U.S. Fish and Wildlife Service
DRAFT Environmental Assessment for
Living Shoreline at Lanyard Lagoon

Edwin B. Forsythe National Wildlife Refuge

June 2022

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This Environmental Assessment (EA) evaluates the impacts associated with the Proposed Action and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (516 DM 8) and U.S. Fish and Wildlife Service (Service) (550 FW 3) policies.

Proposed Action

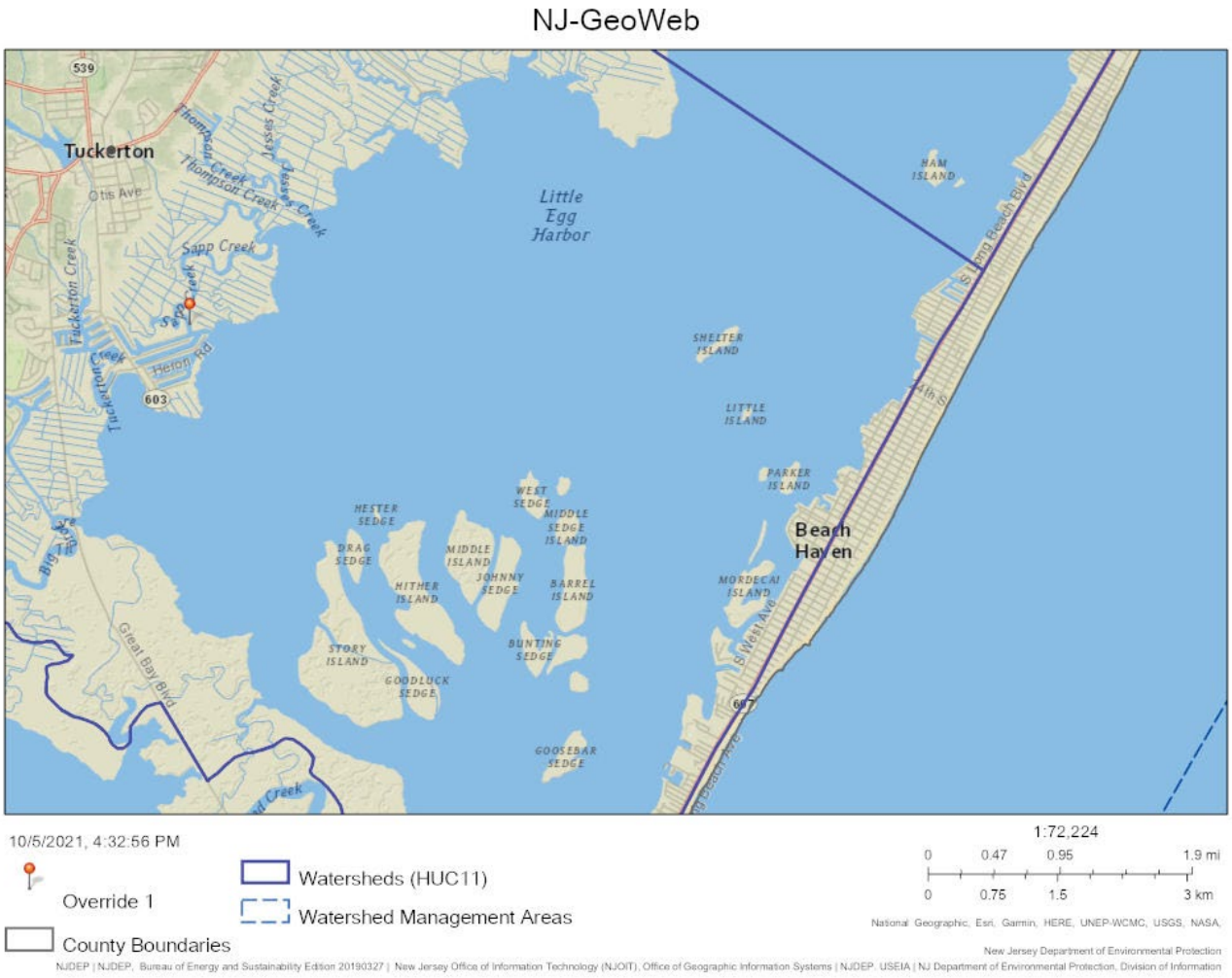
The Proposed Action is the enhancement and restoration of approximately 2.93 acres of coastal marsh habitat that has been negatively impacted by both natural and non-natural activities. To address erosion, vegetation die-back, and to improve rates of sediment accretion, implementation of the following restoration techniques are proposed:

- Remove an existing dilapidated bulkhead and replace with a stone sill structure that allows natural tidal flow while retaining suspended sediments.
- Install a living shoreline around the sill structure to assist with tidal flow reduction to support sediment accumulation.

The Project Area is within the U.S. Fish and Wildlife Service's Edwin B. Forsythe National Wildlife Refuge (refuge) located in the Borough of Tuckerton, Ocean County in Block 110, Lot 1 and is located on the north shore of Kingfisher Lagoon (Figure 1). It comprises is generally situated between Kingfisher Lagoon to the southeast, the Sapp River to the north and west, and residential land to the south and southwest. The Project Area is located in the Coastal Plain physiographic section of the State of New Jersey, within Lower Little Egg Harbor Bay Tributaries and the Barnegat Bay Watershed Management Area (WMA 13) (Figure 2). Photographs and site plans of the Project Area are found in Appendix A and Appendix B, respectively.

Figure 1. Map of the Project Area with an arrow noting Lanyard Lagoon.

Figure 2. Watershed Management Area Map with a red point noting the Project Area.



Background

National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System (Refuge System), the purposes of an individual refuge, U.S. Fish and Wildlife Service (Service) policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The mission of the Refuge System, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is to:

"...to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans."

The act requires that refuges restore and maintain the integrity, diversity, and environmental health necessary to achieve this mission and the purposes established for each refuge.

The NWRSAA mandates the Secretary of the Interior in administering the System to (16 U.S.C. 668dd(a)(4):

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the Refuge System;

- Ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans;

- Ensure that the mission of the Refuge System described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;

- Ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the States in which the units of the Refuge System are located;

- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the Refuge System and the purposes of each refuge;
- Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System through which the American public can develop an appreciation for fish and wildlife;

- Ensure that opportunities are provided within the Refuge System for compatible wildlife-dependent recreational uses; and

- Monitor the status and trends of fish, wildlife, and plants in each refuge.

Edwin B. Forsythe National Wildlife Refuge (NWR, refuge) is located in Atlantic, Burlington and Ocean Counties, New Jersey. In order to meet specific refuge and other broader Service directives, the following purposes were established for the Edwin B. Forsythe NWR:

- For lands acquired under the Migratory Bird Conservation Act (16 U.S.C. §715-715r), as amended, "…for use as an inviolate sanctuary, or for any other management purpose, for migratory birds…." (16 U.S.C. §715d).

- "…the development, advancement, management, conservation, and protection of fish and wildlife resources…." (16 U.S.C. §742f(a)(4), Fish and Wildlife Act of 1956).

- "…the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations (regarding migratory birds) …" (16 U.S.C. §3901(b), 100 Stat. 3583 Emergency Wetlands Resources Act of 1986).

- "…to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." (78 Stat. 890:16 U.S.C. 1121 (note), 1131-1136, Wilderness Act of 1964).

The refuge was created on May 22, 1984, by combining the former Brigantine and Barnegat NWRs (98 Stat. 207). The refuge was named in memory of the late conservationist Congressman from New Jersey, Edwin B. Forsythe, through a Congressional Joint Resolution (H.J. Res. 537).

Brigantine NWR was established on January 24, 1939, by the Migratory Bird Conservation Commission, under the authority of the Migratory Bird Conservation Act (16 U.S.C. 715d). Congress designated 6,603 acres of the Brigantine NWR as the Brigantine Wilderness (Wilderness Area) on January 3, 1975, (P.L. 93-632) to be managed under the Wilderness Act of 1964 (78 Stat. 890; 16 U.S.C. 1121 (note), 1131-1136).

Barnegat NWR was established on June 21, 1967, under the authority of the Migratory Bird Conservation Act (16 U.S.C. 715d).

The Reedy Creek Unit was established in 1991, under authority of the Emergency Wetlands Resources Act of 1968 (16 U.S.C. 3901 (b) 100 Stat.3583).

The refuge was created primarily to provide wintering habitat for American black ducks (*Anas rubripes*), Atlantic brant (*Branta bernicla*) and rails. It spans almost 50 miles of the New Jersey coastal estuaries, from the Metedeconk River in Ocean County to Reeds Bay in Atlantic County. Nearly 48,000 acres of coastal beach/dune, salt marsh, freshwater wetlands, wetland forest, upland forest, pitch pine barrens, early successional habitats, and managed wetland impoundments comprise the refuge. The refuge is listed as a Wetlands of International Significance under the Ramsar Convention on Wetlands. The refuge's approved acquisition boundary encompasses 60,082 acres.

The Borough of Tuckerton is an historic seaport community located in Southern Ocean County encompassing 3.8 square miles. About 3,600 people live there and more than half of Tuckerton is comprised of coastal wetlands, many acres of which have been incorporated into the refuge. The Borough is committed to preserving wetlands for protection of the community related to storm surge, improvement of water quality, and habitat creation.

The National Environmental Policy Act [42 United States Code (U.S.C.) 4321 et seq.; NEPA] and the Council on Environmental Quality's NEPA regulations [40 Code of Federal Regulations (CFR), Parts 1500 to 1508] require that the potential environmental impacts of a Proposed Action be considered before a final decision to carry through with the Proposed Action is made. In compliance with these regulations, this Environmental Assessment (EA) examines the need for the Proposed Action, the potential environmental impacts of the Proposed Action and the No Action

Alternative, and identifies the unavoidable adverse environmental impacts identified as a result of the Proposed Action, if it were to be implemented.

Purpose and Need for the Proposed Action

The overarching goal of refuge habitat restoration is to enhance coastal marshes by addressing the negative impacts of anthropogenic structures (e.g., roads, berms, defunct water control structures (WCSs), dikes, undersized culverts) or actions (e.g., grid-ditching, salt hay farming, and erosion) that have compromised functionality and availability for wildlife. The Proposed Action seeks to improve hydrology of Lanyard Lagoon by entrapping and retaining sediment in the system, while minimizing the flow of that sediment into the adjacent channel. This will be done by replacing a dilapidated and non-functioning bulkhead with a marsh-level break wall with living shoreline components. A sill in the center of the structure will allow movement of water in and out of the lagoon to mimic natural flows. The proposed changes to the site allow for future marsh development to the "inside" or western side of the new sill in future years, whether by natural forces or future sediment deposition, if needed.

Coastal marsh habitats (i.e., salt marshes) are among the most productive ecosystems in the world (Tiner 1987); however, they only exist within a narrow range of elevation bracketing mean sea level (USFWS 2004). The elevation of the marsh influences both the rate and frequency of flooding, which directly affects the plant species that can survive. The vertical accretion of salt marshes is directly determined by deposition of silt material and accumulation of organic matter (Zhigang et al. 2014). The frequency, duration, and height of inundation during flooding events can have an effect on the sedimentation rate and thereby the rate of accretion. Furthermore, changes to the rate and frequency of flooding directly affect the plant communities within a marsh. Low marshes within the refuge are typically flooded twice daily (semidiurnal) by high tides and are dominated almost exclusively by smooth cordgrass (*Spartina alterniflora*). High marshes are irregularly flooded and dominated by saltmeadow cordgrass (*Spartina patens*) and seashore saltgrass (*Distichlis spicata*). As elevation increases, the presence of the invasive species common reed (*Phragmites australis*) also increases.

In some areas of the refuge, increased water levels (i.e., sea level rise) and prolonged duration of inundation have physically overtaxed plants and resulted in a decrease of plant density (die-back) (Bertness and Silliman 2008). While tidal marsh plants are able to tolerate some waterlogging, excessive saturation can create a condition of soil oxygen deficiency, which impacts plant growth and functions such as stomatal opening, photosynthesis, water and mineral uptake, and hormonal balance (Tiner 1999). The concern is that this die-back and reduction in rates of salt marsh accretion may result in the permanent loss of marsh land and conversion to open water. Such changes in the landscape could exacerbate the frequency and intensity of inland flooding from coastal storm surge events (Amec 2016).

Additional stressors on the marsh include thousands of miles of grid ditches that were created in New Jersey's saltmarshes in the early 20th century to reduce the mosquito population by draining standing water where mosquitos bred (USFWS 2004). The impacts of ditching on salt marshes included a decrease in the time flood waters were able to recede off the salt marsh platform, a decrease in the temporal scale of standing water in the marsh platform during ebb tides, vegetation

changes, and associated impacts on fish and bird habitat. In addition, widespread development in the marshes resulted in a network of "lagoon communities" that destroyed hundreds of acres of marsh, altering hydrology of the landscape. Some lagoons were dug and then abandoned and eventually become part of the refuge, as is the case with Lanyard Lagoon.

The Proposed Action seeks to enhance the lagoon to satisfy the Service's mission for conservation and protection of fish and wildlife resources as well as the conservation of extremely sensitive and highly important saltmarsh habitat.

Scope of Analysis

This EA describes the existing environmental resources in the Project Area, describes the Proposed Action activities required, and assesses the potential impacts to those resources from implementation of the Proposed Action. Alternatives to the Proposed Action are presented and the potential impacts to the existing environmental resources are also assessed. This assessment was performed using existing information about the Project Area, and supplemented with literature review, site surveys, and other data gathering efforts.

A number of agencies have been and will be involved in the review and permitting of the Project. These agencies are as follows:

- Federal level:
    - United States Army Corps of Engineers (USACE)

- State level:
    - New Jersey Department of Environmental Protection (NJDEP), Division of Land Use Regulation (DLUR)
    - NJDEP, Bureau of Coastal Management
    - NJDEP, Office of Dredging Sediment and Technology (ODST)
    - NJDEP, State Historic Preservation Office (SHPO)
    - NJDEP, Division of Fish and Wildlife (DFW)

- County level:
    - Ocean County Soil Conservation District (OCSCD)

Coordination and consultation with State agencies have been conducted throughout the planning stages of this Project. Table 1 presents a summary of the permits sought to complete this Project.

Table 1. Permit summary for the project.

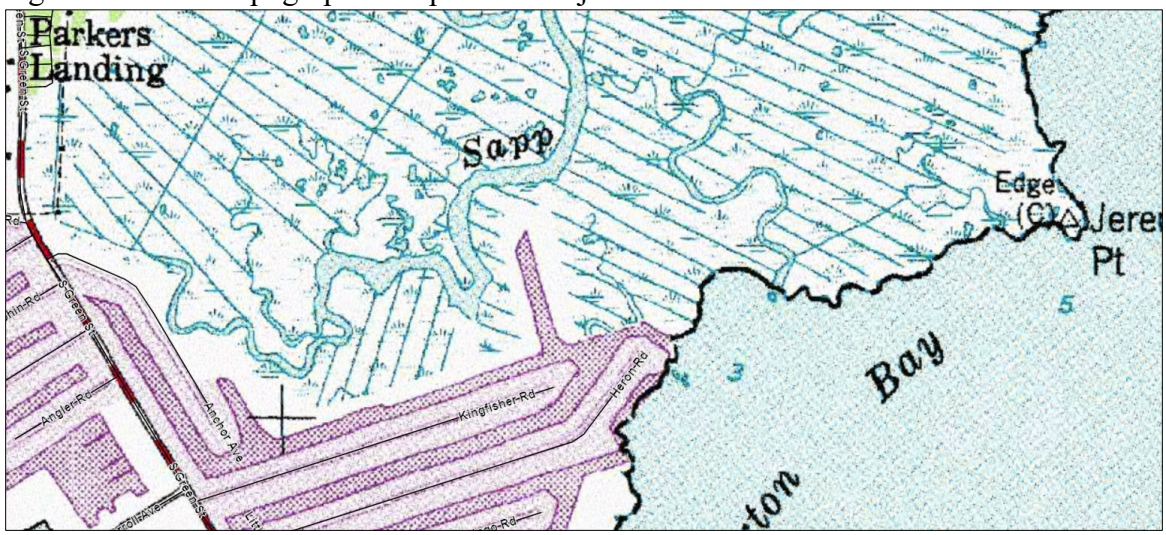
Permit or Authorization	**Agency**	**Status**
Coastal Wetlands General Permit #24	NJDEP	Pending
Nationwide Department of the Army Permit	USACE	Pending
Erosion and Sedimentation Control Plan	OCSCD	Pending

Affected Environment and Existing Conditions

Topography

The topography of Lanyard Lagoon is relatively flat and is situated between 0 and 5 feet above mean sea level (Figure 3). Net local surface water drainage from the Project Area drains into the adjacent Kingfisher Lagoon and Little Egg Harbor.

Figure 3. USGS Topographic Map of the Project Area.



Geology and Soils

The Lanyard Lagoon Project Area is located within the outer Coastal Plain Physiographic section of New Jersey (NJDEP 2021). The unconsolidated deposits of this province range in age from the Cretaceous to the Miocene (135 to 5.3 million years old) and gently dip to the southeast, towards the coast and extend beneath the Atlantic Ocean to the edge of the Continental Shelf (Dalton 2003, NJDEP 1999). The topography of the Coastal Plain is relatively flat to very gently undulating.

The bedrock geology is made of the Belleplain Member of the Kirkwood Formation (NJDEP 2021). The Belleplain Member is described as a middle Miocene Era unit that is primarily a clay to silty clay at the base and sand at the top. Clay locally contains abundant diatoms and scattered small shell fragments. Most Belleplain sand is quartz with lesser amounts of feldspar and mica. The member is as much as 15 m (49 ft) thick (USGS 2021).

The surficial geology of the Project Area is listed as Salt Marsh and Estuarine Deposits (Figure 4). The sediments are classified as Appoquinimink-Transquaking-Mispillion complex with 0 to 1 percent slopes and consist of very frequently flooded, alternately-deposited layers of sand, silt, and clay which outcrop in irregular bands that trend northeast to southwest within deltaic and marine environments occurring at sea level (NJDEP 1999). The Salt Marsh and Estuarine Deposits soils are described as dark in color, ranging from brown, dark brown, gray, or black, and composed of silt, sand, peat, and clay with minor pebble gravel. They contain abundant organic matter and were deposited during the Holocene Era in salt marshes, estuaries, and tidal channels and can be as thick

as 300 feet in some areas (NJDEP 2021). The remaining area is classified as dredge channel without soils.

Figure 4. Soil Survey Map of the Project Area.

AptAv—Appoquinimink-Transquaking-Mispillion complex
WDC4—Dredge Channel, 1 to 4-meter water depth
Source: Web Soil Survey, National Cooperative Soil Survey accessed on 10/28/2021

Air Quality

The United States Environmental Protection Agency (USEPA) has set National Ambient Air Quality Standards (NAAQS) for six commonly found air pollutants as part of the Federal Clean Air Act requirements. These pollutants (also known as criteria pollutants) include particle pollution (often referred to as particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. These pollutants are known to harm human health and the environment and also cause property damage. The USEPA regulates pollutants by developing human health-based and environmentally-based criteria (science-based guidelines) for setting permissible levels (NJDEP 2015). New Jersey is located in the Ozone Transport Region, an area that covers 13

northeastern ozone nonattainment states from Maine to Virginia (Trinity Consultants 2014). Ocean County, along with the rest of New Jersey, is designated as a marginal nonattainment area for the 8-hour ozone standard, but it is in attainment of all other standards (NJDEP 2015).

Edwin B. Forsythe NWR is a designated Class I Air Quality Area due to the 6,600-acre Brigantine National Wilderness Area sites and it is afforded special protections by the Clean Air Act. Congress charged the Service with the responsibility of protecting air quality and air quality-related values, including vegetation, wildlife, soils, water quality, visibility, odors, and cultural and archaeological resources of the area from manmade pollution. The New Jersey Department of Environmental Protection's Division of Air Quality and the Service work together to monitor air quality. Investigations at the refuge include monitoring for ozone, sulfur dioxide, fine particulates, light attenuation, visibility and mercury. Results indicate that the low-altitude ozone levels are high at the refuge with resulting damage to vegetation, including stippling and chlorosis (the yellowing of leaf tissue due to a lack of chlorophyll) (Davis 1995).

The USEPA and NJDEP regulations require proposed projects to demonstrate that predicted impacts will not cause or significantly contribute to a violation of the NAAQS or the New Jersey Ambient Air Quality Standards (NJAAQS). Toward that end, the USEPA and NJDEP have established Significant Impact Levels (SILs), which are a lesser fraction of the NAAQS/NJAAQS. Predicted impacts less than SILs are deemed insignificant, and therefore will not cause or contribute to an air quality standard violation.

Water Quality

According to the NJDEP (2016), "The Surface Water Quality Standards are developed and administered in conformance with requirements of the Federal Water Pollution Control Act 33 U.S.C. §1251 (also called the Clean Water Act) and the Federal regulatory program established by the USEPA at 40 C.F.R. Part 131. The Surface Water Quality Standards are also developed pursuant to the New Jersey Water Quality Planning Act, N.J.S.A. 58:11A et. seq. and the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A et. seq. Surface Water Quality Standards establish designated uses, classify streams based on uses, designate anti-degradation categories, and develop water quality criteria to protect those uses. In addition, the standards specify general, technical, and interstate policies, and policies pertaining to establishment of water quality-based effluent limitations."

All waters within the Lanyard Lagoon Project Area are classified as a SE1(C1) waters according to New Jersey Surface Water Quality Standards (NJDEP 2016). This classification is for category one (C1) saline estuarine (SE) waters with shellfish harvesting as a designated use. According to the NJDEP (2016), "Category one waters" means those waters designated in the tables in New Jersey Administrative Code (N.J.A.C.) 7:9B-1.15(c) through (i), for purposes of implementing the anti-degradation policies set forth at N.J.A.C. 7:9B- 1.5(d), for protection from measurable changes in water quality based on exceptional ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resource(s) to protect their aesthetic value (color, clarity, scenic setting) and ecological integrity (habitat, water quality and biological functions)."

Little Egg Harbor and Barnegat Bay, adjacent to the Project Area to the east, are also classified as SE1(C1) waters.

Wetlands and Streams

The Clean Water Act (40 CFR 230.3) defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency or duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Using that definition, wetlands are defined based on certain characteristics of vegetation, soils, and hydrology. For vegetation, the majority of the plant species must be categorized as hydrophytic, or adapted to living in saturated areas. Soils are considered hydric (permanently or seasonally saturated by water) if they meet the criteria defined by the National Technical Committee for Hydric Soils (USDA 2021). Hydrology is determined based on having a sufficient amount of water, whether saltwater, brackish, or fresh, that the soil is saturated during long periods of the vegetative growing season (FIC 1989).

The most common method of characterizing wetlands is under the system developed by the Service. As described in *Classification of Wetlands and Deepwater Habitats of the United States*, wetland types can be broken down into five basic categories. These categories include marine, estuarine, riverine, lacustrine, and palustrine wetlands. Each of these systems can be further broken down into subsystems, classes, subclasses and dominance types based on the type of vegetation present and/or the bottom substrate for the wetlands (Cowardin et al. 1979).

The Service's National Wetlands Inventory (NWI) indicates that the water bodies surrounding the Project Area to the south and further east are classified as follows (USFWS 2021):

- Estuarine, subtidal, unconsolidated bottom, subtidal, excavated habitat (E1UBLx, Estuarine and Marine Deep)

The NWI indicates that the wetlands within the Project Area boundaries and those surrounding the Project Area to the north, northeast and northwest are classified as follows

- Estuarine, intertidal, emergent, persistent, irregularly flooded, partially drained/ditched habitat (E2EM1Pd, Estuarine and Marine Wetland)

The NJDEP indicates that the Project Area is mapped as containing the following wetland habitats (Figure 5):

- Saline marsh (low marsh)

Figure 5. Geo Web NJDEP Wetlands Map of the Project Area.

Vegetation

The Project Area is dominated by low salt marsh and mudflat. The low salt marsh areas are dominated by smooth cordgrass (*Spartina alterniflora*).

Fish and Wildlife

Fish: Refuge lands are bordered by, and are hydrologically connected to, estuarine habitats comprised of salt marshes, streams, ponds, bays, and rivers (USFWS 2004). In general, the refuge is home to a rich variety of fish, shellfish, and crabs. These species are of significant importance to the sport and commercial fisheries and are a food base for many birds and mammals (USFWS 2004.

The salt marshes contain abundant mummichog and sheepshead minnow, which are frequently found in shallow water environments such as marsh ponds and small intertidal creeks. Important recreational and commercial species, including summer flounder (*Paralichthys dentatus*), striped bass (*Morone saxatilis*), white perch (*Morone americana*), and northern weakfish (*Cynoscion regalis*) use the estuarine habitats as nursery areas.

The Barnegat Bay estuary is estimated to be used by approximately 110 fish species. The ten most commonly reported species are bay anchovy (*Anchoa mitchilli*), Atlantic silverside (*Menidia menidia*), fourspine stickleback (*Apeltes quadracus*), spot (*Leiostomus xanthurus*), winter flounder (*Pseudopleuronectes americanus*), inland silverside (*Menidia beryllina*), northern pipefish (*Syngnathus fuscus*), mummichog, bluefish (*Pomatomus saltatrix*), and oyster toadfish (*Opsanus tau*) (TPL 2008).

The Essential Fish Habitat (EFH) mapper (NOAA 2021) was used as consultation with the National Marine Fisheries Services (NMFS) to determine which fish species habitat may be located on or near the Project Area with the potential of being affected by the Proposed Action. The Project Area is mapped as containing EFH for those fish species listed in Table 2 below:

Table 2. NMFS Findings for Potential Essential Fish Habitat Near the Project Area.

Common Name	**Scientific Name**	**Life Stage**
Clearnose skate	*Raja eglanteria*	Juvenile Adult
Ocean pout	*Zoarces americanus*	Adult Eggs
Window pane flounder	*Scopthalmus aquosus*	Eggs Larvae Juvenile Adult
Winter flounder	*Pseudopleuronectes americanus*	Larvae Eggs Juvenile Adult
Red hake	*Urophycis chuss*	Larvae Juvenile Eggs
Spiny dogfish	*Squalus acanthias*	Adult Female Sub-Adult Female Adult Male
Silver hake	*Merluccius bilinearis*	Eggs/Larvae
Summer flounder	*Paralichthys dentatus*	Adult Juvenile Larvae
Black sea bass	*Centropristis striata*	Adult Juvenile
Scup	*Stenotomus chrysops*	Juvenile Adult

Common Name	Scientific Name	Life Stage
Longfin inshore squid	*Doryteuthis pealeii*	Juvenile Adult Eggs
Bluefish	*Pomatomus saltatrix*	Juvenile Adult
Little Skate	*Leucoraja erinacea*	Juvenile Adult
Winter Skate	*Leucoraja ocellat*	Juvenile Adult
Atlantic butterfish	*Peprilus triacanthus*	Adult
Atlantic herring	*Clupea harengus*	Adult Juvenile

The New England/Mid-Atlantic Habitat Areas of Particular Concern (HAPC) is documented on the Project Area (NOAA 2021).

Birds: The primary focus of the refuge has been to protect tidal wetland and shallow bay habitat for migratory water birds. The refuge's location in one of the most active flight paths of the Atlantic Flyway adds to the taxonomic richness and ecological importance of this area. Tens of thousands of migrating ducks, geese, shorebirds, and wading birds stop at the refuge each spring and fall to feed and rest. Some of these species, such as the American black duck (*Anas rubripes*), clapper rail (*Rallus crepitans*), and willet (*Tringa semipalmata*) breed at the refuge. The refuge is known for holding the largest concentrations of American black duck and Atlantic brant (*Branta bernicla*) on the Atlantic coast. Bald eagle (*Haliaeetus leucocephalus*) often forage over the open water areas, and osprey (*Pandion haliaetus*) and peregrine falcon (*Falco peregrinus*) nest on man-made platforms. Large numbers of songbirds also use the upland habitats on the refuge to breed, rest, and feed.

The more abundant or common waterbirds and shorebirds found at the refuge include snow goose (*Chen caerulescens*), Canada goose (*Branta canadensis*), Atlantic brant, mallard (*Anas platyrhynchos*), American black duck, northern shoveler (*Anas clypeata*), bufflehead (*Bucephala albeola*), double-crested cormorant (*Phalacrocorax auritus*), great egret (*Ardea alba*), glossy ibis (*Plegadis falcinellus*), clapper rail, greater yellowlegs (*Tringa melanoleuca*), semipalmated sandpiper (*Calidris pusilla*), least sandpiper (*Calidris minutilla*), short-billed dowitcher (*Limnodromus griseus*), laughing gull (*Leucophaeus atricilla*), ring-billed gull (*Larus delawarensis*), herring gull (*Larus argentatus*), great black-backed gull (*Larus marinus*), Forster's tern (*Sterna forsteri*), and black skimmer (*Rynchops niger*).

Some of the above species are abundant or common throughout the year, whereas others, such as the snow goose are only present in very large numbers in the fall and winter. Canada goose, mallard, American black duck, great egret, glossy ibis, clapper rail, laughing gull, herring gull,

great black-backed gull, Forster's tern, and black skimmer have been documented to breed at the refuge.

Other abundant or common birds on the refuge include osprey, mourning dove (*Zenaida macroura*), red-bellied woodpecker (*Melanerpes carolinus*), blue jay (*Cyanocitta cristata*), fish crow (*Corvus ossifragus*), tree swallow (*Tachycineta bicolor*), barn swallow (*Hirundo rustica*), Carolina chickadee (*Poecile carolinensis*), tufted titmouse (*Baeolophus bicolor*), Carolina wren (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), northern mockingbird (*Mimus polyglottos*), common yellowthroat (*Geothlypis trichas*), song sparrow (*Melospiza melodia*), northern cardinal (*Cardinalis cardinalis*), red-winged blackbird (*Agelaius phoeniceus*), common grackle (*Quiscalus quiscula*), and American goldfinch (*Carduelis tristis*). All of these species have been documented to breed at the refuge.

Mammals: There are over 30 species of mammals that occur on the refuge, characteristic of assemblages within Mid-Atlantic coastal communities. The following mammals are associated with wetlands, such as those found at the Project Area: mink (*Mustela vison*), river otter (*Lutra canadensis*), muskrat (*Ondatra zibethicus*), meadow vole (*Microtus pennsylvanicus*), southern bog lemming (*Synaptomys cooperi*), and least shrew (*Cryptotis parva*).

Reptiles and Amphibians: The 19 species of reptiles and amphibians that have been documented on the refuge fall into two major assemblages: Pine Barrens environment and coastal estuarine environment. The Project Area hosts the coastal estuarine community type assemblage, which includes coastal marshes, estuaries, coves, tidal flats, and inner edges of barrier beaches. These habitats are used by important species such as the northern diamondback terrapin (*Malaclemys t. terrapin*).

Salamanders, including the red-backed salamander (*Plethodon cinereus*), slimy salamander (*Plethodon glutinosus*), and marbled salamander (*Ambystoma opacum*) are also found in freshwater wetland habitats throughout the refuge.

Others reptiles that have been observed throughout the refuge include (NJA 2021):

- Five-lined skink (*Plestiodon fasciatus*)
- Black racer (*Coluber constrictor constrictor*)
- Black rat snake (*Pantherophis obsoletus*)
- Northern water snake (*Nerodia sipedon sipedon*)
- Eastern hognose snake (*Heterodon platirhinos*)
- Rough green snake (*Opheodrys aestivus*)
- Eastern ribbon snake (*Thamnophis sauritus sauritus*)
- Common snapping turtle (*Chelydra serpentina*)
- Eastern painted turtle (*Chrysemys picta picta*)
- Eastern mud turtle (*Kinosternon subrubrum subrubrum*)
- Redbelly turtle (*Pseudemys rubriventris*)

In addition, visitors to the various refuge properties have documented the following amphibians (NJA 2021):

- Green frog (*Rana clamitans melanota*)
- New Jersey chorus frog (*Pseudacris feriarum kalmi*)
- Northern cricket frog (*Acris crepitans crepitans*)
- Gray treefrog (*Hyela sp.*)
- Southern leopard frog (*Lithobates sphenocephalus sphenocephalus*)
- Northern red salamander (*Pseudotriton ruber ruber*)
- Four-toed salamander (*Hemidactylium scutatum*)

Federally Listed Species, Critical Habitat, and Species of Concern

The unique habitats of the Barnegat Bay estuary (including barrier islands, salt marsh, tidal marshes, shallow water, and swamps) attract threatened and endangered species (TPL 2008). The Service's online Information, Planning, and Conservation (IPaC) system indicated the presence of the following federally listed threatened and endangered species on or near the Project Area (Appendix C).

Table 3. IPaC Findings for Potential Federally Listed Threatened and Endangered Species On or Near the Project Area.

Common Name	**Scientific Name**	**Federal Status**
Eastern black rail	*Laterallus jamaicensis ssp. jamaicensis*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Monarch butterfly	*Danaus plexippus*	Candidate
American chaffseed	*Schwalbea americana*	Endangered
Knieskern's beaked-rush	*Rhynchospora knieskernii*	Threatened
Swamp pink	*Helonias bullata*	Threatened

There were no critical habitats documented within the Project Area. However, the Service's IPaC system indicated the presence of 9 migratory birds protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) that could potentially move through the Project Area.

Table 4. IPaC Findings for Potential Migratory Bird Species On or Near the Project Area.

Common Name	**Scientific Name**
Bald eagle	*Haliaeetus leucocephalus*
Black skimmer	*Rynchops niger*
Eastern whip-poor-will	*Antrostomus vociferous*
Prairie warbler	*Dendroica discolor*
Purple sandpiper	*Calidris maritima*
Red headed woodpecker	*Melanerpes erythrocephalus*
Ruddy turnstone	*Arenaria interpres morinella*
Willet	*Tringa semipalmata*
Wood thrush	*Hylocichla mustelina*

The NJDEP NJ-GeoWeb website (NJDEP 2021) Landscape Project indicated the presence of the following State-listed threatened and endangered species on or near the Project Area.

Table 5. NJDEP Landscape Project Findings for Potential State-Listed Threatened and Endangered Species On or Near the Project Area.

Common Name	**Scientific Name**	**State Status**
Common tern	*Sterna hirundo*	Special Concern
Gull-billed Tern	*Gelochelidon nilotica*	Special Concern
Black Skimmer	*Rynchops niger*	Endangered
Tricolored heron	*Egretta tricolor*	Special Concern
Little blue heron	*Egretta caerula*	Special Concern
Glossy ibis	*Plegadis falcinellus*	Special Concern
Osprey	*Pandion haliaetus*	Threatened
Caspian tern	*Hydroprogne caspia*	Special Concern
Snowy egret	*Egretta thula*	Special Concern
Black-crowned night-heron	*Nycticorax*	Threatened

Wilderness

The approximately 6,600-acre Brigantine National Wilderness Area occurs on the refuge. The area is comprised of Holgate Beach (southern end of Long Beach Island); Little Beach Island (south of Little Egg Inlet); and the Mullica-Motts area (south of the Mullica River: 1,780 acres of marsh). These sites are largely un-ditched saltmarsh and barrier beach and dune habitats.

Cultural Resources

To achieve compliance with the NHPA (Section 106), reviews of cultural resource files were performed by submittal of a Request for Review to the NJDEP SHPO. The objective of the request was to assess the potential for the Proposed Action to impact historic properties (listed or eligible for listing on the National Register of Historic Places) within the Project Area. Historic properties include archaeological sites, as well as historic structures and districts.

The agency review indicated that there are no previously inventoried historic properties within the Area of Potential Effects (APE) for the Project. The archaeological sensitivity of the APE of the Project is low. Therefore, the Proposed Action has no potential to affect objects of archaeological significance. However, activities will be halted if any historic or prehistoric artifacts are unearthed during the renovations. If such an inadvertent discovery occurs, the refuge manager will be contacted immediately. In consultation with the SHPO, the Service will determine the appropriate

management actions that shall be completed before construction may resume. The Request for NHPA (Section 106) Review is included in Appendix D.

Socioeconomic Resources and Environmental Justice

Ocean County began as a rural, agricultural and fishing center. It was not until the latter part of the 1800s and through the 1900s, when the resort industry of the New Jersey Shore was developed, that commercial activities associated with seasonal resorts became the county's economic mainstay. With year-round population increases, Ocean County's economic base has become increasingly diverse and a variety of new industries now supplement the traditional tourist-related businesses. The health care industry is now the top employer in the county and is the fastest growing employment sector. Ocean County is projected to continue leading employment growth in the State through the next decade (OCDP 2021).

The commercial fishing industry in southern New Jersey is also substantial. Important species for this industry includes: finned fish (including bait fish), eel, clams, mussels, and crabs (including horseshoe crabs). In addition, there has been an increase in shellfish aquaculture, especially oysters (USFWS 2004).

Recreation

The refuge receives over 250,000 visitors each year who use the land for various recreational purposes such as hunting, fishing, environmental education, and wildlife observation. The New Jersey shore has long been a major tourist destination and wildlife-dependent uses of the refuge by the public supports tourism in the region (USFWS 2004). Public use of the Project Area is not encouraged, as the Service does not maintain recreational trails or a visitor center there. The refuge provides many walking trails, about 28,000 acres of hunting area, and an 8-mile-long Wildlife Drive to support public use throughout the three counties of the site.

Transportation

The regional and State roads that convey traffic directly into and from the Borough of Tuckerton are as follows:

- The Garden State Parkway is a major arterial toll road running in a northeast to southwest direction.
- U.S. Route 9 (US 9) is a north–south United States highway that runs from Delaware to New York through New Jersey.

Average daily traffic volume for the section of the Garden State Parkway and Route 9 nearest the Project Area is 17,900 and 12,500 cars per day, respectively (NJDOIT 2019, NJDOT 2018).

Alternatives Analysis and Review

Five alternatives were assessed during the development of this EA. The Proposed Action

(Preferred Alternative), which includes tidal flow restoration and hybrid living shoreline installation, is considered to be the most direct and effective way of meeting the Project objectives. The Preferred Alternative, three additional Alternatives and the No Action Alternative are discussed in the following sections.

The Project Area comprises 2.93 acres and the construction site consists of 0.12 acres within the Project Area. The Project Area is generally characterized by North Atlantic low salt marsh. This site has been manipulated by manmade excavation created during a period of rapid coastal land use expansion. The lagoon was excavated into the native salt marsh, and its spoils placed on the east bank in anticipation of further residential construction. After the initial excavation, the lagoon was abandoned without additional improvements. Sometime between 1986 and 1995 a wooden bulkhead was installed across the mouth of the lagoon. This was constructed to stop silt migration into the adjacent Kingfisher Lagoon. That effort had mixed results, but the wood structure used as a barrier eventually yielded to the tide. Severe erosion on the western edge of the breakwater continues as daily tidal flow around the breakwater occurs. Lanyard Lagoon is currently a nonpoint source of sediment depositing into Kingfisher Lagoon and Tuckerton Bay. The goal of this project is to reduce the ongoing erosion by stabilizing the targeted coastal marsh area and promote resiliency in the tidal system, halt coastal edge retreat and promote marsh enhancement.

Alternative A: Living shoreline with low-profile structure (Preferred Alternative)

Living Shorelines are typically used in low and moderate wave energy environments. They incorporate native vegetation such as marsh grasses and sea grasses, low profile rock structures such as stone sills, clean sediment, biodegradable logs made from coconut coir, stone containment and concrete breakwaters such as oyster castles and reef balls.

The proposed project is to construct a Living Shoreline with a low-profile rock structure having a 50-foot-wide notch to maintain tidal flow to the existing salt marsh. Salt marsh restoration is proposed along the marsh side of the rock structure with native vegetation planted in a 10-foot wide section with smooth cordgrass (*Spartina alterniflora*) and Big Cordgrass (*Spartina Cynosuroides*). The Kingfisher Lagoon side of the low-profile rock structure will be seeded with native shellfish by ReClam the Bay post-construction. Work vessels used to complete the project include a 20’ long push boat and two 24’x48’ barges.

The goals of the project will be achieved with the Living Shoreline. The work would begin with the installation of sediment control, followed by the demolition of the existing wood barrier and pilings. The demolition, product delivery, and installation would be completed from a secure location. The debris removed during the demolition of the existing wood barrier and exposed pilings will be taken to a suitable landfill. The area underneath the new shoreline will be prepared prior to the installation of the Triton mattresses. Sand fill will be used to eliminate voids and support the stone sill. The mattress is constructed of a sorted stone encased in a wire cage and will be installed to form the sill's solid base. Rip rap will be installed over the mattress. The sill will have a stone core (R-3 rip rap) capped with large cobble-sized stone (R-7 rip rap) resulting in a 3:1 slope. Shell bags will be installed below the sill along the edge of the rock cap stone. The sill will have a maximum height of 1.5' MSL, with a depressed notch set at 0.0' MSL. The elevations will permit tide entry at the top of the cycle but retain water and silt at and below 0' MSL. It is

anticipated that cord grass will naturally colonize the newly settled silt once it rises to and above the 0' elevation. Construction plans are provided as Appendix B.

Specifically, the creation of the living shoreline will provide:

- Increased habitat
- Protection from erosion
- Reduction of suspended solids into Barnegat Bay
- Improvements to water quality
- Initiate and promote marsh restoration
- Maintain tidal flow for the existing salt marsh

Not only will this project achieve the goals, it could also be utilized as a phase 1 construction project for a future marsh restoration project, should additional funding become available. The proposed living shoreline could easily be modified by adding or removing stone to accommodate adaptive management to a phase 2 design and adjust for sea level rise. Future restoration would include infill of the marsh areas behind the living shoreline construction area to create more coastal marshland, if warranted.

Alternatives Considered but Eliminated for Further Analysis

Alternative B: Natural living shoreline

This alternative would include the use of materials such as grasses, clean sediment and biodegradable logs made from coconut coir to reduce impacts of waves in the lagoon. This type of project is typically used in low wave energy environments, and would not remain intact or provide benefits at the Project Area. Also, the ability to maintain tidal flow to the existing salt marsh could not be achieved. Therefore, while the goals of increased habitat, reduction in suspended solids in the Bay, and improvements to water quality would be achieved with natural living shoreline, the project would not achieve the goals of protection from erosion and maintaining tidal flow for the existing salt marsh.

Alternative C: Structural shoreline

Structural shorelines are typically used in high wave energy environments which are constructed with rock revetments, breakwaters and groins. The wave energy in the Project Area does not require such a structure. Additionally, the goals of increased habitat, reduction in suspended solids in the Bay and improvements to water quality would not be achieved in this alternative.

Alternative D: Bulkhead Removal Alone

This alternative would only removal and dispose of the existing wooden bulkhead. Water quality could improve with removal of the CCA coated timbers, but none of the remaining goals for the project would be achieved. Additionally, it would be difficult to restore marsh within Lanyard Lagoon without some structure in place now that the site has been altered for over 50 years.

Alternative E: No Action Alternative

The No Action Alternative would involve no work at the Project Area to combat critical salt marsh vegetation die-back and improve tidal flow. The bulkhead would be not be removed and replaced and no marsh restoration work would occur at the site.

The No Action Alternative is not preferred as it does not reduce the risks to native flora, fauna, and critical salt marsh habitats. The primary focus of the refuge is to protect tidal wetland and shallow bay habitat for migratory water birds. The refuge's location in one of the most active flight paths of the Atlantic Flyway adds to the taxonomic richness and ecological importance of this area. Not implementing the project may result in further die-back and reduction in salt marsh accretion rates at the site and result in permanent conversion to open water. The loss of such vital habitats can have detrimental impacts on migrating bird populations that rely on salt marsh communities for foraging, reproduction and survival. In addition, the conversion from salt marsh habitat to open water could exacerbate the frequency and intensity of inland flooding due to coastal storm surge events, affecting the health and wellbeing of the surrounding community.

Environmental Consequences and Cumulative Impacts

Topography

The Proposed Action will result in construction of a low-profile rock structure with a 50-foot-wide notch set at 0' MSL to maintain relative tidal flow to the existing salt marsh. This sill will have a maximum height of 1.5' MSL, with a depressed notch set at 0.0' MSL. The elevations will permit tide entry at the top of the cycle, but will retain water and silt at and below 0' MSL. This will provide the tide control needed for native vegetative colonization. Initial salt marsh restoration is proposed along the marsh side (west) of the rock structure with native vegetation. The Kingfisher Lagoon side of the low-profile rock structure will be seeded with native shellfish via ReClam the Bay post-construction.

The Natural Living Shoreline and Structural Shoreline Alternatives would result in impacts to local topography as these alternatives would include installation activities resulting in localized elevation changes. The Bulkhead Removal Alone Alternative would result in impacts to local topography as increased wave action and erosion of the surrounding marsh would take place. The No Action Alternative would not result in impacts to local topography as no living shoreline installation activities would take place.

Geology and Soils

Although there would be some addition of sand, rock core and engineered materials at the Project Area for rock sill emplacement, the Proposed Action does not involve negative impacts to soil composition, nor will any of the Project activities extend down to surficial geological layers. Therefore, the Proposed Action will not have adverse impacts to the local or regional geology and soils.

The Natural Living Shoreline and Structural Shoreline Alternatives would result in the addition of sand, rock and other structural items though they would not involve negative impacts to soil composition. The Bulkhead Removal Alone Alternative would result in increased wave action and erosion of the surrounding soils would take place. The No Action Alternative would not result in impacts to the local or regional geology and soils as no dredging or sediment layering would occur.

Air Quality

The Proposed Action is not expected to have a significant impact to air quality. Some minor, temporary impacts are expected as the Proposed Action would involve the use of emission-producing vehicles and machinery. However, those emissions are expected to be below SILs for all pollutants and averaging times for which a NAAQS or NJAAQS have been established. All on-road and off-road vehicles and machinery would be up-to-date in their registration and emission inspections (for those that require emissions testing), and thus compliant with current USEPA emission standards. Negligible impacts are expected in the refuge's Class I Airshed and those are expected to be short term in duration.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would not be expected to have a significant impact to air quality though some minor, temporary impacts would be expected from the use of emission-producing vehicles and machinery. The No Action Alternative would not result in the use of any construction equipment; therefore, there would be no impacts to air quality.

Water Quality

The addition of the sand, rock core and engineered materials to allow for natural tidal flow would result in temporary higher than normal levels of turbidity. Therefore, temporary, minor impacts to water quality from suspended sediments in the area immediately surrounding this alternative's activities would occur. The additional material will be analytically tested and certified as clean before placement within the marsh. Following placement, subsequent tidal currents and bay circulation would reverse the impacts to water quality created by the installation of the hybrid living shoreline settlement is expected to occur within a few days.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would result in temporary higher than normal levels of turbidity. The No Action Alternative would not result in direct impacts to water quality at the Project Area as no construction work would occur.

Wetlands and Streams

The Proposed Action would result in limited unavoidable disturbances to mapped coastal wetlands from the installation of the hybrid living shoreline, the use of construction equipment to perform the installation, and the actions of field crews navigating within wetland communities on site. However, these disturbances would be temporary in nature and are necessary to complete the living shoreline activities. Overall, the Proposed Action would result in long-term positive ecological benefits to the local salt marsh habitat.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would result in disturbance to mapped coastal wetlands. The No Action Alternative would not result in immediate physical impacts to wetlands or open water as no equipment or crew would be navigating through the marsh. However, failure to proceed with the Proposed Action could lead to permanent loss of high quality marsh habitat and, subsequently, cause a permanent conversion to open water.

Vegetation

The Preferred Alternative would have unavoidable, but temporary and minor impacts to vegetation at the Project Area. Vegetation would be directly impacted by compaction from sand and rock layering, construction equipment, and from foot traffic by laborers performing the living shoreline installation activities. Over time, it is estimated that the Project Area will naturally revegetate these disturbed areas with native, non-invasive salt marsh vegetation.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would result in disturbances to surrounding vegetation either by increasing vegetative cover through sediment accretion or reducing vegetative cover via erosion in the case of the Bulkhead Removal Alone Alternative.

The No Action Alternative would not result in immediate physical impacts to vegetation as no equipment or crew would be navigating through the marsh. However, failure to proceed with the Preferred Alternative could lead to more frequent and intense flooding, resulting in further salt marsh die-back, leading to the conversion of salt marsh habitat to open water.

Fish and Wildlife

The Preferred Alternative would not have significant long-term environmental impacts to migratory birds or other terrestrial wildlife species or their habitats as animals living on or near the Project Area would be expected to avoid the site during construction due to the presence of the equipment and work crew. This dispersal would be short-term and have minimal impact as abundant suitable habitat nearby will provide places for wildlife to move during construction. The Preferred Alternative would result in the overall enhancement of the local environment and migratory bird habitat and wildlife.

Sediment disruption of fish and/or shellfish habitat would occur due to the living shoreline installation in the designated Project Area. However, these impacts are not considered significant and would be temporary in nature as the increase in turbidity during construction activities is expected to be similar to that experienced during natural storm events. Coastal storms can increase turbidity as a result of sediments that have been re-suspended from shallow beds, from sediments eroded from beaches, as well as from sediment-laden river plumes (IADC 2021). Preferred Alternative will suspend sediments from shallow beds and eroded areas, but it will have no effect on up-stream river sediment plumes and the water will settle out within a few days of the work.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would not have significant long-term environmental impacts to migratory birds or other terrestrial

wildlife species or their habitats as animals living on or near the Project area would be expected to avoid the construction activities.

The No Action Alternative would not result in any direct impacts to fish, wildlife, or their habitats as no disturbed material would be released into the marsh. However, if the Preferred Alternative is not conducted, die-back and reduction in salt marsh accretion rates may result in permanent loss of marsh land. The loss of such vital habitat can have detrimental impacts on migrating bird populations that rely on salt marsh communities for foraging, reproduction and survival.

Federally Listed Species, Critical Habitat, and Species of Concern

A "Not Likely to Adversely Affect" letter dated November 24, 2021, was issued by the Service's New Jersey Field Office, who is responsible for reviews of listed species that could be impacted by projects (Appendix C). The federally threatened red knot, swamp pink, Knieskern's beaked-rush, and the endangered American chaffseed are not known or expected to occur in, or within the vicinity of, the proposed work areas based on their preferred habitats. The nearest concentration area for red knots is over three miles away; the nearest occurrence of swamp peak is over seven miles away; the nearest occurrence of Knieskern's beaked-rush is over there miles away; and the nearest occurrence of American chaffseed is over 18 miles away.

The Eastern black rail (threatened) uses the types of wetlands found in the Project Area. To ensure no impacts to this species, construction will occur in the non-breeding season September 14 to March 31.

There are no critical habitats documented within the Project Area. However, the Service's IPaC system indicated the presence of 9 migratory birds protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act that could potentially move through the Project Area (see Table 4 for species list). These species as well as the State-listed threatened and endangered species or species of special concern that have the potential to be on or near the Project Area would be expected to avoid the Project Area due to the presence of the work crew. This indirect impact would be temporary, as the Project is expected to take approximately 38 working days to complete. In addition, the ecological uplift resulting from the restoration of healthy salt marsh habitat within their home range would have an indirect, long-term, and beneficial impact to these bird species, as well as other wildlife of concern who live on or near the Project Area.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would not have significant long-term environmental impacts to threatened and endangered species given the temporary nature of the construction activities.

The No Action Alternative would not have any direct impacts to threatened and endangered species, as no activities would occur in the marsh. However, leaving the marsh in its current condition would lead to further reduction of salt marsh, a habitat type that is critical for breeding, nesting, and foraging for Federal and State-listed threatened and endangered species.

Wilderness

None of the proposed work will occur in the Brigantine National Wilderness area; therefore, no direct impacts would occur as a result of any of the alternatives. The Project Area is small (less than 1 acre) and is 6 miles away from the Wilderness Area; therefore, no indirect impacts to wilderness are expected from any of the alternatives.

Cultural Resources

Based on consultation with the Service's Regional Historic Preservation Officer, the NHPA Section 106 review determined that the Preferred Alternative would not have impacts on historic properties that are eligible for listing in the National Register of Historic Places or on known areas where historic or prehistoric archaeological artifacts were recovered as no below-ground work would be performed in the Project Area (Appendix D). In addition, if any historic or prehistoric artifacts are discovered during the completion of this Project, work would be stopped immediately and the refuge management would be contacted to determine how to proceed.

None of the Alternatives would have impacts to cultural resources.

Socioeconomic Resources and Environmental Justice

The Preferred Alternative is not expected to have any impact, adverse or beneficial, on race, gender, age class, or the area schools. It will also not affect the county's leading employment industries, including resorts and commercial outfits related to tourism, health care, or commercial fishing. It does not include long-term construction of any facility that would increase the number of permanent jobs in the Borough of Tuckerton or Ocean County, nor would it have any effect on State or local tax revenue. Only minor, temporary, economic benefits may occur locally through Project area personnel increasing spending at nearby gas stations, hotels, restaurants, hardware stores, other retail shops, etc.

None of the Alternatives would have impacts on socioeconomic resources and environmental justice.

Recreation

While the refuge as a whole receives over 250,000 visitors each year, the Project Area is not open to public use; therefore, there would be no adverse impacts to recreation in general. Project activities would have minor impacts on waterfowl hunting in nearby tidal estuary where the refuge allows hunting. That area is about 725 feet from the Project Area and could be disrupted by sound during the 38-day construction window. The long-term benefits would include restoration of migratory bird routes to a more natural condition, which will indirectly improve recreation opportunities to the refuge.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would not have adverse impacts to recreation as impacts from construction or demolition would

be temporary. The No Action Alternative would not have any impacts on recreation, as no work would be performed in the Project area.

Transportation

The Project does not involve the building, removal, or repair of any transportation infrastructure. Personnel and vehicles would be required to travel along local roads leading to the Project Area, such as South Green Street and Kingfisher Road. The use of these local roads by Project crew would be minor and temporary. Therefore, the resulting increase in traffic on local infrastructure would not be significant. The Preferred Alternative is anticipated to require approximately 38 working days to complete, which is a short construction window, and should only minimally disrupt residents.

The Natural Living Shoreline, Structural Shoreline, and Bulkhead Removal Alone Alternatives would not have adverse impacts to transportation. The No Action Alternative would not have any impacts on infrastructure, as no workforce would be required to travel to and from the Project area.

Cumulative Impacts

A cumulative impact analysis must consider the potential impact on the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). The methodology for performing such analyses is set forth in "*Considering Cumulative Effects under the National Environmental Policy Act*" (CEQ 1997), and includes the following:

1. Identification of the geographic area in which effects of the project may be felt.
2. Assessment of the impacts that are expected in that area from the project.
3. Identification of other actions (past, present, and reasonably foreseeable) that have had or are expected to have impacts in the same geographic area.
4. Assessment of the impacts or expected impacts from these other actions.
5. Assessment of the overall impact that can be expected if the individual impacts are allowed to accumulate.

The geographic area for the assessment of cumulative impacts from the Preferred Alternative is primarily identified as the Lower Little Egg Harbor Bay Tributaries and the Barnegat Bay watershed. This watershed includes the municipalities of Tuckerton Borough and Little Egg Harbor Township. Both of these municipalities are located in Ocean County. However, Tuckerton Borough was the only municipality included in the geographic area of this cumulative impacts assessment as the Project Area's drainage occurs only within this municipality.

Significant changes were made to the aquatic environment by the creation of manmade excavations for land use development and the installation of a wooden breakwater across the mouth of Lanyard Lagoon. Additionally, other land use changes to the watershed have increased impervious surface area resulting in an increase in stormwater quantity and a subsequent decrease in stormwater quality. The Preferred Alternative is intended to provide long-term improvement to the

environment through the enhancement of coastal marsh habitat. The Preferred Alternative will not induce development, land use change, or other external pressures to the Project Area.

Noise generated from the implementation of this Project would include engine noise from a variety of types of construction equipment. However, the noise would be temporary in nature, and wildlife that are present within the Project Area during construction are expected to temporarily relocate due to the physical disruption. Approximately, 500 homes are within one half-mile of the Project Area. These residents may experience a minor and temporary inconvenience from construction noise. Project-related noise would not jeopardize the health or welfare of the public or to wildlife in the area.

A review of the *Ocean County Planning Board Comprehensive Master Plan* (OCPB 2011, Updated 2018) did not reveal any potential conflicts between the Preferred Alternative and future planned activities for the county. While the Master Plan presents a number of improvements, past and planned, to the Garden State Parkway, U.S. Route 9, and other major roadways and transportation infrastructure, none are anticipated to adversely affect or be affected by the Preferred Alternative.

In summary, there would not be any significant cumulative adverse environmental impacts from the Marsh Enhancement Project at the Project Area when considered together with other past, present, and reasonably foreseeable future projects in the area. A Draft Finding of No Significant Impact (FONSI) has been included as Appendix E to this EA.

Public Review and Comment

The public will be notified of the availability of this EA for review and will include no less than a 30-day comment period. We will inform the public through local venues, the refuge website, and social media. Comments received from the public will be considered, and modifications may be incorporated into the final plan and decision documents.

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APPENDIX A

PHOTOGRAPHS

APPENDIX B

SITE PLANS

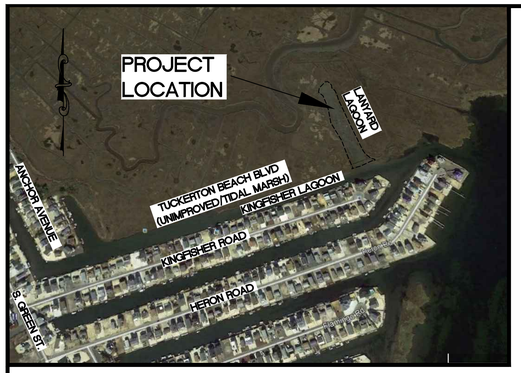
SFY 2018 WATER QUALITY RESTORATION PROJECT

LANYARD LAGOON – LIVING SHORELINE

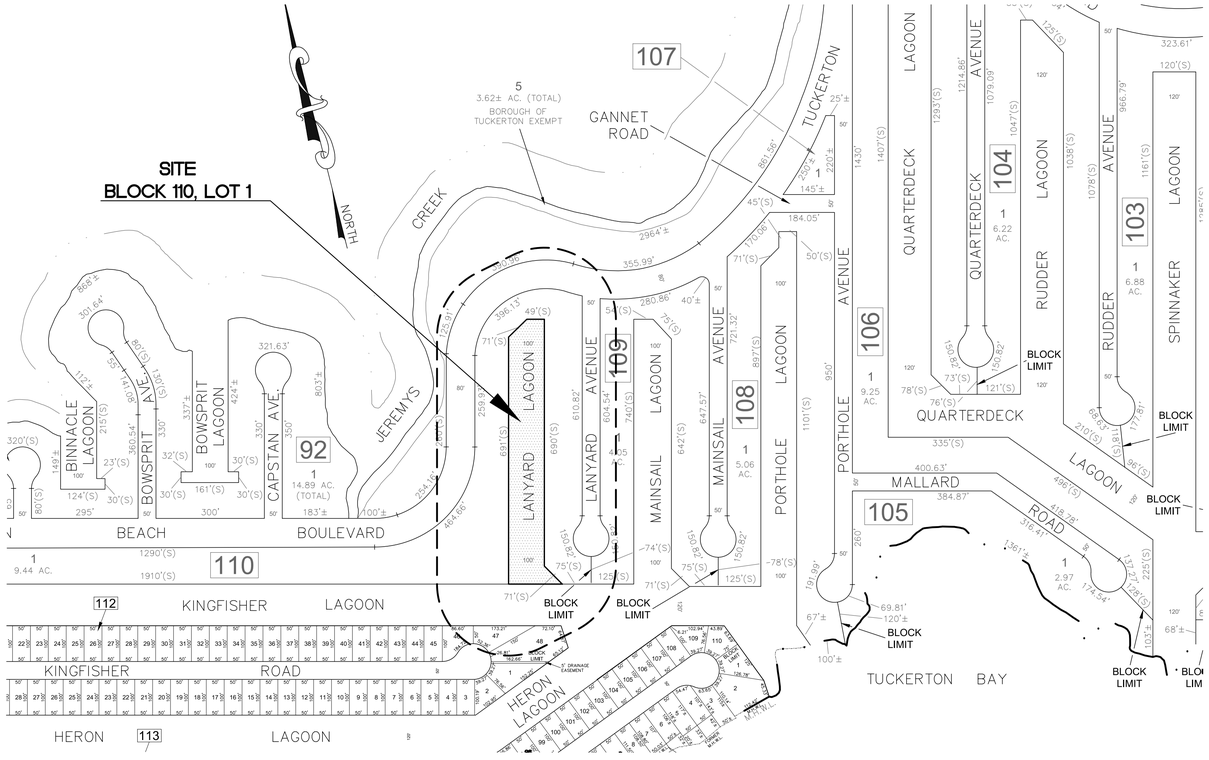
BOROUGH OF TUCKERTON

OCEAN COUNTY, NEW JERSEY

NJDEP APPROVAL



LOCATION MAP
NOT TO SCALE



TAX MAP SHEET 16.01
SCALE: 1"=200'

GENERAL NOTES:

1. APPLICANT: BOROUGH OF TUCKERTON
140 EAST MAIN STREET
TUCKERTON, NJ 08087
(P) (609) 296 – 2701
JGLEGHORN@TRUCKERTONBOROUGH.COM

OWNER: U.S. FISH AND WILDLIFE SERVICE
ATTN: VIRGINIA RETTIG, REFUGE MANAGER
EDWIN B. FORSYTHE NWR
800 GREAT CREEK ROAD
OCEANVILLE, NJ 08231
(P) (609) 652-1665
VIRGINIA_RETTIG@FWS.GOV.

2. PROPERTY KNOWN AS BLOCK 110, LOT 1 AS SHOWN ON THE BOROUGH OF TUCKERTON TAX MAP SHEET 16.01, DATED MARCH 2018, NO REVISION.

3. SURVEY DATA REFERENCES:
THE VERTICAL DATUM FOR THIS PROJECT WAS DERIVED UTILIZING NGS MONUMENT R.55 (PID JU0229). ELEVATION 3.75 (NAVD 1988)

THE HORIZONTAL DATUM FOR THE PROJECT WAS DERIVED UTILIZING LEICA VIVA SERIES GPS UNITS. THE SITE COORDINATES WERE VERIFIED TO LOCAL NGS MONUMENTS.

PROPERTY INFORMATION WAS TAKEN FROM A MAP ENTITLED, "TUCKERTON BEACH, SECTION NO. 3, MAP 1 OF 4 MAPS, BOROUGH OF TUCKERTON, OCEAN COUNTY N.J.," PREPARED BY SHERMAN – TAYLOR & SLEEPER, DATED DECEMBER, 1955, FILED IN THE OCEAN COUNTY CLERKS OFFICE ON 1-26-56, FILE NO. D-285.

4. TIDAL ELEVATIONS (N.A.V.D. 1988):
HIGH TIDE LINE ELEVATION = +1.55'
SPRING HIGH WATER ELEVATION = +1.25'
MEAN HIGH WATER ELEVATION = +0.99'
MEAN LOW WATER ELEVATION = -1.09'

5. THE PROJECT LIES WITHIN FLOOD ZONE AE WITH A BASE FLOOD ELEVATION OF 7.00 FEET. THE FLOOD ZONE WAS TAKEN FROM MAP NUMBER 34029C0579F (PANEL 579 OF 611) WITH AN EFFECTIVE DATE OF SEPTEMBER 29, 2006.

6. EXISTING PROPERTY USE: MANMADE LAGOON KNOWN AS LANYARD LAGOON.

7. PUBLIC ACCESS WILL BE MAINTAINED WITHIN KINGFISHER LAGOON.

8. ALL MATERIAL WILL BE NON POLLUTING.

9. SITE SURVEY PERFORMED IN OCTOBER, 2020 BY OWEN, LITTLE AND ASSOCIATES. ALL ELEVATIONS NAVD 1988.

10. THIS PLAN IS FOR DEVELOPMENT OF A LIVING SHORELINE FOR WATER QUALITY RESTORATION.

11. SITE IS LOCATED AT NORTH 273732 LONGITUDE (-74.3267112')
EAST 540962 LATITUDE (39.5848022')

12. PROPOSED STONE SILL AREA = 3520 SF, 0.08 AC.
PROPOSED LIVING SHORE LINE / MARSH RESTORATION AREA = 1470 SF, 0.03 AC.

13. 1977 TIDELANDS CLAIM LINE AS SHOWN BY SUPERIMPOSING OF NEW JERSEY 1977 TIDELANDS BASE MAPS PER THE NJ OFFICE OF INFORMATION TECHNOLOGY.

14. THE PLAN HAS BEEN PREPARED FOR USE IN CONJUNCTION WITH A STATE OF NEW JERSEY 319 WATER QUALITY RESTORATION GRANT.

15. SEDIMENT FROM LANYARD LAGOON HAS BEEN ERODING PAST THE EXISTING BULKHEAD WHICH IS EFFECTING NAVIGATION WITHIN THE KINGFISHER LAGOON.

16. THE PURPOSE OF THIS PROJECT WILL BE TO CONSTRUCT A LIVING SHORELINE ALONG THE EASTERLY SIDE OF THE EXISTING BULKHEAD TO STABILIZE THE SHORELINE AND MAINTAIN SEDIMENT WITHIN THE LANYARD LAGOON.

SHEET INDEX

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

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NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

OWEN, LITTLE & ASSOCIATES INC.
Authorization No. 24GA27965700
Engineers, Planners, Surveyors & Environmental Scientists
643 Alaska City Blvd.
Beachwood, NJ 08722
Tel. (732)244-1090
Fax (732)341-3412

FRANK J. LITTLE, JR. P.E., P.P.
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE02708500
PROFESSIONAL PLANNER
N.J. LIC. NO. 03096

SFY 2018 WATER QUALITY RESTORATION PROJECT
LANYARD LAGOON - LIVING SHORELINE

TITLE SHEET

LOT 1 BLOCK 110
BOROUGH OF TUCKERTON
OCEAN COUNTY NEW JERSEY

SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
AS NOTED	12/17/20	JSM	GK		SURVEY# TK-19LLLS	1 / 6

NJDEP APPROVAL

PLAN VIEW
SCALE: 1" = 30'
NOTE: CONTOURS ARE 0.50 FT.

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN
COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 inch = 30 ft.

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

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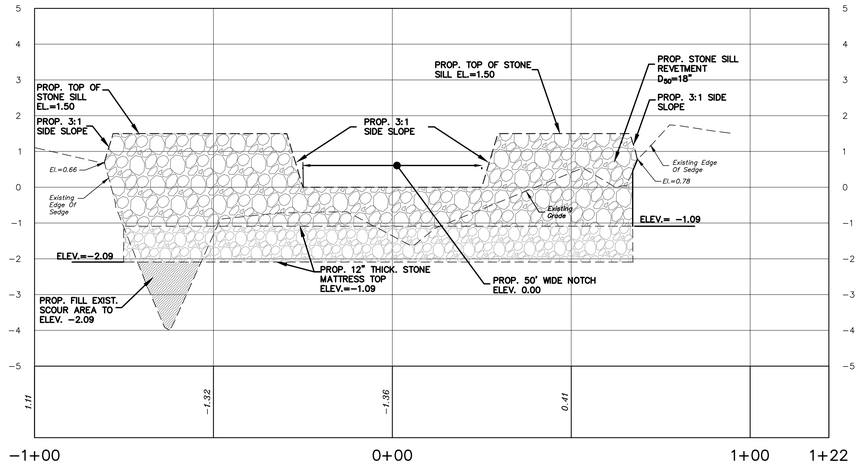
SFY 2018 WATER QUALITY RESTORATION PROJECT

LANYARD LAGOON - LIVING SHORELINE

EXISTING CONDITIONS/DEMOLITION PLAN

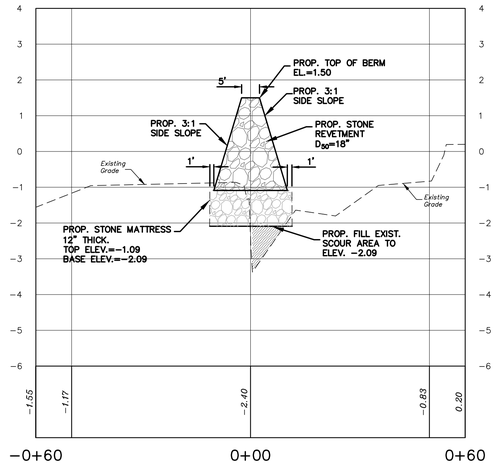
LOT 1 BLOCK 110
BOROUGH OF TUCKERTON
OCEAN COUNTY NEW JERSEY

SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
1"=30'	12/17/20	JSM	GK		SURVEY# TK-19LLLS	2 / 6



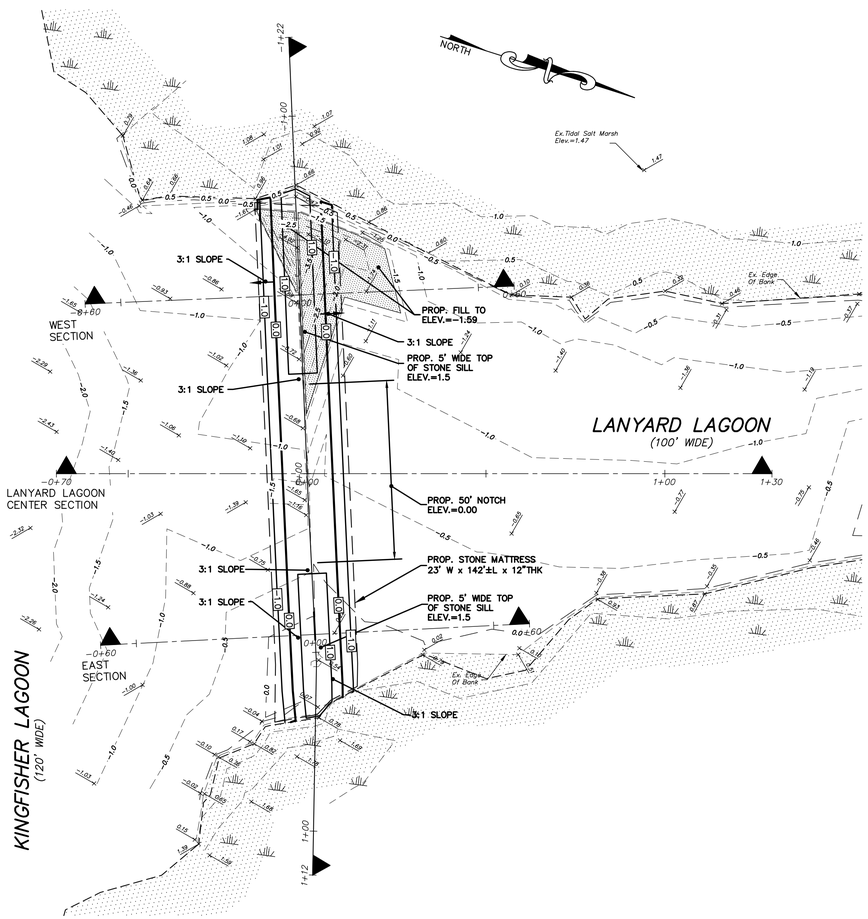
STONE SILL SECTION

SCALE: 1"=20' HORIZ., 1"=2' VERT.



WEST SECTION STONE SILL

SCALE: 1"=20' HORIZ., 1"=2' VERT.

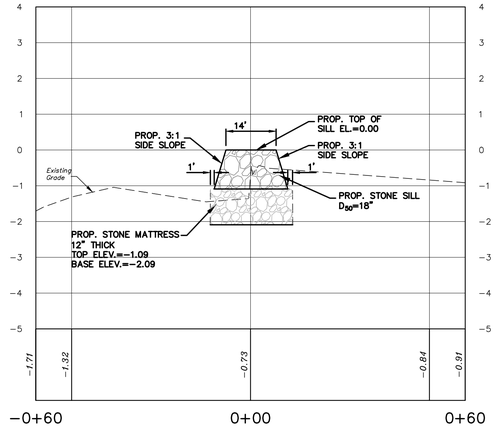


STONE SILL PLAN VIEW

SCALE:1" = 20'

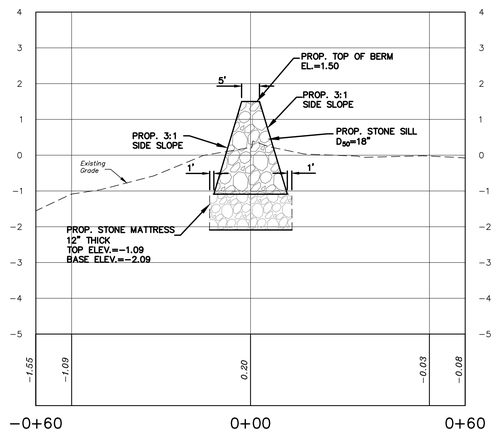
NOTE: EXISTING CONTOURS ARE 0.50 FT.
PROPOSED CONTOURS ARE 1.00 FT.

GRAPHIC SCALE
20 0 10 20 40 80
(IN FEET)
1 inch = 20 ft.



LANYARD LAGOON CENTER SECTION STONE SILL

SCALE: 1"=20' HORIZ., 1"=2' VERT.



EAST SECTION STONE SILL

SCALE: 1"=20' HORIZ., 1"=2' VERT.

GRAPHIC SCALE
(IN FEET)
20 0 10 20 40 80
1 inch = 20 ft. HORIZ.
2 0 1 2 4 8
1 inch = 2 ft. VERT.

NJDEP APPROVAL

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

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SFY 2018 WATER QUALITY RESTORATION PROJECT

LANYARD LAGOON - LIVING SHORELINE

STONE SILL GRADING PLAN

LOT 1 BLOCK 110

BOROUGH OF TUCKERTON

OCEAN COUNTY NEW JERSEY

SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
1"=20'	12/17/20	JSM	GK		TK-19LLS	3 / 6

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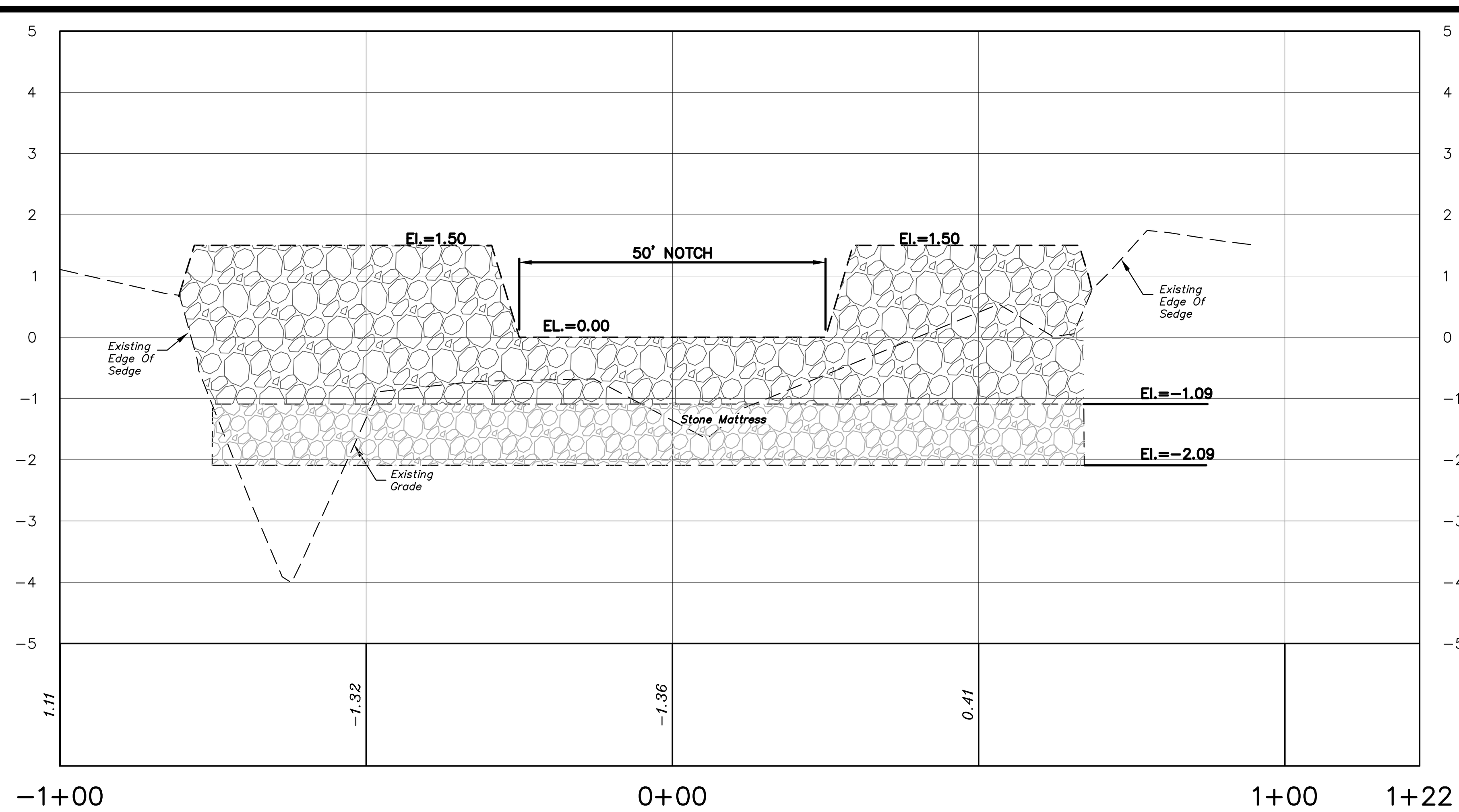
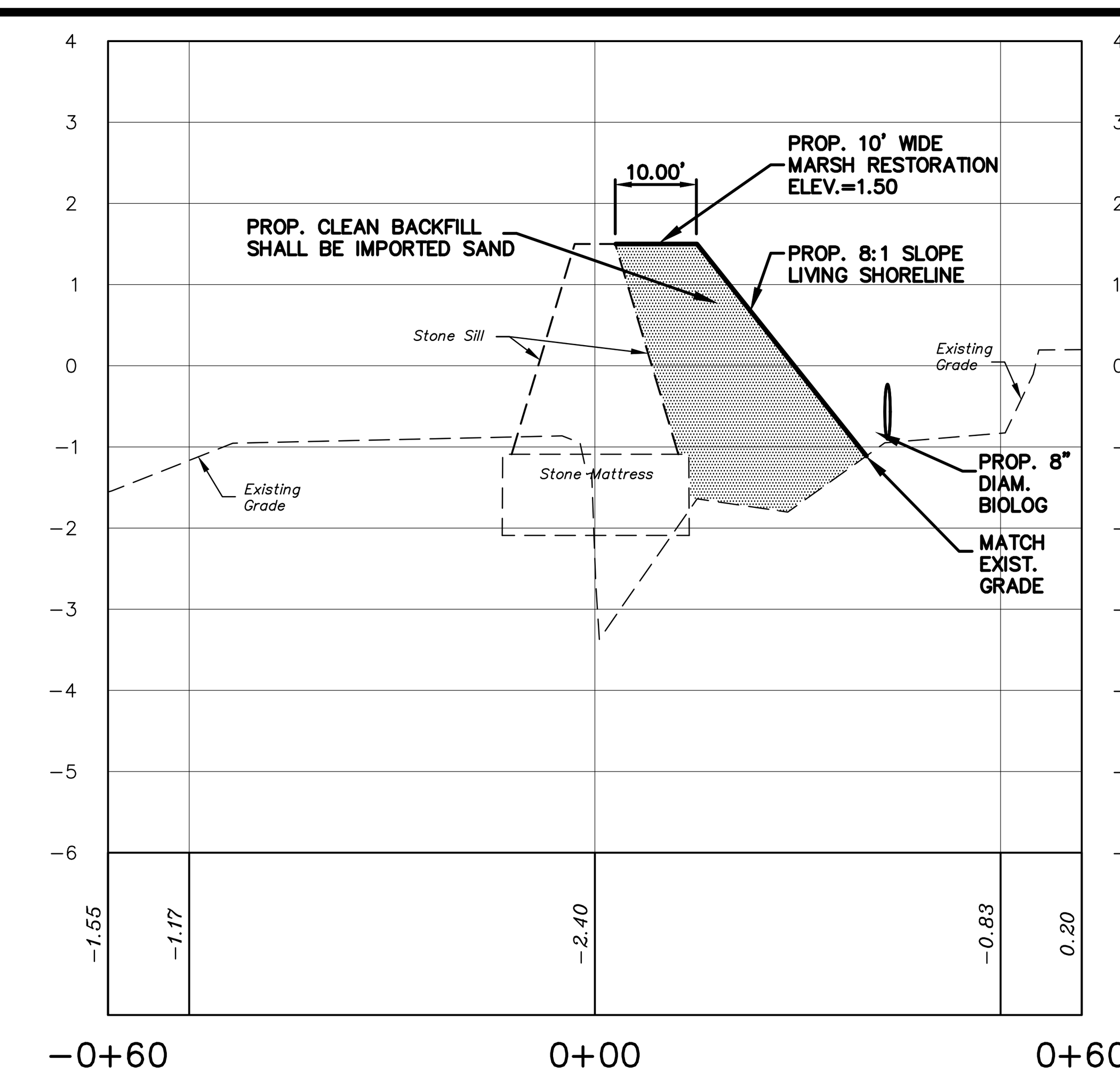


STONE SILL SECTION

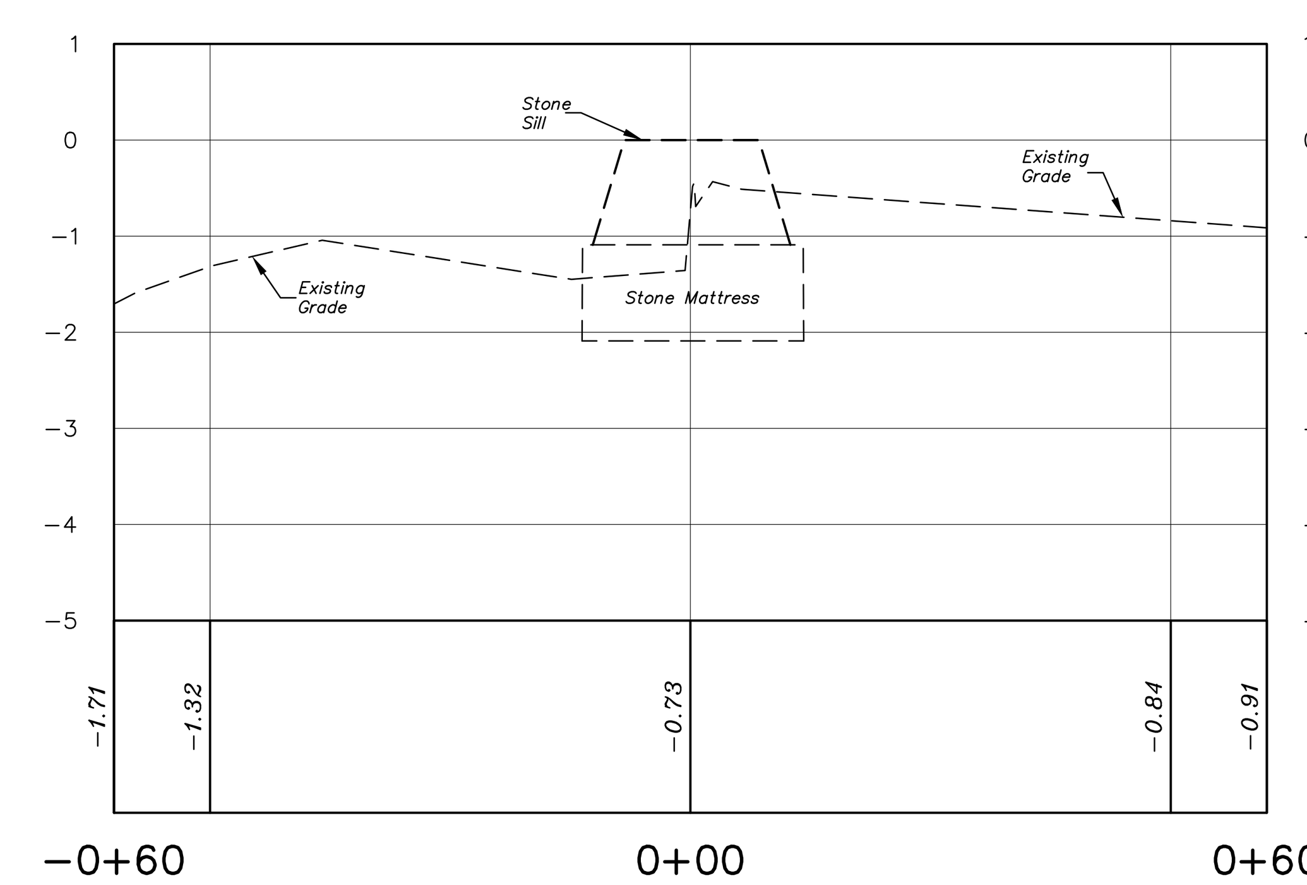
SCALE: 1"=20' HORIZ., 1"=2' VERT.

NOTE: SEE SHEET 3 OF 6 FOR STONE SILL DESIGN



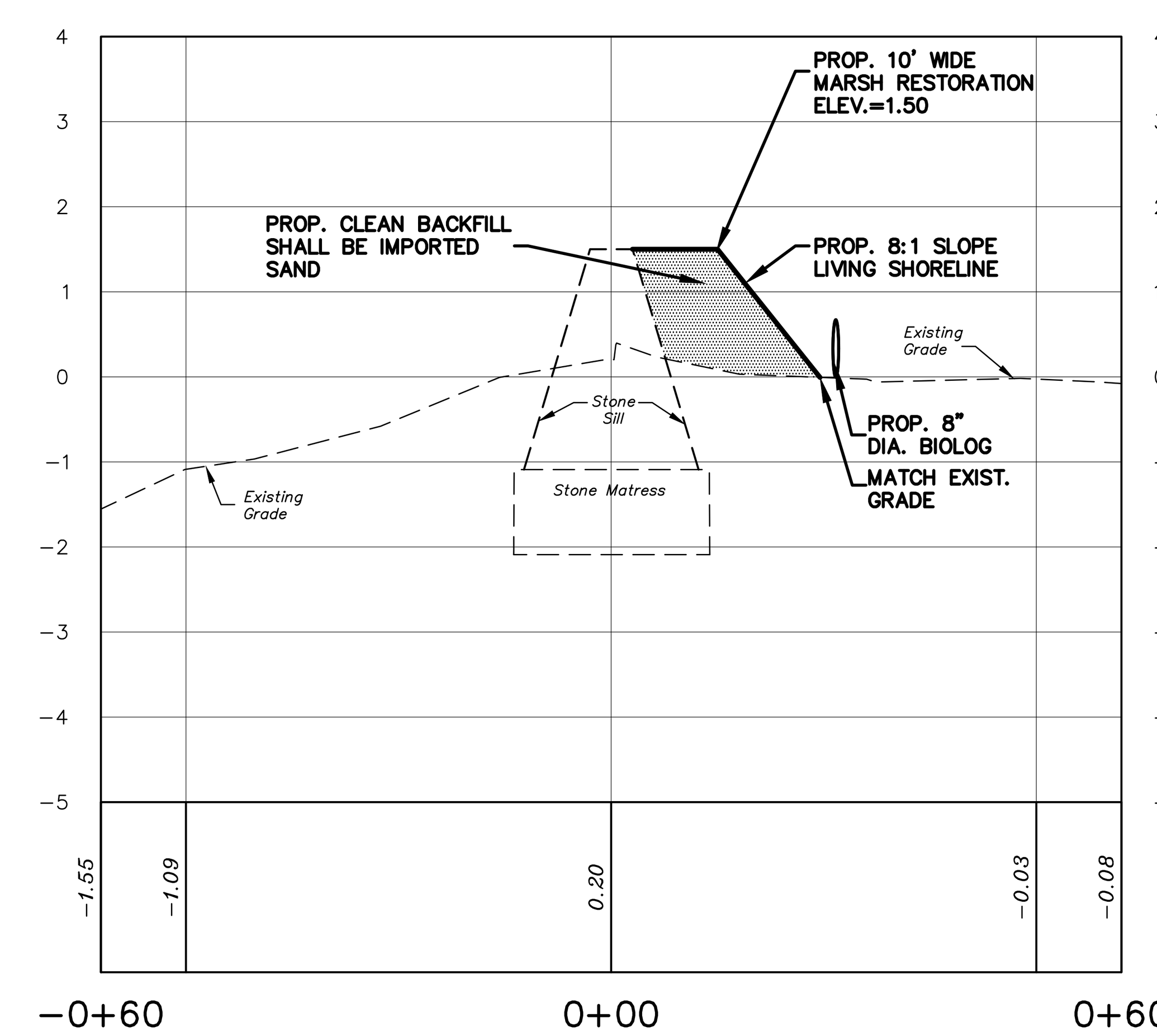
WEST SECTION BACK FILL DESIGN

SCALE: 1"=20' HORIZ., 1"=2' VERT.



LANYARD LAGOON CENTER SECTION BACK FILL DESIGN

SCALE: 1"=20' HORIZ., 1"=2' VERT.

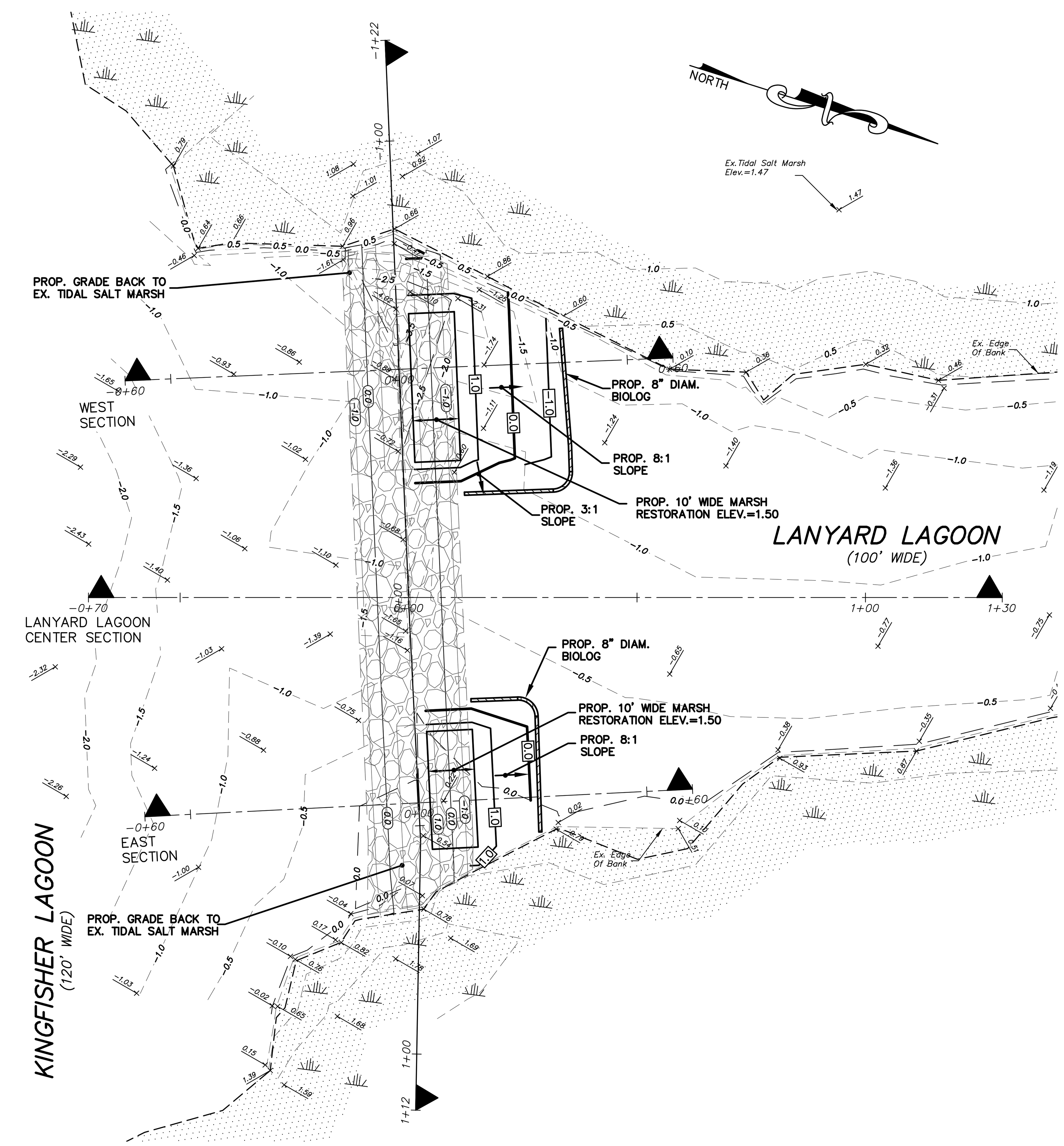


EAST SECTION BACK FILL DESIGN

SCALE: 1"=20' HORIZ., 1"=2' VERT.

GRAPHIC SCALE (IN FEET) 1 inch = 20 ft. HORIZ.

1 inch = 2 ft. VERT.



BACKFILL PLAN VIEW

SCALE: 1" = 20'

NOTE: EXISTING CONTOURS ARE 0.50 FT. PROPOSED CONTOURS ARE 1.00 FT.

GRAPHIC SCALE (IN FEET) 1 inch = 20 ft.

CONTOUR LABEL LEGEND

Existing Surface Contour	-0.5
PROPOSED STONE SILL CONTOUR	-0.5
PROPOSED BACKFILL CONTOUR	-0.5

NJDEP APPROVAL

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

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PROFESSIONAL PLANNER N.J. LIC. NO. 03096

SFY 2018 WATER QUALITY RESTORATION PROJECT

LANYARD LAGOON - LIVING SHORELINE

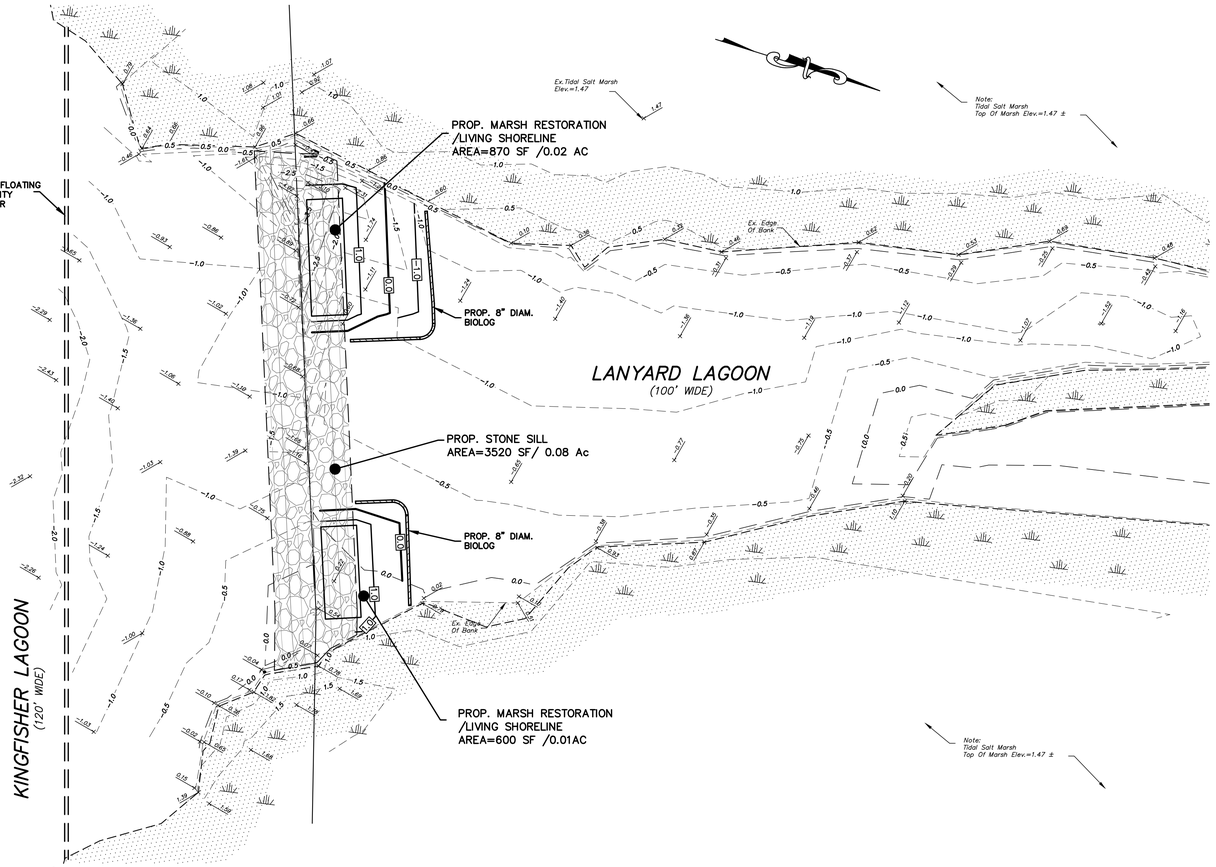
LIVING SHORELINE / MARSH RESTORATION

LOT 1 — BLOCK 110

BOROUGH OF TUCKERTON

OCEAN COUNTY — NEW JERSEY

SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
1"=20'	12/17/20	JSM	GK		TK-19LLLS	4 / 6

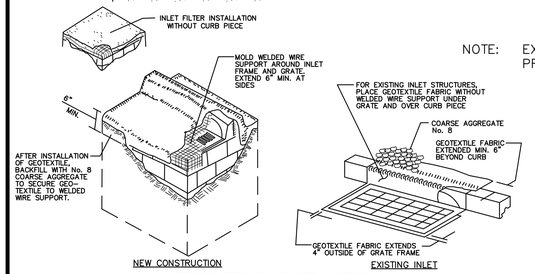


PLAN VIEW
SCALE:1" = 20'

NOTE: EXISTING CONTOURS ARE 0.50 FT.
PROPOSED CONTOURS ARE 1.00 FT.

CONTOUR LABEL LEGEND

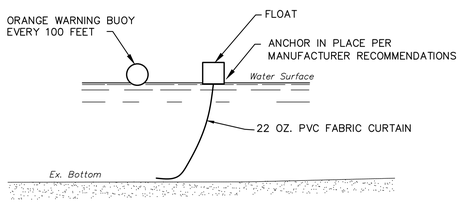
Existing Surface Contour	*-0.5*
PROPOSED STONE SILL CONTOUR	(-0.5)
PROPOSED BACKFILL CONTOUR	-0.5



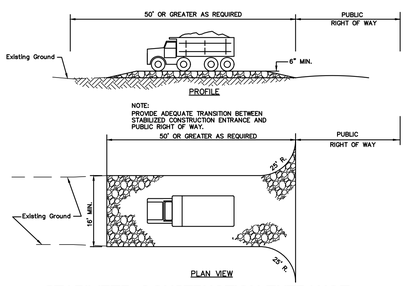
INLET FILTERS AS REQUIRED

NOTE:

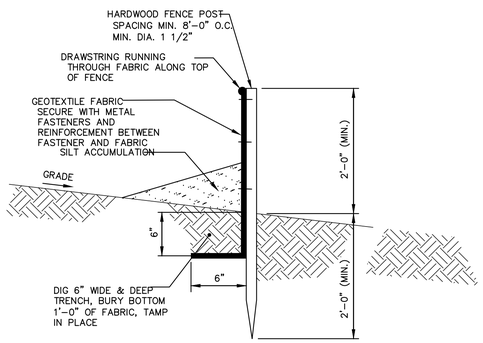
INLET FILTER, STABILIZED CONSTRUCTION ENTRANCE AND SILT FENCE SHALL ONLY BE REQUIRED FOR STAGING AREAS WITH AND AREA OF DISTURBANCE GREATER THAN 5000 SF AND SHALL NOT BE REQUIRED FOR WATER BORNE STAGING.



FLOATING TURBIDITY BARRIER
NO SCALE



STABILIZED CONSTRUCTION ENTRANCE
NO SCALE



SILT FENCE DETAIL
N.T.S.

THIS DRAWING VALID FOR CONSTRUCTION OF:
SOIL EROSION AND SEDIMENT CONTROL
ALL OTHER DATA FOR INFORMATION PURPOSES ONLY !!

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

SECTION III – SOIL EROSION AND SEDIMENT CONTROL DEVICES

THE FOLLOWING METHODS AND DEVICES SHALL BE UTILIZED TO LIMIT SOIL EROSION AND CONTROL SEDIMENT:

1. EXISTING GROUND SURFACES SHALL NOT BE DISTURBED UNTIL IT BECOMES NECESSARY FOR CONSTRUCTION.
2. DISTURBED SOILS SHALL BE IMMEDIATELY STABILIZED IF NOT TO BE SUBJECT TO CONSTRUCTION TRAFFIC WITHIN THIRTY (30) DAYS AS PER THE TEMPORARY STABILIZATION SCHEDULE.
3. IMMEDIATELY AFTER FINAL GRADING ALL EXPOSED SOILS WILL BE STABILIZED IN ACCORDANCE WITH THE PERMANENT STABILIZATION SCHEDULE.
4. STORM SEWER INLET PROTECTION SHALL BE PLACED AT ALL INLETS WHERE RUNOFF FROM THE CONSTRUCTION AREA WILL OCCUR.
5. SEDIMENT BARRIERS SHALL BE PLACED AS SHOWN ON THE PLAN AND ON ALL DOWNSLOPE AREAS SUBJECT TO RUNOFF FROM CONSTRUCTION AREAS.
6. SEDIMENTATION DURING EARTHWORK OPERATIONS SHALL BE CONTROLLED BY DAILY SWEEPING OF PAVEMENT AREAS.

ALL SESC DEVICES SHALL BE MAINTAINED IN GOOD WORKING ORDER THROUGHOUT THE CONSTRUCTION PERIOD UNTIL SUCH TIME AS PERMANENT STABILIZATION IS ACCOMPLISHED.

SECTION IV. – TEMPORARY STABILIZATION SCHEDULE

TO BE USED ON ANY TEMPORARY FILL PILES LEFT EXPOSED FOR MORE THAN 30 DAYS.

1. SEEDBED PREPARATION:
   - LIMESTONE (PULVERIZED DOLOMITIC) 45 LBS/1000 SF
   - FERTILIZED 10–20–10 11 LBS/1000 SF
2. SEEDING: ANY OF THE FOLLOWING CROPS MAY BE UTILIZED:

   FROM FEB. 15 – MAY 1 AND AUG. 15 – OCT. 15
   - OATS 2.0 LBS/1000 SF
   - RYEGRASS (PERENNIAL) 1.0 LBS/1000 SF
   - BARLEY 2.2 LBS/1000 SF

   FROM MAY 1 TO AUG. 1:
   - PEARL MILLET 0.5 LBS/1000 SF
   - MILLET (GERMAN OR HUNGARIAN) 0.7 LBS/1000 SF
   - SUDANGRASS 0.7 LBS/1000 SF
   - WEEPING LOVEGRASS 0.2 LBS/1000 SF

   ALL THE ABOVE CROPS MAY BE PLANTED THROUGHOUT THE SUMMER IF SOIL MOISTURE IS ADEQUATE OR IRRIGATION IS PROVIDED.
3. MULCHING: MULCH TO BE UTILIZED FOR STABILIZATION DURING OFF SEASON OPERATION AND FOR THE ESTABLISHMENT OF TEMPORARY AND PERMANENT VEGETATIVE COVER. MULCH SHALL BE UNROTTED SALT HAY OR SMALL GRAIN STRAW AND APPLIED AT A RATE OF 90 TO 115 LBS/1000 SF, ANCHORED BY THE PEG AND TWINE METHOD, STAPLED PAPER JUTE NETTING, LIQUID SYNTHETIC OR TERRA–TACK APPLIED AT RATES AS RECOMMENDED BY THE MANUFACTURER.

SECTION V. – PERMANENT STABILIZATION SCHEDULE

PERMANENT STABILIZATION SHALL BE IN ACCORDANCE WITH THE PLANTING SCHEDULE SHOWN ON THE PLAN.

SECTION VI. – DUST CONTROL

1. ALL DISTURBED AREAS NOT SUBJECT TO CONSTRUCTION TRAFFIC WITHIN THIRTY (30) DAYS SHALL BE IMMEDIATELY STABILIZED IN ACCORDANCE WITH THE TEMPORARY STABILIZATION SCHEDULE.
2. DISTURBED PORTIONS OF THE SITE SHALL BE SPRINKLED PERIODICALLY DURING DRY PERIODS TO REDUCE WIND–BORNE SOIL PARTICLES.
4. PAVEMENT SURFACES SHALL BE SWEPT ON A DAILY BASIS DURING EARTHWORK OPERATIONS.

SECTION II – CONSTRUCTION SEQUENCE

SITE IMPROVEMENTS WILL BE INSTALLED IN A CONTINUOUS OPERATION:

1. INSTALL STABILIZED CONSTRUCTION ENTRANCE, TURBIDITY BARRIER, INLET PROTECTION AND SILT FENCE – 1 WEEK.
2. PROVIDE TEMPORARY CONSTRUCTION FENCING AROUND PROJECT AREA AS REQUIRED TO PROTECT PUBLIC. REMOVE, STOCKPILE AND PLACE SILL CORE STONE FROM EXISTING RIP–RAP AND IMPORT CORE STONE, AS REQUIRED – 2 WEEKS.
3. IMPORT AND PLACE ARMOR STONE ON SILL – 2 WEEKS.
4. IMPORT PLANTING FILL, ENHANCE, AND PLACE TO FINAL GRADE; – 1 WEEKS.
5. IN CONJUNCTION WITH FILLING, IMMEDIATELY PERMANENTLY STABILIZE WITH PLANTINGS –2 WEEKS.
6. CLEAN UP AND DEMOBILIZE. STABILIZE ALL DISTURBED AREAS. 1 WEEK

TURBIDITY BARRIER AND SILT FENCING TO REMIAN UNTIL VEGETATION IS ESTABLISHED AND STABLE.

TOTAL ANTICIPATED TIME FOR IMPROVEMENT CONSTRUCTION WILL BE APPROXIMATELY 12 WEEKS.

SECTION I – GENERAL SOIL EROSION AND SEDIMENT CONTROL NOTES

1. APPROXIMATE AREA OF LANYARD LAGOON: 1.0 ACRES INCLUDING R.O.W.'S.
2. AREA OF DISTURBANCE: 3,920 SF, 0.09 Ac.
3. PROJECT AREA SOILS: PstAt PSAMMAQUENTS, SULFIDIC SUBSTRATUM.
4. THIS PLAN IS FOR DEVELOPMENT OF A LIVING SHORELINE FOR RESTORATION OF ERODED TIDAL MARSH ALONG THE EDWIN B. FORSYTHE NWR.
5. THE OCEAN COUNTY SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED FORTY–EIGHT (48) HOURS IN ADVANCE OF ANY LAND DISTURBANCE.
6. ALL WORK IS TO BE DONE IN ACCORDANCE WITH THE STATE STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL IN NEW JERSEY.
7. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ARE TO BE INSTALLED PRIOR TO ANY MAJOR SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
8. ANY CHANGES TO THE CERTIFIED SOIL EROSION AND SEDIMENT CONTROL PLANS WILL REQUIRE THE SUBMISSION OF REVISED SOIL EROSION AND SEDIMENT CONTROL PLANS TO THE DISTRICT. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENT CONTROL STANDARDS.
9. N.J.S.A 4:24–39 ET SEQ. REQUIRES THAT NO CERTIFICATES OF OCCUPANCY BE ISSUED BEFORE THERE HAS BEEN COMPLIANCE WITH PROVISIONS OF A CERTIFIED PLAN FOR PERMANENT MEASURES. ALL SITE WORK, AND ALL WORK AROUND INDIVIDUAL LOTS IN SUBDIVISIONS, MUST BE COMPLETED PRIOR TO THE DISTRICT ISSUING A REPORT OF COMPLIANCE FOR THE ISSUANCE OF A CERTIFICATE OF OCCUPANCY BY THE MUNICIPALITY.
10. ANY DISTURBED AREAS THAT WILL BE LEFT EXPOSED MORE THAN THIRTY (30) DAYS, AND NOT SUBJECT TO CONSTRUCTION TRAFFIC, WILL IMMEDIATELY RECEIVE A TEMPORARY SEEDING. IF THE SEASON PREVENTS THE ESTABLISHMENT OF TEMPORARY COVER, THE DISTURBED AREAS WILL BE MULCHED WITH STRAW, OR EQUIVALENT MATERIAL, AT A RATE OF 2 TO 2 1/2 TONS PER ACRE, ACCORDING TO STATE STANDARD FOR STABILIZATION WITH MULCH ONLY.
11. IMMEDIATELY FOLLOWING INITIAL DISTURBANCE OR ROUGH GRADING, ALL CRITICAL AREAS SUBJECT TO EROSION (I.E. STEEP SLOPES AND ROADWAY EMBANKMENTS) WILL RECEIVE TEMPORARY SEEDING IN COMBINATION WITH STRAW MULCH OR A SUITABLE EQUIVALENT, AT A RATE OF 1 1/2 TO 2 TONS PER ACRE, ACCORDING TO STATE STANDARDS.
12. A SUB–BASE COURSE WILL BE APPLIED IMMEDIATELY FOLLOWING ROUGH GRADING AND INSTALLATION OF IMPROVEMENTS TO STABILIZE STREETS, ROADS, DRIVEWAYS, AND PARKING AREAS. IN AREAS WHERE NO UTILITIES ARE PRESENT, THE SUB–BASE SHALL BE INSTALLED WITHIN FIFTEEN (15) DAYS OF THE PRELIMINARY GRADING.
13. ANY STEEP SLOPES (3:1 OR GREATER) OR ANY EXISTING ROADWAYS RECEIVING PIPELINE INSTALLATION WILL BE BACKFILLED AND STABILIZED DAILY, AS THE INSTALLATION CONTINUES.
14. THE STANDARD FOR STABILIZED CONSTRUCTION ACCESS REQUIRES THE INSTALLATION OF A STONE PAD AT ALL CONSTRUCTION DRIVEWAYS WHERE VEHICLES WILL ACCESS PAVED ROADWAYS FROM UNPAVED AREAS OF THE SITE.
15. ALL SEDIMENT WASHED, DROPPED, SPILLED, OR TRACKED ONTO ROADWAYS (PUBLIC OR PRIVATE) OR OTHER IMPERVIOUS SURFACES WILL BE REMOVED IMMEDIATELY.
16. PERMANENT VEGETATION IS TO BE SEEDED OR SODDED ON ALL EXPOSED AREAS WITHIN TEN (10) DAYS AFTER FINAL GRADING. AT THE TIME OF THE FINAL INSPECTION, YOU ARE REQUIRED TO PROVIDE CONFIRMATION THAT THE PROPER TYPE AND AMOUNT OF SEED, LIME AND FERTILIZER HAVE BEEN USED FOR PERMANENT STABILIZATION WORK. STRAW MULCH IS REQUIRED ON ALL SEEDING.
17. AT THE TIME THAT SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER SHALL BE REMOVED OR TREATED IN SUCH A WAY THAT IT WILL PERMANENTLY ADJUST THE SOIL CONDITIONS AND RENDER IT SUITABLE FOR VEGETATIVE GROUND COVER. IF THE REMOVAL OR TREATMENT OF THE SOIL WILL NOT PROVIDE SUITABLE CONDITIONS, NON–VEGETATIVE MEANS OF PERMANENT GROUND STABILIZATION WILL HAVE TO BE EMPLOYED.
18. IN ACCORDANCE WITH THE STANDARD FOR MANAGEMENT OF HIGH ACID PRODUCING SOILS, ANY SOIL HAVING A PH OF 4 OR LESS OR CONTAINING IRON SULFIDES SHALL BE COVERED WITH A MINIMUM OF TWELVE (12) INCHES OF SOIL HAVING A PH OF 5 OR MORE PRIOR TO SEEDBED PREPARATION. AREAS WHERE TREES OR SHRUBS ARE TO BE PLANTED SHALL BE COVERED WITH A MINIMUM OF TWENTY–FOUR (24) INCHES OF SOIL HAVING A PH OF 5 OR MORE.
19. CONDUIT OUTLET PROTECTION MUST BE INSTALLED AT ALL REQUIRED OUTFALLS PRIOR TO THE DRAINAGE SYSTEM BECOMING OPERATIONAL.
20. UNFILTERED DEWATERING IS NOT PERMITTED. NECESSARY PRECAUTIONS MUST BE TAKEN DURING ALL DEWATERING OPERATIONS TO MINIMIZE SEDIMENT TRANSFER. ANY DEWATERING METHODS USED MUST BE IN ACCORDANCE WITH THE STANDARD FOR DEWATERING.
21. SHOULD THE CONTROL OF DUST AT THE SITE BE NECESSARY, THE SITE WILL BE SPRINKLED UNTIL THE SURFACE IS WET. TEMPORARY VEGETATIVE COVER SHALL BE ESTABLISHED OR MULCH SHALL BE APPLIED AS REQUIRED BY THE STANDARD FOR DUST CONTROL.
22. STOCKPILE AND STAGING LOCATIONS ESTABLISHED IN THE FIELD SHALL BE PLACED WITHIN THE LIMIT OF DISTURBANCE ACCORDING TO THE CERTIFIED PLAN. STAGING AND STOCKPILES NOT LOCATED WITHIN THE LIMIT OF DISTURBANCE WILL REQUIRE CERTIFICATION OF A REVISED SOIL EROSION AND SEDIMENT CONTROL PLAN. THE DISTRICT RESERVES THE RIGHT TO DETERMINE WHEN CERTIFICATION OF A NEW AND SEPARATE SOIL EROSION AND SEDIMENT CONTROL PLAN WILL BE REQUIRED FOR THESE ACTIVITIES.
23. ALL SOIL STOCKPILES ARE TO BE TEMPORARILY STABILIZED IN ACCORDANCE WITH SOIL EROSION AND SEDIMENT CONTROL NOTE #6.
24. THE BOROUGH OF TUCKERTON SHALL BE RESPONSIBLE FOR ANY EROSION OR SEDIMENTATION THAT MAY OCCUR OFFSITE AS A RESULT OF CONSTRUCTION OF THE PROJECT.
25. CONTACT: OCEAN COUNTY SOIL CONSERVATION DISTRICT, 714 LACEY ROAD, FORKED RIVER, NJ 08731, (609) 971–7002, FAX: (609) 971–3391, EMAIL: INFO@SOILDISTRICT.ORG.

NJDEP APPROVAL

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NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

OWEN, LITTLE & ASSOCIATES INC.
Authorization No. 24GA27965700
Engineers, Planners, Surveyors
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443 Atlantic City Blvd.
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FRANK J. LITTLE, JR. P.E., P.P.
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE02708500
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N.J. LIC. NO. 03096

SFY 2018 WATER QUALITY RESTORATION PROJECT

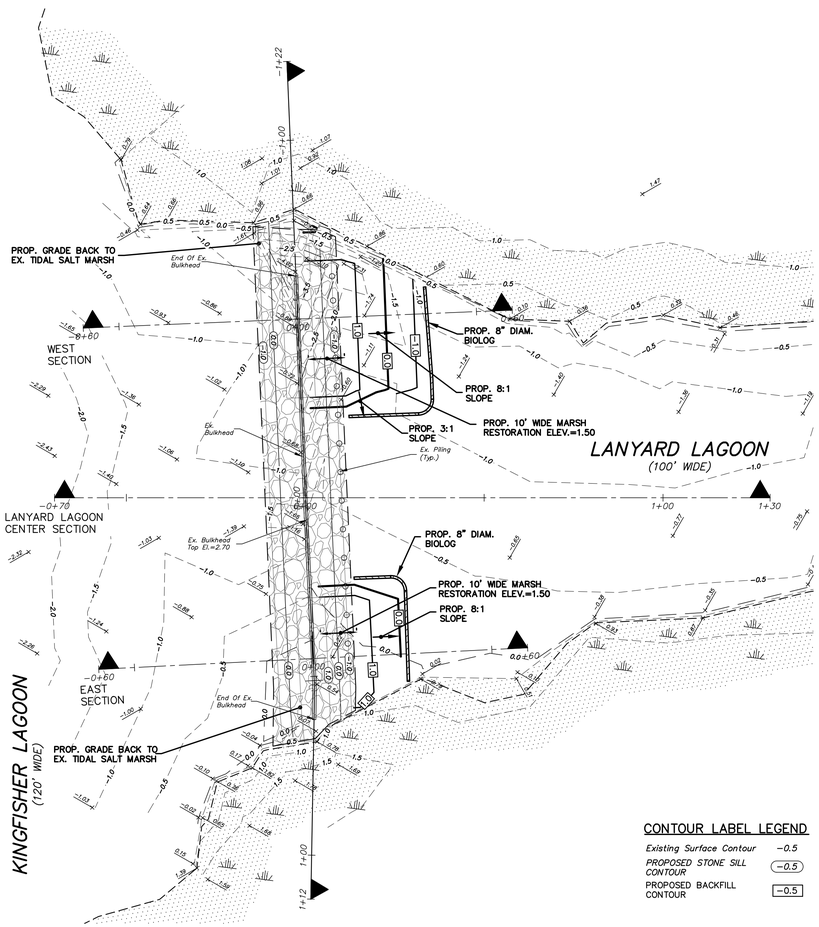
LANYARD LAGOON – LIVING SHORELINE SOIL EROSION AND SEDIMENT CONTROL PLAN

LOT 1 BLOCK 110

BOROUGH OF TUCKERTON

OCEAN COUNTY NEW JERSEY

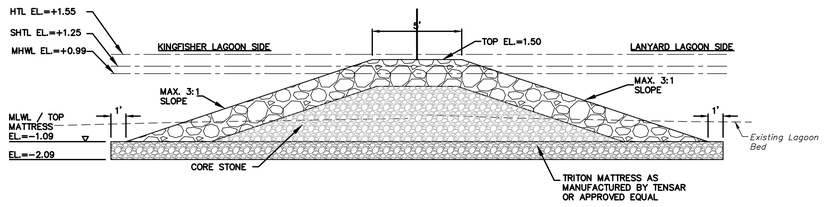
SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
AS NOTED	12/17/20	JSM	GK		SURVEY# TK–19LLLS	5 / 6



CONTOUR LABEL LEGEND

Existing Surface Contour	−0.5
PROPOSED STONE SILL CONTOUR	(−0.5)
PROPOSED BACKFILL CONTOUR	[−0.5]

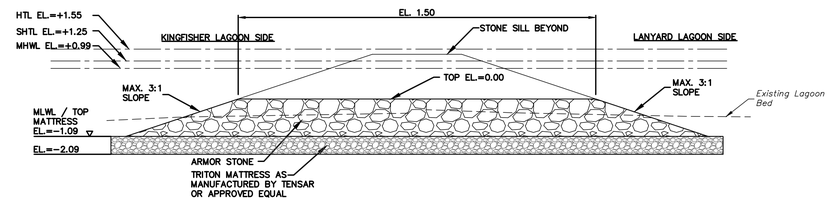
LIVING SHORELINE / MARSH RESTORATION PLAN



STONE SILL EAST AND WEST SECTION DETAIL

N.T.S.

MATTRESS STONE – TRITON MATTRESS (OR APPROVED EQUAL)
CORE STONE – R-3 RIP RAP
ARMOR STONE – R-7 RIP RAP



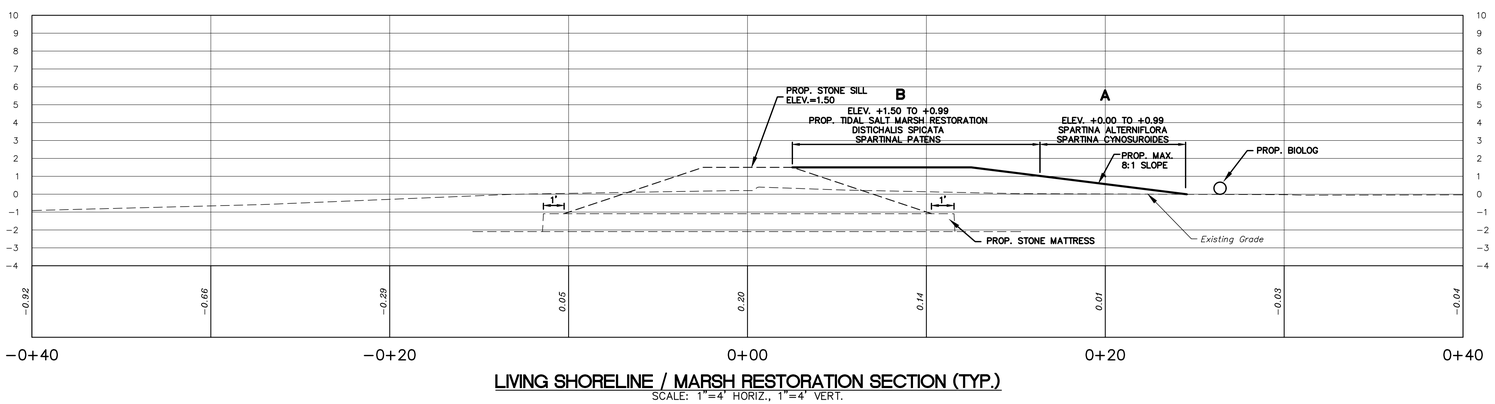
STONE SILL NOTCH SECTION DETAIL

N.T.S.

NOTE: MATTRESS STONE – AASHTO #1
CORE STONE – R-3 RIP RAP
ARMOR STONE – R-7 RIP RAP

NOTES:

1. TIDAL ELEVATIONS (N.A.V.D. 1988):
   HIGH TIDE LINE ELEVATION = +1.55'
   SPRING HIGH WATER ELEVATION = +1.25'
   MEAN HIGH WATER ELEVATION = +0.99'
   MEAN LOW WATER ELEVATION = −1.09'



LIVING SHORELINE / MARSH RESTORATION SECTION (TYP.)

SCALE: 1"=4' HORIZ., 1"=4' VERT.

NOTE:
NO DISTURBANCE SHALL BE PERMITTED WITHIN COASTAL WETLANDS AND/OR TIDAL SALT MARSH.

NJDEP APPROVAL

PLANTING SUMMARY IN AREAS INDICATED ON PLAN:

KEY	ELEVATION RANGE	NO. REQ'D	BOTANICAL NAME	COMMON NAME	SIZE	SPACING
A	+0.00 TO +0.99	170	SPARTINA ALTERNIFLORA	SMOOTH CORDGRASS	2" POTS	3' O.C.
		170	SPARTINA CYNOSUROIDES	BIG CORDGRASS	2" POTS	3' O.C.
B	+0.99 TO +1.50	736	DISTICHALIS SPICATA	SPIKE SALT GRASS	2" POT	18" O.C.
		736	SPARTINA ALTERNIFLORA	SMOOTH CORDGRASS	2" POT	18" O.C.

ALL PLANTINGS SHALL BE RANDOMLY DISTRIBUTED WITH AVERAGE SPACING WITHIN EACH SPECIES AS NOTED FOR THE AREA WITHIN THE ELEVATION LIMITS NOTED. SEE TYPICAL SECTION.

THE LANDSCAPE ARCHITECT MAY DIRECT CLUSTERING OF PLANTS OF INDIVIDUAL SPECIES FOR AESTHETIC OR HORTICULTURAL REASONS, OR AS OTHERWISE DETERMINED BY THE NJDEP.

NOTES:

1. THIS PLAN IS FOR DEVELOPMENT OF A LIVING SHORELINE AND TIDAL SALT MARSH RESTORATION .
2. TIDAL SALT MARSH IS PRESENT WITHIN 150 FEET OF THE AREA TO BE DEVELOPED.
3. NO DISTURBANCE IS PROPOSED OUTSIDE THE MAPPED 1977 TIDELANDS LIMIT LINE.
4. PROJECT AREA OF DISTURBANCE WITHIN SPRING WATER LINE ELEVATION + 1.25 IS 3520 SF, 0.08 AC.
5. FILL SOILS TO BE POORLY GRADED FINE SANDS, WITH 98-100% PASSING A No. 10 SIEVE, 85-99 % PASSING A No. 40 SIEVE, AND 5-10 % PASSING A No. 200 SIEVE. SOIL SHALL BE AUGMENTED WITH THE ADDITION OF 5% ORGANIC MATERIAL BY WEIGHT. SOIL MIXTURE TO BE APPROVED BY ENGINEER PRIOR TO CONSTRUCTED.
6. THE USE OF DREDGED MATERIAL FOR SOURCE OF FILL SOIL IS ACCEPTABLE, UPON APPROVAL OF SOURCE AND GRADATION OF SUCH BY NJDEP AND THE ENGINEER.
7. APPROXIMATE TOTAL VOLUME OF FILL SOIL TO BE PLACED IS 290 CUBIC YARDS (CY). AREA OF FILL BELOW SPRING HIGH WATER LINE IS 430 SF OR 0.01 AC. VOLUME OF SAND FILL BELOW SPRING HIGH WATER LINE IS 36 C.Y.
8. STONE FOR SILLS TO BE A UNIFORMLY GRADED MIXTURE OF ROCK CONFORMING TO THE SIZES DESIGNATED AND TO NJDOT SPECIFICATION FOR BROKEN STONE.
9. APPROXIMATE SILL ROCK VOLUME CONSISTS OF 615 CY, CONSISTING OF 101 CY CORE STONE, 225 CY CORE STONE, 225 CY ARMOR STONE AND 165 CY STONE MATTRESS. AREA OF ROCK FILL BELOW THE SPRING HIGH WATER LINE IS 3520 SF OR 0.08 AC. VOLUME OF ROCK FILL BELOW THE SPRING HIGH WATER LINE IS 550 CY.
10. PUBLIC WATER ACCESS IS PROVIDED AND IS TO BE MAINTAINED DURING AND AFTER CONSTRUCTION AS SHOWN.
11. CONTRACTOR TO PROVIDE PROTECTION TO THE PUBLIC DURING ALL PHASES OF CONSTRUCTION WITH ADEQUATE CONSTRUCTION SIGNAGE AND TRAFFIC SAFETY DEVICES, INCLUDING NOTICE TO MARINERS, AS REQUIRED.

NOTE: ALL VOLUME CALCULATIONS ASSUME 0% VOIDS.

MAINTENANCE NOTES:

1. MAINTENANCE OF EMBANKMENT SOILS AND VEGETATION AS ESTABLISHED AT THE LIVING SHORELINE TO BE THE RESPONSIBILITY OF THE CONTRACTOR FOR A PERIOD OF ONE YEAR. CONTRACTOR SHALL SUPPLEMENT, REPLACE OR REPLANT AS PROVIDED FOR IN THE BID PROPOSAL FOR THE VARIOUS ITEMS OF EMBANKMENT AND PLANT MAINTENANCE.
2. GOOSE PROTECTION OF NEW PLANTINGS TO BE INSTALLED PER THE REQUIREMENTS OF THE FINAL CONSTRUCTION PLANS. AND MAINTAINED BY THE CONTRACTOR UNTIL ACCEPTANCE OF PLANTING.
3. INVASIVE PLANT SPECIES TO BE REMOVED PER THE MAINTENANCE SCHEDULE OR ON A WEEKLY BASIS THROUGHOUT THE GROWING SEASON.

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NO.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D
1	10/19/21	REVISED PROPOSED STONE SILL AREA AND AREA OF DISTURBANCE	JSM	GK

OWEN, LITTLE & ASSOCIATES INC.
Authorization No. 24GA27965700
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PROFESSIONAL PLANNER
N.J. LIC. NO. 03096

SFY 2018 WATER QUALITY RESTORATION PROJECT

LANYARD LAGOON - LIVING SHORELINE

CONSTRUCTION DETAILS

BOROUGH OF TUCKERTON

OCEAN COUNTY — NEW JERSEY

SCALE	DATE	DRAWN	CHK'D	APPROVED FOR CONSTRUCTION	SURVEY & BILLING NO.	DRAWING NO.
AS NOTED	12/17/20	JSM	GK		SURVEY# TK-19LLLS	6 / 6

APPENDIX C

THREATENED AND ENDANGERED SPECIES FINDINGS

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New Jersey Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, New Jersey 08205
Tel: 609/646 9310
www.fws.gov/northeast/njfieldoffice/

In reply refer to:
2021-CPA-0025

November 24, 2021

Lawrence Slavitter
U.S. Army Corps of Engineers
100 Penn Square East
Philadelphia, Pennsylvania 19107
Email: Lawrence.M.Slavitter@usace.army.mil

Reference: Lanyard Lagoon Living Shoreline, Lot 1, Block 110, Borough of Tuckerton, Ocean County, New Jersey

The U.S. Fish and Wildlife Service (Service) has reviewed the above-referenced proposed project pursuant to the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) (ESA) to ensure the protection of federally listed endangered and threatened species. The following comments do not address all Service concerns for fish and wildlife resources and do not preclude separate review and comment by the Service as afforded by other applicable environmental legislation.

A known occurrence or potential habitat for the following federally-listed or proposed-listed species is located on or near the project's action area. However, the Service concurs that the proposed project is not likely to adversely affect federally-listed or proposed-listed species for the reasons listed below.

Species	**Basis for Determination**
Eastern black rail, (*Laterallus jamaicensis jamaicensis)*, threatened	The nearest occurrence of black rail is over three miles from the proposed project area. The wetlands in the project area are mapped as low marsh, which is potentially suitable habitat for black rail. Per the email between Lawrence Slavitter and Ariel Poirier, dated October 19, 2021, construction will be conducted from September 15th – March 31st to avoid potential impacts to black rail.
Red knot, (*Calidris cautus rufa),* Swamp pink, (*Helonias bullata*), Knieskern's Beaked-rush, (*Rhynchospora knieskernii*), threatened, American chaffseed (*Schwalbea americana*), endangered	The nearest concentration area for red knot is over three miles from the proposed project area. The nearest occurrence of swamp pink is over seven miles from the proposed project area. The nearest occurrence of Knieskern's beaked-rush is over three miles from the proposed project area and is historic. The nearest occurrence of American chaffseed is over eighteen miles from the proposed project area and is historic. The Species Distribution Model has mapped no suitable habitat for American chaffseed and swamp pink. Based on the lack of suitable habitat, adverse effects are not anticipated for red knot, swamp pink, Knieskern's beaked-rush and American chaffseed.

Except for the above-mentioned species, no other federally listed or proposed threatened or endangered flora or fauna under Service jurisdiction are known to occur within the proposed project's impact area. Therefore, no further consultation pursuant to the ESA is required. If additional information on federally listed species becomes available, or if project plans change, this determination may be reconsidered.

Please refer to this office's web site at http://www.fws.gov/northeast/njfieldoffice/Endangered/ for further information including federally listed and candidate species lists, procedures for requesting ESA review, the National Bald Eagle Management Guidelines, and contacts for obtaining information from the New Jersey Natural Heritage and Endangered and Nongame Species Programs regarding State-listed and other species of concern.

Reviewing Biologist: ARIEL POIRIER Digitally signed by ARIEL POIRIER Date: 2021.11.24 07:55:36 -05'00'

Ariel Poirier

Authorizing Supervisor: RONALD POPOWSKI Digitally signed by RONALD POPOWSKI Date: 2021.11.24 07:58:40 -05'00'

Ronald Popowski

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
Phone: (609) 646-9310 Fax: (609) 646-0352
http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

In Reply Refer To: October 11, 2021
Consultation Code: 05E2NJ00-2022-SLI-0036
Event Code: 05E2NJ00-2022-E-00083
Project Name: Lanyard Lagoon Living Shoreline

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species that may occur in your proposed action area and/or may be affected by your proposed project. This species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*)

If the enclosed list indicates that any listed species may be present in your action area, please visit the New Jersey Field Office consultation web page as the next step in evaluating potential project impacts: http://www.fws.gov/northeast/njfieldoffice/Endangered/consultation.html

On the New Jersey Field Office consultation web page you will find:

- habitat descriptions, survey protocols, and recommended best management practices for listed species;
- recommended procedures for submitting information to this office; and
- links to other Federal and State agencies, the Section 7 Consultation Handbook, the Service's wind energy guidelines, communication tower recommendations, the National Bald Eagle Management Guidelines, and other resources and recommendations for protecting wildlife resources.

The enclosed list may change as new information about listed species becomes available. As per Federal regulations at 50 CFR 402.12(e), the enclosed list is only valid for 90 days. Please return to the ECOS-IPaC website at regular intervals during project planning and implementation to obtain an updated species list. When using ECOS-IPaC, be careful about drawing the boundary of your Project Location. Remember that your action area under the ESA is not limited to just the footprint of the project. The action area also includes all areas that may be indirectly affected

through impacts such as noise, visual disturbance, erosion, sedimentation, hydrologic change, chemical exposure, reduced availability or access to food resources, barriers to movement, increased human intrusions or access, and all areas affected by reasonably forseeable future that would not occur without ("but for") the project that is currently being proposed.

We appreciate your concern for threatened and endangered species. The Service encourages Federal and non-Federal project proponents to consider listed, proposed, and candidate species early in the planning process. Feel free to contact this office if you would like more information or assistance evaluating potential project impacts to federally listed species or other wildlife resources. Please include the Consultation Tracking Number in the header of this letter with any correspondence about your project.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New Jersey Ecological Services Field Office
4 E. Jimmie Leeds Road, Suite 4
Galloway, NJ 08205
(609) 646-9310

Project Summary

Consultation Code: 05E2NJ00-2022-SLI-0036
Event Code: Some(05E2NJ00-2022-E-00083)
Project Name: Lanyard Lagoon Living Shoreline
Project Type: LAND - RESTORATION / ENHANCEMENT
Project Description: Lanyard Lagoon is a manmade excavation created during a period of rapid coastal land use expansion. The lagoon was excavated into the native salt marsh, and its spoils placed on the east bank in anticipation of further residential construction. After the initial excavation the lagoon was abandoned without additional improvements. Sometime between 1986 and 1995 a wood breakwater was installed across the mouth of the lagoon. This was constructed to trap silt and stop silt migration into the adjacent Kingfisher Lagoon. That effort had mixed results, but the wood structure used as a barrier eventually yielded to the tide. Erosion on the western edge of the breakwater permits a renewed daily tidal flow.

The Borough of Tuckerton and the land owner, the US Fish and Wildlife Service, identified this site as a location in need of marsh restoration. To accomplish this task, a rock sill and living shoreline will be constructed across the mouth of the Lanyard Lagoon in an attempt slow the tidal currents and allow for a renewed silt accumulation. The eventual accumulation of silt behind the sill will permit the establishment of salt marsh cord grass, Spartina alterniflora.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@39.5857154,-74.32709719535282,14z

Counties: Ocean County, New Jersey

Endangered Species Act Species

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Birds

NAME	STATUS
Eastern Black Rail *Laterallus jamaicensis ssp. jamaicensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10477	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
American Chaffseed *Schwalbea americana* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1286	Endangered
Knieskern's Beaked-rush *Rhynchospora knieskernii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/3280	Threatened
Swamp Pink *Helonias bullata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4333	Threatened

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
EDWIN B. FORSYTHE NATIONAL WILDLIFE REFUGE https://www.fws.gov/refuges/profiles/index.cfm?id=52510	18,915.451

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black Skimmer *Rynchops niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5234	Breeds May 20 to Sep 15

NAME	BREEDING SEASON
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Purple Sandpiper *Calidris maritima* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone *Arenaria interpres morinella* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee

was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

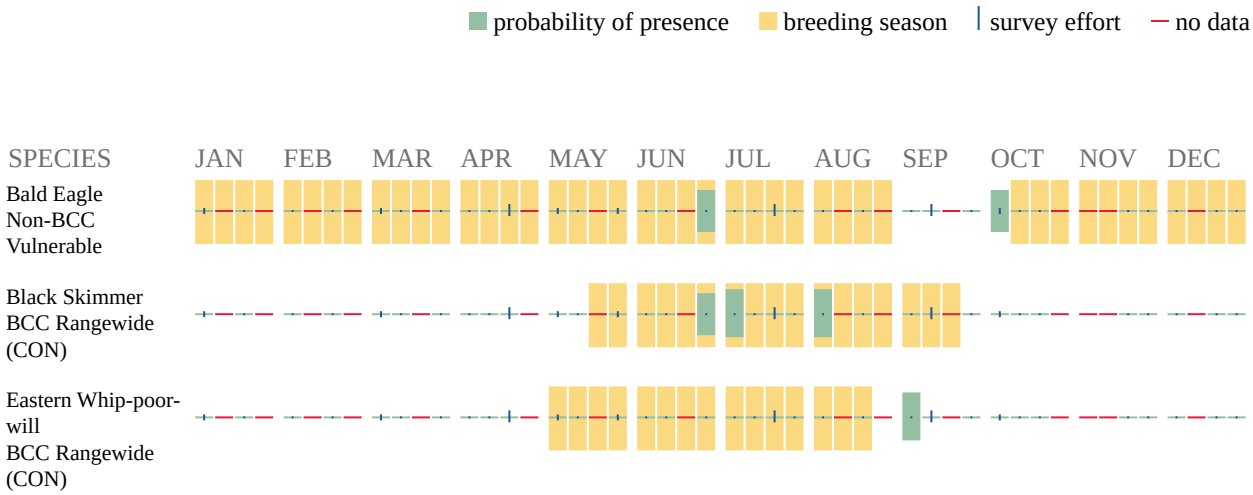
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



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
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

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.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

ESTUARINE AND MARINE DEEPWATER

- E1UBLx

ESTUARINE AND MARINE WETLAND

- E2EM1Pd

APPENDIX D

PHASE 1A CULTURAL RESOURCES ASSESSMENT REPORT

REQUEST FOR NHPA (SECTION 106) REVIEW – NORTHEAST REGION

Submit to RHPO in Advance of Undertakings

Project Background:

Project Name: _Lanyard Lagoon_____ Project Type: __Marsh restoration_____

Station: _EB Forsythe_____ County: __Ocean ____ State: __NJ _____On USFWS land? Yes ☑ No ☐

USFWS Program: NWRS If Other, please name:_____

Project Location: Township(s) Tuckerton USGS Quad: Tuckerton

Total Project Area Size (in Acres): 3 If road/trail, (linear ft, L and W):_____

USFWS Project Leader: Virginia Rettig Phone #: 609-382-7638

If there is a Governmental/NGO partner(s), please name: Borough of Tuckerton

Mandatory Attachments (on separate sheets):

1. USGS topographical map and aerial photo, ensuring that the proposed project boundaries are exact.
2. Details of anticipated project activities, i.e. ground/building disturbance (add maps as necessary)
3. Only the relevant sections of design drawings showing soil disturbance boundaries (e.g. planviews)
4. Land use history and environmental setting of the project area (add maps as necessary)

☐ **Check here if you have done any informal consultation(s) outside the USFWS** (if not, check here ☐)
If so, did you talk with SHPO? Tribes? Did you consult any database with known surveys or sites?
Please attach any information you have regarding your outside informal consultation(s).

☐ **Check here if there has been a CR survey done in the project area already** (if not, check here ☐).
If so, who conducted it and when? Did they find any buildings/sites? Please see the next section.
Please attach any information/report(s) you have regarding any previous field survey(s).

☐ **Check here if there are buildings/known sites* in the project area.** (if not, check here ☐)
*Sites may include archaeological sites or features, artifact scatters, mounds or earthworks, cemeteries, privy pits, old foundations, ruins, bridges, dams, water control structures, historic roads/trails/fences, and trash pits/piles.

Information for RHPO if there are known buildings/sites in the project area:

1. Age of building(s)/site(s) or date(s) built: _____RPI # or State(s)_____
2. Attach ground level photographs of both inside and outside of buildings/sites.
3. Attach close-up aerial photo or a sketch map illustrating the placement of the buildings/sites in the project area, key the ground photos to the aerial photo/sketch map.
4. Attach detailed descriptions of the buildings/sites with emphasis on their size, floor plans and architectural elements. Individually, what kind of physical shape are they in (good, fair or poor)?

Submitted by: _____ Date: 9/15/21 Phone #: 609-382-7638

If applicable, submit this form with the Environmental Action Statement (EAS) or NEPA Checklist

***RHPO Only* **

☐ Investigation **Final Finding by Regional Director via RHPO*

☐ No Field Survey Needed ■ No Potential Effect. ☐ No site/building(s) in APE. No Effect.

☐ Field Survey Done ☐ Site/Building(s) present, but none are Historic Properties. No Effect.

☐ Phase I (ARPA# _____) ☐ Historic Property(ies) present, but No Effect/No Adverse Effect.

☐ Phase II (ARPA# _____) ☐ Historic Property(ies) present, Adverse Effect, Resolved with MOA.

☐ Phase III (ARPA# _____) Justify Finding: Project within inundated wetlands, no new ground disturbance. Bulkhead does not represent historic property.

■ Stipulations If evidence of cultural resources is uncovered during any phase activity should halt until the find can be adequately evaluated before resuming actions.

_____ 11/5/2021 2022.NJ.EBF.001

Amy Wood, USFWS Northeast RHPO Date RHPO Project #

*Although the project has been cleared, inadvertent discoveries are still possible. If so, please stop and contact the RHPO at 413-253-8297.

APPENDIX E

DRAFT FONSI – LANYARD LAGOON

NEPA - Finding of No Significant Impact (FONSI)

Living Shoreline at Lanyard Lagoon

Edwin B. Forsythe National Wildlife Refuge, Ocean County, NJ

June 2022

The Edwin B. Forsythe National Wildlife Refuge (Refuge) consists of more than 48,000 acres, and is administrated by the U.S. Fish and Wildlife Service (Service). The proposed project is the enhancement of approximately 0.12 acres of coastal marsh habitat (Project) at one location within the refuge that was selected for its long history of anthropogenic alterations, advanced state of degradation, and vulnerability to sea level rise and other stressors. The Project Area is located in the Borough of Tuckerton, Ocean County, Block 110, Lot 1 and is located on the north shore of Kingfisher Lagoon.

The Preferred Alternative is a living shoreline that will be constructed across the mouth of the Lanyard Lagoon in an attempt to slow tidal currents and allow for silt accumulation. Approximately 145 linear feet and 5,000 square feet of the lagoon's mouth will be stabilized with a new shoreline. The design uses a rock barrier to create a new sill breakwater with a notch set at 0' MSL. This will provide the tide control needed for native vegetation to colonize. The eventual accumulation of silt behind the sill will permit the establishment of salt marsh cord grass, *Spartina alterniflora*. The Preferred Alternative allows for creation of an important improvement that will reduce erosion and improve rates of sediment accretion; alter hydrologic conditions to promote optimal tidal flow; and address the long-term negative impacts of anthropogenic impacts to the site. Management of the salt marshes to counteract these negative effects is necessary to uphold the Service's mission to the public regarding conservation and protection of fish and wildlife resources, as well as the conservation of extremely sensitive and highly important salt marsh habitat.

The appropriate State, federal and local regulatory approvals for the Proposed Action are being sought from the New Jersey Department of Environmental Protection (NJDEP), the United States Army Corps of Engineers (USACE), and the Ocean County Soil Conservation District (OCSD).

The Preferred Alternative (Proposed Action) was found to meet the project goals and objectives with a minimum amount of environmental disturbance, while providing the desired ecological enhancement to the marsh for wildlife, and protecting the salt marsh against the detrimental effects of impending sea level rise. The alternatives considered but eliminated, Alternatives B through D, were originally considered as part of data gathering efforts, but were removed from consideration due to disqualifying factors such as tidal flow limitations and lack of ecological benefits. The No Action Alternative, Alternative E, was dismissed from further consideration because it would not produce the desired ecological enhancement of the marsh, and would perpetuate the continued deterioration, resulting in a loss of vital habitat that could have detrimental impacts on migrating birds that rely on salt marsh communities for foraging, reproduction and survival. Thus, the No Action Alternative would not achieve the purpose and need for the project.

The EA for this project was released for a 30-day public review period on June 1, 2022 and closed June 30, 2022. A public meeting was held on June 9, 2022 at the Tuckerton Borough Administrative Office. XXX people attended the meeting. XXX written comments were received, and the Service provided

written responses to all commenters. The following bullets summarize the comments received and the Service's responses *[to be included when final.]*

I have reviewed the anticipated beneficial and adverse impacts of the Preferred Alternative presented in the EA and compared them to the other alternatives. I reviewed the context and intensity of those predicted impacts over the short- and long-term, and considered the cumulative effects. The review of each of the NEPA factors was conducted to assess whether there will be significant environmental impact resulting from the proposed action.

The Proposed Action would have long-term beneficial impacts to the salt marsh system by restoring salt marsh bottom elevations and altering hydrologic conditions so that prolonged inundation would be reduced, thereby reducing vegetation die-back and improving rates of accretion. The overall effect would be the restoration of ecological function and habitat value of the refuge's salt marsh.

Direct and indirect adverse impacts of the Proposed Action would be localized and short-term in nature, limited to the period of site activities that involve removal of the current wooden bulkhead, placement of fill material, and installation of the sill. This includes the temporary loss of existing vegetation, short-term impacts to water quality, and temporary displacement of wildlife due to construction activity, construction noise, and land disturbance.

Based on the review of the information presented in this document and the analyses contained in the supporting Environmental Assessment, I find that the implementation of the Preferred Alternative (Alternative A) for the Living Shoreline at Lanyard Lagoon Project within the Edwin B. Forsythe National Wildlife Refuge will not have a significant impact on the quality of the human environment, in accordance with Section 102(2)(c) of NEPA. In addition, all beneficial and adverse impacts of the Proposed Action have been addressed to reach the conclusion of no significant adverse impacts. Accordingly, the preparation of an Environmental Impact Statement for this action is not required, and this FONSI is appropriate and warranted.

_____ _____

Scott B. Kahan, Regional Chief
National Wildlife Refuge System Date
U.S. Fish and Wildlife Service