

ENVIRONMENTAL ASSESSMENT

Federal Financial Assistance Grant Number: 44068
Shooting Island Wetland Restoration Project, City of Ocean City, New Jersey

Prepared as Part of the Hurricane Sandy Coastal Resiliency Competitive Grant Program

Prepared by:



U.S. Department of the Interior

In Partnership With:

National Fish and Wildlife Foundation

And

City of Ocean City, New Jersey

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This Environmental Assessment becomes a Federal document when evaluated and signed by the responsible Federal Official.

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- New Jersey Department of Environmental Protection, Division of Land Use Waterfront Development Act, Coastal Wetlands Act of 1970 and Coastal Zone Management Act Coastal Consistency Determination Permit No. 0508-17-0030.2 CSW180001 & WFD180001
- U.S. Army Corps of Engineers Clean Water Act Section 404 and Rivers and Harbors Act Section 10, Permit No. CENAP-OP-R-2018-00291
- Correspondence Log and copies of Correspondence, including SHPO concurrence

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1.0 INTRODUCTION

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

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

The DOI, as lead federal agency, and its partner, the City of Ocean City, New Jersey, in cooperation with the New Jersey Department of Environmental Protection (NJDEP), Division of Fish and Wildlife (DFW), are proposing the Shooting Island Wetland Restoration Project, Federal Financial Assistance Grant Number: 44068 (Project).

Shooting Island, a bay island located in the Great Egg Harbor Bay (GEHB), Cape May County, New Jersey, has experienced significant deterioration of its natural shoreline for more than 80 years. A map depicting the island can be found in Figure 1-1. The island is owned by the NJDEP and is located in the back-bay area of Ocean City, Cape May County, New Jersey. Primary uses of the island are limited as the site is owned by the DFW. There are no existing man-made structures on the island with the exception of osprey nesting platforms, an inactive Atlantic City Electric utility easement/pipe/conduit that provided Ocean City with electricity in the 1970's and a previously constructed and now inactive Confined Disposal Facility (CDF), measuring approximately five (5) acres in size. There are no activities currently existing, or permitted, on the island with the exception of NJDEP Special Use Permitted passive recreation. Access to the island is allowed only by completing a NJDEP Special Use Permit application and submitting it to DFW for approval.

The island has historically been tidally flowed wetlands, dominated by smooth cordgrass (*Spartina alterniflora*). The tidal range typical for a smooth cordgrass marsh is mean sea level (MSL) to mean high water (MHW). Because of erosion, subsidence, and sea level rise the island

is currently at MHW (+1.55 NAVD88). The project design team completed an in-depth analysis of the historical aerial imagery of the island compared to the recently surveyed conditions as of 2017. Based on this analysis, shoreline erosion rates along the northern and western edges of Shooting Island have varied between 1 and 6 feet per year since 1978. As result, the island features a vertical scarp along the northern shoreline of approximately 4 feet in height. The elevation of top of the marsh along the scarp is approximately at MHW. Although the marsh vegetation could continue to exist at the lower end of this elevation, this will likely result in decreased wetland function for flood resiliency and retention.

In addition, Shooting Island is a tidal wetland nursery fish habitat, critical to the life cycle of most commercial and recreational fish species in Great Egg Harbor Bay (GEHB). Except for tropical rainforests, tidal wetlands are the most productive ecosystem, vital to sustaining fisheries diversity and abundance. Oysters also depend on the protection of Shooting Island; the oyster castle component of the Project (see Section 2.2) is proposed to promote oyster recruitment that will in turn improve the water quality around Ocean City, among other wide ranging benefits (Baggett et al., 2014). A similar project has taken place around Mordecai Island which is located in the Barnegat Bay, New Jersey.

The City of Ocean City, New Jersey experiences flooding from any significant storm and any measures to reduce or mitigate these impacts is vital to protection of public health and property. Shooting Island is located approximately 500 – 1,000 feet offshore from a dense development of residential communities, and commercial and recreational facilities. Enhancement of the island and flood resiliency is vital to the public health, property and economic viability of this barrier island community.

Marsh edge erosion is a complex process and is dependent on a variety of factors (e.g., soil characteristics, root structure, wave forces, and storm intensity). However, the Hydrodynamic Modeling and Sediment Management Evaluation, done by Anchor QEA, LLC (December, 2016) suggests that waves are the main driver of salt marsh edge erosion on Shooting Island. Therefore, the primary cause of erosion at Shooting Island is likely wind waves, vessel wakes in the GEHB, and waves caused by storm events such as Hurricane Sandy. Restoring Shooting Island will benefit the nearby communities by adding additional areas of protection from storm surges and waves and vessel wake.

The grant proposal (Appendix A) included potential restoration actions by the City of Ocean City, New Jersey at several islands in GEHB, including Shooting Island. After additional evaluation, Shooting Island was selected as the preferred location for restoration and enhancement activities. The proposed Project, designed in close consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), includes two main components: 1) construction of approximately 2,700 linear feet of shoreline rock sill to protect existing marsh and allow for further development of marsh on the island and 2) creation of approximately 1,450 linear feet of living shoreline using oyster habitat components (see

Section 2.0).

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

The City of Somers Point, New Jersey was also awarded funds under the Program grant 44068 for partial funding of dredging activities at the Higbee Marina and installation of a living shoreline embankment along Somers Point-Mays Landing Road (see also Section 5.0).

1.1 Purpose and Need

The purpose of the Program is to undertake a variety of actions to restore wetlands and other natural areas, better manage storm water using green infrastructure, and assist states, tribes and local communities in protecting themselves from major storms such as Hurricane Sandy. Overall, the Program goals relate to coastal resiliency and ecosystem enhancement. The Program provides funding for projects in five categories, including, Project Planning and Design, Coastal Resiliency Assessments, Restoration and Resiliency Projects, Green Infrastructure, and Community Coastal Resiliency Planning. The Program provides technical and financial assistance to identify, protect, conserve, manage, enhance, or restore habitat and infrastructure on both public and private lands that have been negatively impacted by Hurricane Sandy.

The Project meets the purpose and need of the Restoration and Resiliency and Green Infrastructure by providing protection to the City of Ocean City against erosion, wave action, and sea level rise, and restoring and enhancing the shoreline and marsh habitat of Shooting Island. Creation of the living shoreline embankment and oyster castles on Shooting Island would also provide enhanced coastal resiliency to the City, mitigating some of the currently experienced flooding impacts. In addition, the Project would result in improved stability of the island and expansion of the area by natural accretion, thereby improving nursery fish habitat, fisheries diversity and abundance. The Project is needed to offset the continued loss of coastal land and marsh habitat and increase resiliency of Shooting Island and nearby communities to repeated flooding and to sea level rise.

Figure 1-1 Project Area Overview – Shooting Island Wetland Restoration Project. Source: ESRI Streaming Aerial Imagery (June 2017); Not to Scale.



2.0 ALTERNATIVES

An alternatives analysis was performed to determine the most feasible and prudent means of achieving the defined Project purpose and need. The ability to provide protection against erosion, wave action, and sea level rise and to enhance island marsh habitat was evaluated under each alternative. Two alternative action plans were analyzed: a No Action Alternative, and the Proposed Action Alternative, as described below.

2.1 No Action Alternative

Under this alternative, no restoration or enhancement activities for Shooting Island would take place. The result of no action along the shoreline of Shooting Island would likely result in continued land loss and, combined with sea level rise and island subsidence, accelerated marsh habitat loss. Under this alternative, there would be no elevation increase or improvement of marsh habitat and no increased resiliency of coastal areas to sea level rise. The no action alternative would result in continued and greater adverse flooding impacts to the City. Also, the no action alternative would result in a significant loss of nursery fisheries habitat. For these reasons, the No Action alternative would not meet the Project's purpose and need to provide protection against flooding, wave action, and sea level rise and to enhance existing marsh habitat.

2.2 Proposed Action Alternative

Under this alternative, more than 150 acres of tidal wetlands on Shooting Island would be restored and protected. The Project, designed in close consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS), includes two main components: 1) construction of approximately 2,700 linear feet of shoreline rock sill to protect existing marsh and allow for further development of marsh on the island; and, 2) creation of approximately 1,450 linear feet of living shoreline using oyster habitat components. The Proposed Action complies with the Living Shorelines Engineering Guidelines, prepared for the NJDEP by Stevens Institute of Technology (Miller, 2015/2016) and the U.S. Army Corps of Engineers (USACE) Coastal Engineering Manual (CEM) (Sabatier, 2006)

2.2.1 Shoreline Sill

Approximately 2,700 linear feet of rock sill will be construction in three separate segments (with gaps between), just off the northern shoreline of Shooting Island (Figure 1-2). A copy of the Existing Conditions and Proposed Living Shoreline Alignment drawings are included in Appendix D.

The sill would function as protection for the Shooting Island wetlands and would absorb existing wave and current energy, transitioning the marsh fringe areas on Shooting Island into a depositional environment. This would result in greater flood protection for Ocean City. That is,

flood waters would be slowed down and dissipated over the surface of the island prior to reaching the City's infrastructure and property.

The sill would be approximately 30-33 feet wide at the base prior to estimated settlement, and approximately 22-25 feet wide following estimated settlement (see below). It would be approximately 6.5 to 7.5 feet high above the base, with a design top elevation of +3.55 feet NAVD88 (5.78' MLW) prior to estimated settlement. With the anticipated 2 feet of settlement, the top elevation would be +1.55 feet NAVD88 (3.78' MLW). The sill would cover approximately 1.55 acres of area below the high tide line (HTL) with a total volume of 10,530 cubic yards (CY).

The sill would include nine (9) "windows" for enhanced tidal flow and fish passage. The sill windows would be 50 feet wide at the sill crest and would be approximately 31 feet wide at the bottom opening at a pre-settlement elevation of -1.23 feet NAVD88 (1.00' MLW), or 4.78 feet below the sill top elevation.

The sill would be installed using three different materials as follows: a) geosynthetic system installation; b) sill core stone construction; and c) sill armor stone construction. The materials would be imported from a contractor-determined upland source and be placed in their respective order on the bay floor. In-water construction work would commence no earlier than October 22, 2018. The anticipated in-water construction completion date is scheduled March 31, 2019.

The sill has been designed to accommodate the estimated settlement described above while targeting a constructed crest height at MHW elevation following initial (Year 1) settlement. The following design components are included to address estimates of long-term performance and to facilitate constructability in what are expected to be soft soils:

1. A geogrid and geotextile layer would be placed beneath the sill to spread the load and provide a more competent working surface for sill construction.
2. To accommodate estimated settlement for the first year following construction, the design includes overbuilding the berm profile by 2 feet. Note that future maintenance of the berm may still be necessary, even with a plan to overbuild the crest.
3. Multiple best management practices have been integrated in the bid contract documents to control the placement methodology so as to minimize the potential for disruption of the subsurface during construction. These practices include limited production during the initial placement, limited lift thicknesses for initial placement, and numerous monitoring controls including daily contractor survey checks.
4. Long-term monitoring would be conducted to track post-construction settlement and identify any required actions.

Sill core stone and armor stone materials used for the living shoreline would be transported to Shooting Island via shallow-draft barges. Shallow-Draft barges operate at very slow speeds and would not generate noise on their own, the tug boats that are already used in the back-bay will generate minimal noise while pushing the barges into location. A small crane or long-reach excavator positioned on a barge would be used to place the sill core stone materials. A layer of geogrid and geotextile fabric¹ would be placed under the core stone to provide support and promote uniform settlement. The sill would then be covered in a larger stone layer to provide erosion protection of the living shoreline and the underlying sill core.

Monitoring of the area following implementation would be conducted to evaluate the success of the restoration work, evaluate potential for future additional restoration, and implement any necessary corrective actions. Monitoring would focus on structural stability of the shoreline structure, accretion of sediment, plant establishment, wave attenuation, and reduction of erosion rates. It is anticipated that monitoring of the restoration will be conducted over a minimum period of five (5) years. The monitoring will be conducted by the City's consultants and in cooperation with the NJDEP DFW and may include an academic partner. Annual monitoring reports would be prepared and submitted to the regulatory agencies demonstrating success of the proposed action. The proposed action would be deemed successful upon demonstration that the shoreline and oyster castles are structurally stable and ancillary benefits are observed: accretion, plant establishment, wave attenuation, and reduction of erosion rates.

2.2.2 Oyster Habitat

Approximately 1,450 linear feet of oyster habitat would be developed using concrete habitat blocks, in multiple segments with gaps between, within a 1,450 linear-foot area up to approximately 300 feet offshore the northwestern shoreline of Shooting Island (Figure 1-2). A copy of the Existing Conditions and Proposed Living Shoreline Alignment drawings are included in Appendix D.

In response to NMFS and USFWS guidance, the design includes a 10-foot wide gravel base beneath a 3-foot wide arrangement of tiered/stacked oyster blocks. The block arrangement would be 2.5 feet high, with a top elevation of approximately 0 to -1-foot NAVD88 (2.23 to 1.23' MLW), depending on existing surface elevation. The total coverage by the base would be 0.23 acre below the high tide line (HTL), with a total volume of 240 CY.

The oyster habitat blocks have been shown to be successful at several previous restoration sites located in the northeast, mid-Atlantic, and southeast. They would provide habitat for oysters which in turn would be eaten by crabs. The crabs would then be eaten by turtles, rays, jellyfish, and even other crabs. Regional example placement sites of these oyster castles include Mordecai

¹ Geogrid and geotextile fabrics are polyester, high tenacity multifilament yarns that are woven into a stable network. These high strength polyester yarns are coated with a PVC material.

Island, New Jersey; Raritan Bay, New Jersey; Gandy's Beach, New Jersey, Mispillion River, Delaware; and Chincoteague Island, Virginia. The oyster habitat blocks are intended to be placed in a non-continuous manner along the designated alignment, providing designed breaks between the oyster habitat system to promote exchange of tidal water between the island marsh and the bay.

The options for oyster habitat block assembly are: 1) assemble at an upland staging area and transport assembled to the project location; or, 2) transport blocks to the project location and assemble in the water area.

Transporting the assembled blocks and placing in the water area is expected to be an arduous and difficult task. Rather, it is expected the oyster habitat blocks would be assembled at the project location in a stacked, four-high, interlocking design. The selected contractor would determine the appropriate equipment to be used for the assembly which has to be done at low tide, which could result in an increase in turbidity.

Monitoring of the area following implementation would be conducted to evaluate the success of the restoration work, evaluate potential for future additional restoration, and implement any necessary corrective actions. It is anticipated that monitoring of the restoration would be conducted over a minimum period of five (5) years. The monitoring would be conducted by the City's consultants and in cooperation with the NJDEP DFW and may include an academic component. Annual monitoring reports would be prepared and submitted to the regulatory agencies demonstrating success of the proposed action. The proposed action would be deemed successful upon demonstration that the shoreline and oyster habitat blocks are structurally stable and ancillary benefits are observed: accretion, plant establishment, wave attenuation, reduction of erosion rates.

2.3 Alternatives - Eliminated from Further Consideration

Shooting Island was selected after an alternatives analysis was completed to evaluate four (4) candidate sites:

- Shooting Island;
- The marsh adjacent to the existing Site 83 CDF located proximate to Roosevelt Boulevard;
- The marsh adjacent to the Ocean City airport; and,
- Select areas of Cowpen's and Garrett's Islands.

These four candidate sites underwent a detailed desktop evaluation and were further investigated as part of a field reconnaissance program conducted in October 2016, as summarized in the following table:

NFWF Great Egg Harbor Bay Restoration Project
Site Selection Analysis of Alternatives Matrix

Analysis Criteria	Site 1 - CDF 83 Vicinity	Site 2 - Airport Back Bay	Site 3 - Cowpen's and Garrett's Island	Site 4 - Shooting Island
Quality of Existing Wetlands and Current Habitat Function	The site consists of mostly low <i>Spartina alterniflora</i> marsh with glasswort. There are some mosquito ditches close to highway. There are large ponded areas within the marsh that have high organic content. The Site 83 Confined Disposal Facility (CDF) at the marsh edge is active; removal activities for material within the CDF began in October 2016. The haul road to the CDF spans the center of the marsh allows flow through the roadway. At high tide, the site was completely inundated. There are osprey nesting platforms within the marsh.	The site consists of mostly high <i>Spartina alterniflora</i> and <i>Spartina patens</i> marsh. The site has mixed habitat quality.	Assessed west side only. Most of the site has high vigor <i>Spartina alterniflora</i> marsh. Waterbird roosting and/or nesting area adjacent to the bridge. SAV was found on north edge along the installed living shoreline components. It is also expected within the cove area. The vegetation baseline survey is complete.	High tide inundates the island. There is a significant scarp line along the shoreline. There are large ponded areas throughout the island. Growth patterns of vegetation show high vigor in certain areas of the island. Rootmats were present in the ponded areas indicative of plant cover loss. Human disturbance on the island has degraded marsh areas and promoted colonization by invasive species. The island is the site of a closed CDF which is colonized by <i>Phragmites</i> . There is also another area just to the west of that CDF that is higher in elevation than the marsh - likely sidecast material from a former dredge event. The vegetation baseline survey has been completed.
Size	Approximately 80 acres	Approximately 70 acres	Approximately 20 acres	Approximately 135 acres
Land Ownership	City of Ocean City	City of Ocean City	City of Ocean City	Lot 1: State Wildlife Management Area (WMA) - New Jersey Department of Environmental Protection (NJDEP) Lot 2: City of Ocean City
Historic Marsh Conditions (potential for restoration)	Yes; Primarily limited to ponded areas	Yes; Approximately 5 - 10 feet of shoreline loss since 1978 - 2012; 1930's footprint significantly larger	Yes; Approximately 5 - 10 feet in some areas; 1978 shoreline not noted on the south side of island; 1930's footprint significantly larger	Yes; Approximately 40-60 feet of shoreline loss since 1978 - 2012; 1930's footprint significantly larger, as much as 150 feet along the shoreline and up to 1/4 mile in southern areas of the island
Proximity to Communities and Potential for Coastal Resiliency	Adjacent to 34th Street Bridge and roadway; nearby single family home residential areas. Existing wetlands protect immediately adjacent public and private infrastructure including important community access roadway.	Airport adjacent; condominium housing adjacent. Existing wetlands protect immediately adjacent public and private infrastructure. Coordination with Federal Aviation Administration (FAA) regarding airport right of way and bird attraction would be required.	Adjacent to OCNJ Welcome Center; Route 52/9th Street bridge; not adjacent to housing. Existing wetlands protect immediately adjacent public infrastructure including important community access roadway. Protected bird nesting/roosting areas are immediately adjacent.	Not immediately adjacent to infrastructure or private properties.
Priority for Restoration/Enhancement (targeted area within existing habitat or conservation plan)	Area is designated "Conservation" under Ocean City Comprehensive Plan (City of Ocean City 2009).	Area is designated "Conservation" under Ocean City Comprehensive Plan (City of Ocean City 2009).	Area is designated "Conservation" under Ocean City Comprehensive Plan (City of Ocean City 2009).	This is a tract of the NJDEP Cape May Coastal Wetlands WMA. A memorandum of agreement (MOA) with the state agency (NJDEP/Division of Fish and Wildlife/Bureau of Land Management) for use of the area for restoration purposes is in progress.
Potential for Storm Inundation and Sea Level Rise (SLR) Impacts	Yes	Yes	Yes	Yes
Cost Considerations	Landside access and staging of equipment and construction materials is available. Potential for costlier water-side access is reduced.	Landside access and staging of equipment and construction materials is available. Potential for costlier water-side access is reduced. FAA coordination may restrict construction methods and access.	Landside access and staging of equipment and construction materials is available. Potential for costlier water-side access is reduced.	Costlier barge and vessel based access is required. Larger, contiguous potential restoration area may provide economy of scale compared to other restoration area alternatives.
Initial Site Prioritization Based on Known Factors	4	3	2	1

Notes:

City of Ocean City, NJ 2009. *Conservation Plan Element, Environmental Resources and Recreation Inventory*. Ocean City Environmental Commission and the Ocean City Department of Planning and Engineering. June 2009.

CDF: Confined Disposal Facility

NJDEP: New Jersey Department of Environmental Protection

SLR: Sea Level Rise

WMA: Wildlife Management Area

The selection of an optimal restoration site was based primarily on the following factors:

- Quality of existing wetlands (pools, non-vegetated areas, degraded vegetation), and current habitat functions;
- Potential for storm inundation and sea level rise impacts at location;
- Size of area;
- Land ownership;
- Proximity to communities (and potential for coastal resiliency for local communities);
- Distance to conflicting land uses (i.e., airports);
- Erosional edge of wetlands;
- Estimated implementation costs; and
- Overall priority/value of restoration/enhancement (gauged from factors listed above).

It was concluded Shooting Island provides the most economically viable alternative in creating and restoring the wetlands given the size of the area and proximity to the open bay and typical wind directions. With sea level rise and the potential for an increase in coastal storms, Shooting Island serves to provide protection to more than a mile of residential properties. Given Shooting Island's proximity to the open bay and typical wind directions, this location was selected as the optimal restoration site.

The marsh adjacent to the existing Site-83 CDF, the marsh adjacent to the Ocean City airport, and select areas of Cowpen's and Garrett's Islands were not selected as the erosion of these wetlands is not as severe as Shooting Island. Shooting Island is located at an optimal location because there are no road, airports, or CDF's that are in constant use. With the exception of Shooting Island, all sites that were considered are owned by the City of Ocean City.

At this time the alternative locations are not proposed for restoration, and are not considered further in this document.

The Proposed Action alternative meets the Project's purpose and need to provide protection to the City of Ocean City against erosion, wave action, and sea level rise, and to enhance the existing shoreline and marsh habitat of Shooting Island. Dates of the Proposed Action implementation are:

- July 19, 2018 – NJDEP permits approved;
- September 24, 2018 - NMFS and USFWS agency consultation on final / acceptable design;
- October 2018 - USACE permits approved;
- November/December 2018 to March 2019 – wetland creation and restoration;
- March 31, 2019 – Proposed Action completed.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction – Scope of Resources Evaluated

The environmental resources identified and analyzed in this document are listed below. The evaluation of environmental effects resulting from implementation of the Proposed Action to these resources for each alternative is described in Section 4. Descriptions of existing resource conditions are provided below.

3.2 Soils, Sediment and Topography

Marsh edge erosion is a complex process and is dependent on a variety of factors (e.g., soil characteristics, root structure, wave forces, and storm intensity). In the back-bay area of Ocean City, waves are the main driver of salt marsh edge erosion. Therefore, the primary cause of erosion at Shooting Island is likely wind waves and vessel wakes in the Great Egg Harbor Bay. The result of no action along the shoreline will result in continued land loss and, combined with sea level rise, likely accelerated wetland loss.

Shooting Island is located in the back bay of Ocean City, Cape May County, New Jersey (Figures 1-1 and 1-2). Based on sediment sampling for proposed dredging work in the City, the majority of the material found within Ocean City's bay network is primarily silt with little fine sand.

The topography of Shooting Island is relatively flat and is primarily vegetated by smooth cordgrass (*Spartina alterniflora*). Natural salt pannes are located on the island due to the Island subsidence and erosion from extreme storms events. The CDF that is also located within Shooting Island was constructed in the 1950's when Ocean City was in the process of constructing the back-bay lagoon system. The CDF measures approximately five (5) acres in size and will not be disturbed during the duration of the project. This CDF is comprised of upland invasive and opportunistic vegetation atop dredge material from previous dredging work done in the 1950's.

No sediment sampling has been conducted on the island as part of this project.

3.3 Water Resources and Wetlands

A large ebb shoal exists near the entrance of Great Egg Harbor Inlet. Shoals such as these will dissipate large amounts of wave energy before they can enter the corresponding bay. Therefore, offshore swells from the Atlantic Ocean are generally attenuated over the inlet ebb shoal and do not propagate into Great Egg Harbor Bay. Waves within the Bay are primarily generated locally by winds or from vessel wakes.

Hydrodynamic modeling of the existing conditions in the Great Egg Harbor Bay show that locally

generated significant wave heights are unlikely to exceed 2 to 2.5 feet. This is primarily due to the fetch-limited nature of Great Egg Harbor Bay.

The proposed action will restore the footprint of Shooting Island to the north and northwest with the establishment of a shoreline sill along the 1978 mapped coastal wetlands boundary line. The living shoreline, which will function as a low-crested breakwater, will be placed along the 1978 shoreline boundary line and constructed to a crest elevation equivalent to MHW level (+1.55 feet NAVD88).

3.3.1 Flood Zones

The Federal Emergency Management Agency (FEMA) defines floodplains as any land area susceptible to being inundated by floodwaters from any source. Flood zones, a commonly used term in floodplain management, are geographic areas defined by FEMA, reflecting the severity or type of flooding in the area. Special Flood Hazard Areas (SFHAs) refer to flood zones with a 1 percent or greater chance of flooding in any given year and are further differentiated by zones (FEMA 2016a). The Project area is designated as AE zone with a base flood elevation (BFE) of 9-feet (NAVD88) (FEMA Flood Insurance Rate Map #34009C0088F, effective October 5, 2017).

Executive Order (EO) 11988, *Floodplain Management* (1977), states that when considering the potential impacts of federal actions on flooding, the geographic extent of a floodplain should be established based on the type of action and whether or not the action is critical (i.e., an activity for which even a slight chance of flooding would be too great). The Project area is located within an SFHA.

3.3.2 Surface Water and Hydrology

The Proposed Action is subject to review by the USACE under Section 10 of the Rivers and Harbors Act (33 U.S. Code [USC] 403) and Section 404 of the Clean Water Act (CWA; 33 USC 1344), which govern work or structures in navigable waters of the United States and/or the discharge of dredged or fill material into waters of the United States, including their adjacent wetlands. The City of Ocean City applied for a USACE Permit on January 26, 2018.

With the issuance of the Permit, and, in consultation with various Federal and State agencies, the USACE has reviewed and confirmed the proposed action will not significantly adversely impact surface water and hydrology. Diversion of water courses, adverse impacts to tidal flow and currents are not expected as a result of the proposed action. The proposed shoreline sill and oyster castles are expected to attenuate wave action and reduce erosional forces to Shooting Island, a net positive benefit.

3.3.3 Wetlands

The proposed action area is characterized as a bay island of approximately 19 acres of emergent tidal wetlands, dominated by smooth cordgrass. The island also contains some mud flats, although classified in 1970 by the State of New Jersey as mapped tidal wetlands the Project area is currently open water. The total area of ‘disturbance’ within mapped coastal wetlands (albeit currently devoid of any vegetation) is 99,000 square feet, or approximately 1.78-acres.

Wetlands are defined jointly by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions . . . including swamps, marshes, bogs, and similar areas".

Wetland areas are identified and mapped on National Wetlands Inventory Maps produced by the USFWS, coastal wetland maps prepared by NJDEP, and freshwater wetland maps prepared by NJDEP.

The proposed project area is mapped by the NJDEP as coastal wetlands. Coastal (tidal) wetlands were mapped in 1970 using remote aerial interpretation and the boundaries promulgated under N.J.A.C. 7:7 et seq. The NJDEP and USACE require the presence of all three wetland parameters (hydric soils; hydrology; and a predominance of hydrophytic vegetation) to regulate an area as a jurisdictional wetland. Since NJDEP mapping in 1970, the project area has eroded and there is currently no wetland vegetation present within the restoration area. Mapped coastal wetlands are present beyond the restoration area on the adjacent Shooting Island. The restoration area is currently open water. Regardless of the absence of vegetation, the project area remains within a promulgated wetlands boundary and, as confirmed by NJDEP staff (Janet Arnett, NJDEP-Division of Land Use Regulation), is subject to NJDEP review and approval under the Coastal Wetlands Act of 1970. Also, because activities are proposed below the plane of the mean high-water line, an NJDEP Waterfront Development Act Individual Permit is also required. NJDEP permits were approved July 19, 2018 (refer to Appendix B).

3.4 Biological Resources and Vegetation

3.4.1 Common Flora and Fauna

The Great Egg Harbor Region (GEHR) is a productive coastal ecosystem supporting diverse aquatic and terrestrial habitats and species. It provides important habitat for anadromous fish² populations, nesting and wintering raptors, colonial nesting water birds, migrating and wintering waterfowl, wetland communities, plants, and invertebrates.

² Anadromous fish are fish species that live in salt water during their lifetime but spawn in fresh water.

It is expected that a warm water finfish community occurs in the shallow open water habitat edge of Shooting Island, although it was not inventoried. Given the shallow water, this habitat may be impaired during summer months due to lower dissolved oxygen and higher temperatures.

Fish and invertebrates that regularly breed in the GEHR complex include a total of 67 species caught in a 1995, one-year inventory of the Great Egg Harbor estuary (New Jersey Division of Fish, Game and Shellfish. 1995). The most abundant species were Atlantic silversides (*Menidia menidia*), Atlantic menhaden (*Brevoortia tyrannus*), bay anchovy (*Anchoa mitchilli*), banded killifish (*Fundulus diaphanus*), alewife (*Alosa pseudoharengus*), hogchoker (*Trinectes maculatus*), white perch (*Morone americanus*), white catfish (*Ameirus catus*), and winter flounder (*Plueronectes americanus*) (McClain, J.F, 1972). Great Egg Harbor Bay, with 32 species, had the highest diversity of fish taken (New Jersey Division of Fish, Game and Shellfish. 1995).

Great Egg Harbor Bay is an important commercial hard clam fishery, and the upper (western) bay inland of the Garden State Parkway is one of the few remaining oyster seed production areas in the state. The Great Egg Harbor Bay is fed by the Great Egg Harbor River (GEHR), the Mullica River, Patcong Creek and Tuckahoe River tributaries. The 1985 New Jersey Department of Environmental Protection survey indicates that there are over 40 hectares (100 acres) of oyster beds in the GEHR tributary (5,636 acres) and nearly 16 hectares (40 acres) in the Tuckahoe River (5,776 acres total) tributary.

Anadromous fish, including blueback herring (*Alosa aestivalis*), alewife (*Alosa pseudoharengus*), and striped bass (*Morone saxatilis*), spawn in streams of the New Jersey Pinelands; this estuary serves as the major thoroughfare in the spring to the GEHR upriver sections and as the nursery area for newly-hatched fish. Other anadromous species in the Great Egg Harbor Bay are hickory shad (*Alosa mediocris*), Atlantic menhaden, and the catadromous³ species American eel (*Anguilla rostrata*). Fish passage, especially upstream migrations, is impeded by obstructions, usually dams, which generally restrict activity to the lower reaches of these rivers.

Birds that regularly breed in the GEHR complex include American oystercatcher (*Haematopus palliatus*), black skimmer (*Rynchops niger*), osprey (*Pandion haliaetus*), clapper rail (*Rallus crepitans*), American black duck (*Anas rubripes*), seaside sparrow (*Ammodramus maritimus*), marsh wren (*Cistothorus palustris*), and willet (*Tringa semipalmata*). It is also an important foraging and breeding area for common tern (*Sterna hirundo*), yellow-crowned and black-crowned night-heron (*Nyctanassa violacea* and *Nycticorax nycticorax*), tricolored and little blue herons (*Egretta tricolor* and *Egretta caerulea*), whimbrels (*Numenius phaeopus*), and northern harrier (*Circus cyaneus*) (New Jersey Audubon 2018).

³ Catadromous fish live in fresh water and migrate to the sea to spawn.

Benthic invertebrates in Great Egg Harbor Bay include hard substrate shellfish such as mussels and barnacles, epibenthic crabs and amphipods, and benthic polychaete worms and crustaceans (USFWS 1997).

3.4.2 Special Status Species

The Great Egg Harbor estuary is home to state- and federally listed plant and animal species. Special-status species include those federally listed as threatened or endangered, or those considered candidate species, by the USFWS or the NMFS under the Endangered Species Act (ESA). Special-status species also include species protected under the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act, and those species listed as threatened or endangered by the NJDEP.

3.4.2.1 Federally Listed Species

Endangered Species Act

A July 8, 2018, query of the USFWS's online Information, Planning, and Conservation (IPaC) system produced a report indicating that is only one federally listed threatened or endangered species potentially occurring within the project area, the rufa subspecies of red knot bird (*Calidris Canutus refaese*), which is federally listed as threatened. The report lists no critical habitats in the project area. Rufa red knots feed on invertebrates, especially small clams, mussels, and snails, but also crustaceans, marine worms, and horseshoe crab eggs. On the breeding grounds red knots mainly eat insects. Rufa red knots were added to the list of federal candidate species in 2006 with an effective date of January 12, 2015. They are federally protected under the Migratory Bird Treaty Act and are also on the New Jersey State list as endangered.

Small numbers of rufa red knots may occur in New Jersey year-round, while large numbers of birds rely on New Jersey's coastal stopover habitats during the spring (mid-May through early June) and fall (late-July through November) migration periods. Smaller numbers of knots may spend all or part of the winter in New Jersey.

The primary wintering areas for the red knot include the southern tip of South America, northern Brazil, the Caribbean, and the southeastern and Gulf coasts of the U.S. The red knot breeds in the tundra of the central Canadian Arctic. Large flocks of red knots arrive at stopover areas along the Delaware Bay and New Jersey's Atlantic coast each spring, with many of the birds having flown directly from northern Brazil. The spring migration is timed to coincide with the spawning season for the horseshoe crab (*Limulus polyphemus*). Horseshoe crab eggs provide a rich, easily digestible food source for migrating birds. Mussel beds on New Jersey's southern Atlantic coast are also an important food source for migrating knots. The restoration project will be completed outside of the spring migration of the rufa red knots.

Preferred red knot foraging habitat is sandy beaches where horseshoe crabs lay their eggs. Shooting Island does not contain any beach areas and the eroding shoreline has a vertical scarp approximately 4 feet in height. The area is not expected habitat for horseshoe crabs because there are no sandy beaches suitable for laying their eggs. Accordingly, the potential for use of the island by red knots is extremely limited due to no preferred food sources. The proposed action seeks to restore a more natural sloped shoreline and return the island to 1978 conditions. The proposed action will result in increased areas of intertidal habitat in areas that have eroded and are now currently open water.

During October 2018 agency consultation, the USACE questioned the need to address potential impacts to the eastern black rail (*Laterallus jamaicensis jamaicensis*). The USFWS is proposing to protect the eastern black rail, a small secretive marsh bird native to the United States, as a threatened species under the Endangered Species Act (ESA). The Species Status Assessment states that the eastern black rail is in decline and will continue to decline unless the Service and its partners collaborate to conserve the subspecies and work to restore populations. This report provides a biological risk assessment using the best available information on threats to the subspecies and evaluates its current condition.

The Biological Risk Assessment (USFWS, 2018) concluded the eastern black rail faces threats from multiple factors such as habitat loss due to continued alteration and loss of wetland habitats; other threats include increased sea level rise and associated tidal flooding, increased temperatures, decreased precipitation, increased drought, and severe weather events producing flooding. In the northeastern United States, the eastern black rail is typically found in Atlantic Coast salt and brackish marshes, with dense cover of salt meadow cordgrass (*Spartina patens*); smooth cordgrass (*S. alterniflora*); big cordgrass (*S. cynosuroides*); coastal saltgrass (*Distichlis spicata*); black needlerush (*Juncus roemerianus*); blackgrass (*J. gerardii*); and chairmaker's bulrush (*Schoenoplectus americanus*). Birds may also occupy the more upland extents of these marshes, which include shrubs such as Jesuit's bark (*Iva frutescens*) and eastern baccharis (*Baccharis halimifolia*), and the invasive common reed (*Phragmites australis*). Within the northeastern United States, historical (1836-2010) records document the eastern black rail as present during breeding months from Virginia to Massachusetts, with 70% of historical observations (773 records) in Maryland, Delaware, and New Jersey (Watts 2016, p. 22). The latter three states are considered historical strongholds for eastern black rail in this region of the United States (the Northeast) as well as across the subspecies' entire breeding range (Watts 2016, p. 22), due to the total number and frequency of observations reported over time. The distribution of the recent records points toward a substantial contraction in the subspecies' range southward of approximately 450 kilometers (280 miles), with vacated historical sites from 33 counties generally occurring from the Newbury marshes in Massachusetts to Ocean County, New Jersey. Based on a population estimate from 2016, New Jersey is believed to support the highest abundance of eastern black rails remaining in the Northeast with an estimated 40-60 breeding pairs.

Finally, the IPaC results from July 9, 2018, confirm there are no critical habitats or refuge lands or fish hatcheries within the project area under the USFWS jurisdiction.

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act requires all federal agencies to consult with the NMFS on all actions, or Proposed Actions, permitted, funded, or undertaken by the agency that may adversely affect Essential Fish Habitat (EFH). NMFS designates EFH to protect and conserve the habitats of marine, estuarine, and anadromous finfish, mollusks, and crustaceans. EFH is broadly defined to include “those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” Habitat Areas of Particular Concern (HAPC) are a subset of EFH and represent habitat types or geographic areas identified as priorities for habitat conservation, management, and research. These areas play important roles in the life history of managed species and/or are especially vulnerable to degradation from human activities. The HAPC designation does not confer specific habitat protections but can focus habitat conservation efforts (Mid-Atlantic Fishery Management Council 2016).

The proposed action will contribute to the restoration of diadromous fish stocks that are of regional and national significance. The National Oceanic and Atmospheric Administration National Marine Fisheries Service has documented the decline of both river herring and American eel, precipitating petitions to list these species under the Endangered Species Act. Regionally, these species are prey for important target species, including bluefish and striped bass, and a wide *range of birds*, other fish and marine mammals. River herring provide critical forage to these and other important target species along coastal river mouths and tidal reaches during the spring herring run and when the juvenile herring return to Long Island Sound in the early fall.

The project area was historically tidal wetlands along the shoreline of Shooting Island. As a result of significant erosion, wave action, sea level rise and subsidence, the island is substantially smaller than it was, and the area of tidal wetlands and intertidal shallows – juvenile fisheries habitat - has been significantly reduced.

Migratory Bird Treaty Act

Migratory birds are protected under the MBTA (40 Stat 755 as amended; 16 USC 703-712). The MBTA is a federal law making it unlawful to pursue, hunt, take, capture, kill, or sell birds listed therein. Nonnative species are not protected under the MBTA (USFWS 2015).

Migratory birds may use the Project area for breeding or overwintering, during migration, or may be present year-round. Marshes provide important foraging habitat for migrant shorebirds, especially in spring. During the winter months, thousands of migratory birds find refuge in marsh

areas including bufflehead (*Bucephala albeola*), American black duck, horned grebe (*Podiceps auritus*), long-tailed duck (*Clangula hyemalis*), red-breasted merganser (*Mergus serrator*), common loon (*Gavia*), double-crested cormorant (*Phalacrocorax auritus*), and greater and lesser scaup (*Aythya marila* and *Aythya affinis*) (New Jersey Audubon 2018).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 USC 668-668c) prohibits take of bald (*Haliaeetus leucocephalus*) and golden (*Aquila chrysaetos*) eagles, including their parts, nests, or eggs. The definition also covers impacts that result from human-induced alterations initiated around a previously used nest site while eagles are not present (USFWS 2016).

The New Jersey Bald Eagle Project maintains a staff of biologists and volunteers to observe and locate bald eagle nests and territories. As documented on the NJDEP GeoWeb maps, accessed on July 8, 2018, there are no Bald Eagle or Golden Eagle occurrences on, or proximate to, the subject site.

Fish and Wildlife Conservation Act

The 1988 amendment to the Fish and Wildlife Conservation Act mandates that the USFWS “identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA of 1973.” These species are designated as Birds of Conservation Concern and include nongame birds; gamebirds without hunting seasons; and ESA candidate, proposed, or recently delisted species (USFWS 2015b). USFWS Birds of Conservation Concern that may be present in the area include 43 species of shorebirds (refer to Appendix C) for the complete list.

The proposed action seeks to restore and enhance tidal wetlands, foraging habitat for these birds. All of the bird species listed breed elsewhere or within the project area during the summer months. The proposed action is scheduled to be implemented in early fall – through December. The timing of the restoration activities outside of the breeding season will ensure minimal adverse impacts to birds of conservation concern.

3.4.2.2 State-Listed Species

State-listed endangered species are defined as those species whose prospects for survival in New Jersey are in immediate danger due to loss or change of habitat, overexploitation, predation, competition, disease, disturbance, or contamination. State-listed threatened species are defined as those that may become endangered if adverse conditions begin or continue to deteriorate.

The NJDEP GeoWeb mapping and the USFWS database (accessed July 8, 2018) indicate the

following state-listed threatened or endangered species inhabiting the wetlands area around the Shooting Island:

- Black skimmer (*Rynchops niger*) – State Endangered
- Cattle egret (*Bubulcus ibis*) – State Threatened
- Black-crowned Night-heron (*Nycticorax nycticorax*) – State Threatened
- Least tern (*Sternula antillarum*) – State Endangered
- Yellow-crowned Night-heron (*Nyctanassa violacea*) – State Threatened
- Osprey (*Pandion haliaetus*) – State Threatened

All of these species are shorebirds that may utilize Shooting Island wetlands for nesting and/or foraging. However, the restoration activities are proposed for fall – winter, outside of the breeding season for all of these species. The proposed action is intended to restore and enhance wetland habitat used by all of these birds for foraging.

3.5 Human Health and Public Safety

There are past documented and imminent threats of flooding to the City of Ocean City during severe storm events. Hurricane Sandy cost Ocean City approximately \$8,300,000 in damages to public facilities. The damage to private homes and businesses is unknown. During Hurricane Sandy and other storms such as Tropical Storm Irene and Hurricane Harvey, homeowners experienced flood damage and many roadways were impassible.

After initial damages to property, a 2015 study funded by the New Jersey Department of Health found that residents of New Jersey affected by Hurricane Sandy continued to be affected by the storm in the form of unfinished repairs, disputed claims, and recurrent mold, which are associated with mental health distress, post-traumatic stress disorder (PTSD), and depression (New Jersey Environmental Justice Alliance 2015). Mold was associated with both asthma and with mental health distress. For New Jersey residents whose homes were damaged by Hurricane Sandy, 27 percent experienced moderate or severe mental health distress and 14 percent reported the signs and symptoms of PTSD even 2.5 years after the storm. Additionally, children in hurricane-damaged homes are at higher risk for mental health problems than children whose homes suffered no damage (New Jersey Environmental Justice Alliance 2015).

3.6 Cultural Resources

Section 106 of National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800) outlines the process by which federal agencies are required to determine the effects of their undertakings on historic properties. The term “historic property” refers to cultural resources that have been determined eligible for listing, or are listed, in the National Register of Historic Places

(NRHP). Historic properties may include archaeological sites, historic resources, or properties of traditional cultural or religious importance to tribes. Impacts to historic properties could occur from a project if there were an alteration to the characteristics of a property that qualify it for inclusion in the NRHP.

The grantee has consulted, via certified letter on May 29, 2018, with the State of New Jersey State Historic Preservation Office (SHPO) on the Proposed Action. A June 28, 2018, response was received from SHPO concurring that there are “no historic properties affected” within the Project’s area of potential effects. Additionally, a December 12, 2017, email from received from the SHPO stating, “there are no buildings, structures, sites, objects, or historic districts on or adjacent to the project location that are listed on, or that have been identified as eligible for listing on the New Jersey or National Registers of Historic Places. Although the project setting is sensitive for archaeological sites, based upon a review of the information on file with the SHPO, the project only has a low potential for archaeological remains. Consequently, the SHPO does not recommend further consideration prior to permit issuance.” Copies of these correspondence are included in Appendix B.

Finally, Native American tribes were contacted via certified mail, seeking assistance in identifying historic properties in the project area and assessing potential impacts. The Delaware Nation, Delaware Tribe Historic Preservation Office and Stockbridge Munsee Community Band of Mohican Indians were contacted under section 106 of the NHPA. To date, no responses have been received. Copies of these correspondence are included in Appendix B.

3.7 Socioeconomics, Environmental Justice, and Protection of Children

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

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, seeks to protect children from disproportionately incurring environmental health risks or safety risks that might arise as a result of federal policies, programs, activities, and standards. Environmental health risks and safety risks include risks to health and safety attributable to products or substances that a child is likely to come in contact with or ingest. For a project to affect environmental justice (EJ) populations or children, significant adverse environmental impacts must fall disproportionately upon EJ populations or children within the affected area.

According to the NJDEP Office of Environmental Justice, the project location (in the City of Ocean City) is *not* a City with a disproportionally high minority or low-income rate. Also, according to the 2010 census, the area does not have a high proportion of minority populations

3.8 Land Use, Recreation, Public Safety, and Coastal Zone Management

3.8.1 Land Use and Recreation

The proposed development is located on the Great Egg Harbor Bay. Although the GEHB is designated as a Wild and Scenic River Corridor, as confirmed by the National Park Service, the designation ends at the confluence of the mouth of Patcong Creek, west of the Garden State Parkway. The designation ends approximately 1.82 miles from the project area.

The project area is an undeveloped bay island with no existing land uses other than specially permitted passive recreation, enforced by the DFW. There are no unique farmlands or forest lands on the island. The island consists primarily of tidally flowed wetlands that provide wildlife habitat but limited public access. Access is allowed only with DFW special permit.

3.8.2 Coastal Zone Management

The Coastal Zone Management Act (CZMA) of 1972 (16 USC 1451 et seq., as amended) provides assistance to states, in cooperation with federal agencies, or developing land and water use programs in coastal zones. Section 307 of the CZMA stipulates that where a federal project initiates reasonably foreseeable effects on any coastal use or resource, the action must be consistent to the maximum extent practicable with enforceable policies of the affected state's federally approved coastal management plan.

In response to the CZMA, New Jersey developed the New Jersey Coastal Management Program (NJCMP), which was approved by NOAA in 1980 and ensures coastal resources and ecosystems are conserved to enhance sustainable coastal communities. Subchapter 9 of the Coastal Zone Management rules outlines "special areas" (N.J.A.C. 7:7) found in the coastal zone that are regulated by NJDEP. These special areas are either naturally valuable, important to human use, hazardous, or sensitive to impacts. Any development within sites with special areas must demonstrate compliance with the special area rule.

The Project area is located within the New Jersey coastal zone and is subject to federal consistency review under the CZMA and NJCMP. The proposed action requires approval from the NJDEP under the CZMA and specifically, under the Waterfront Development Act and Wetlands Act of 1970. With the approval of these two permits, the NJDEP has concluded the proposed action complies with the Coastal Management Program and demonstrates compliance with all special rules.

3.9 Air Quality and Noise

3.9.1 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants determined by the USEPA to be of concern to the health and welfare of the general public and the environment and widespread across the United States. The primary pollutants of concern, called “criteria pollutants,” include carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂), ozone, suspended particulate matter less than or equal to 10 microns in diameter (PM-10), fine particulate matter less than or equal to 2.5 microns in diameter (PM-2.5), and lead. These pollutants are subject to both primary and secondary National Ambient Air Quality Standards (NAAQS). Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. State air quality standards cannot be less stringent than the NAAQS.

The USEPA determines air quality attainment status based on whether the air quality in an area meets (attains) the NAAQS. Areas that violate NAAQS are designated as nonattainment areas for the relevant pollutants. Areas with insufficient data are designated as attainment/unclassified areas and are treated as attainment areas under the Clean Air Act. Areas that were previously designated nonattainment and have demonstrated compliance with a NAAQS are designated “maintenance” for 20 years after the effective date of attainment, assuming they remain in compliance with the standard.

The Project area is within Cape May County, New Jersey, which is located in the Philadelphia-Wilmington-Atlantic City nonattainment area for the 2008 8-hour ozone standard; the area is also located in a maintenance area for the CO standard (USEPA 2018). On October 1, 2015, the USEPA lowered the 8-hour ozone standard from 0.075 parts per million (ppm) to 0.070 ppm (USEPA 2016b). The NJDEP urged the USEPA to adopt a single nonattainment area encompassing New Jersey, Connecticut, southeastern New York, eastern Pennsylvania, Delaware, Maryland, District of Columbia, and northeastern Virginia for the 2015 8-hour ozone standard (NJDEP 2016).

Furthermore, the entire state of New Jersey is in the Ozone Transport Region (OTR). States located in the OTR are required to implement additional requirements to control pollutants that form ozone, which include oxides of nitrogen (NO_x) and volatile organic compounds (VOCs).

3.9.2 Noise

Sound is mechanical energy transmitted by pressure waves in media such as air or water. When the sound level becomes excessive, annoying, or unwanted, it is referred to as “noise.” Noise may be continuous (constant noise at a steady level), steady (constant noise with a fluctuating level), impulsive (having a high peak of short duration), stationary (occurring from a fixed source),

intermittent (at intervals of high and low levels), or transient (occurring at different levels).

Noise levels are quantified using decibels (dB), which are units of sound pressure. The A-weighted sound level, expressed as dBA, is an expression of the relative loudness of sounds in air as perceived by the human ear and is usually used to quantify audible sound and its effect on people. The State of New Jersey Noise Control Act of 1971 authorized the NJDEP to develop regulations related to noise control and abatement (N.J.A.C 7:29). Local noise ordinances cannot be less stringent than the state regulations, but local municipalities can make changes to the state ordinance and submit them for approval by NJDEP. NJDEP established outdoor sound level standards of 50 dBA during nighttime (10:00 p.m. to 7:00 a.m.) and 65 dBA during daytime (7:00 a.m. to 10:00 p.m.) for receiving residential properties. For commercial, public service, non-residential, and community service facilities, the receiving outdoor sound level standard is 65 dBA 24 hours a day (NJDEP 2014, 2016).

The City of Ocean City has a municipal noise ordinance (Ocean City, NJ Ordinance 15-82) that defines acceptable durations of construction during specific times of the year. The proposed action will comply with all City ordinances; construction vehicles and access will be compliant with City, County and NJDOT guidelines.

Existing ambient noise levels (background noise levels) are the sounds from natural and artificial sources present at the time a sound measurement is taken. The magnitude and frequency of background noise at any given location may vary considerably over the course of a day or night and throughout the year. The variations are caused in part by weather conditions, seasonal vegetative cover, and human activity.

3.10 Sea Level Rise

The Project area is located within the Great Egg Harbor Bay in New Jersey and is vulnerable to increased weather intensity and sea level rise.

The historic rate of sea level rise along the New Jersey coast over the past century was 0.16 inch per year (NOAA), while predicted future rates are expected to increase to 0.2 to 0.4 inches per year over 2010 to 2030 (Kopp et al. 2016). By 2050, the sea level is expected to rise by approximately 1.4 feet along the New Jersey shore, and by 2100 it is projected to rise by 2.3 to 3.4 feet, depending on emission levels (Kopp et al. 2016).

The rise in sea level will increase the baseline for flooding from coastal storms and therefore impacts of coastal storms (Kopp et al. 2016). The areas exposed to waves are likely to expand inland, with an increasing amount of property becoming exposed to the hazard in developed shoreline areas in the future.

The average temperature in New Jersey has warmed by about 3 degrees Fahrenheit in the last century, and heavy rainstorms are more frequent. Average annual precipitation in New Jersey has increased 5 to 10 percent in the last century, and precipitation from extremely heavy storms has increased 70 percent in the northeastern United States since 1958 (USEPA 2016). In the 1980s there were two major disaster declarations in New Jersey from events such as hurricanes and nor'easters, as compared to seven in the 1990s, eight between 2000 and 2009, and eleven to-date between 2010 and 2018 (FEMA 2018, Newark Water Group 2014). Climatologists predict that strong storms (such as Hurricane Sandy) are likely to become more prevalent as a result of increased weather intensity.

Higher water levels associated with sea level rise are eroding beaches, submerging low lands, exacerbating coastal flooding, and increasing the salinity of estuaries and aquifers. In the coming decades, coastal and inland flooding is likely to increase, harming coastal and inland ecosystems, disrupting fishing and farming, and increasing risks to human health (USEPA 2018).

4.0 ENVIRONMENTAL CONSEQUENCES

Section 4 summarizes the environmental effects to each resource described in Section 3 under each alternative. The following resource areas dismissed from further analysis were presented previously and are not restated herein: flood zones; surface water and hydrology; cultural resources; socioeconomic, environmental justice and protection of children; coastal zone management; air quality and noise; and, sea level rise. Only those resources that are affected in important ways by the proposed action are discussed herein.

4.1 Soils, Sediment and Topography

Introduction

Historical remote sensing data exist that highlight the significant degradation of Shooting Island that has occurred over the last 80-plus years. Figure 1 of Attachment 5 illustrates this significant land loss with the 1930 and 1978 historic footprint of Shooting Island overlaid on a 2012 aerial photo. In the areas targeted for living shoreline construction, the shoreline has receded approximately 60 feet since 1978. In some locations, the shoreline has eroded such that only a thin marsh fringe protects interior ponded areas of the island. If these marsh fringe areas are breached, the interior marsh on Shooting Island would likely suffer accelerated erosion, potentially leading to substantial land loss.

Historical aerial images also show the expansion of unvegetated ponded areas in the interior of the island, which are indicative of poor drainage, and an increase in areas of lower elevation that are more susceptible to sea level rise (SLR). Estimated SLR within the project area is approximately 1 to 3 feet over a 100-year time span, depending on the assumed SLR scenario.

The Shooting Island proposed action of wetland creation/restoration through the placement of sill and oyster castle, including spacing between structures and “windows” to facilitate movement of water and fish, is not expected to result in significant adverse impacts to the soils, sediment, or topography of the island. No grading, dredging or other disturbances to the marsh surface are proposed. Topography of the island will be beneficially impacted by creation of a new shoreline, depositional sedimentation and reduced erosional forces.

No Action Alternative

The No Action alternative would result in the continued erosion and subsidence of Shooting Island and eventually, the island and its tidal wetland habitat will be substantially lost, leaving only the CDF, by 2100.

Proposed Action

No direct or indirect adverse impacts to soils, sediment and topography are expected as a result of the proposed action. Beneficial impacts of the proposed action will be the restoration of the historic location of the shoreline; accretion of sediment behind the sill; and, reduced wave action resulting in reduced erosional forces.

4.2 Water Resources and Wetlands

No Action Alternative

The no action alternative will result in the continued erosion of the shoreline of Shooting Island, resulting in continued sedimentation of the water column and the eventual loss of approximately 150 acres of tidal wetlands.

Proposed Action

The proposed action will result in the protection and enhancement of over 100 acres of wetlands and the restoration of significant fisheries nursery habitat. Shooting Island has experienced significant erosion over the past years and, in combination with increased weather intensity and sea level rise is expected to ultimately disappear without intervening actions.

The Proposed Action seeks to promote flood resiliency and protect the City of Ocean City by reestablishing the historic land mass boundary of Shooting Island. Although the Project area is mapped as coastal wetlands and regulated under the Coastal Wetlands Act of 1970, there is no existing wetland vegetation meeting the definition of jurisdictional wetland and the area is currently open water. Mapped coastal wetlands are regulated based on a promulgated line drawn in 1970 and not based on field conditions (NJDEP).

The proposed approximate sill establishment is expected to result in the encouragement of natural accretion behind the sill, restoring areas of mapped coastal wetlands. No disturbance to wetland vegetation is proposed as a result of the shoreline restoration project.

4.3 Biological Resources and Vegetation

No Action Alternative

The no action alternative will result in the continued loss of tidal wetlands and their associated wildlife habitat for fisheries nursery habitat and foraging shorebirds. Additionally, the no action alternative results in continued erosion of the island and sediment discharge into the water column, adversely impacting water quality.

Proposed Action

All restoration activities are proposed to take place outside of any critical life cycle seasons for threatened or endangered species. Appropriate best management practices and other mitigative measures will be implemented to minimize or avoid adverse impacts to any potential threatened or endangered species and/or documented habitat. Silt curtains, hay bales, timing restrictions and turbidity barriers are all examples of best management practices that may be implemented during construction.

The proposed action has been reviewed by the NJDEP and USACE and found to be consistent with the applicable rules and policies. The overall benefit of the project, protecting public health, safety and property, outweighs the minimal adverse impacts to open water and benthic habitat. The proposed action will result in the protection and enhancement of approximately 150 acres of tidal wetlands and restore the shoreline of Shooting Island to 1977 conditions.

The proposed action will restore the historic island shoreline and restore fisheries habitat. It is recognized the proposed action will result in the filling and disturbance of open water and benthic habitat. However, the project area was historically not benthic nor open water habitat and the proposed action seeks to restore the area to historic conditions. The proposed action will result in the increased area of fisheries nursery habitat, necessary for spawning, breeding, feeding and growth to maturity of finfish. The proposed oyster castles are intended to increase the density and abundance of shellfish to an area that historically was prime shellfish habitat which has declined over the years. The project is proximal to one of the few remaining oyster seed production areas in the state leading to an expectation for potential recruitment. The proposed action seeks to restore habitat using NMFS, USFWS, NJDEP and DFW accepted design methods and guidelines and specifically included design elements recommended by the NMFS and the USFWS for the protection of EFH.

The restoration activities would be conducted during the fall and winter months, outside of any migration of shorebirds, horseshoe crab nesting; rufa red knot migration and anadromous fish migration. There are no expected occurrences or use of the project area during restoration activities by state or federally listed threatened or endangered species

4.4 Human Health and Safety

No Action Alternative

The no action alternative will result in continued flooding impacts to the City of Ocean City and threats to life and property.

Proposed Action

The proposed action will result in improved flood resiliency to the City of Ocean City by attenuating wave action and dissipating storm events over the bay island.

The City of Ocean City has a municipal noise ordinance (Ocean City, NJ Ordinance 15-82) that defines acceptable durations of construction during specific times of the year. The proposed action will comply with all City ordinances; construction vehicles and access will be compliant with City, County and NJDOT guidelines.

4.5 Land Use, Recreation, Public Safety, and Coastal Zone Management

No Action Alternative

The no action alternative will result in adverse effects to the public safety of Ocean City. The continued erosion and subsidence of Shooting Island results in increased flooding impacts, a threat to the health and property of the community, including residential, commercial, and recreational facilities.

Proposed Action

The proposed action will result in improved flood protection for the City of Ocean City, a direct and indirect benefit to the health and property of the community. Also, the project action has been reviewed by the NJDEP and found to be consistent with the Coastal Zone Management rules.

5.0 CUMULATIVE EFFECTS

CEQ regulations stipulate that a cumulative effects analysis be conducted to consider the potential impacts to the environment potentially resulting from the incremental impact of a proposed action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Four known actions in close proximity to the Project area that would occur during the same time period as the Proposed Action are dredging and upgrading the City of Somers Point Higbee Marina facility, improving the Gateway Marina parking lot, and creation of a living shoreline embankment at Somers Point using dredge materials from Higbee Marina.

Upgrades to the Higbee Marina would be funded by a grant from the USFWS and their Boating Infrastructure Grant Program. This money is administered by the New Jersey Department of Transportation (NJDOT), Office of Maritime Resources, through their Marina Infrastructure Improvement Program. Upgrading Higbee Marina involves removing the existing “U-shaped” dock arrangement and approximately 48 12-inch piles and replacing these with 48 new pilings, floating dock systems, and a fixed pier to be used for water-dependent activities such as kayak rentals, bait sales, and fishing equipment rentals. Approximately 26 docking spaces for boats of 26 feet or more in length would be developed, of which 24 would be dedicated to use by transient boaters. The two other boat slips would be reserved for one pontoon-type “day fishing” boat and a water taxi. This project is anticipated to occur during a similar timeframe as the Proposed Action.

Dredging of the Higbee Marina pier site and use of the dredge material to create a living shoreline embankment in Somers Point would be funded by a Program grant. The City of Somers Point is planning to dredge an area of approximately 150 feet long and 135 feet wide, and 125 feet long and 86 feet wide. Dredging is proposed to be completed by mechanical dredging and would take place at the shoreline using a long reach excavator or by working off of a barge. A maximum total of 6,896 cy of material would be dredged from a maximum area of approximately 0.9 acre, to a maximum depth of 6 feet below mean low water (–8 feet North American Vertical Datum of 1988 [NAVD 88]). Dredging is anticipated to take 1 month. The dredged material would be moved to a staging area in the adjacent city-owned William Morrow public beach parking lot using a long reach excavator or barge. The dredged materials would be contained by Jersey barriers and silt fencing, which would be placed around the perimeter of the staging/dewatering area. Once dewatered, dredged material would be transported via tarped dump trucks to the Gateway Marina parking lot site and the Somers Point living shoreline embankment site.

Clearing and improvements for the Gateway Marina parking lot would be funded by the City of Somers Point. For the parking lot improvements, the city proposes to place dredged material from maintenance dredging at the Higbee Marina pier onto an existing parking lot at Gateway Marina along Patcong Creek to elevate it by approximately 3.5 feet above grade. The parking lot is approximately 34,280 square feet and is located in an upland area. It currently contains two buildings on piles and is covered with stones. The stones would be removed and stockpiled for

later use, and the buildings would remain. Approximately 4,485 cy of dredged material would be mixed with approximately 672 cy of Portland cement to obtain a maximum moisture content of 30 percent to provide structural stability. Material would be placed on the parking lot surface and underneath the buildings. During placement, the parking area would be contained by Jersey barriers and silt fencing. The stockpiled stones would then be placed back onto the surface of the parking lot. This area would continue to be used as a parking lot following these improvements. This project is anticipated to occur during a similar timeframe as the Proposed Action.

The City of Somers Point is planning to install a living shoreline embankment along Somers Point-Mays Landing Road. The length of the embankment would be 1,600 linear feet along the fringe of the existing marsh. Dredged material would be placed within the 50-foot riparian zone, which was determined from the mean high-water line according to N.J.A.C. 7:13-1.2. The embankment would have a 1-foot-wide top (at various elevations) and a 2 to 1 slope (height to width). Prior to dredge material placement, approximately 16,600 square feet (0.38 acre) of the living shoreline embankment site that is currently overrun with invasive common reed (*Phragmites australis*) and Japanese knotweed (*Polygonum cuspidatum*) species would be removed at 6 inches below the ground at the root system. A permeable fabric would be installed below the embankment to help prevent the invasive species from returning. The living shoreline embankment would be created using 2,411 cy of dredged sediments transported from the Higbee Marina dredge site staging area via tarped dump trucks after sufficient dewatering. A maximum of five dump trucks and 50 truckloads would operate per day, for up to 10 days. Dredged and dewatered material would be placed using two bulldozers. Silt fences would be installed along the marsh edge to contain the material and prevent erosion. The living shoreline embankment site would then be graded as needed. Placement and grading of the embankment is anticipated to take 1 month, with an additional month for planting. After material placement and grading, topsoil would be applied to a uniform depth of 4 inches. Permanent stabilization of the embankment would be conducted by applying lime and fertilizer into the topsoil with a disc, springtooth harrow, or other suitable equipment. Native vegetation would be planted on the prepared embankment in containers or plugs. This project is anticipated to occur during a similar timeframe as the Proposed Action.

There are no anticipated significant direct or indirect effects from the proposed actions on any particular resource. Moreover, all proposed restoration activities shall occur outside of any migration of fish or shorebirds. There are no significant adverse impacts to state or federally listed threatened or endangered species in the project area. The cumulative benefits of the restoration will result in increased flood resiliency and protection of Ocean City property and life. Cumulative effects from other projects in the area in combination with the subject restoration are expected to be minimal. The proposed restoration is expected to be completed in less than two months, during off-season fall and winter months. The location of the restoration in the Great Egg Harbor Bay distances the project from other cumulative noise impacts.

The dredging and material placement projects and living shoreline developments, in combination

with the Proposed Action, would result in increased resiliency of this coastal area of New Jersey and more effective management of flooding, storm surge, and sea level rise, resulting in long-term benefits to local communities.

These projects and other past, present, and reasonably foreseeable future actions identified within, or in close proximity to, the Project area are shown in Table 5-1. Upgrading and dredging the Higbee Marina facility, improving the Gateway Marina parking lot, and creation of a living shoreline embankment at Somers Point using dredge materials from Higbee Marina, and the other actions shown in Table 5-1 were considered in the cumulative effects analysis.

The Route 52 causeway bridge replacement has been completed. Upgrades to the Higbee Marina facility are planned to be completed by March 31, 2019. These projects, in combination with the Proposed Action, could result in positive impacts to recreation and tourism, as these are city attractions and local residents and tourists could more easily access the area by different means.

In summary, long-term beneficial cumulative effects are expected as a result of the Proposed Action in combination with past, present, and reasonably foreseeable future actions. The future actions are trying to restore and improve marsh elevations to promote and sustain healthy marsh vegetation composition and keep pace with sea level rise. The purpose of the Proposed Action of this project is ultimately to restore and add armor protection to Shooting Island, which will protect over \$300,000,000 in real estate from the effects of increased weather intensity, sea level rise, and severe storm events.

Table 5-1 Projects Included in the Cumulative Effects Analysis

Project Name	Project Proponent	Actions	Status
Upgrading the Higbee Marina facility	City of Somers Point	Removal of existing dock and piles and replacement with new pilings, floating dock systems, and a fixed pier. Approximately 26 docking spaces for boats of 26 feet or more in length.	USACE and NJDEP permits; construction pending
Dredging the Higbee Marina facility	City of Somers Point	Dredging approximately 6,896 cy of material from approximately 0.9 acre to 6 feet below mean low water.	USACE and NJDEP permits; construction pending
Gateway Marina Parking Lot Improvements	City of Somers Point	Placement of approximately 4,485 cy of dredged material to existing parking lot to elevate it by approximately 3.5 feet above grade.	USACE and NJDEP permits; construction pending
Creation of Living Shoreline Embankment	City of Somers Point	Beneficial reuse of dredge material from Higbee Marina to install 1,600 linear feet of living shoreline.	USACE and NJDEP permits; construction pending

Project Name	Project Proponent	Actions	Status
Placement of Dredged Material at Seaspray Road and 12th Street	Ocean City (grantee)	Beach Replenishment - Placement of 1.3 million cy of sand to beaches between Seaspray Road and 12th Street in Ocean City and stockpiling sand for the rebuilding of dunes in areas near Fifth Street and 10th Street. Work was completed in December 2017.	Complete
Rebuilding Sand Dunes at Fifth Street in Ocean City	Ocean City (grantee)	Placement of dredged sand material from offshore of the beach (significant distance from the subject Project) to rebuild sand dunes at Fifth Street and between 10th Street and 12th Street. Work ongoing.	Ongoing
Route 52 Causeway Bridge Replacement	NJDOT	Replacement of the Route 52 causeway bridge and roadway section between Somers Point and Ocean City, including the elimination of the Somers Point Circle. Construction began in 2006 and is complete.	Complete
Development of Living Shoreline in Atlantic City	Atlantic City	Development of living shoreline in Atlantic City adjacent to Gardner's Basin to stabilize the shoreline, provide flood protection, and create wetlands habitat. Project funded by NFWF Grant Number 42279.	Completed
Atlantic Brigantine Blvd. Shoreline Stabilization	Atlantic City	Development of living shoreline along Brigantine Blvd. to increase coastal stabilization. Project funded by NFWF Grant Number 42279.	Completed

Sources: Bellano 2017; Dhir 2017; Marino 2017; New Jersey Department of Transportation 2013; Ocean City 2017, 2018.

6.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

6.1 Agency Coordination

Representatives of, and published documentation from, the following Federal, State, and local agencies, Tribes, and project team members were contacted and/or consulted during Project planning and the development of this EA.

- USFWS
- NOAA NMFS
- USACE
- NJDEP
- Stevens Institute of Technology (Design Guidelines)
- Partnership for the Delaware Estuary
- Delaware Nation (contacted; no response received)
- Delaware Tribe (contacted; no response received)
- Stockbridge Munsee Community (contacted; no response received)

Letters of support for the Project have been submitted to DOI and NFWF by the following entities (Appendix O):

- NJDEP
- Frank A. LoBiondo, Member of Congress
- New Jersey Association for Floodplain Management
- Jacques Cousteau National Estuarine Research Reserve
- Schedule Planning Solutions, LLC

6.2 Public Involvement

The Project has undergone local, state, and federal permitting processes, as described in Section 7 of this document. Each permit process requires extensive environmental and planning agency circulation, as well as ample public notice and involvement that provide opportunities for a wide variety of specialists, regulators, and residents to comment on and condition the Project's potential short-term and long-term impacts.

The USACE issued a pre-construction notification (PCN) regarding issuance of a USACE permit pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the CWA on April 5, 2018, to solicit comments and recommendations from the public; federal, state, and local agencies and officials; Native American tribes; and other interested parties in order to consider and evaluate the impacts of the proposed Project. Comments received are considered by the USACE when determining whether to issue, modify, condition, or deny a permit for the proposed Project (ACT Engineers, 2018).

Additionally, the land owner, NJDEP DFW held a public meeting on July 24, 2018, that allowed members of the public to share their comments on the proposed action. The meeting was advertised on the City of Ocean City website and in local publications. Although well attended, no written comments were received as a result of the meeting.

7.0 COMPLIANCE WITH FEDERAL, STATE, AND LOCAL LAWS

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

- Waterfront Development Individual Permit (NJDEP)
- Wetlands Act of 1970 Individual Permit (NJDEP)
- Water Quality Certificate (NJDEP)
- Coastal Zone Management Consistency Determination (NJDEP)
- State ESA Consultation (NJDEP)

- Department of Army Permit (USACE)
- NHPA Section 106 Consultation (NJDEP and Tribal HPOs)
- Federal ESA Consultation (USFWS and NOAA Office of Protected Resources)
- EFH Assessment/Consultation (NOAA NMFS)

Consultations with federal and state regulatory agencies and officials have been held to confirm the soundness of the Project and the ability to receive permits. Refer to Appendices A through N for agency consultation and permit authorizations received for this Project.

Consultations with regulatory agencies, including USFWS, NOAA NMFS, USACE, and state wildlife officials have been held to confirm the soundness of the Project and the ability to receive permits. Approvals have already been obtained from USACE, USFWS, NOAA NMFS, and NJDEP to ensure all work is compatible with the nesting needs of the red knot and horseshoe crabs. Refer to Appendix B for agency consultation and permit authorizations received for this Project. In addition, the USACE issued its Finding of No Significant Impact Decision Document on October 29, 2018.

8.0 LIST OF PREPARERS

The following contributed to the development of this EA:

U.S. Department of the Interior (DOI)

Name	Role
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City of Ocean City

Name	Role
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Frank Donato, Director of Financial Management, CFO Emergency Management Coordinator	Financial / grant oversight
George Savastano, PE, City Administrator	Project oversight

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Name	Role	Project Responsibility
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Alison Uno	NEPA Specialist	Environmental Assessment

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