.noaa.gov](http://www.nmfs.noaa.gov)





State of Delaware  
Historical and Cultural Affairs

21 The Green  
Dover, DE 19901-3611

Phone: (302) 736.7400

Fax: (302) 739.5660

August 27, 2015

Review Code: 2015.08.20.04

John McCarthy  
Cultural Resource Unit  
Delaware State Parks  
DNREC

Project: Mispillion River Complex Beach Nourishment and Rock Structures  
Delaware Fish and Wildlife Division, DNREC, Kent and Sussex Counties, DE.

Thank you for the correspondence regarding this project. It is our understanding the project will restore the sand fill along the previously existing stone sill structure and sand fill at the north side of the mouth of the river. In addition, it will add rock to the sill to raise its height, and rock groins to the west side. Also, a tidal channel will be relocated from right behind (west of) the beach to a location further to the west so that channel flows do not erode the beach or the sill complex.

As noted in your letter, the National Register-listed 1873 Mispillion Lighthouse and Beacon Tower are in the immediate vicinity of the project. During our field investigation of August 26, we found that much of the landscape has been altered recently through natural processes, though we did locate the remains of a structure that was depicted on a ca. 1895 atlas. It is our understanding these remain will not be disturbed by this undertaking.

As presented, this undertaking will not diminish the historical characteristics or the use of the properties nor any of the physical features within the properties that contribute to their historic significance. In addition, it is probable this undertaking will protect the Lighthouse and tower from future storm damage. Also, the undertaking will not introduce visual or audible elements to historic properties. We find these impacts will not notably diminish any of the elements that contribute to the historic significance of the resources. Therefore, we concur with your determination the above project will have no adverse effect on the Mispillion Lighthouse and Beacon Tower or any other historic properties.

If you have any questions I can be reached at [craig.lukezic@state.de.us](mailto:craig.lukezic@state.de.us).

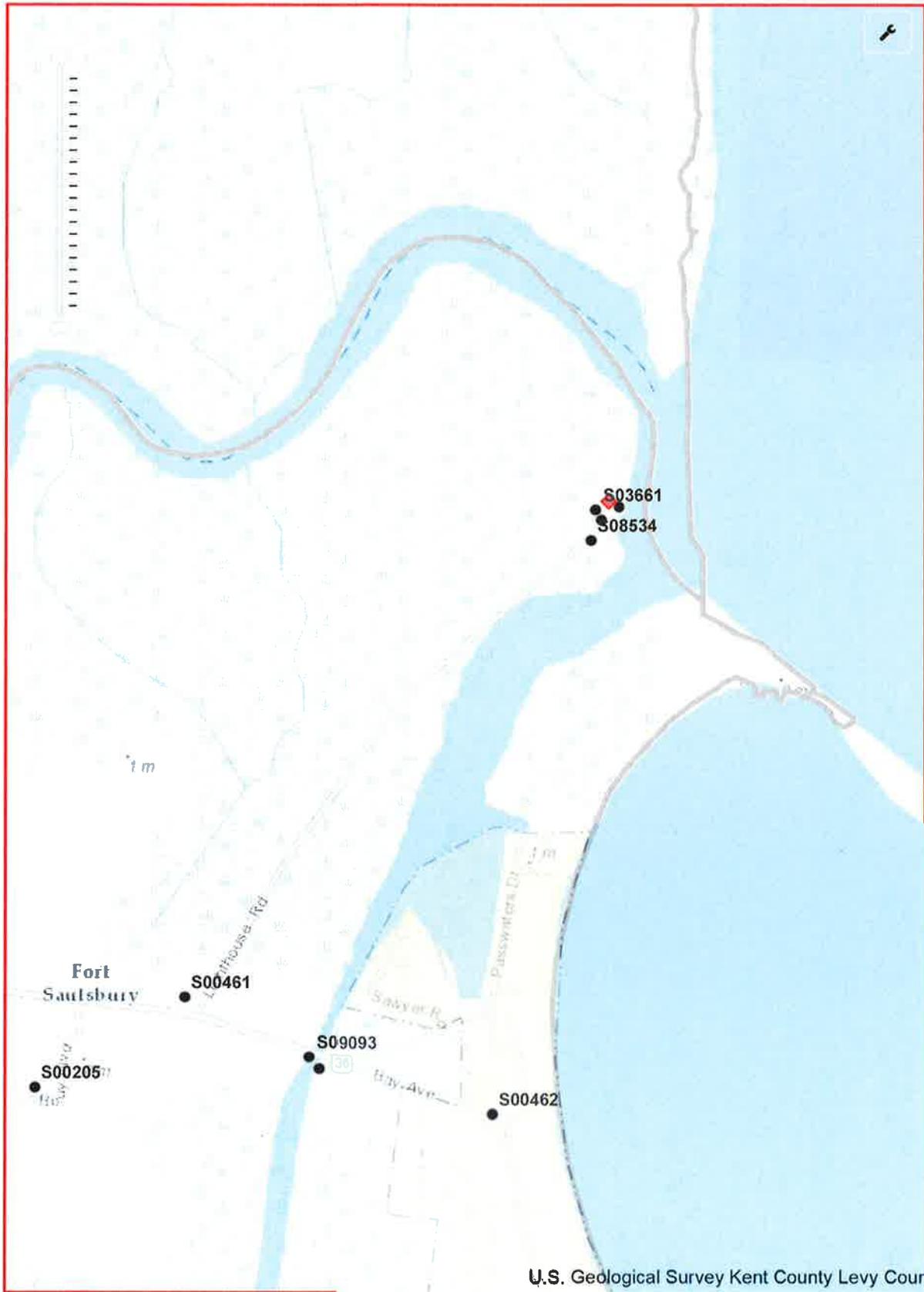
Sincerely,

  
Craig Lukezic  
Archaeologist

cc: Gwen Davis, Deputy SHPO, Delaware Division of Historical and Cultural Affairs









**DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL**  
***DIVISION OF PARKS AND RECREATION***

<b>TO:</b> Craig Lukezic, State Historic Preservation Office. HCA
<b>FROM:</b> John McCarthy, Cultural Resources Unit, SPR
<b>SUBJECT:</b> Mispillion River Complex Beach Nourishment and Rock Structures Section 106 Consultation No Adverse Effect Finding
<b>DATE:</b> August 20, 2015

The Fish and Wildlife Division, DNREC, is planning to restore various features at the mouth of the Mispillion River at the boundary of Kent and Sussex Counties, DE.

Hurricane Sandy and other storm events eroded a sand spit and stone sill structure at the mouth of the Mispillion River that directed the outflow of the river into the Mispillion Inlet Navigation Channel. As a result, this Channel is now by-passed by outflowing river water, leading to silting of the Channel (see attached project location information and existing conditions aerial photograph G-101).

The Fish and Wildlife Division plans on using funding from the U.S. Department of the Interior through the National Fish & Wildlife Foundation to correct this situation by doing the following:

- Restoring sand fill along the previously existing stone sill structure connecting the beach at the north side of the river mouth to the north jetty of the navigation channel;
- Restoring sand fill at the north side of the mouth of the river;
- Adding rock to the sill to raise its height;
- Adding rock groins to the west side of the sill and at other locations on the north side of the mouth of the river;
- Adding a new “dogleg” groin to reconnect the sill structure to the beach north of the river mouth; and
- Moving a tidal channel from right behind (west of) the beach to a location further to the west so that channel flows do not erode the beach or the sill complex. (excavate a new channel and fill the old channel).

These proposed actions are detailed on the attached plan sheet C-101. Additional plan sheets show details of the proposed work.

The work will be subject to Section 10 and Section 404 permits from the US Army Corps of Engineers.

The stone and sand will be barged-in from existing commercial sources. No pumping of sand or borrow from local sources will take place.

Given that the work is restorative in nature and that the area has been previously disturbed, and that the new disturbance associated with relocating the tidal channel will be in a wetland, there does not appear to be any potential for the proposed undertaking to affect potentially significant archaeological resources.

The National Register-listed 1873 Mispillion Lighthouse and Beacon Tower is in the immediate vicinity (about a tenth of a mile to the west of the structure to be restored). The project will restore a previously existing landscape feature. While the feature will be somewhat taller than previously and will include new stone groins on the side of the feature facing the lighthouse, we believe that these changes do not represent an adverse change in settling.

We ask that your office concur that the proposed undertaking, as described above and in the attachments, will have No Adverse Effect on historic properties in accordance with 36 CFR 800.



INDEX OF DRAWINGS		
INDEX NO.	SHEET NO.	SHEET TITLE
<b>GENERAL</b>		
1	G-001	TITLE SHEET WITH VICINITY AND LOCATION MAPS
2	G-002	INDEX OF DRAWINGS, LEGEND, ABBREVIATIONS AND GENERAL NOTES
3	G-101	PLAN - EXISTING CONDITIONS
<b>CIVIL</b>		
4	C-101	PLAN - GENERAL ARRANGEMENT
5	C-102	PLAN - ENLARGED GENERAL ARRANGEMENT SHEET 1 OF 2
6	C-103	PLAN - ENLARGED GENERAL ARRANGEMENT SHEET 2 OF 2
7	C-301	TYPICAL GROIN SECTIONS - SHEET 1 OF 2
8	C-302	TYPICAL GROIN SECTIONS - SHEET 2 OF 2

**GENERAL NOTES**

- NOTES BELOW ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS IN ADDITION TO GENERAL NOTES.
- VERTICAL DATUM IS REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). HORIZONTAL DATUM IS THE NORTH AMERICAN DATUM OF 1983 (NAD 83), DELAWARE STATE PLANE COORDINATE SYSTEM.

TIDAL DATUM - MISPELLION INLET	
MEAN HIGHER HIGH WATER (MHHW)	2.58 FEET
MEAN HIGH WATER (MHW)	2.16 FEET
NORTH AMERICAN VERTICAL DATUM (NAVD88)	0.00 FEET
MEAN TIDE LEVEL (MTL)	-0.15 FEET
NATIONAL GEODETIC VERTICAL DATUM (NGVD)	-0.78 FEET
MEAN LOW WATER (MLW)	-2.47 FEET
MEAN LOWER LOW WATER (MLLW)	-2.63 FEET

- THE HYDROGRAPHIC SURVEY WAS PERFORMED BY MORRIS & RITCHIE, ASSOC DURING MAY-JUNE 2015. THE REFERENCE DATUM GPS K1A IS LOCATED AT N 404,689.27, E 643,087.42, ELEVATION 13.64' NAVD88.
- THE CONTRACTOR SHALL ABIDE BY ALL APPLICABLE ENVIRONMENTAL PROTECTION STANDARDS, PERMITS, LAWS AND REGULATIONS. DISPOSAL OF DREDGED MATERIALS IN THE LITTLE RIVER IS NOT PERMITTED.
- ALL SAFETY REGULATIONS ARE TO BE STRICTLY FOLLOWED.
- CONTRACTOR SHALL TAKE ALL NECESSARY STEPS AND ACTIONS REQUIRED UNDER THE APPLICABLE SAFETY PRACTICES OF THE FOLLOWING REGULATORY AGENCIES INCLUDING, BUT NOT LIMITED TO: DELAWARE OFFICE OF OCCUPATIONAL HEALTH, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), AND NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH).

**DESIGN SPECIFICATIONS AND REFERENCE**

- ROCK MANUAL THE USE OF ROCK IN HYDRAULIC ENGINEERING (2nd EDITION), CIRIA.
- STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2001 DELAWARE DEPARTMENT OF TRANSPORTATION.

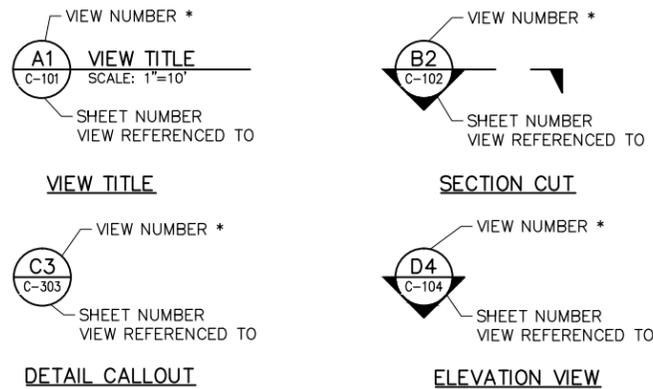
**PROJECT INFORMATION**

- REFERENCE DOCUMENTS - THE FOLLOWING DOCUMENTS WERE UTILIZED IN PREPARING THIS DESIGN=

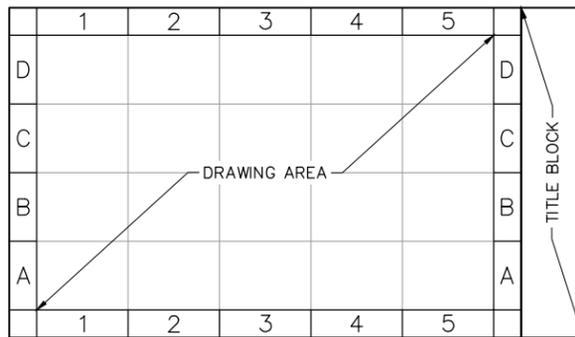
**A. DRAWING ENTITLED**

- MISPELLION RIVER, DELAWARE BREACH CLOSURE, 1993 USACE.
- CONCH BAR BREACH KENT COUNTY, DELAWARE BREACH REPAIR, 1985.

**LEGEND**



\* VIEW NUMBER IS BASED ON THE (DACS) LOCATION OF THE LOWER-LEFT EXTENTS OF THE VIEW ON THE REFERENCED SHEET. WHEN REFERENCING DRAWING INFORMATION BETWEEN SHEETS, BOTH THE VIEW AND SHEET NUMBERS MUST BE QUOTED TOGETHER - EITHER IN A CALLOUT FORMAT AS SHOWN ABOVE OR IN THE FORM: "VIEW NO./SHEET NO." (A1/C-501)



**DRAWING AREA COORDINATE SYSTEM (DACS)**

**ABBREVIATIONS**

ACI	— AMERICAN CONCRETE INSTITUTE	MH	— MANHOLE
AISC	— AMERICAN INSTITUTE OF STEEL CONSTRUCTION	MHW	— MEAN HIGH WATER
APPROX	— APPROXIMATE	MHHW	— MEAN HIGHER HIGH WATER
AREA	— AMERICAN RAILWAY ENGINEERING ASSOCIATION	MIN	— MINIMUM
ASTM	— AMERICAN SOCIETY FOR TESTING MATERIALS	MISC	— MISCELLANEOUS
AWPA	— AMERICAN WOOD PRESERVERS ASSOCIATION	MLW	— MEAN LOW WATER
AWS	— AMERICAN WELDING SOCIETY	MLLW	— MEAN LOWER LOW WATER
BL	— BASELINE	MON	— MONUMENT
BLDG	— BUILDING	MPA	— MARYLAND PORT ADMINISTRATION
BOLL	— BOLLARD	MSL	— MEAN SEA LEVEL
BOT	— BOTTOM	N	— NORTH
CJ	— CONSTRUCTION JOINT	NAVD88	— NORTH AMERICAN VERTICAL DATUM 1988
CB	— CATCH BASIN	NGVD	— NATIONAL GEODETIC VERTICAL DATUM 1929
CCA	— CHROMATED COPPER ARSENATE	NIC	— NOT IN CONTRACT
CF	— CUBIC FEET	NTS	— NOT TO SCALE
CHK	— CHECKERED	NO.	— NUMBER
CL	— CENTERLINE	OC	— ON CENTER
CLR	— CLEAR	OD	— OUTSIDE DIAMETER
CMP	— CORRUGATED METAL PIPE	OUTBD	— OUTBOARD
CONC	— CONCRETE	OWS	— OIL WATER SEPARATOR
CONST	— CONSTRUCTION	PC	— POINT OF CURVE
CONT	— CONTINUOUS	P/C	— PRECAST
CORR	— CORRUGATED	P/F	— PREFABRICATED
CTS	— CENTERS	PI	— POINT OF INTERSECTION
CY	— CUBIC YARDS	P/S	— PRESTRESSED
DBL	— DOUBLE	PERF	— PERFORATED
DET	— DETAIL	PL	— PLATE
DIA	— DIAMETER	POB	— POINT OF BEGINNING
DI	— DUCTILE IRON	PSF	— POUNDS PER SQUARE FOOT
DMCF	— DREDGED MATERIAL CONTAINMENT FACILITY	PSI	— POUND PER SQUARE INCH
DISCON	— DISCONTINUOUS	PT	— POINT OF TANGENT
DWG	— DRAWING	PVC	— POLYVINYL CHLORIDE
E	— EAST	QTY	— QUANTITY
EA	— EACH	R/C	— REINFORCED CONCRETE
EC	— ELECTRICAL CONTRACTOR	REQ'D	— REQUIRED
EF	— EACH FACE	RT	— RIGHT
ELEV, EL	— ELEVATION	S	— SOUTH
EP	— END POINT	SEC	— SECOND
EQ	— EQUAL	SCH	— SCHEDULE
EW	— EACH WAY	SF	— SQUARE FOOT, SILT FENCE
EXIST	— EXISTING	SHT	— SHEET
EXP	— EXPANSION	SPA.	— SPACES
F	— FAHRENHEIT	SQ	— SQUARE
FFE	— FINISHED FLOOR ELEVATION	SS	— STAINLESS STEEL
FT	— FEET	STA	— STATION
GALV	— GALVANIZED	STD	— STANDARD
HDPE	— HIGH DENSITY POLYETHYLENE	T	— TON
HORIZ	— HORIZONTAL	TBR	— TO BE REMOVED
IN.	— INCHES	TC	— TURBIDITY CURTAIN
INFO	— INFORMATION	TOC	— TOP OF CONCRETE
INV	— INVERT	TOS	— TOP OF STEEL
JT	— JOINT	TP	— TURNING POINT
KIP	— 1000 LB	WT, tw	— WALL THICKNESS
KSI	— KIPS PER SQUARE INCH	TYP	— TYPICAL
KT	— KNOT	U/G	— UNDERGROUND
L	— LENGTH / ANGLE	UNC	— UNIFIED NATIONAL COARSE
LB, LBS	— POUND, POUNDS	UON	— UNLESS OTHERWISE NOTED
LOD	— LIMIT OF DISTURBANCE	VERT	— VERTICAL
LF	— LINEAR FEET	W	— WEST
LG	— LONG	W/	— WITH
LT	— LEFT	WP	— WORK POINT
MAX	— MAXIMUM	WWF	— WELDED WIRE FABRIC
MES	— MARYLAND ENVIRONMENTAL SERVICE		



Rev.	Date	Description

MISPELLION COMPLEX PROJECT  
 BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
 DOVER, DELAWARE  
 INDEX OF DRAWINGS, LEGEND, ABBREVIATIONS AND GENERAL NOTES

Designed by:	PKK	Checked by:	WRF/MSS	Reviewed by:	PKK	Submitted by:	MOFFATT & NICHOL
Date:	JULY 2015	M&N Project No.:	8482-03	Drawing code:		Drawing Scale:	As Shown (1:1)

2700 LIGHTHOUSE POINT EAST,  
BALTIMORE, MD 21224  
410-563-7300

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL  
89 KINGS HIGHWAY  
DOVER, DE 19901

Sheet Reference No.  
**G-002**

INDEX: 2 OF 8

**30% SUBMITTAL**  
JULY 2015  
NOT TO BE USED FOR CONSTRUCTION



**A1** PLAN - EXISTING CONDITIONS  
 G-101 SCALE: 1"=500'



Mark	Description	Date	Appr.

**MISPILLION COMPLEX PROJECT  
 BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
 DOVER, DELAWARE**

**PLAN - EXISTING CONDITIONS**

Designed by: PWK	Checked by: PWK	Date: JULY 2015	Revision: -
Dwn by: WRF/MES	Reviewed by: PWK	M&N Project No. 8482-03	Drawing code:
Submitted by: MOFFATT & NICHOL	Drawing Scale: As Shown	Plot scale: 1" = 500'	Plot scale: 1" = 500'

2700 LIGHTHOUSE POINT EAST,  
 BALTIMORE, MD 21224  
 410-563-7300

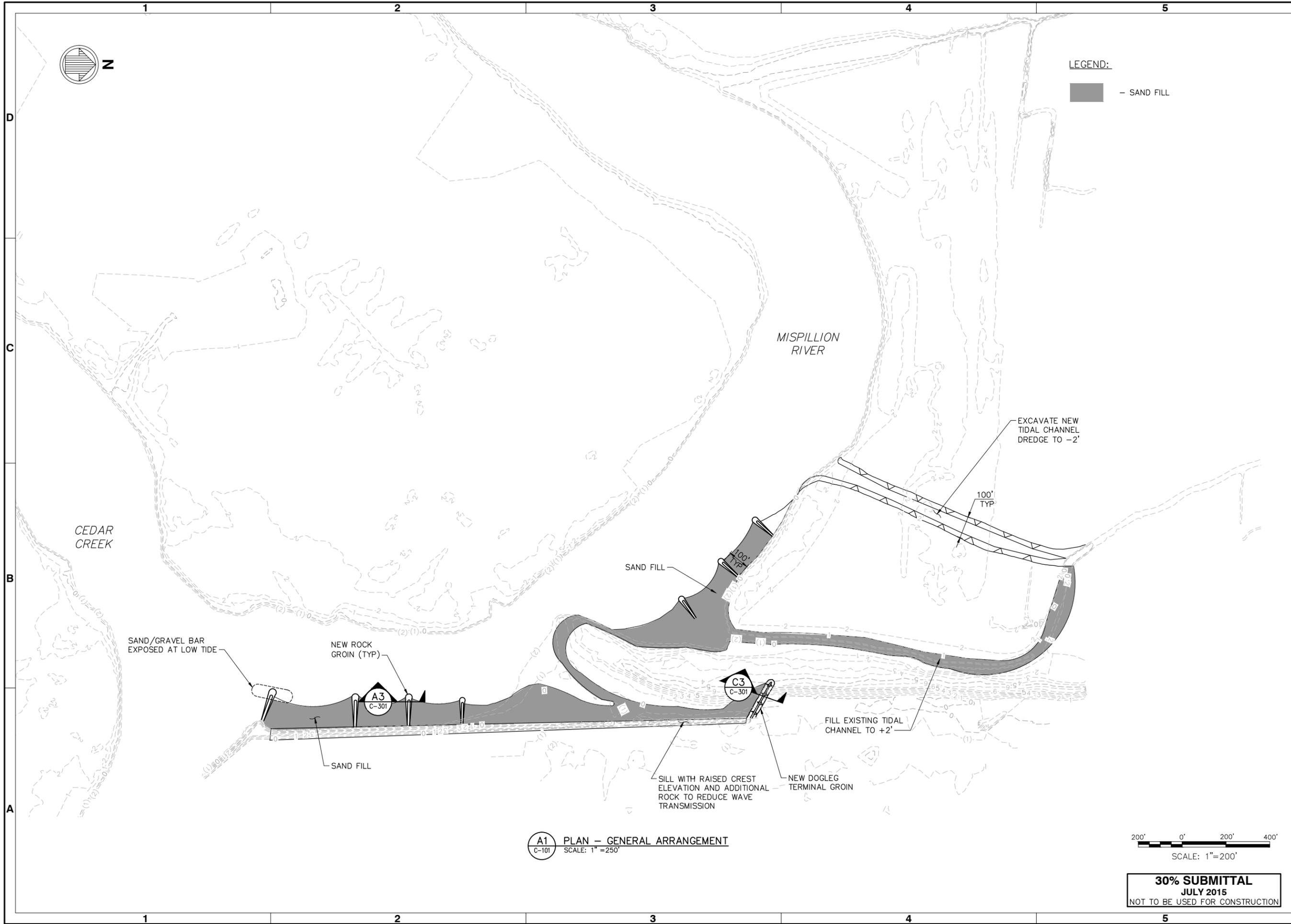
**moffatt & nichol**

DEPARTMENT OF NATURAL RESOURCES AND  
 ENVIRONMENTAL CONTROL  
 89 KINGS HIGHWAY  
 DOVER, DE 19901

SEAL

**30% SUBMITTAL  
 JULY 2015  
 NOT TO BE USED FOR CONSTRUCTION**

Sheet Reference No.  
**G-101**  
 INDEX: 3 OF 8



**LEGEND:**  
 - SAND FILL



Mark	Description	Date	Appr.

**MISPILLION COMPLEX PROJECT  
 BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
 DOVER, DELAWARE**

**PLAN - GENERAL ARRANGEMENT**

Designed by: PWK	Checked by: WRF/MES	Reviewed by: PWK	Submitted by: MOFFATT & NICHOL
Date: JULY 2015	M&N Project No. 8482-03	Drawing code:	Drawing Scale: Plot scale: 1" (D SHEET)

2700 LIGHTHOUSE POINT EAST,  
 BALTIMORE, MD 21224  
 410-563-7300

**moffatt & nichol**

DEPARTMENT OF NATURAL RESOURCES AND  
 ENVIRONMENTAL CONTROL  
 89 KINGS HIGHWAY  
 DOVER, DE 19901

**A1 PLAN - GENERAL ARRANGEMENT**  
 SCALE: 1" = 250'

200' 0' 200' 400'  
 SCALE: 1" = 200'

**30% SUBMITTAL**  
 JULY 2015  
 NOT TO BE USED FOR CONSTRUCTION

SEAL

Sheet Reference No.  
**C-101**  
 INDEX: 4 OF 8

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

File: P:\18482-04\500 CADD\ACTIVE\SheetSet\1848204C-101.Plotfile: 7/10/2015 9:59 AM by FARRAR, WALTER; Saved: 7/10/2015 9:52 AM by MSOUDER



Work	Description	Date	Appr.

MISPILLION COMPLEX PROJECT  
BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
DOVER, DELAWARE

**PLAN - ENLARGED GENERAL  
ARRANGEMENT SHEET 1 OF 2**

Designed by: PWK	Checked by: WRF/MSS	Reviewed by: PWK	Submitted by: MOFFATT & NICHOL
Date: JULY 2015	M&N Project No. 8482-03	Drawing code:	Drawing Scale: Plot scale: 1" = 10' (D SHEET)

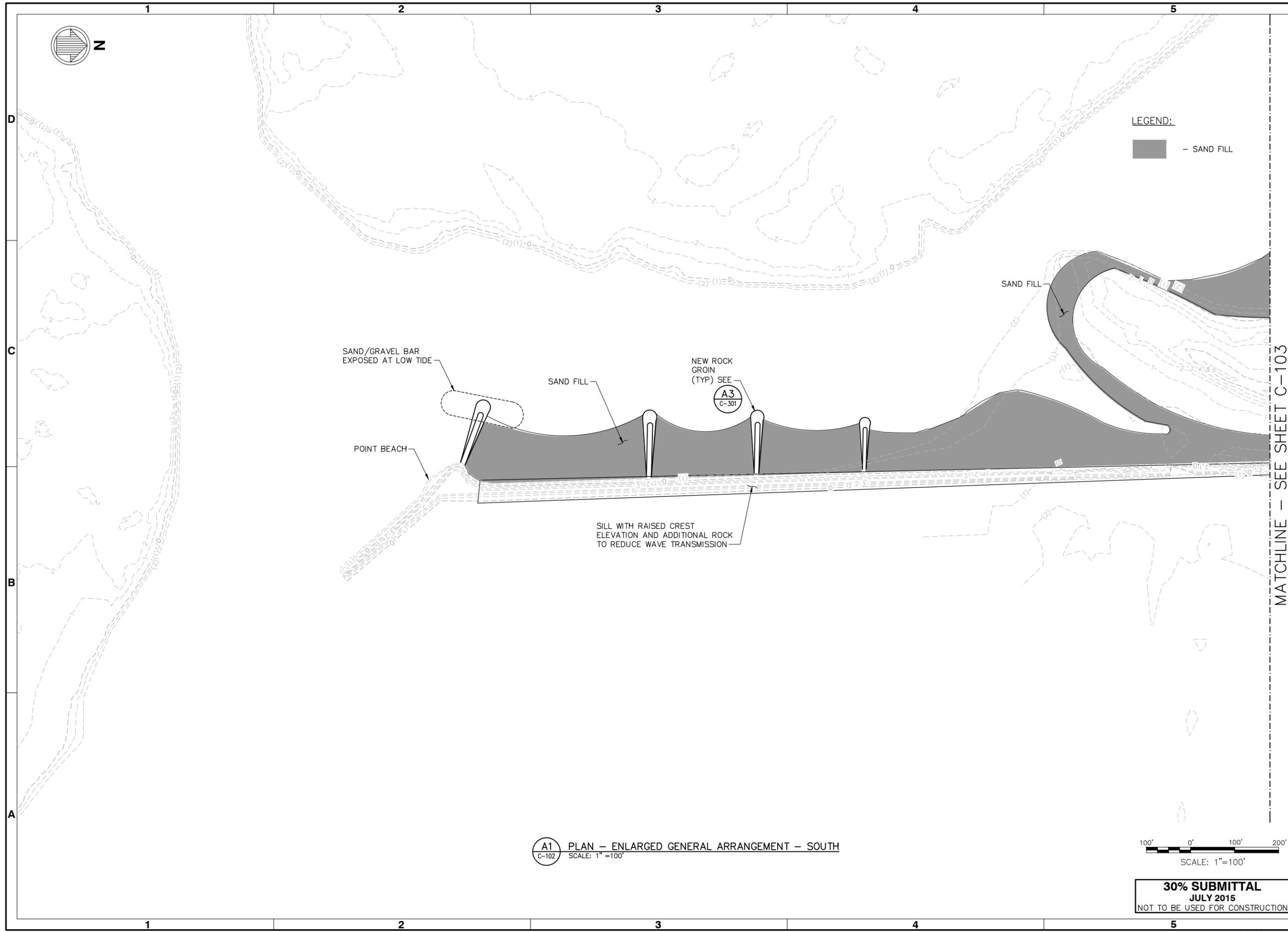
2700 LIGHTHOUSE POINT EAST,  
BALTIMORE, MD 21224  
410-563-7300

**moffatt & nichol**

DEPARTMENT OF NATURAL RESOURCES AND  
ENVIRONMENTAL CONTROL  
89 KINGS HIGHWAY  
DOVER, DE 19901

SEAL

Sheet  
Reference No.  
**C-102**  
INDEX: 5 OF 8



**A1** PLAN - ENLARGED GENERAL ARRANGEMENT - SOUTH  
SCALE: 1"=100'

100' 0' 100' 200'  
SCALE: 1"=100'

**30% SUBMITTAL**  
JULY 2015  
NOT TO BE USED FOR CONSTRUCTION

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

File: P:\18482-04\1500 CADD\ACTIVE\SheetSet\1848204C-102; Plotted: 7/10/2015 10:00 AM by FARRAR, WALTER; Saved: 7/10/2015 9:52 AM by MSQUIDER







Rev.	Date	Description

MISPILLION COMPLEX PROJECT  
 BEACH NOURISHMENT AND ROCK PROTECTION STRUCTURES  
 DOVER, DELAWARE

TYPICAL GROIN SECTIONS - SHEET 2 OF 2

Designed by: PWK	Checked by: WRF/MSS	Reviewed by: PWK	Submitted by: MOFFATT & NICHOL
Date: JULY 2015	M&N Project No. 8482-03	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

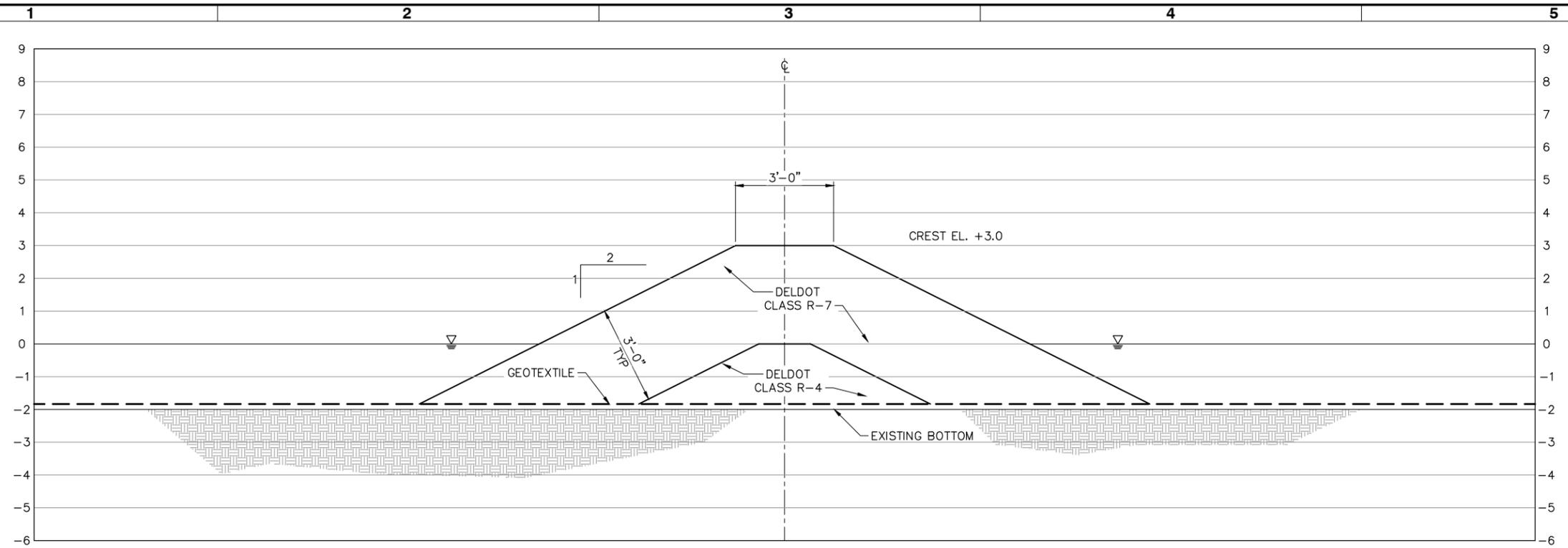
2700 LIGHTHOUSE POINT EAST,  
 BALTIMORE, MD 21224  
 410-563-7300

**moftatt & nichol**

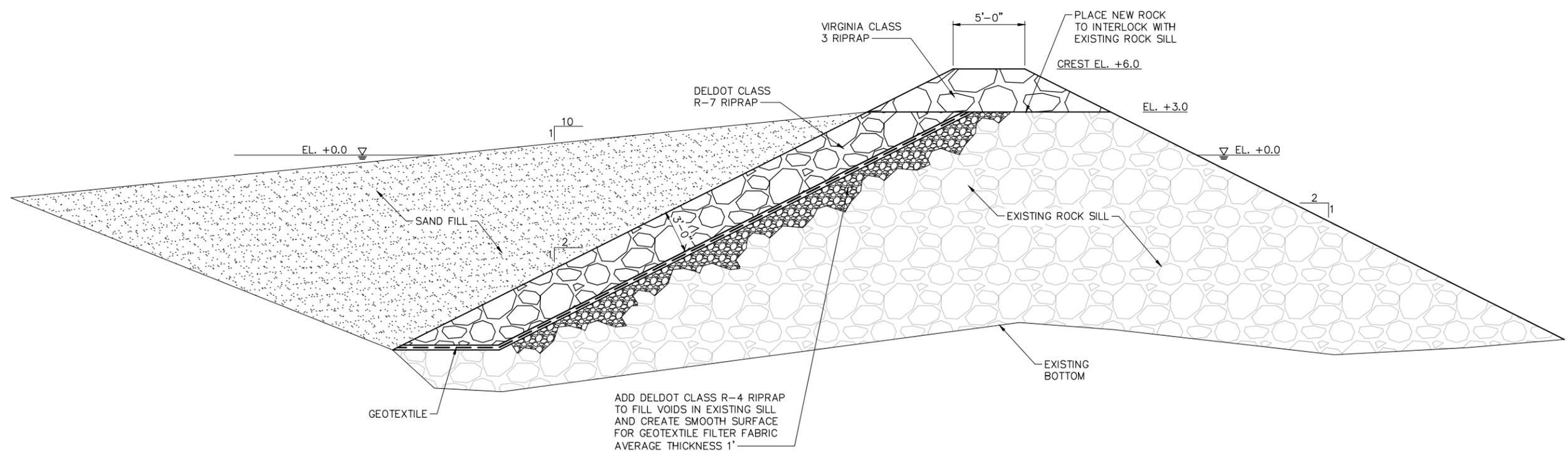
DEPARTMENT OF NATURAL RESOURCES AND  
 ENVIRONMENTAL CONTROL  
 89 KINGS HIGHWAY  
 DOVER, DE 19901

SEAL

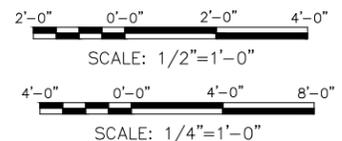
Sheet Reference No.  
**C-302**  
 INDEX: 8 OF 8



**C3** SECTION - TYPICAL ROCK GROIN AT EXISTING SILL - WATER DEPTH -2 FT  
 C-101 SCALE: 1/2" = 1'-0"



**A3** SECTION - TYPICAL SILL REHABILITATION  
 C-101 SCALE: 1/4" = 1'-0"



**30% SUBMITTAL**  
 JULY 2015  
 NOT TO BE USED FOR CONSTRUCTION



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
PHILADELPHIA DISTRICT CORPS OF ENGINEERS  
WANAMAKER BUILDING, 100 PENN SQUARE EAST  
PHILADELPHIA, PENNSYLVANIA 19107-3390

APR 01 2016

Regulatory Branch  
Application Section I

SUBJECT: CENAP-OP-R-2016-19-85 (NWP27)  
Project Name: DDNREC Mispillion Harbor Beach Restoration KE  
Latitude/Longitude: 38.95166°N/-75.31356°W

Jeremey Ashe  
Delaware Department of Natural Resources and Environmental Control  
Division of Fish and Wildlife  
89 Kings Highway  
Dover, Delaware 19901

Dear Mr. Ashe:

This is in regard to your proposal to conduct earthmoving and construction activities in waters of the United States in order to restore horseshoe crab beach nesting habitat and red knot foraging habitat at the Milford Neck Conservation Area and the Mispillion Harbor Complex, in Milford, Kent County, Delaware.

Under current Federal regulations, a Department of the Army permit is required for work or structures in navigable waters of the United States and/or the discharge of dredged or fill material into waters of the United States including their adjacent wetlands.

Based upon our review of the information you have provided, it has been determined that the proposed work is approved by the existing Department of the Army Nationwide Permit (NWP) described in Enclosure 1, provided the work is conducted in compliance with the project specific special conditions listed below and the attached general conditions (Enclosure 2). Initiation of any authorized work shall constitute your agreement to comply with all of the NWP's conditions. You should also note that the authorized work may be subject to periodic inspections by a Corps of Engineers representative. The verification of a nationwide permit including all general and special conditions is not subject to appeal.

On March 16, 2012 the Division Engineer approved several Regional Conditions for NWPs within the Philadelphia District. The enclosed table (Enclosure 3) identifies those NWPs which require a preconstruction notification (PCN) to the Corps of Engineers, those which have been regionally conditioned by the Division Engineer, and those which have been denied 401 Water Quality Certification (WQC) and/or Coastal Zone Management (CZM) consistency by the Delaware Department of Natural Resources and Environmental Control (DDNREC). It should be carefully noted that DDNREC has denied the requisite WQC and CZM for certain NWP

activities in ALL waters of the United States in Delaware. For other NWP activities, DDNREC has denied the requisite WQC and CZM for projects located in waters of the United States which have been determined to be critical resource waters.

For those NWPs for which DDNREC has denied the requisite WQC and CZM, the NWP authorization is considered denied without prejudice by the Corps of Engineers until an individual, project-specific WQC and/or CZM review and approval has been obtained from DDNREC. Furthermore, copies of the WQC and CZM approvals must be provided to the Corps of Engineers before the authorized work begins. Any project-specific conditions required by DDNREC for the WQC and/or CZM approval will automatically become part of the NWP authorization as well.

Please note that CZM consistency from DDNREC is only required for those activities in or affecting Delaware's coastal zone. Additionally, some of the NWPs do not involve a discharge of dredged or fill material and, as such, do not require a 401 WQC. For those NWPs not requiring a 401 WQC, the appropriate rows and columns of the enclosed table (Enclosure 3) have been identified with the term "NA".

#### PROJECT SPECIFIC SPECIAL CONDITIONS:

1. All work performed in association with the above noted project shall be conducted in accordance with the project plans prepared by Moffatt & Nichol, dated March 2016, entitled: *Delaware Department of Natural Resources and Environmental Control Dover, Delaware Mispillion Complex Project Beach Nourishment and Rock Protection Structures*, 16 Sheets. The stated purpose of the project is to conduct earthmoving and construction activities in waters of the United States in order to restore horseshoe crab beach nesting habitat and red knot foraging habitat at the Milford Neck Conservation Area and the Mispillion Harbor Complex, in Milford, Kent County, Delaware.
2. Any deviation in construction methodology or project design from that shown on the above noted drawings must be approved by this office, in writing, prior to performance of the work. All modifications to the above noted project plans shall be approved, in writing, by this office. No work shall be performed prior to written approval of this office.
3. This office shall be notified at least 10 days prior to the commencement of authorized work by completing and signing the enclosed Notification/ Certification of Work Commencement Form (Enclosure 4). This office shall also be notified within 10 days of the completion of the authorized work by completing and signing the enclosed Notification/Certification of Work Completion/Compliance Form (Enclosure 5). All notifications required by this condition shall be in writing and shall be transmitted to this office by registered mail. Oral notifications are not acceptable. Similar notification is required each time maintenance work is to be done under the terms of this Corps of Engineers permit.
4. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee

will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration. (This special condition is applicable to Corps of Engineers permits that provide authorization under Section 10 of the Rivers and Harbors Act of 1899.)

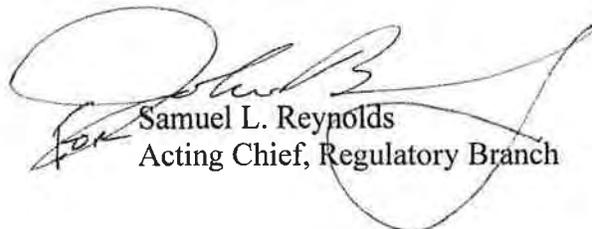
5. The applicant shall ensure that its contractor(s) will be responsible for all damages to the federal project caused by applicant or applicant's contractor(s) during the duration of the restoration work, and be required to repair such damage in a timely manner to the satisfaction of the U.S. Army Corps of Engineers. The U.S. Army Corps of Engineers shall have a reasonable time, not to exceed 30 days, following completion of the restoration project to notify the applicant of any damage to the federal project with a description of damage and the required repair.
6. The United States Government shall not be responsible for damages to property or injuries to persons which may arise from or be incident to the applicant's or contractor's exercise of activities within the federal project during the duration of the restoration work, and applicant shall ensure that its contractor(s) hold the United States harmless from any and all such claims.
7. The applicant shall keep the U.S. Army Corps of Engineers Project Manager updated on the construction project schedule and progress. Representatives of the U.S. Army Corps of Engineers shall be permitted to inspect the project during its phase of construction, and to collect any samples, or to conduct any tests deemed necessary.
8. Should future maintenance dredging operations within the federal approach channel to Mispillion River be pursued by the U.S. Army Corps of Engineers, it is recommended that the applicant consider utilizing the dredged material beneficially to nourish the proposed construction project area.
9. The permittee is responsible for ensuring that the contractor and/or workers executing the activity(s) authorized by this permit have knowledge of the terms and conditions of the authorization and that a copy of the permit document is at the project site throughout the period the work is underway.
10. The mechanical equipment used to execute the work authorized shall be operated in such a way as to minimize turbidity that could degrade water quality and adversely affect aquatic plant and animal life.
11. The disposal of trees, brush and other debris in any stream corridor, wetland or surface water is prohibited.
12. Every effort shall be made to keep construction debris from entering the waterway or wetland. Debris in the waterway or wetland shall be removed immediately.
13. All material to be used as fill shall be obtained from an upland source. The fill material shall be free of oil and grease, debris, wood, general refuse, plaster, and other pollutants, and shall contain no broken asphalt.

14. Appropriate erosion and siltation controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills must be permanently stabilized at the earliest practicable date
15. The movement of equipment within the wetland shall be limited to the minimum necessary to accomplish the work authorized herein.
16. Work on the stone dike shall not occur from April 15 to June 7 in order to protect the horseshoe crab (*Limulus Polyphemus*) and the federally threatened red knot (*Calidris canutus rufa*).
17. Beach fill and groin work shall not occur from April 15 to July 1 in order to protect the horseshoe crab (*Limulus Polyphemus*) and the federally threatened red knot (*Calidris canutus rufa*).
18. A post construction monitoring plan shall be drafted prior to completion of the project.
19. This permit does not obviate the permittee from obtaining any State or local approvals required by law for the activity authorized.

This verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 16, 2017. It is incumbent upon the permittee to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this NWP.

Also enclosed is a pre-addressed postal card (Enclosure 6) soliciting your comments on the processing of your application. Any comments, positive or otherwise, on the procedures, timeliness, fairness, etc., may be made on this card. If you have any questions regarding this matter, please contact Michael Yost at 302-736-9763 or write to the above address.

Sincerely,



for Samuel L. Reynolds  
Acting Chief, Regulatory Branch

Enclosures

## 2012 Nationwide Permits

NWP 27. Aquatic Habitat Restoration, Establishment, and Enhancement Activities. Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas, the restoration and enhancement of non-tidal streams and other non-tidal open waters, and the rehabilitation or enhancement of tidal streams, tidal wetlands, and tidal open waters, provided those activities result in net increases in aquatic resource functions and services. To the extent that a Corps permit is required, activities authorized by this NWP include, but are not limited to: the removal of accumulated sediments; the installation, removal, and maintenance of small water control structures, dikes, and berms, as well as discharges of dredged or fill material to restore appropriate stream channel configurations after small water control structures, dikes, and berms, are removed; the installation of current deflectors; the enhancement, restoration, or establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to restore or establish stream meanders; the backfilling of artificial channels; the removal of existing drainage structures, such as drain tiles, and the filling, blocking, or reshaping of drainage ditches to restore wetland hydrology; the installation of structures or fills necessary to establish or re-establish wetland or stream hydrology; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; shellfish seeding; activities needed to reestablish vegetation, including plowing or disking for seed bed preparation and the planting of appropriate wetland species; re-establishment of submerged aquatic vegetation in areas where those plant communities previously existed; re-establishment of tidal wetlands in tidal waters where those wetlands previously existed; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site. This NWP authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services.

Except for the relocation of non-tidal waters on the project site, this NWP does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type. This NWP does not authorize stream channelization. This NWP does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Compensatory mitigation is not required for activities authorized by this NWP since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland establishment agreement, between the landowner and the U.S. Fish and Wildlife Service (FWS), the Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), the National Marine Fisheries Service (NMFS), the National Ocean Service (NOS), U.S. Forest Service (USFS), or their designated state cooperating agencies; (2) as voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or (3) on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable state agency, this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities). The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge occurs after this NWP expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS, or an appropriate state cooperating agency. This NWP also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands

## 2012 Nationwide Permits

that were restored, enhanced, or established on prior-converted cropland or on uplands, in accordance with a binding agreement between the landowner and NRCS, FSA, FWS, or their designated state cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Before conducting any reversion activity the permittee or the appropriate Federal or state agency must notify the district engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps Regulatory requirements are applicable to that type of land at the time. The requirement that the activity results in a net increase in aquatic resource functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit would be required for any reversion.

Reporting. For those activities that do not require pre-construction notification, the permittee must submit to the district engineer a copy of: (1) The binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) the NRCS or USDA Technical Service Provider documentation for the voluntary stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSMRE or the applicable state agency. The report must also include information on baseline ecological conditions on the project site, such as a delineation of wetlands, streams, and/or other aquatic habitats. These documents must be submitted to the district engineer at least 30 days prior to commencing activities in waters of the United States authorized by this NWP.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing any activity (see general condition 31), except for the following activities:

- (1) Activities conducted on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the U.S. FWS, NRCS, FSA, NMFS, NOS, USFS or their designated state cooperating agencies;
- (2) Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or
- (3) The reclamation of surface coal mine lands, in accordance with an SMCRA permit issued by the OSMRE or the applicable state agency. However, the permittee must submit a copy of the appropriate documentation to the district engineer to fulfill the reporting requirement. (Sections 10 and 404)

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. However, this NWP does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

## Nationwide Permit General Conditions (2012)

**Note:** To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

**1. Navigation.** (a) No activity may cause more than a minimal adverse effect on navigation. (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States. (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

**2. Aquatic Life Movements.** No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

**3. Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

**4. Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

**5. Shellfish Beds.** No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

**6. Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

**7. Water Supply Intakes.** No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

**8. Adverse Effects From Impoundments.** If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

**9. Management of Water Flows.** To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

**10. Fills Within 100-Year Floodplains.** The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

**11. Equipment.** Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

**12. Soil Erosion and Sediment Controls.** Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

**13. Removal of Temporary Fills.** Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

**14. Proper Maintenance.** Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

**15. Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

**16. Wild and Scenic Rivers.** No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

**17. Tribal Rights.** No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

**18. Endangered Species.** (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at <http://www.fws.gov/> or <http://www.fws.gov/ipac> and <http://www.noaa.gov/fisheries.html> respectively.

**19. Migratory Birds and Bald and Golden Eagles.** The permittee is responsible for obtaining any “take” permits required under the U.S. Fish and Wildlife Service’s regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such “take” permits are required for a particular activity.

**20. Historic Properties.** (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

**21. Discovery of Previously Unknown Remains and Artifacts.** If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

**22. Designated Critical Resource Waters.** Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those

waters. The district engineer may authorize activities under these NWP's only after it is determined that the impacts to the critical resource waters will be no more than minimal.

**23. Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWP's. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWP's.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

**24. Safety of Impoundment Structures.** To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

**25. Water Quality.** Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

**26. Coastal Zone Management.** In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

**27. Regional and Case-By-Case Conditions.** The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

**28. Use of Multiple Nationwide Permits.** The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

**29. Transfer of Nationwide Permit Verifications.** If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

**30. Compliance Certification.** Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

- (a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;
- (b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and
- (c) The signature of the permittee certifying the completion of the work and mitigation.

**31. Pre-Construction Notification.** (a) **Timing.** Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

- (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special

conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWP 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's

compliance with the terms and conditions of the NWP, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

#### D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.



**NWP CZM and WQC Status Table: Delaware, New Jersey, Pennsylvania (4.4.2012)**

NWP #	PCN	DE CZM	DE WQC	NJ CZM	NJ WQC	PA CZM	PA WQC
NWP 1	NO	ISSUED	N/A				
NWP 2	NO	ISSUED	N/A				
NWP 3	YES *	DENIED #	DENIED #				
NWP 4	NO	ISSUED	ISSUED				
NWP 5	NO	ISSUED	ISSUED				
NWP 6	NO	ISSUED	ISSUED				
NWP 7	YES	ISSUED	ISSUED				
NWP 8	YES	DENIED	N/A				
NWP 9	NO	ISSUED	N/A				
NWP 10	YES *	ISSUED	N/A				
NWP 11	YES*	ISSUED	N/A				
NWP 12	YES	ISSUED	ISSUED				
NWP 13	YES *	DENIED #	DENIED #				
NWP 14	YES	ISSUED	ISSUED				
NWP 15	YES *	ISSUED	ISSUED				
NWP 16	NO	ISSUED	ISSUED				
NWP 17	YES	ISSUED	ISSUED				
NWP 18	YES *	DENIED #	DENIED #				
NWP 19	YES	ISSUED	ISSUED				
NWP 20	NO	ISSUED	ISSUED				
NWP 21	YES	ISSUED	ISSUED				
NWP 22	YES *	ISSUED	ISSUED				
NWP 23	YES	ISSUED	ISSUED				
NWP 24	NO	ISSUED	N/A				
NWP 25	YES *	ISSUED	ISSUED				
NWP 27	YES *	ISSUED	ISSUED				
NWP 28	YES	ISSUED	N/A				
NWP 29	YES	DENIED #	DENIED #				
NWP 30	YES *	ISSUED	ISSUED				
NWP 31	YES	ISSUED	ISSUED				
NWP 32	N/A	ISSUED	ISSUED				
NWP 33	YES	ISSUED	ISSUED				
NWP 34	YES	ISSUED	ISSUED				
NWP 35	YES	ISSUED	N/A				
NWP 36	YES *	ISSUED	ISSUED				
NWP 37	YES	ISSUED	ISSUED				
NWP 38	YES	ISSUED	ISSUED				
NWP 39	YES	DENIED #	DENIED #				
NWP 40	YES	DENIED	DENIED				
NWP 41	YES	DENIED	DENIED				
NWP 42	YES	DENIED	DENIED				
NWP 43	YES	DENIED	DENIED				
NWP 44	YES	DENIED	DENIED				
NWP 45	YES	ISSUED	ISSUED				
NWP 46	YES	DENIED	DENIED				
NWP 48	YES	ISSUED	ISSUED				
NWP 49	YES	ISSUED	ISSUED				
NWP 50	YES	ISSUED	ISSUED				
NWP 51	YES	DENIED	DENIED				
NWP 52	YES	DENIED	DENIED				

**Note: \* A PCN is required under certain circumstances. Review the terms of the NWP, general conditions, or regional conditions to identify those circumstances. # The State of Delaware has denied the CZM and WQC for this NWP in critical resource waters only.**

NOTIFICATION/CERTIFICATION OF WORK COMMENCEMENT FORM

Permit Number: CENAP-OP-R-2016-19-85 (NWP27)  
Name of Permittee: DDNREC Division of Fish and Wildlife  
Project Name: DDNREC Mispillion Harbor Beach Restoration KE  
Waterway: Mispillion River/Cedar Creek  
County: Kent State: Delaware  
Compensation/Mitigation Work Required: Yes  No

TO: U.S. Army Corps of Engineers, Philadelphia District  
Wanamaker Building - 100 Penn Square East  
Philadelphia, Pennsylvania 19107-3390  
Attention: CENAP-OP-R

I have received authorization to conduct earthmoving and construction activities in waters of the United States in order to restore horseshoe crab beach nesting habitat and red knot foraging habitat at the Milford Neck Conservation Area and the Mispillion Harbor Complex, in Milford, Kent County, Delaware.

The work will be performed by:

Name of Person or Firm \_\_\_\_\_

Address: \_\_\_\_\_

I hereby certify that I have reviewed the approved plans, have read the terms and conditions of the above referenced permit, and shall perform the authorized work in strict accordance with the permit document. The authorized work will begin on or about \_\_\_\_\_ and should be completed on or about \_\_\_\_\_.

Please note that the permitted activity is subject to compliance inspections by the Army Corps of Engineers. If you fail to return this notification form or fail to comply with the terms or conditions of the permit, you are subject to permit suspension, modification, revocation, and/or penalties.

\_\_\_\_\_  
Permittee (Signature and Date)

\_\_\_\_\_  
Telephone Number

\_\_\_\_\_  
Contractor (Signature and Date)

\_\_\_\_\_  
Telephone Number

NOTE: This form shall be completed/signed and returned to the Philadelphia District Office a minimum of 10 days prior to commencing work.

NOTIFICATION/CERTIFICATION OF WORK COMPLETION/COMPLIANCE FORM

Permit Number: CENAP-OP-R-2016-19-85 (NWP27)  
Name of Permittee: DDNREC Division of Fish and Wildlife  
Name of Contractor: \_\_\_\_\_  
Project Name: DDNREC Mispillion Harbor Beach Restoration KE  
County: Kent State: Delaware  
Waterway: Mispillion River/Cedar Creek

Within 10 days of completion of the activity authorized by this permit, please sign this certification and return it to the following address:

U.S. Army Corps of Engineers, Philadelphia District  
Wanamaker Building - 100 Penn Square East  
Philadelphia, Pennsylvania 19107-3390  
Attention: CENAP-OP-R

Please note that the permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to return this notification form or fail to perform work in compliance with the permit, you are subject to administrative, civil and/or criminal penalties. Further, the subject permit may be suspended or revoked.

The authorized work was commenced on \_\_\_\_\_.

The authorized work was completed on \_\_\_\_\_.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the above noted permit.

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Signature of Permittee

Address: \_\_\_\_\_  
\_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Telephone Number: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

For project located in areas identified as shellfish habitat, you must include with this form a bill of lading; sales order or any other document(s) demonstrating non-polluting materials were purchased and utilized for your project. I hereby certify that I and/or my contractor have utilized non-polluting materials as defined in the above noted permit.

\_\_\_\_\_  
Signature of Contractor

\_\_\_\_\_  
Signature of Permittee

**APPENDIX C IPaC query for the proposed Project  
(run on May 24, 2016)**

# 43281 Mispillion Restoration IPaC Report

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## *IPaC Trust Resources Report*

Generated May 24, 2016 09:56 AM MDT, IPaC v3.0.7

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



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U.S. Fish & Wildlife Service

# IPaC Trust Resources Report

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NAME

43281 Mispillion Restoration IPaC  
Report

LOCATION

Kent and Sussex counties, Delaware

IPAC LINK

[https://ecos.fws.gov/ipac/project/  
RQDST-YC23V-AN3DH-JKVTS-2LC3FE](https://ecos.fws.gov/ipac/project/RQDST-YC23V-AN3DH-JKVTS-2LC3FE)



## U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

**Chesapeake Bay Ecological Services Field Office**

177 Admiral Cochrane Drive

Annapolis, MD 21401-7307

(410) 573-4599

## Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the [Endangered Species Program](#) of the U.S. Fish & Wildlife Service.

**This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.**

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

[Section 7](#) of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

**A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.**

The list of species below are those that may occur or could potentially be affected by activities in this location:

### Birds

**Red Knot** *Calidris canutus rufa*

Threatened

CRITICAL HABITAT

**No critical habitat** has been designated for this species.

[http://ecos.fws.gov/tess\\_public/profile/speciesProfile.action?scode=B0DM](http://ecos.fws.gov/tess_public/profile/speciesProfile.action?scode=B0DM)

### Critical Habitats

**There are no critical habitats in this location**

## Migratory Birds

Birds are protected by the [Migratory Bird Treaty Act](#) and the [Bald and Golden Eagle Protection Act](#).

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.<sup>[1]</sup> There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern  
<http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php>
- Conservation measures for birds  
<http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php>
- Year-round bird occurrence data  
<http://www.birdscanada.org/birdmon/default/datasummaries.jsp>

The following species of migratory birds could potentially be affected by activities in this location:

<b>American Oystercatcher</b> <i>Haematopus palliatus</i>	Bird of conservation concern
Year-round <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0G8">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0G8</a>	
<b>American Bittern</b> <i>Botaurus lentiginosus</i>	Bird of conservation concern
Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0F3">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B0F3</a>	
<b>Bald Eagle</b> <i>Haliaeetus leucocephalus</i>	Bird of conservation concern
Year-round <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B008">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B008</a>	
<b>Black Rail</b> <i>Laterallus jamaicensis</i>	Bird of conservation concern
Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B09A">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?sPCODE=B09A</a>	

<b>Black Skimmer</b> <i>Rynchops niger</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EO</a>	Bird of conservation concern
<b>Black-billed Cuckoo</b> <i>Coccyzus erythrophthalmus</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HI</a>	Bird of conservation concern
<b>Blue-winged Warbler</b> <i>Vermivora pinus</i> Season: Breeding	Bird of conservation concern
<b>Fox Sparrow</b> <i>Passerella iliaca</i> Season: Wintering	Bird of conservation concern
<b>Gull-billed Tern</b> <i>Gelochelidon nilotica</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JV">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JV</a>	Bird of conservation concern
<b>Horned Grebe</b> <i>Podiceps auritus</i> Season: Wintering	Bird of conservation concern
<b>Hudsonian Godwit</b> <i>Limosa haemastica</i> Season: Migrating	Bird of conservation concern
<b>Kentucky Warbler</b> <i>Oporornis formosus</i> Season: Breeding	Bird of conservation concern
<b>Least Bittern</b> <i>Ixobrychus exilis</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B092</a>	
<b>Least Tern</b> <i>Sterna antillarum</i> Season: Breeding	Bird of conservation concern
<b>Lesser Yellowlegs</b> <i>Tringa flavipes</i> Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MD">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0MD</a>	Bird of conservation concern
<b>Loggerhead Shrike</b> <i>Lanius ludovicianus</i> Year-round <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY</a>	Bird of conservation concern
<b>Nelson's Sparrow</b> <i>Ammodramus nelsoni</i> Season: Wintering	Bird of conservation concern
<b>Peregrine Falcon</b> <i>Falco peregrinus</i> Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU</a>	Bird of conservation concern
<b>Pied-billed Grebe</b> <i>Podilymbus podiceps</i> Year-round	Bird of conservation concern
<b>Prairie Warbler</b> <i>Dendroica discolor</i> Season: Breeding	Bird of conservation concern

<b>Prothonotary Warbler</b> <i>Protonotaria citrea</i> Season: Breeding	Bird of conservation concern
<b>Purple Sandpiper</b> <i>Calidris maritima</i> Season: Wintering	Bird of conservation concern
<b>Red Knot</b> <i>Calidris canutus rufa</i> Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DM">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0DM</a>	Bird of conservation concern
<b>Red-headed Woodpecker</b> <i>Melanerpes erythrocephalus</i> Year-round	Bird of conservation concern
<b>Rusty Blackbird</b> <i>Euphagus carolinus</i> Season: Wintering	Bird of conservation concern
<b>Saltmarsh Sparrow</b> <i>Ammodramus caudacutus</i> Year-round	Bird of conservation concern
<b>Seaside Sparrow</b> <i>Ammodramus maritimus</i> Year-round	Bird of conservation concern
<b>Short-billed Dowitcher</b> <i>Limnodromus griseus</i> Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JK">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0JK</a>	Bird of conservation concern
<b>Short-eared Owl</b> <i>Asio flammeus</i> Season: Wintering <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD</a>	Bird of conservation concern
<b>Snowy Egret</b> <i>Egretta thula</i> Season: Breeding	Bird of conservation concern
<b>Upland Sandpiper</b> <i>Bartramia longicauda</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HC</a>	Bird of conservation concern
<b>Willow Flycatcher</b> <i>Empidonax traillii</i> Season: Breeding <a href="http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6">http://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6</a>	Bird of conservation concern
<b>Wood Thrush</b> <i>Hylocichla mustelina</i> Season: Breeding	Bird of conservation concern
<b>Worm Eating Warbler</b> <i>Helmitheros vermivorum</i> Season: Breeding	Bird of conservation concern

## Wildlife refuges and fish hatcheries

**There are no refuges or fish hatcheries in this location**

# Wetlands in the National Wetlands Inventory

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

## DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

## DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

## DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

## Estuarine And Marine Wetland

[E2EM1Nd](#)

[E2US2P](#)

[E2USM](#)

[E2USN](#)

A full description for each wetland code can be found at the National Wetlands

Inventory website: <http://107.20.228.18/decoders/wetlands.aspx>

**Appendix D** Department of the Interior Consultation with  
Federally Recognized Tribes



Nelson, Lindy <lindy\_nelson@ios.doi.gov>

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## RE: Draft Environmental Assessment, Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area, Kent County, Delaware

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Nelson, Lindy <lindy\_nelson@ios.doi.gov>  
To: Kimberly Penrod <kpenrod@delawarenation.com>  
Cc: Valincia Darby <valincia\_darby@ios.doi.gov>

Fri, May 12, 2017 at 1:52 PM

Greetings Kim,

For your reference, attached is confirmation from NFWF and DNREC on receiving your comments on behalf of the Delaware Nation and commitments to notify you (via DOI) of any discoveries during project implementation.

Thanks much,  
Lindy

---  
Lindy Nelson  
Regional Environmental Officer, Philadelphia  
Office of Environmental Policy and Compliance  
Department of the Interior

215-597-5012 (office); 215-266-5155 (mobile 24/7)  
Custom House, #244, 200 Chestnut St., Philadelphia, PA 19106

On Thu, Apr 27, 2017 at 2:26 PM, Nelson, Lindy <lindy\_nelson@ios.doi.gov> wrote:

Greetings Kim,

Thank you for your comments; we will incorporate them into our environmental analysis. We will ensure the project applicant is aware of the Delaware Nation's interest in project progress and immediate notification of discoveries that could affect Delaware Nation trust or cultural resources.

Please don't hesitate to give me a call or email if you have any questions or topics to discuss.

All best,  
Lindy

---  
Lindy Nelson  
Regional Environmental Officer, Philadelphia  
Office of Environmental Policy and Compliance  
Department of the Interior

215-597-5012 (office); 215-266-5155 (mobile 24/7)  
Custom House, #244, 200 Chestnut St., Philadelphia, PA 19106

On Tue, Mar 28, 2017 at 10:01 AM, Kimberly Penrod <kpenrod@delawarenation.com> wrote:

Lindy,

The protection of our tribal cultural resources and tribal trust resources will take all of us working together.

We look forward to working with you and your agency.

With the information you have submitted we can concur at present with this proposed plan.

As with any new project, we never know what may come to light until work begins.

The Delaware Nation asks that you keep us up to date on the progress of this project and if any discoveries arise please contact us immediately.

If you need anything additional from me please do not hesitate to contact me.

*Respectfully,*

*Kim Penrod*

*Delaware Nation*

*Director, Cultural Resources/*

*106, Archives, Library and Museum*

*(405)-247-2448 Ext. 1403 Office*

*(405)-924-9485 Cell*

[kpenrod@delawarenation.com](mailto:kpenrod@delawarenation.com)

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**2 attachments**

 **43281 DNREC concurrence approval.pdf**  
122K

 **43281 NFWF concurrence approval.pdf**  
135K



Nelson, Lindy &lt;lindy\_nelson@ios.doi.gov&gt;

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## Mispillion Harbor Reserve project

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**Lindy Nelson** <lindy\_nelson@ios.doi.gov>  
To: Bonney Hartley <Bonney.Hartley@mohican-nsn.gov>

Tue, Mar 21, 2017 at 9:57 AM

Thank you, Bonnie!

--

Lindy Nelson  
Regional Environmental Officer, Philadelphia  
Office of Environmental Policy and Compliance  
Department of the Interior

215-597-5012 (office); 215-266-5155(mobile 24/7)  
Custom House, #244, 200 Chestnut St., Philadelphia, PA 19106

On Mar 21, 2017, at 9:46 AM, Bonney Hartley <Bonney.Hartley@mohican-nsn.gov> wrote:

Dear Lindy:

I received the Draft Environmental Assessment of Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve Kent County, Delaware. On behalf of Stockbridge-Munsee Community I am responding that the project is outside of our cultural area of interest, therefore we do not wish to consult.

Respectfully,

Bonney

*Bonney Hartley*

Tribal Historic Preservation Officer

Stockbridge-Munsee Mohican Tribal Historic Preservation

New York Office

65 1st Street

Troy, NY 12180

(518) 244-3164

[Bonney.Hartley@mohican-nsn.gov](mailto:Bonney.Hartley@mohican-nsn.gov)

[www.mohican-nsn.gov](http://www.mohican-nsn.gov)



IN REPLY REFER TO:

# United States Department of the Interior

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
Custom House, Room 244  
200 Chestnut Street  
Philadelphia, Pennsylvania 19106-2904

March 16, 2017

Ms. Bonnie Hartley  
Tribal Historic Preservation Officer  
Stockbridge-Munsee Community  
New York Office  
65 1st Street  
Troy, NY 12180

**Subject: Draft Environmental Assessment - Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area, Kent County, Delaware.**

Dear Ms. Hartley:

Pursuant to Sections 101(d)(6)(b) and 106 of the National Historic Preservation Act (NHPA) and 36 CFR Part 800, the United States Department of the Interior (DOI) has identified the Stockbridge-Munsee Community as potentially having an interest in projects undertaken in the state of Delaware. The Department of the Interior, through the National Fish and Wildlife Foundation (NFWF), has provided grant funds to the Delaware Department of Natural Resources for the restoration of Delaware Bay's wetlands and beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area (MNCA). Consistent with the National Environmental Policy Act (42 USC § 4332), DOI is now in the process of preparing an Environmental Assessment on the proposed restoration effort.

This project will be implemented along the Delaware Bayshore at Mispillion Harbor Reserve and adjacent Milford Neck Conservation Area in southeastern Kent County, Delaware. Mispillion Harbor is renowned as globally significant for the extraordinary concentration of spawning horseshoe crabs (*Limulus polyphemus*) and migratory shorebirds each spring – including the Red Knot (*Calidris canutus rufa*), a species currently considered for listing under the U.S. Endangered Species Act. Great numbers of horseshoe crabs and shorebirds are found here because of the harbor's sandy beaches and calm waters when surf conditions elsewhere in Delaware Bay may be turbulent. Milford Neck's expansive tidal marshes interspersed with tidal pools and streams are important for a diversity of nesting, wintering and roosting migratory waterfowl, shorebirds, marsh birds and wading birds. The expansive forest immediately adjacent to the marsh is one of the most important sites on the Delmarva Peninsula for migratory songbirds during spring and fall migration.

The Mispillion Harbor Reserve is a unit of Milford Neck Wildlife Area (MNWA), owned and managed by the Delaware Division of Fish and Wildlife. Over the past century, the MNCA has experienced significant alterations to the natural hydraulic and hydrologic regimes of its tidal and palustrine wetlands. Alterations include grid ditching for saltmarsh mosquito control, construction of drainage ditches for agricultural lands, creation of a large canal (Grecos Canal) originally intended for navigation, and construction of roadways. The Delaware Division of Historical and Cultural Affairs, State Historic Preservation Office has indicated that the known historic property is the Mispillion Lighthouse, an 1873 structure built to replace one originally constructed in 1831. The SHPO noted that much of the landscape in the vicinity of the Project area had been altered recently through natural processes.

We are soliciting your input in identifying whether any historic properties, including those of traditional religious and cultural importance, are located in or near the project area. If so, please identify any concerns you may have regarding the effects this undertaking may have on these properties, including recommendations on mitigation strategies or measures. We are seeking to avoid or, where necessary, mitigate any adverse effects this undertaking may have on resources of interest to the Stockbridge-Munsee Community.

Information on the project, including a draft environmental assessment with maps, diagrams and other supplemental planning documentation and communication, is enclosed. (Sections 3.6.1 and 4.5 will evaluate potential impacts to tribal resources.) Please review the materials and advise whether the proposed actions of this project are inapplicable to the interests of your tribe or if further consultation is needed. We request your written response by April 26, 2017 to the following address:

Mr. Lindy Nelson  
U.S. Department of the Interior, OEPC  
200 Chestnut Street, Rm. 244  
Philadelphia, PA 19120

We appreciate the Stockbridge-Munsee Community's cooperation in working with this office. Please contact me if there are questions or concerns regarding this project at (215) 597- 5378 or by email at [Lindy.Nelson@ios.doi.gov](mailto:Lindy.Nelson@ios.doi.gov).

Sincerely,



Lindy Nelson  
Regional Environmental Officer

Enclosures: Draft Environmental Assessment  
Appendices



IN REPLY REFER TO:

# United States Department of the Interior

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
Custom House, Room 244  
200 Chestnut Street  
Philadelphia, Pennsylvania 19106-2904

March 16, 2017

Ms. Blair Fink  
Delaware Tribe Historic Preservation Representative  
Department of Anthropology  
Gladfelter Hall, Rm. 207  
Temple University  
1115 W. Polett Walk  
Philadelphia, PA 19122

**Subject: Draft Environmental Assessment - Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area, Kent County, Delaware.**

Dear Ms. Fink:

Pursuant to Sections 101(d)(6)(b) and 106 of the National Historic Preservation Act (NHPA) and 36 CFR Part 800, the United States Department of the Interior (DOI) has identified the Delaware Tribe of Indians as potentially having an interest in projects undertaken in the state of Delaware. The Department of the Interior, through the National Fish and Wildlife Foundation (NFWF), has provided grant funds to the Delaware Department of Natural Resources for the restoration of Delaware Bay's wetlands and beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area (MNCA). Consistent with the National Environmental Policy Act (42 USC § 4332), DOI is now in the process of preparing an Environmental Assessment on the proposed restoration effort.

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We are soliciting your input in identifying whether any historic properties, including those of traditional religious and cultural importance, are located in or near the project area. If so, please identify any concerns you may have regarding the effects this undertaking may have on these properties, including recommendations on mitigation strategies or measures. We are seeking to avoid or, where necessary, mitigate any adverse effects this undertaking may have on resources of interest to the Delaware Tribe of Indians.

Information on the project, including a draft environmental assessment with maps, diagrams and other supplemental planning documentation and communication, is enclosed. (Sections 3.6.1 and 4.5 will evaluate potential impacts to tribal resources.) Please review the materials and advise whether the proposed actions of this project are inapplicable to the interests of your tribe or if further consultation is needed. We request your written response by April 26, 2017 to the following address:

Mr. Lindy Nelson  
U.S. Department of the Interior, OEPC  
200 Chestnut Street, Rm. 244  
Philadelphia, PA 19120

We appreciate the Delaware Tribe of Indians' cooperation in working with this office. Please contact me if there are questions or concerns regarding this project at (215) 597- 5378 or by email at [Lindy.Nelson@ios.doi.gov](mailto:Lindy.Nelson@ios.doi.gov).

Sincerely,



Lindy Nelson  
Regional Environmental Officer

Enclosures: Draft Environmental Assessment

## Appendices



IN REPLY REFER TO:

# United States Department of the Interior

OFFICE OF THE SECRETARY  
Office of Environmental Policy and Compliance  
Custom House, Room 244  
200 Chestnut Street  
Philadelphia, Pennsylvania 19106-2904

March 16, 2017

Mr. Jason Ross  
Section 106 Manager  
Cultural Preservation Department  
The Delaware Nation  
P.O. Box 825  
Anadarko, OK 73005

**Subject: Draft Environmental Assessment - Restoring Delaware Bay's Wetlands and Beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area, Kent County, Delaware.**

Dear Mr. Ross:

Pursuant to Sections 101(d)(6)(b) and 106 of the National Historic Preservation Act (NHPA) and 36 CFR Part 800, the United States Department of the Interior (DOI) has identified the Delaware Nation as potentially having an interest in projects undertaken in the state of Delaware. The Department of the Interior, through the National Fish and Wildlife Foundation (NFWF), has provided grant funds to the Delaware Department of Natural Resources for the restoration of Delaware Bay's wetlands and beaches in Mispillion Harbor Reserve and Milford Neck Conservation Area (MNCA). Consistent with the National Environmental Policy Act (42 USC § 4332), DOI is now in the process of preparing an Environmental Assessment on the proposed restoration effort.

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Information on the project, including a draft environmental assessment with maps, diagrams and other supplemental planning documentation and communication, is enclosed. (Sections 3.6.1 and 4.5 will evaluate potential impacts to tribal resources.) Please review the materials and advise whether the proposed actions of this project are inapplicable to the interests of your tribe or if further consultation is needed. We request your written response by April 26, 2017 to the following address:

Mr. Lindy Nelson  
U.S. Department of the Interior, OEPC  
200 Chestnut Street, Rm. 244  
Philadelphia, PA 19120

We appreciate the Delaware Nation's cooperation in working with this office. Please contact me if there are questions or concerns regarding this project at (215) 597- 5378 or by email at [Lindy\\_Nelson@ios.doi.gov](mailto:Lindy_Nelson@ios.doi.gov).

Sincerely,



Lindy Nelson  
Regional Environmental Officer

Enclosures: Draft Environmental Assessment  
Appendices