APPENDIX D: STATE AND DISTRICT OF COLUMBIA ANALYSES

NORTH ATLANTIC COAST COMPREHENSIVE STUDY:
RESILIENT ADAPTATION TO INCREASING RISK

STATE CHAPTER

D-6: State of New Jersey

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I. Introduction

The purpose of the North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk (NACCS) is to catalyze and spearhead innovation and action by all to implement comprehensive coastal storm risk management (CSRM) strategies. Action is imperative to increase resilience and reduce risk from, and make the North Atlantic region more resilient to, future storms and impacts of sea level change (SLC). The U.S. Army Corps of Engineers (USACE) and National Oceanic and Atmospheric Administration's (NOAA) Infrastructure Systems Rebuilding Principles defines resilience as the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies.

The goals of the NACCS are to:

- Provide a risk management framework, consistent with and NOAA/USACE Infrastructure Systems Rebuilding Principles; and
- Support resilient coastal communities and robust, sustainable coastal landscape systems, considering future sea level and climate change scenarios, to reduce risk to vulnerable populations, property, ecosystems, and infrastructure.

The NACCS Main Report addresses the entire study area at a regional scale and explains the development and application of the NACCS State Coastal Storm Risk Management Framework from a broad perspective. This NACCS State Coastal Risk Management Framework Appendix discusses state-specific conditions, risk analyses and areas, and comprehensive CSRM strategies in order to provide a more tailored Framework for the State of New Jersey (NJ). Attachments include the New York-New Jersey Harbor and Tributaries Focus Area Analyses (FAA) Report and the New Jersey Back Bays FAA Report as well as the State of New Jersey response to the USACE State Problems, Needs, and Opportunities correspondence.

II. Planning Reaches

Planning reaches for New Jersey have been developed to offer smaller units than state boundaries from which CSRM and coastal resilient community decisions can be made. These planning reaches are based on natural and manmade coastal features, including shoreline type, USACE CSRM projects, and the 1 percent flood (Figure 1).

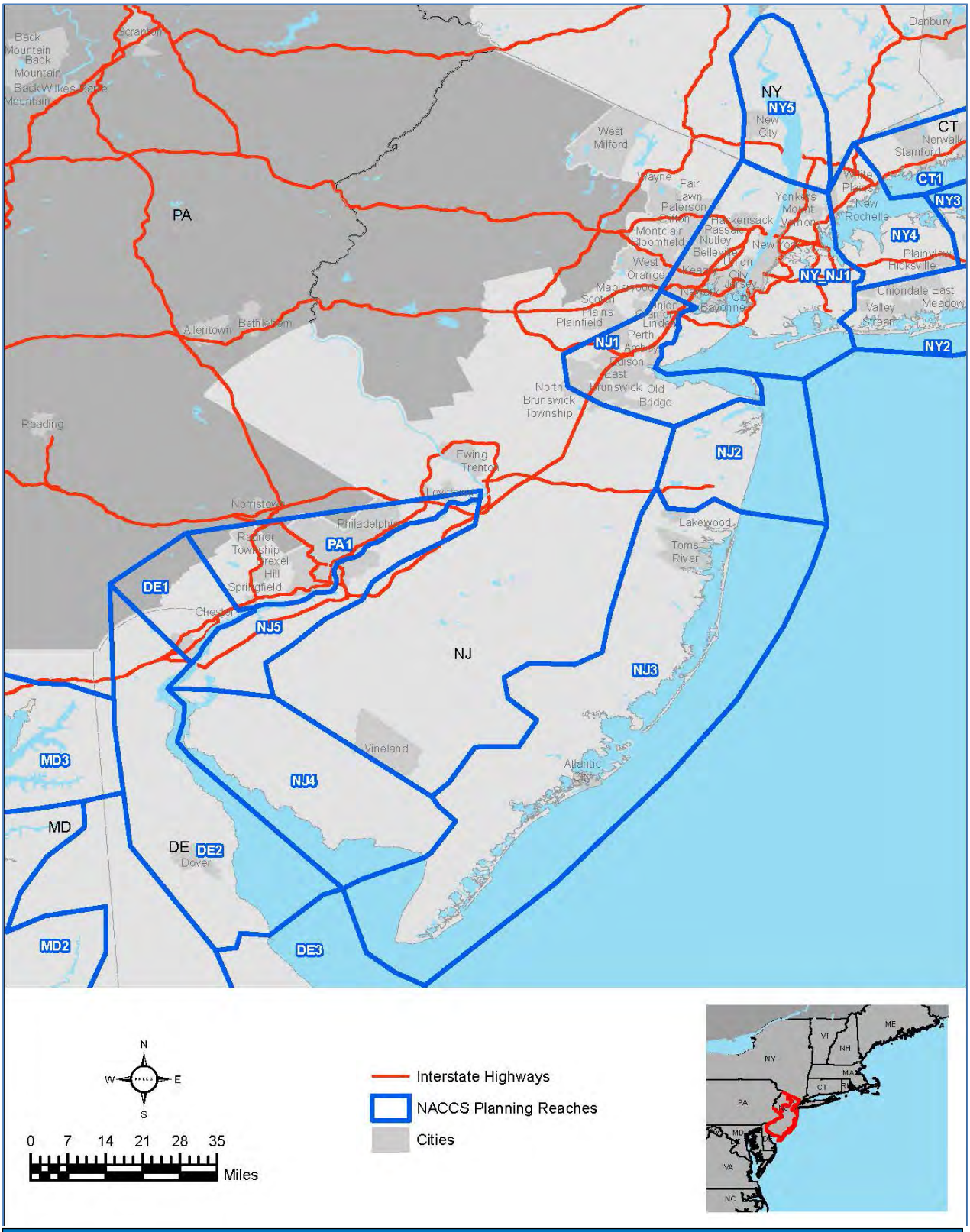

Figure 1. Planning Reaches for the State of New Jersey

There are five planning reaches in New Jersey, designated as NJ1-5. NJ1 includes areas of northeastern New Jersey, from the junction of the Kill Van Kull and Arthur Kill tidal straights south to the Raritan river mouth and east to Sandy Hook Bay peninsula. Major cities/towns include Elizabeth, Edison, New Brunswick, Perth Amboy, and Sayreville. NJ2 includes the Atlantic coast of Monmouth County, extending from the eastern edge of the Sandy Hook Bay peninsula south to the Manasquan Inlet. Major cities/towns include Asbury Park and Long Branch. NJ3 includes the largest stretch of New Jersey. This reach extends from Manasquan Inlet south to Cape May Point and north to Dennis Creek. Within NJ3 are Ocean, Bergen, Atlantic, and Cape May counties, and some of the major cities/towns include Mantoloking, Toms River, Seaside Heights, Surf City, Atlantic City, Ocean City, Sea Isle City, Avalon, Stone Harbor, Wildwood, and Cape May. NJ4 includes part of Cape May, Cumberland, and Salem counties along the Delaware Bay coastal section from Dennis Creek northwest to Killcohook National Wildlife Refuge in Salem County. Major cities/towns include Millville and Bridgeton, both of which are well inland. NJ5 includes the stretch of Delaware River northeast of Killcohook National Wildlife Refuge to Money Island. Major cities/towns include Pennsville, Penns Grove, Paulsboro, Gloucester City, Camden, Riverton, Delanco, and Burlington within Gloucester and Camden counties.

Additionally, New Jersey and New York share one planning reach. NY_NJ1 comprises the New York and New Jersey Harbor estuary within northeastern New Jersey and Southern New York. Major cities/towns include Newark, Jersey City, New York City (Manhattan, the Bronx, Brooklyn, Queens, and Staten Island).

III. Existing and Post-Sandy Landscape Conditions

III.1 Existing Conditions

The existing conditions are the conditions immediately after the landfall of Hurricane Sandy. This existing conditions analysis includes consideration of the population, supporting critical infrastructure, environmental conditions, inventory of existing CSRM projects and associated project performance during Hurricane Sandy, the Federal Emergency Management Agency (FEMA) and Small Business Administration response and recovery efforts, FEMA flood insurance claims, and shoreline characteristics that were vulnerable to coastal flood risk associated with Hurricane Sandy. Development of detailed existing conditions across the study area illuminates the vulnerabilities to storm damage that exist. This process helps to identify coastal risk reduction and resilience opportunities. The existing condition serves as the base against which all proposed risk reduction and resilience are compared. Further discussion of the existing conditions is provided in Appendix C – Planning Analyses.

The existing conditions for the State of New Jersey are summarized in that while coastal storm risk is managed along the Atlantic Ocean coast by a number of Federal coastal storm risk management projects, the back bay and Delaware Bay coasts are not well protected due to the limited number of coastal storm risk management projects. The existing conditions are further discussed herein through an analysis of the population and supporting critical infrastructure affected by Hurricane Sandy within the study area. Figure 2 and Table 1 summarize pertinent information regarding the population affected by Hurricane Sandy.

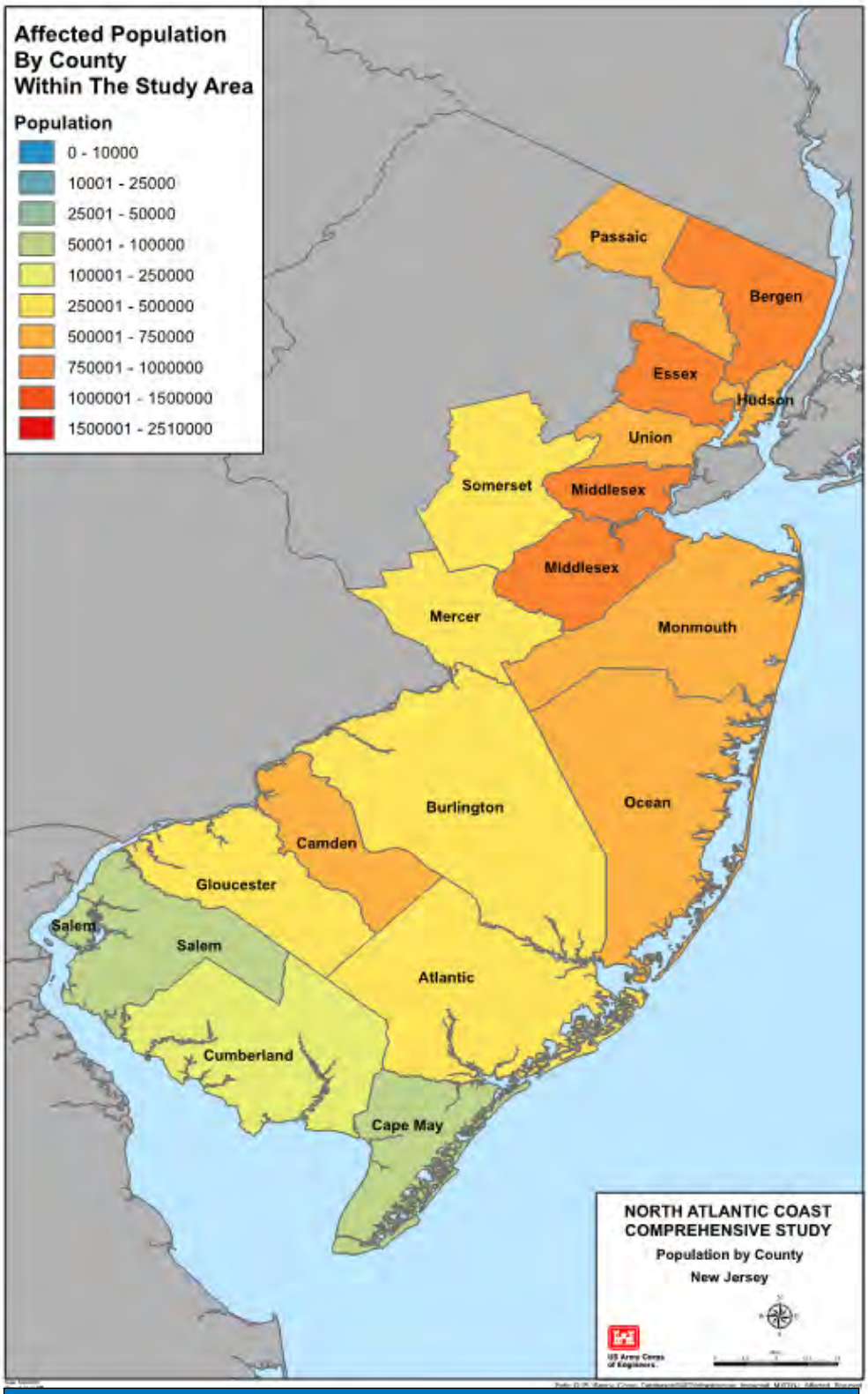

Figure 2. Affected Population by Hurricane Sandy for the State of New Jersey (2010, U.S. Census data)

Table 1. Affected Population by Hurricane Sandy for the State of New Jersey

County	Population
Atlantic	274,549
Bergen	905,116
Burlington	448,734
Camden	513,657
Cape May	97,265
Cumberland	156,898
Essex	783,969
Gloucester	288,288
Hudson	634,266
Mercer	366,513
Middlesex	809,585
Monmouth	630,380
Ocean	576,567
Passaic	501,226
Salem	66,083
Somerset	323,444
Union	536,499
Total Population Affected	**7,913,039**

Figure 3 and Table 2 summarize pertinent information regarding infrastructure affected by Hurricane Sandy. Critical infrastructure elements include sewage, water, electricity, academics, trash, medical, and safety.

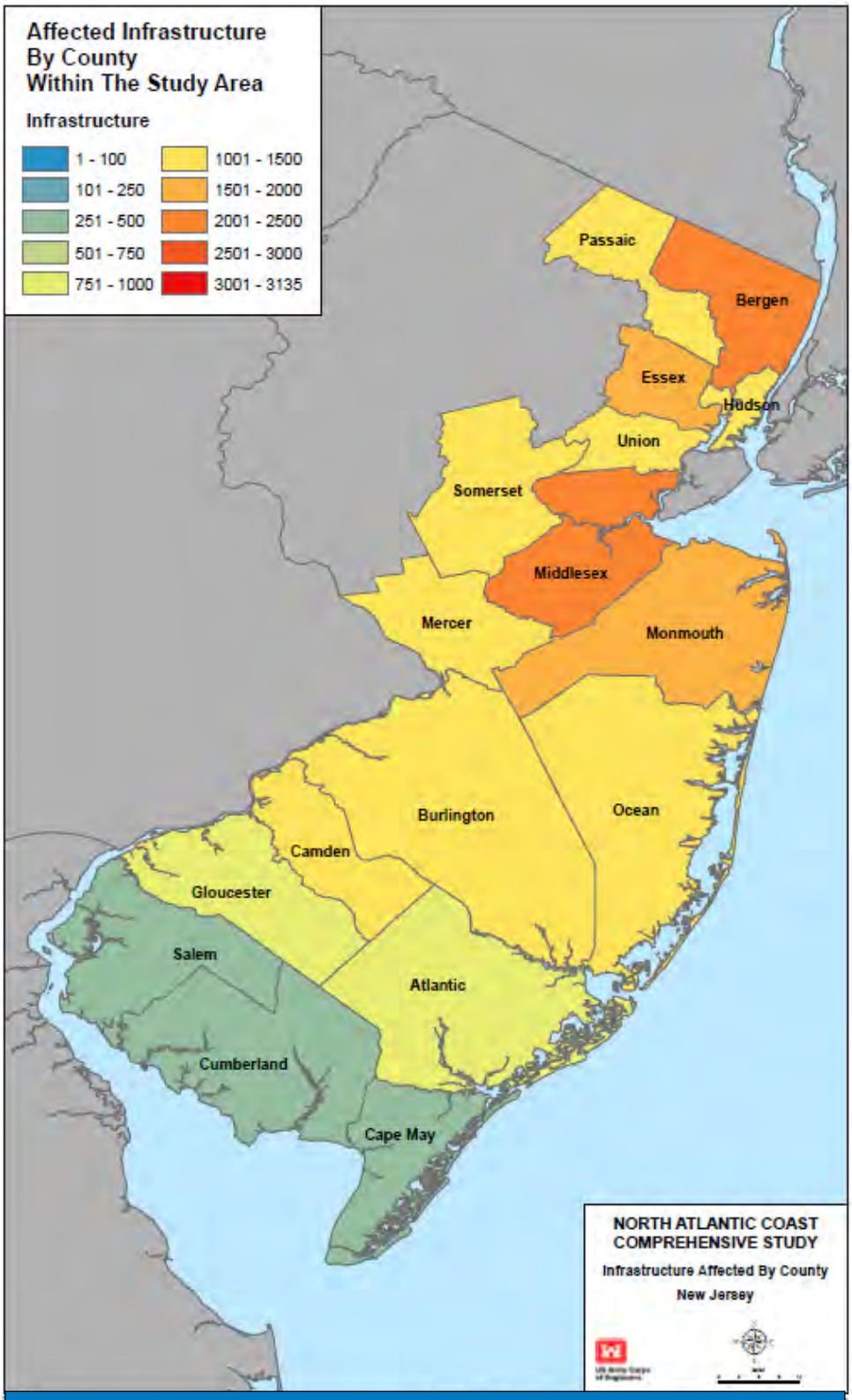

Figure 3. Affected Infrastructure by Hurricane Sandy for the State of New Jersey

Table 2. Affected Infrastructure Elements by Hurricane Sandy

County	Infrastructure
Atlantic	790
Bergen	2,484
Burlington	1,213
Camden	1,242
Cape May	355
Cumberland	484
Essex	1,836
Gloucester	752
Hudson	1,223
Mercer	1,002
Middlesex	2,159
Monmouth	1,739
Ocean	1,147
Passaic	1,150
Salem	366
Somerset	1,112
Union	1,353
Total Infrastructure Affected	**20,407**

A detailed discussion of the existing environmental conditions is provided in the Environmental and Cultural Resources Conditions Report.

III.2 Post-Sandy Landscape

The post-Sandy landscape condition is defined as the forecasted scenario or most likely future condition if no NACCS CSRM action is taken, and is characterized by CSRM projects and features, and socio-economic, environmental, and cultural conditions. This condition is considered as the baseline from which future measures will be evaluated with regard to reducing coastal storm risk and promoting resilience. A base year of 2018 has been identified as the year when USACE projects discussed below will be implemented or constructed.

USACE has identified 35 Federal projects in New Jersey are included in the post-Sandy landscape condition, 22 of which are CSRM projects (one under study), and 13 are navigation (NAV) projects (Figure 4). A complete list of existing USACE projects within the entire study area is presented in Appendix C – Planning Analyses.

The post-Sandy landscape condition also includes active (at the time of the landfall of Hurricane Sandy) state and local communities' CSRM projects in the State of New Jersey. Some of these projects may have been damaged during Hurricane Sandy. USACE understands that the State of New Jersey and the local communities have or are currently rebuilding and restoring the shoreline and damaged infrastructure and property to pre-Sandy conditions under emergency authorities and programs. Given this priority, and the apparent current lack of resources to commence new CSRM efforts at this time, USACE has made the assumption that the states' most likely future condition will be the pre-Sandy condition. The State of New Jersey was queried with regards to the statement's accuracy in a May 23, 2013 letter, and there was no disagreement as to the statement's accuracy.

Active State of New Jersey CSRM projects (at the time of the landfall of Hurricane Sandy) limited to beach nourishments were inventoried and mapped as shown on Figure 5. In addition, 134 smaller strictly publicly owned (municipal or state) seawalls, bulkheads, jetties, and revetments were identified in the New Jersey Shore Protection Study: Report of Limited Reconnaissance (USACE, 1990). These structures were not considered as part of the most likely future condition due to their condition, alongshore length, or structural height limitations. In addition, although groins were included in the aforementioned study, these structures were not considered as a structure that provides flood risk reduction capabilities.

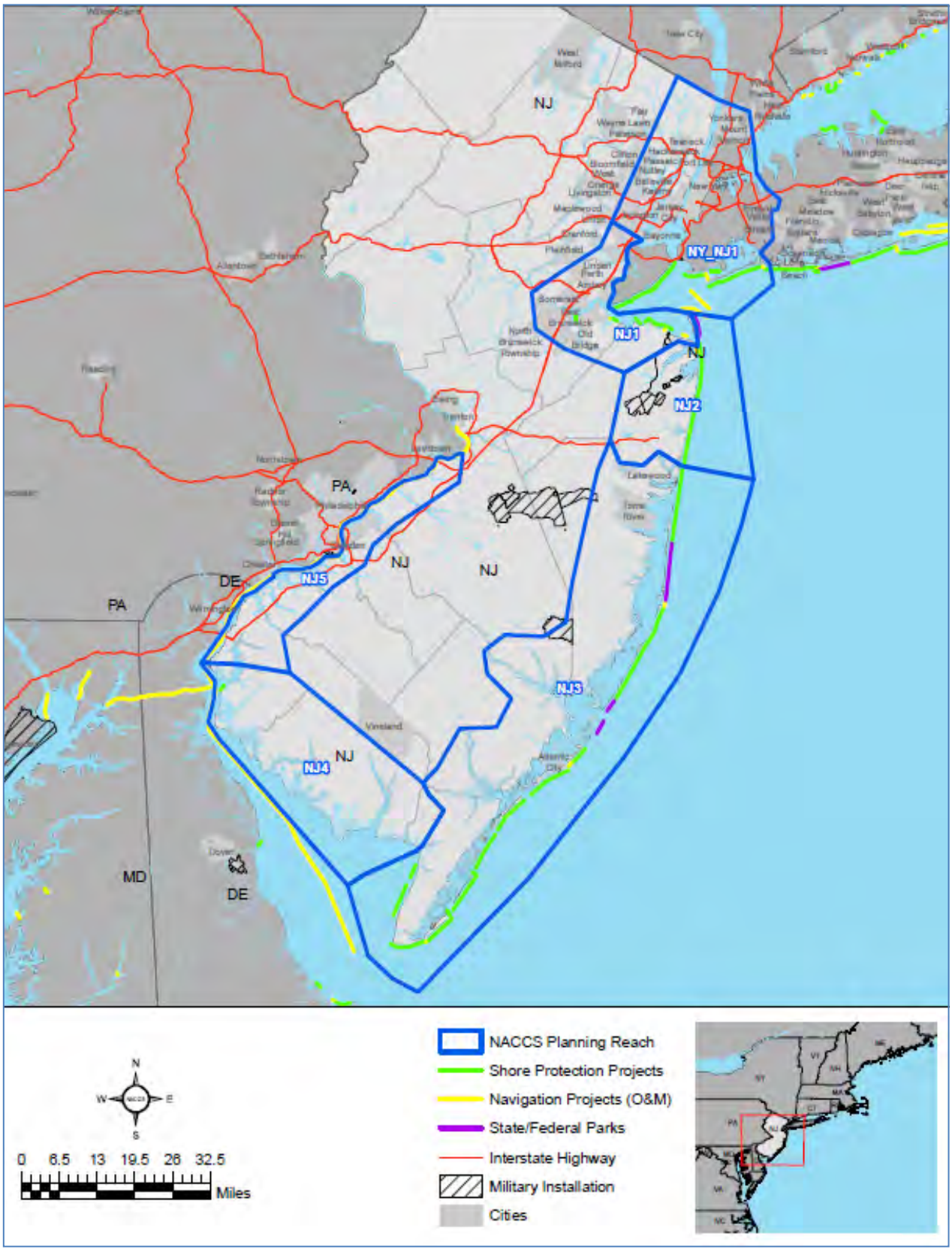

Figure 4. Federal Projects Included in the Post-Sandy Landscape Condition

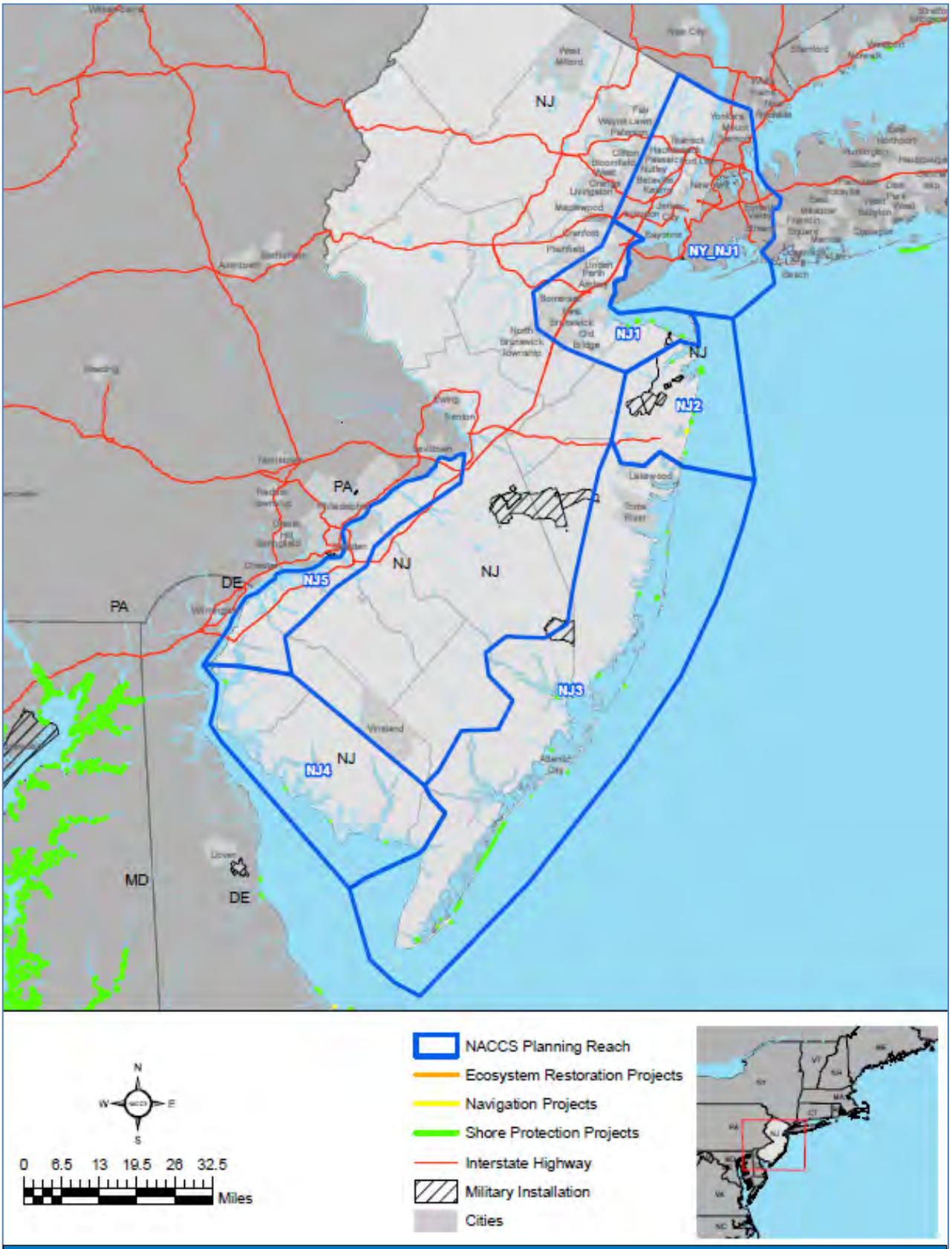

Figure 5. State Projects Included in the Post-Sandy Landscape Condition

Sea Level Change

The current USACE guidance on SLC (USACE, 2013) outlines the development of three scenarios: Low, Intermediate, and High (Figure 6). The NOAA High scenario (NOAA, 2012) is also plotted on Figure 6. The details of different scenarios and their application to the development of future, local, relative sea level elevations for the NACCS study area are discussed in the NACCS Main Report.

These USACE and NOAA future SLC scenarios have been compared to state or region specific SLC scenarios. The scenario presented in Miller et al. (2013) is frequently referenced, if unofficially, by various bureaus within the State of New Jersey, including the New Jersey Department of Environmental Protection (NJDEP) (Figure 6). Comparison of the USACE Low, Intermediate, and High and NOAA High relative SLC scenarios (for the Sandy Hook, NJ NOAA tide gauge) with the Miller et al. (2013) scenarios for the State of New Jersey indicates similar trends but some uncertainty in future water levels. Thus, importance should be placed on scenario planning rather than on specific, deterministic single values for future sea level change. Such SLC scenario planning efforts will help to provide additional context for state and local planning and assessment activities.

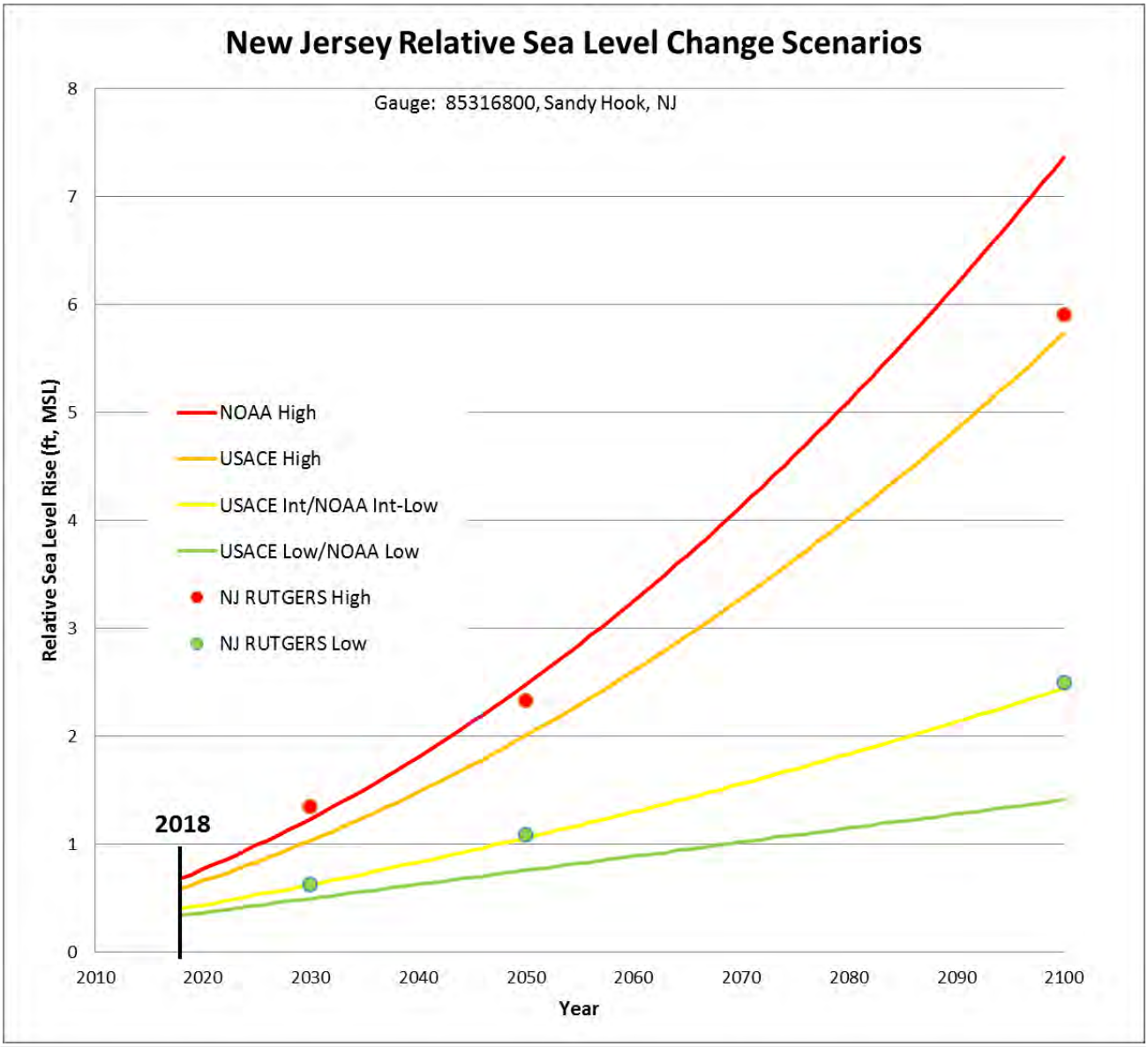

Figure 6. Relative Sea Level Change for New Jersey (Miller et al., 2013) and for Sandy Hook, NJ for USACE and NOAA Scenarios

To consider the effects of SLC on the future landscape change, future SLC scenarios have been developed by USACE (2013d) and NOAA (2012). Figure 7 shows areas that would be below mean sea level (MSL) at three future times (2018, 2068, and 2100) based on the USACE High scenario. A detailed discussion of mapping basis and technique for this and other mapping is provided in Appendix C – Planning Analyses.

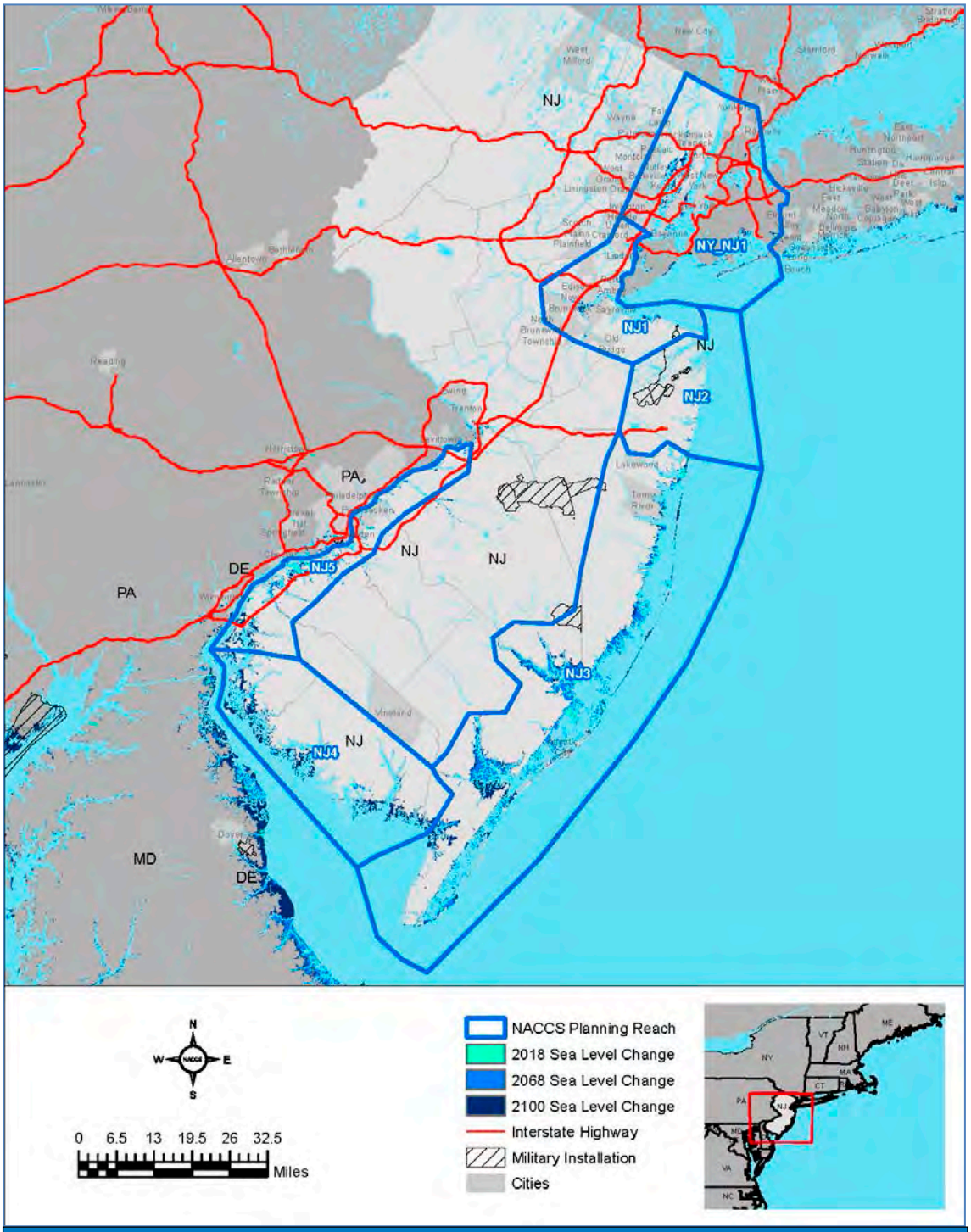

Figure 7. USACE High Scenario Future Mean Sea Level Mapping for the State of New Jersey

Forecasted Population and Development Density

Using information and datasets generated as part of the U.S. Environmental Protection Agency's (EPA) Integrated Climate and Land Use Scenarios (ICLUS), inferences to future population and residential development increases by 2070 were evaluated (USEPA, 2009). Figure 8 presents the USACE High scenario inundation and the forecasted increase in residential development density derived from ICLUS data for New Jersey. Changes to environmental and cultural resources and social vulnerability characteristics will not be considered as part of the overall forecasted exposure index assessment. Discussions of likely future impacts with respect to SLC on environmental and cultural resources will be considered in the Environmental and Cultural Resources Conditions Report. Additional information related to the forecasted population and development density is included in Appendix C – Planning Analyses.

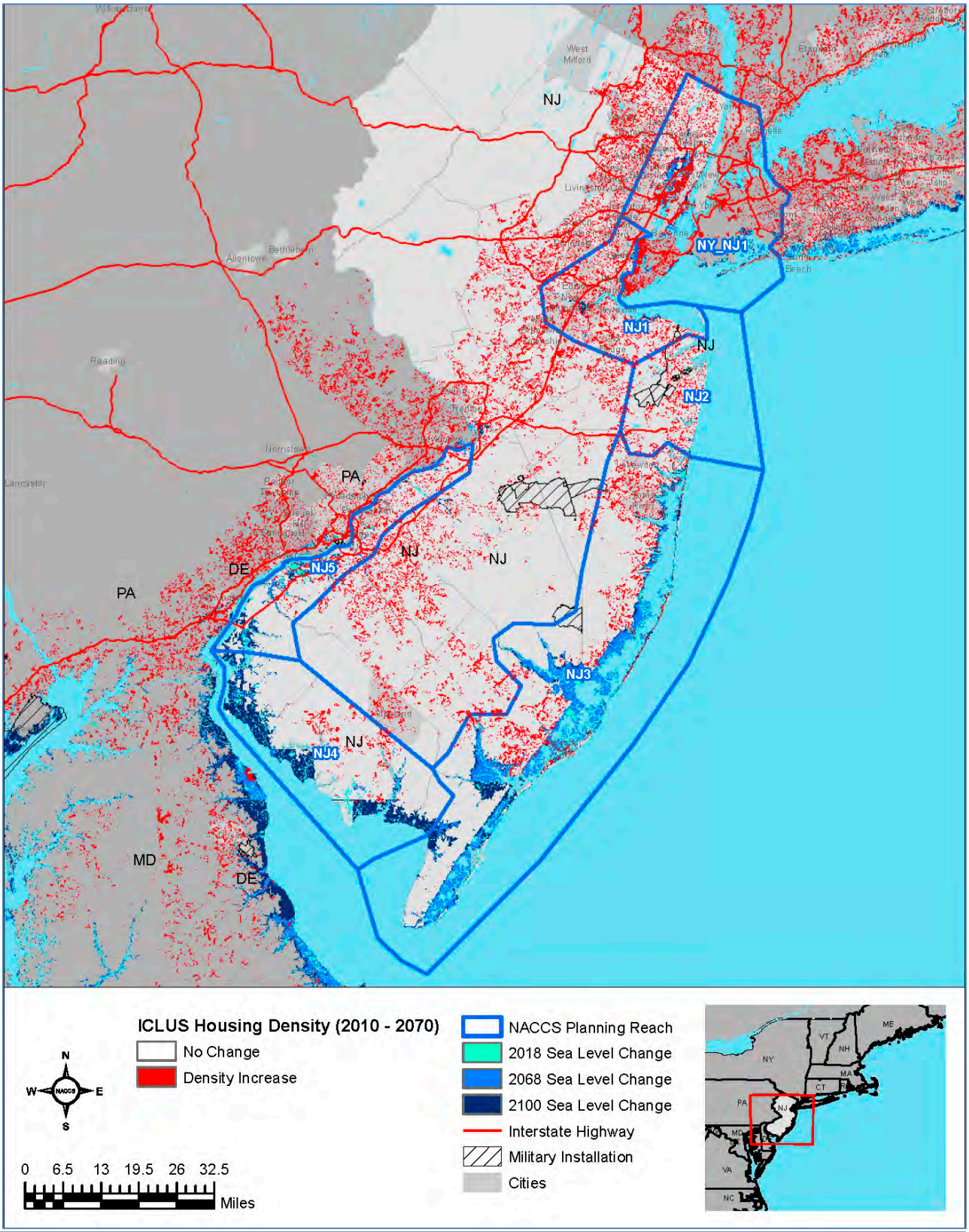

Figure 8. USACE High Scenario Future Mean Sea Level Inundation and Forecasted Residential Development Density Increase for the State of New Jersey

Extreme Water Levels

As part of the CSRM Framework, the extent of coastal flood hazard was completed by using readily available 1 percent flood mapping from FEMA, preliminary 10 percent flood values from the Engineer Research and Development Center (ERDC) extreme water level analysis, and the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) modeling conducted by NOAA. The inundation zones identified by the SLOSH model depict areas of possible flooding from the maximum of maximum (MOM) event within the five categories of hurricanes by estimating the potential surge inundation during a high tide landfall. Although the SLOSH inundation mapping is not referenced to a specific probability of occurrence (unlike FEMA flood mapping, which presents the 0.2 percent and 1 percent flood elevation zones), a Category 4 hurricane making landfall during high tide represents an extremely low probability of occurrence but high magnitude event. In most cases, it is only possible to provide risk reduction to some lower level like the 1 percent flood. Figure 9 presents the SLOSH hydrodynamic modeling inundation mapping associated with Category 1 through 4 hurricanes.

Figure 10 presents the approximate 1 percent floodplain plus 3 feet for the same area to illustrate areas exposed to projected inundation levels, which are closely aligned with the USACE High scenario for projected SLC by year 2068 as well as New York City's new building ordinance. Areas between the Category 4 and 1 percent plus 3 feet floodplain represent the residual risk for those areas included in the NACCS study area and Category 4 MOM floodplain.

Figure 11 presents the limit of the current 10 percent floodplain (an area with a 10 percent or greater chance of being flooded in any given year). The purpose of the 10 percent floodplain is to consider the possibility of surge reduction related to some natural and nature-based features (NNBF) management measures such as wetland, living shorelines, and reefs.

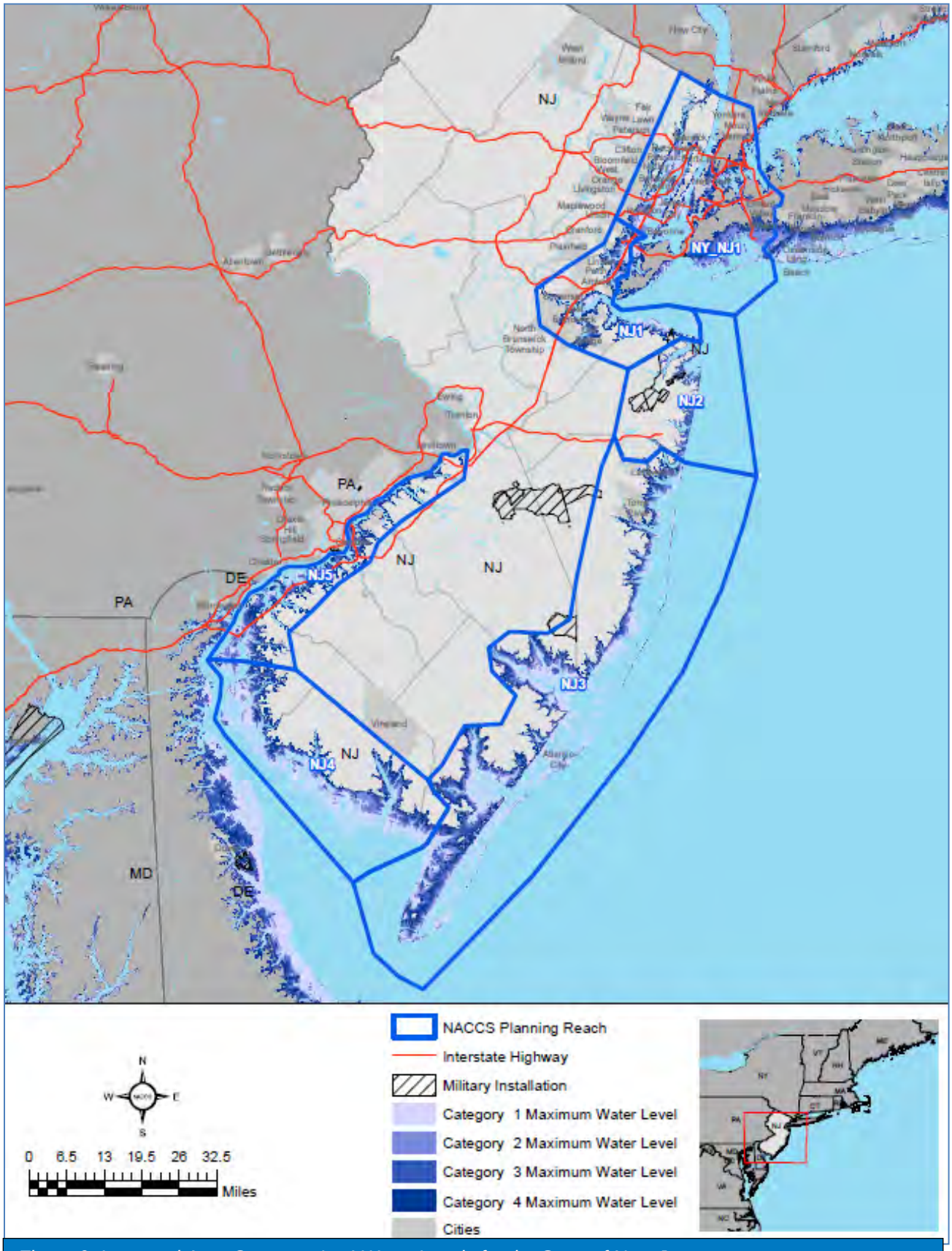

Figure 9. Impacted Area Category 1 - 4 Water Levels for the State of New Jersey

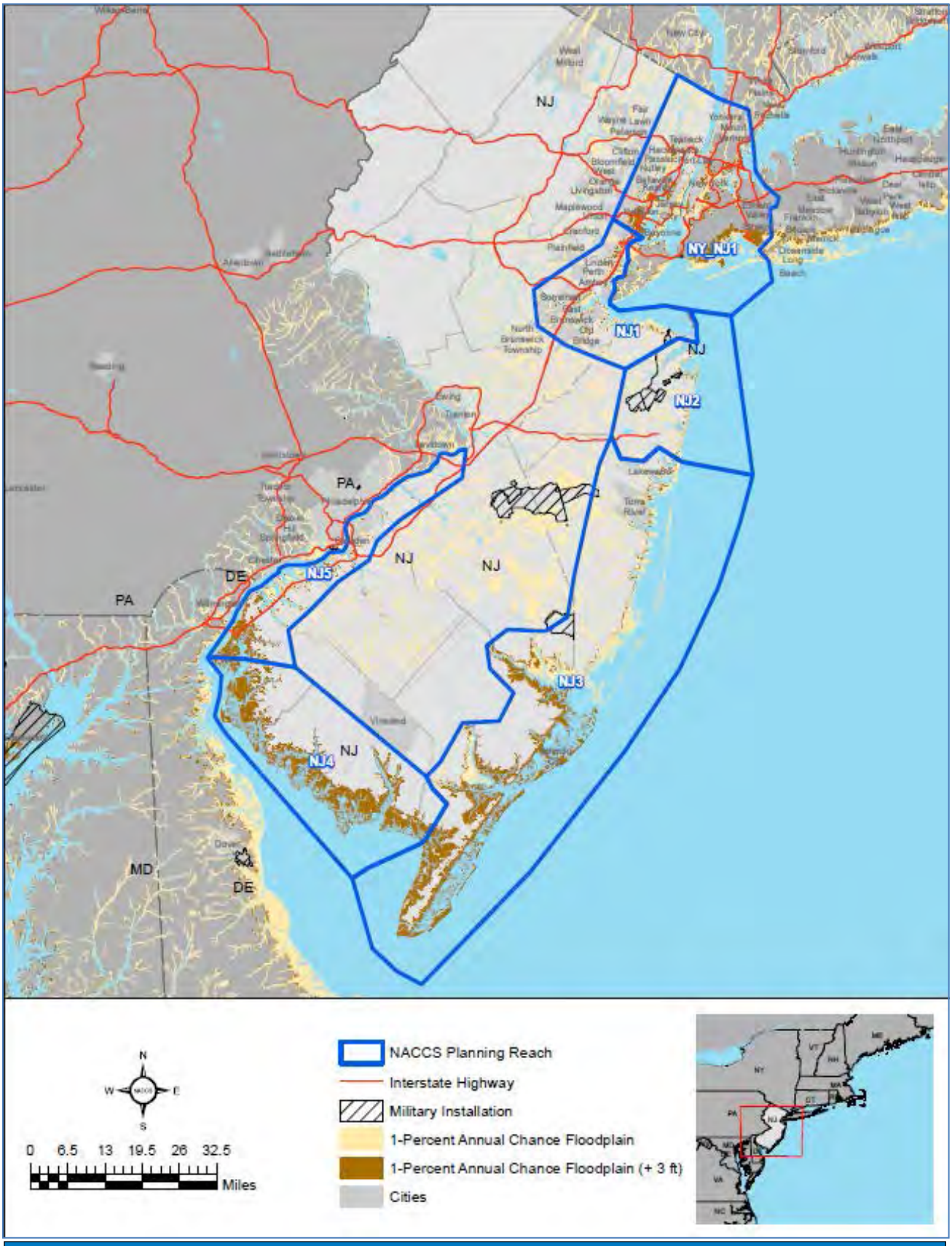

Figure 10. Impacted Area 1 Percent + 3 feet Water Surface for the State of New Jersey

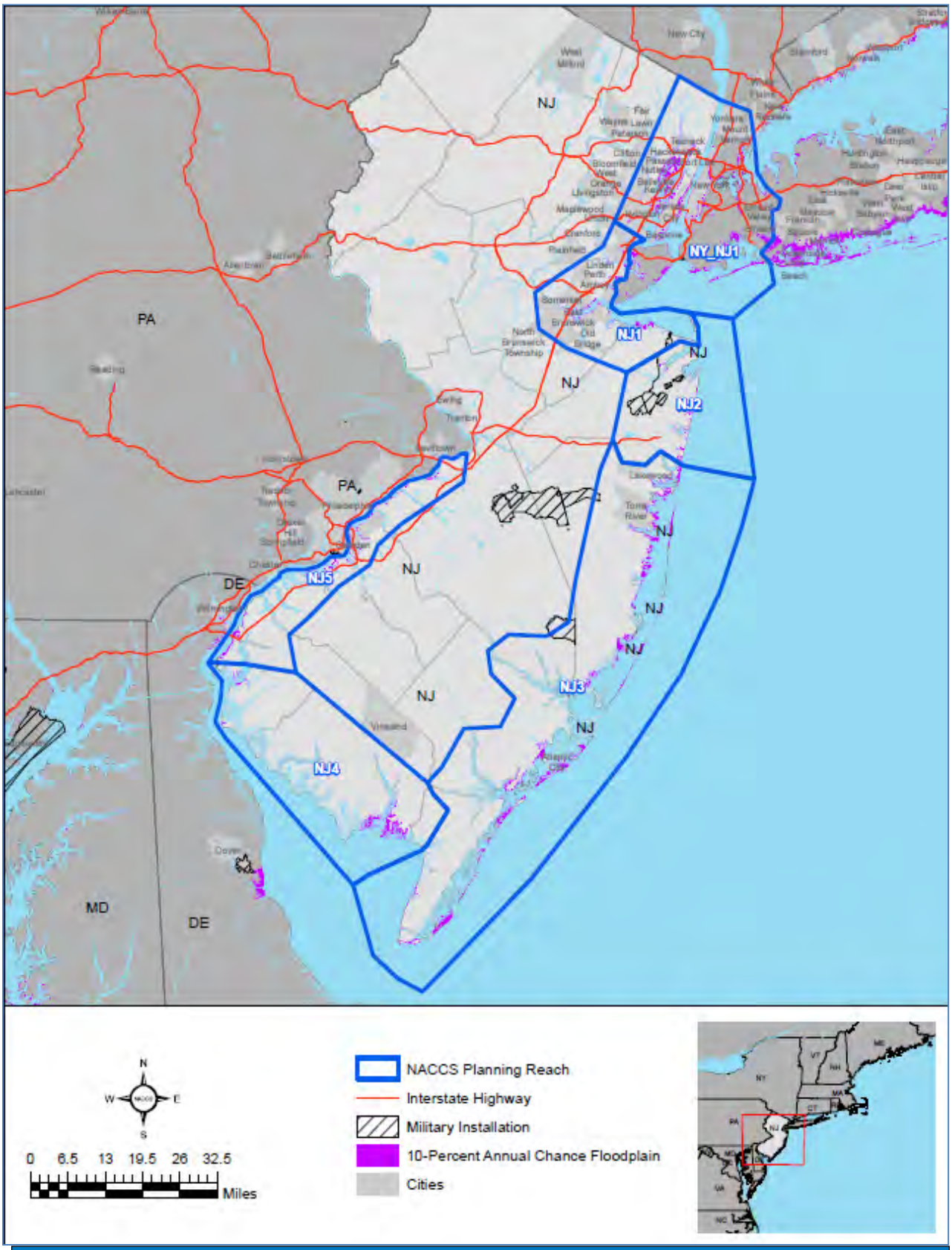

Figure 11. Impacted Area 10 Percent Water Surface for the State of New Jersey

Environmental Resources

Nearly half of New Jersey's beach and dune habitat is adjacent to highly developed areas. Sand beaches and vegetated dunes provide an important buffer between coastal waters and infrastructure. Sea level and climate change can have significant impacts to this buffer if nothing is done to protect this habitat.

It is expected that CSRM projects constructed by USACE would continue to receive renourishment for 50 years after initial construction. The remaining beaches and dunes that are not maintained by the state and local communities are at risk of damage from SLC. If beaches are armored, adjacent beaches will erode and sediments will not be available for natural replenishment of sand in areas that are not supplemented with beach nourishment projects. In many areas, this will eliminate beach nesting habitat for terrapins and horseshoe crabs and foraging habitat for birds by small beach organisms found within or on the sandy substrate or beach wrack.

Millions of birds migrating along the mid-Atlantic Flyway depend on horseshoe crab (*Limulus polyphemus*) eggs laid on sandy beaches along the Delaware Bay, Sandy Hook Bay, and Raritan Bay. The loss of these sandy beaches, particularly the highly susceptible beaches of southern New Jersey to SLC could be devastating to horseshoe crabs, birds, including the red knot, coastal birds, nesting terrapins, and other wildlife.

Coastal wetlands have the potential to adapt and keep pace with SLC through vertical accretion and inland migration if there is space available at the same elevation relative to the tidal range and a stable source of sediment. SLC forces coastal wetlands to migrate inland, causing upslope transitional brackish wetlands to convert to saline marshes and the saline marshes on the coastline to drown or erode. Many of New Jersey's coastal wetlands are adjacent to human development or seawalls that block natural wetland migration paths, and these wetlands will be inundated. In addition, these wetlands will generally be unable to accrete at a pace greater or equal to relative SLC, so a change in sea level will cause a net loss of marsh acreage. This habitat is critical for numerous nesting and migrating bird species, diamondback terrapin, marsh dwelling fish, and other species.

Coastal freshwater wetlands in New Jersey are particularly sensitive to extreme high tides resulting from an increase in storm frequency or magnitude; these high tides can carry salts inland to salt-intolerant vegetation and soils. If these coastal freshwater wetland communities are unable to shift inland, freshwater flora and fauna could be displaced by salt-tolerant species.

Sea level change could result in the inundation of tidal mud flats, and this would eliminate critical foraging opportunities for birds. The tidal flats of New Jersey's back bays are especially vulnerable, as these are critical foraging areas for hundreds of species of shorebirds, passerines, raptors, waterfowl, and finfish.

Sea level change could also have an impact on large bird populations found on marsh islands and islands created with dredged material in the back bays. Loss of marsh area as a result of SLC would have negative implications for the hundreds of thousands of shorebirds that stop in marshes along the Atlantic Flyway to feed and rest during their annual migrations.

Although there is generally more room for wetland to migrate in parks and refuges, these areas will still lose salt and freshwater marshes and dry land to open water as a result of the effects of SLC.

A more detailed explanation of these effects can be found in the Environmental and Cultural Resources Conditions Report.

IV. NACCS Coastal Storm Exposure and Risk Assessments

The extent of flooding, as presented in Figures 9 to 11, was used to delineate the areas included in the coastal storm risk and exposure assessments. An exposure index was created for population density and infrastructure, social vulnerability characterization, and environmental and cultural resources. In addition, the three individual indices were combined to create a composite exposure index. The purpose of combining individual exposure indices into a composite index was to provide an illustration of example values for features of the system, with population density and infrastructure weighted at 80 percent of the total index, and social vulnerability characterization and environmental and cultural resources weighted at 10 percent each. For the purpose of the Framework, the overall composite exposure assessment identified areas with the potential for relative higher exposure to flood peril considering collectively the natural, social, and built components of the system. Additional information related to the development of the NACCS risk and exposure assessments is presented in Appendices B – Economics and Social Analyses, and C – Planning Analyses.

IV.1 NACCS Exposure Assessment

The Tier 1 assessment first required identifying the various categories to best characterize exposure. Although a myriad of factors or criteria can be used to identify exposure, the NACCS focused on the following categories and criteria, as emphasized in Public Law (PL) 113-2.

Population Density and Infrastructure Index

Population density includes identification of the number of persons within an areal extent across the study area; infrastructure includes critical infrastructure that supports the population and communities. These factors were combined to reflect overall exposure of the built environment. Figure 12 presents the population density and infrastructure exposure index. Figure 13 presents the percentages of infrastructure included within the population density and infrastructure exposure index.

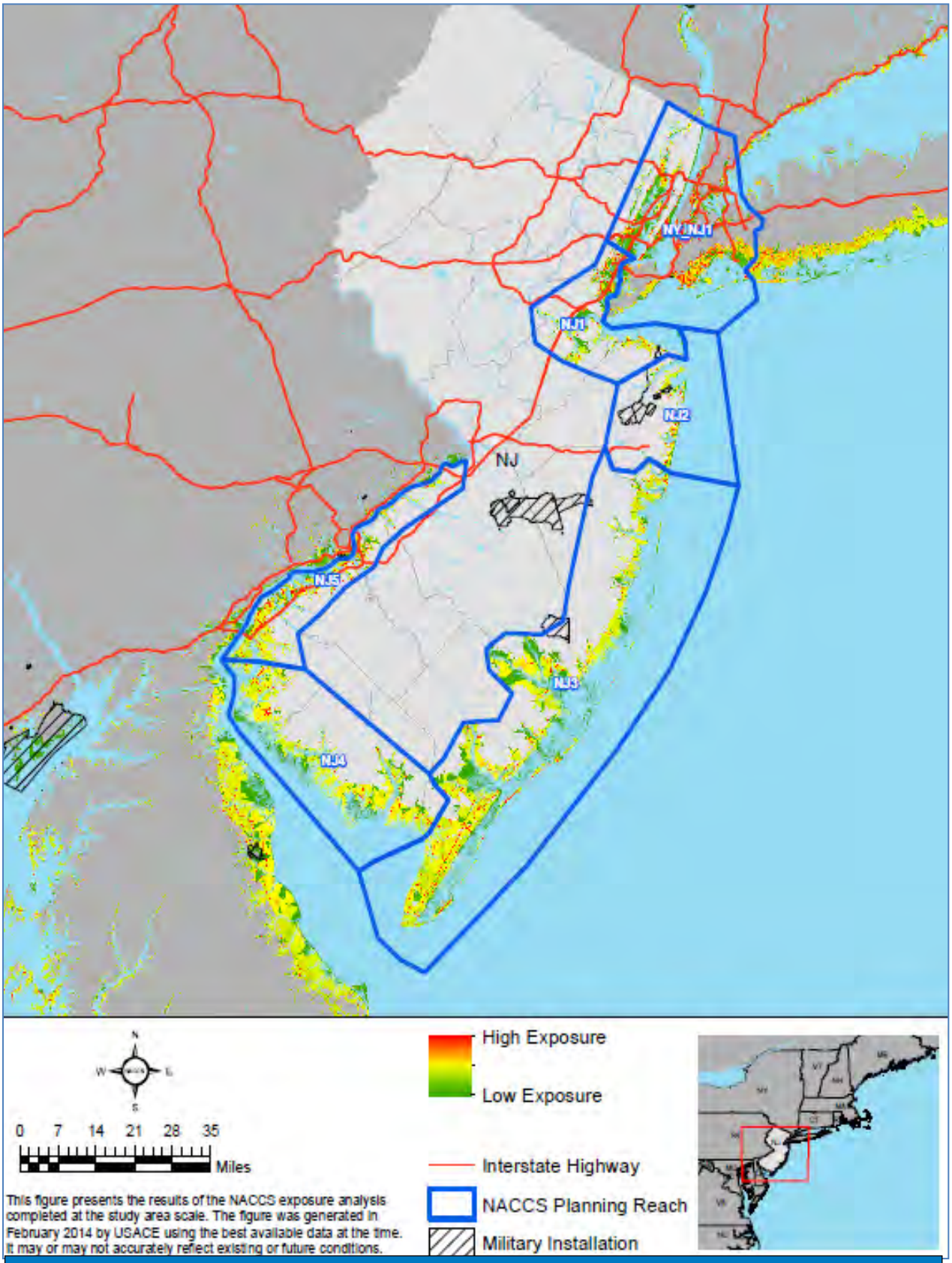

Figure 12. Population and Infrastructure Exposure Index for the State of New Jersey

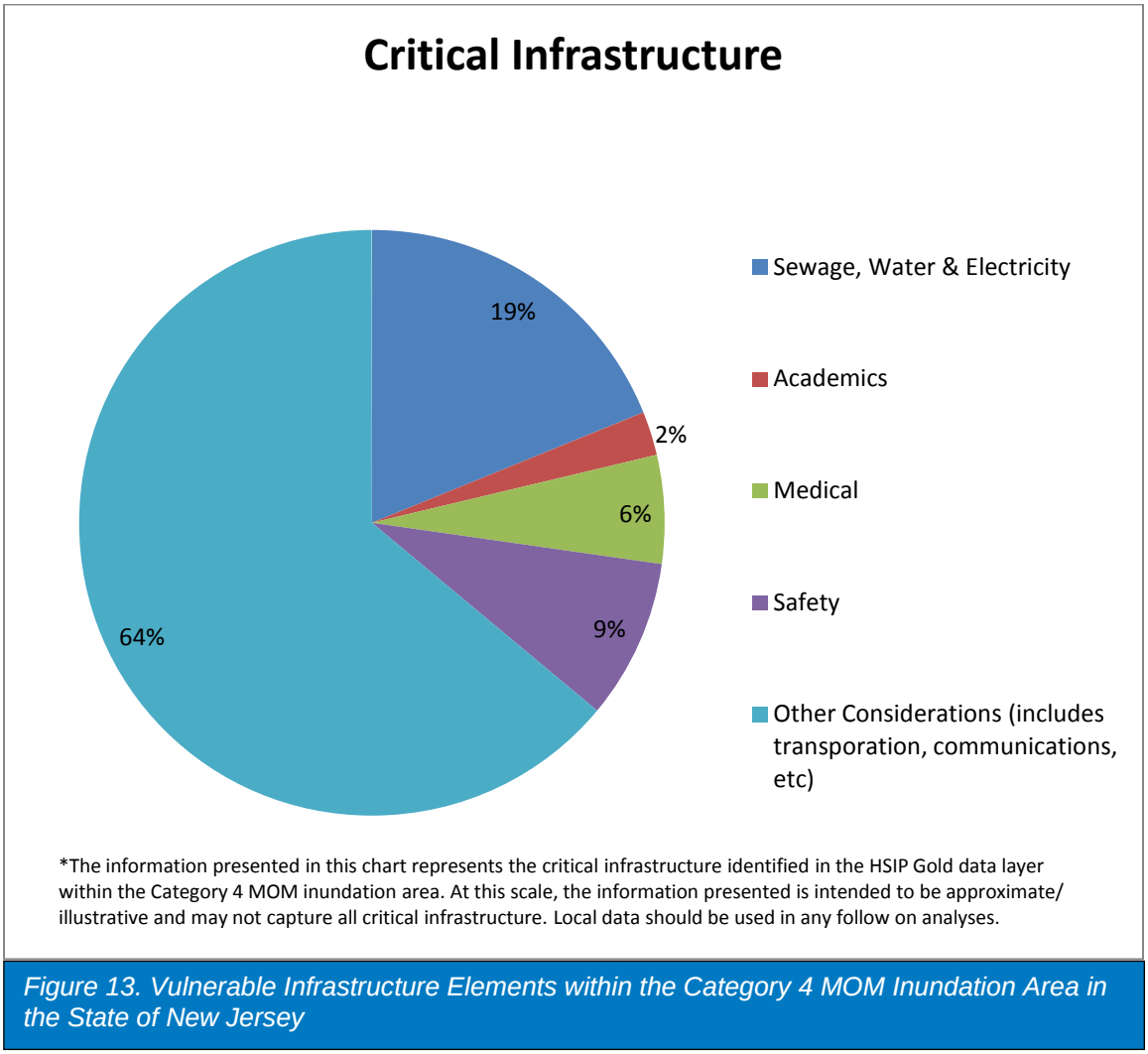

Figure 13. Vulnerable Infrastructure Elements within the Category 4 MOM Inundation Area in the State of New Jersey

Social Vulnerability Characterization Index

The social vulnerability characterization captures certain segments of the population that may have more difficulty preparing for and responding to natural disasters and was completed using the U.S. Census Bureau 2010 Census data. Important factors in social vulnerability include age, income, and inability to speak English.

Figure 14 presents the social vulnerability characterization exposure index for the State of New Jersey. Areas with relatively higher concentrations of vulnerable segments of the population are identified from this analysis.

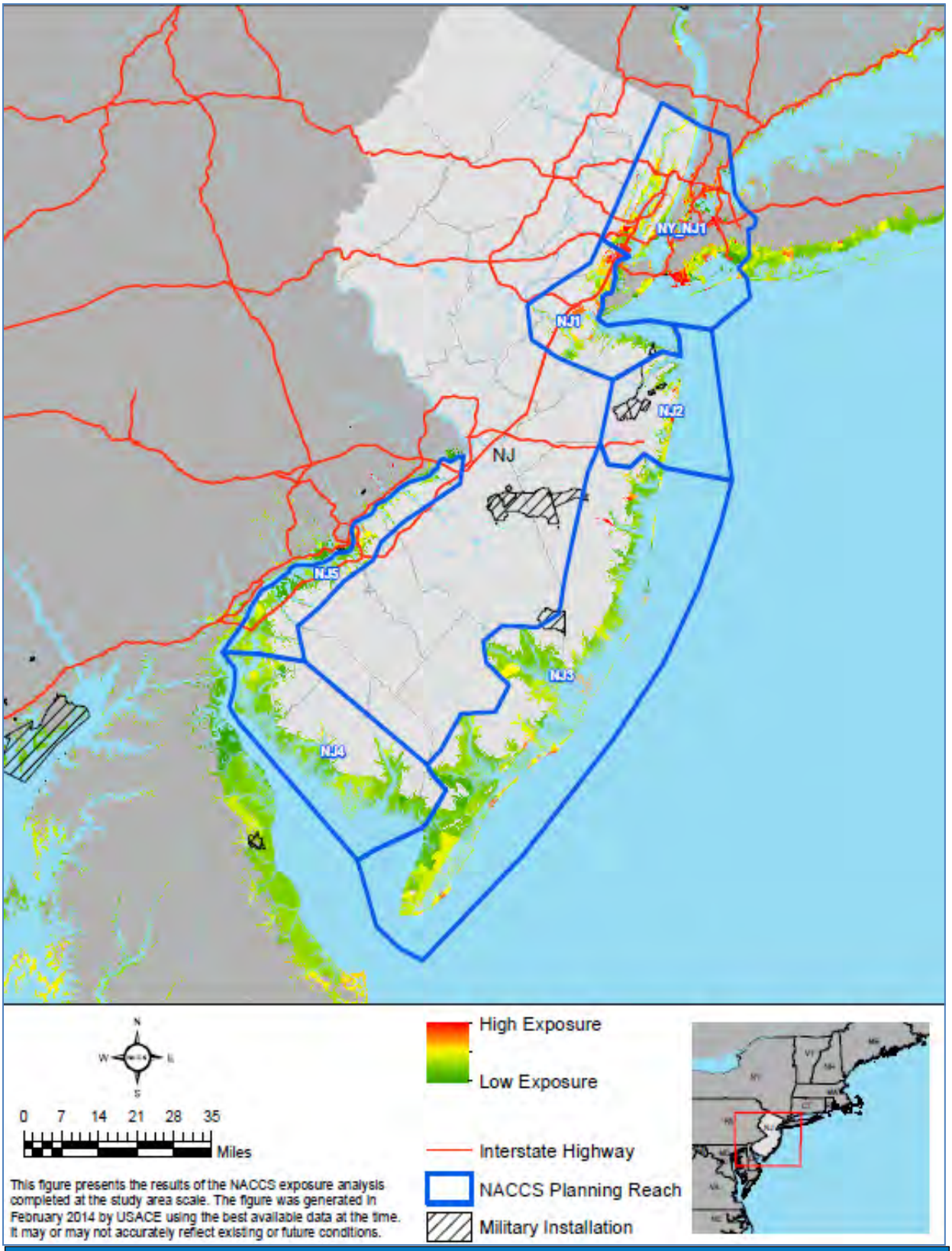

Figure 14. Social Vulnerability Index for the State of New Jersey

The identification of risk areas based on the social exposure analysis is provided below on a reach-by-reach basis for each of the planning reaches in the State of New Jersey.

Reach: NJ1

Based on the social vulnerability analysis, 34 areas were identified within this reach as areas with relatively high social vulnerability. These areas were located within census tracts 306, 304, 309, 313, 311, 310, 307.02, 316.01, 316.02, 319.03, 319.04, 398, 307.01, 318.02, 320.01, 314, 308.02, 302, 317, and 305 (Union County, NJ) and 57, 58, 45, 46, 47, 48, 49, 50, 14.16, 56.01, 56.02, 52, 53, and 93 (Middlesex County, NJ). These areas were all identified as areas of high risk mainly due to a large percent of the population being non-English speakers. Census tract 52 also was identified as vulnerable due to a large percent of the population being below the poverty level. Census tract 319.03 also was identified as vulnerable due to a large percent of the population being over 65 years old.

Reach: NJ2

Based on the social vulnerability analysis, nine areas were identified within this reach as areas with relatively high social vulnerability. These areas were located within census tracts 7152 and 7153.01 (Ocean County, NJ) and 8057, 8034, 8056, 8073, 8070.04, 8070.03, and 8072 (Monmouth County, NJ). The areas in census tracts 7152 and 7153.01 were identified as vulnerable due to a considerable percent of the population being under 5 years old. Census tracts 8057, 8034, 8070.34, and 8070.03 have a considerable percent of the population that is non-English speaking. Census tracts 8056, 8073, and 8072 have a large percent of the population below the poverty level. Census tract 8070.04 has a considerable percent of the population over 65 years old.

Reach: NJ3

Based on the social vulnerability analysis, 30 areas were identified within this reach as areas with relatively high social vulnerability. These areas were located within census tracts 121, 2, 3, 4, 5, 15, 23, 24, 14 (Atlantic County, NJ), and 214 (Cape May County, NJ) and 214, 7152, 7153.01, 7312.03, 7312.02, 7312.06, 7312.04, 7312.05, 7222, 7157, 7159.02, 7202.05, 7160, 7153.02, 7154.02, 7156, 7201.03, 7201.02, 7202.02, and 7201.01 (Ocean County, NJ). The areas in census tracts 121, 2, 3, 5, 23, and 214 were all identified as vulnerable due to a large percent of the population being non-English speakers. The areas in census tracts 15, 23 24, and 7153.02 were identified as vulnerable due to a large percent of the population being below the poverty level. Census tracts 23, 14, 7152, 7153.01, 7157, 7153.02, 7154.02, and 7156 were identified as vulnerable due to a large percent of the population being under 5 years old. And, census tracts 121, 2, 15, 24, 214, 7312.03, 7312.02, 7312.06, 7312.04, 7312.05, 7222, 7157, 7159.02, 7202.05, 7160, 7201.03, 7201.02, 7202.02, and 7201.01 were all identified as vulnerable due to a large percent of the population being over 65 years old.

Reach: NJ4

Based on the social vulnerability analysis, four areas were identified within this reach as areas with relatively high social vulnerability. These areas were located within census tracts 220 (Salem County, NJ), and 203, 202, and 201 (Cumberland County, NJ). The areas in census tracts 203 and 202 were identified as vulnerable mainly due to a large percent of the population being non-English speakers. Census tract 220 was identified as vulnerable mainly due to a large percent of the population being below the poverty level. Census tract 201 was identified as vulnerable due to both a considerable

amount of non-English speakers as well as a large amount of the population being below the poverty level.

Reach: NJ5

Based on the social vulnerability analysis, 13 areas were identified within this reach as areas with relatively high social vulnerability. These areas were located within census tracts 7014.02 (Burlington County, NJ) and 6009, 6004, 6008, 6018, 6011.01, 6013, 6011.02, 6015, 6104, 6019, 6017, and 6007 (Camden County, NJ). The areas in census tracts 6009, 6008, 6011.01, 6013, and 6007 were all identified as vulnerable due to a considerable percent of the population being non-English speakers. The areas in census tracts 6009, 6004, 6008, 6018, 6013, 6015, 6104, 6019, and 6017 were identified as vulnerable due to a large percent of the population being below the poverty level. Census tract 7014.02 was identified as vulnerable due to a large percent of the population being over 65 years old.

Reach: NY_NJ1

Based on the social vulnerability analysis, 247 areas were identified within this reach in the State of New Jersey as areas with relatively high social vulnerability. These areas were located within the following census tracts, by county: Hudson County, NJ (39 census tracts); Bergen County, NJ (8 census tracts); Union County, NJ (6 census tracts); Middlesex, County, NJ (4 census tracts); Passaic County, NJ (12 census tracts), and; Queens County, NJ (178 census tracts).

Environmental and Cultural Resources Exposure Index

Environmental and cultural resources were also evaluated as they relate to exposure to the Cat 4 maximum inundation. Data from national databases, such as the National Wetlands Inventory and The Nature Conservancy Ecoregional Assessments; data provided from USFWS, including threatened and endangered species habitat and important sites for bird nesting and feeding areas; shoreline types; and historic sites and national monuments, among others were used in this analysis to assess environmental and cultural resource exposure. It should be noted that properties with restricted locations, typically archaeological sites, and certain other properties were omitted from the analysis due to site sensitivity issues.

Figure 15 depicts the environmental and cultural resources exposure index for the State of New Jersey. This exposure analysis is intended to capture important habitat, and environmental and cultural resources that would be vulnerable to storm surge, winds, and erosion. It should be noted though, that mapped areas displaying high exposure index scores (shown in red and orange) may not include all critical or significant environmental or cultural resources, as indexed scores are additive; the higher the index score, the greater number of resources present at the site. Impacts and recovery opportunity would vary across areas and depending on the resource affected.

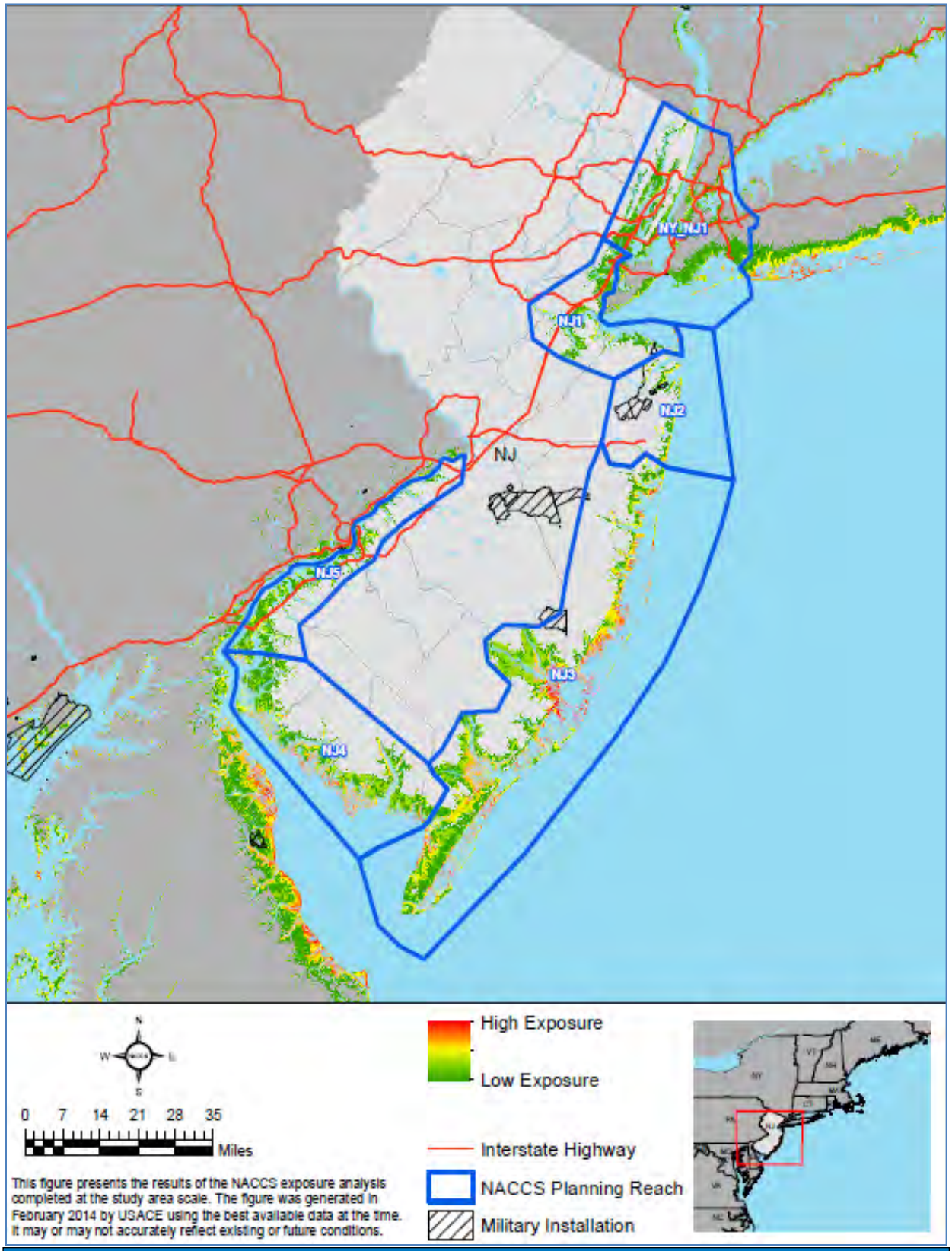

Figure 15. Environmental and Cultural Resources Exposure Index for the State of New Jersey

It should be noted that some regions that may be recognized as important in one category or another may not show up on the maps as a location identified as a high (red and orange) environmental and cultural resource exposure area. These areas may have met only one or just a few of the criteria used in the evaluation. Further, due to the minority contribution of cultural resources in the analysis (40 percent) and their general lack of proximity to key natural resource areas, historic properties may not be strongly represented. Additional information on important habitat and environmental and cultural resources can be found in the Environmental and Cultural Resources Conditions Report.

A description of the high environmental and cultural resource exposure areas for each planning reach is described below.

Reach: NJ1

This analysis resulted in approximately 990 acres (red and orange) of high environmental and cultural resources exposure in planning reach NJ1.

Historic Gateway National Recreation Area forms the entire 990 acres of the Coastal Barrier Resources System (CBRS) at Sandy Hook in the high environmental and cultural resources exposure index area. Sandy Hook provides habitat and has populations of threatened and endangered plants (seabeach amaranth, and knotweed); threatened and endangered shorebirds (piping plover, black skimmer, least tern, and roseate tern); and naturally formed dune systems. Salt marsh along the backside of the Sandy Hook spit provides habitat for many important invertebrates and resident fish species. The reach has a total of nearly 800 acres of rare, threatened, and endangered species habitat.

Roughly 975 acres of The Nature Conservancy (TNC) priority conservation areas are located within the high environmental and cultural resources exposure index area of Reach NJ1. Coarse-grain unconsolidated material (sand, gravel, and cobble) compose approximately 350 acres of the shoreline, and there are about 51 acres of emergent marsh present.

This index analysis resulted in roughly 975 acres of cultural resources buffer in the high environmental and cultural resources exposure index area. There is also one historic site, Fort Hancock at Sandy Hook. Fort Hancock has played dual roles in United States military history, Army Ordnance Board's Proving and Fort Hancock, the chief unit in the defense of New York Harbor (1898 through the 1960s), containing nearly 400 buildings and structures (many of which are seriously deteriorated and remain empty). http://www.nps.gov/history/history/online_books/saho/fort_handcock_clr.pdf.

Within both NJ1 and NJ2 reaches, two Federal parks are within the high environmental and cultural resources exposure index area, Gateway National Recreation Area and Sandy Hook National Park.

Reach: NJ2

This analysis resulted in approximately 46 acres of high (red and orange) environmental and cultural resources exposure index area in planning reach NJ2.

The Navesink/Shrewsbury Rivers complex comprises the roughly 13 acres of the CBRS in the high environmental and cultural resources exposure index area.

Habitat is provided for piping plovers (~20 acres) and rare colonial waterbirds (~33). Approximately 50 acres of TNC priority conservation area exists in these high exposure index areas. The shoreline is composed of about 18 acres of coarse-grained unconsolidated shore. Approximately 9 acres of emergent marsh and 4 acres of scrub-shrub wetlands also can be found in this exposure area.

Within both NJ1 and NJ2 reaches, two historic sites are within the high environmental and cultural resources exposure index area, Squan Beach Life Saving Station #9 and St. John's Episcopal Church. There are also 46 acres of high exposure cultural resources buffer in NJ2.

Reach: NJ3

This analysis resulted in approximately 28,000 acres of high (red and orange) environmental and cultural resources exposure index area in NJ3.

Priority areas (as defined by others) within the high environmental and cultural resources exposure index area in NJ3 include Coastal Barrier Islands as defined under the Coastal Barrier Resources Act (~26,000 acres); U.S. Fish and Wildlife Service (USFWS) protected areas (~43,200 acres); rare, threatened, and endangered species (21,300 acres); TNC priority conservation areas (~27,000 acres); and city, county, and state parks (~2,400 acres).

The Coastal Barrier Islands within the high environmental and cultural resources exposure index area in NJ3 include Brigantine (~20,000 acres), Cedar Bonnet Island (~340 acres), Corson Inlet (~590 acres), Del Haven (~400 acres), Island Beach (~1,800 acres), Kimbles Beach (~560 acres), Metedeconk Neck (~570 acres), Cape May (~4 acres), Moores Beach (~390 acres), and Stone Harbor (~1,550 acres).

The USFWS protected areas within the high environmental and cultural resources exposure index area in NJ3 include about 43,200 acres of national wildlife refuges (NWRs) (Edwin B. Forsythe National Wildlife Refuge and Cape May National Wildlife Refuge). Habitat for rare, threatened, and endangered species within the NJ3 high environmental and cultural resources exposure index area include colonial waterbird habitat (~9,300 acres), shorebird species habitat (~1,400 acres), red knot habitat (~8,300 acres), and piping plover habitat (~2,350 acres).

City, county, and state parks (> 10 acres in size) within the resulting high environmental and cultural resources exposure index area of NJ3 include roughly 340 acres of city and/or county parks and 2,000 acres of state parks.

Habitat within the high environmental and cultural resources exposure index area in NJ3 is primarily emergent marsh (~23,350) but also includes seagrass (~1,060 acres), unconsolidated shore (sand, gravel, cobble) (~900 acres), freshwater forested/shrub wetland (~530 acres), scrub-shrub (~290 acres), consolidated shore (mud, organic, flat) (~29 acres), and freshwater emergent wetland (~45 acres).

Cultural resources within the high environmental and cultural resources exposure index area in NJ3 includes the U.S. Coast Guard Station, Cape May Lighthouse, Captain Francis Babcock House, Barnegat Lighthouse, Battery 223, Amanda Blake Store, and U.S. Life Saving Station No. 35 historic sites. Additionally, there are approximately 27,200 acres of cultural resources buffer.

Reach: NJ4

This analysis resulted in approximately 1,080 acres of high (red and orange) environmental and cultural resources exposure index area in NJ4.

Priority areas (as defined by others) within the high environmental and cultural resources exposure index area in NJ4 include coastal barrier islands as defined under the Coastal Barrier Resources Act

(~1,060 acres); Rare, threatened, and endangered species (~1,810 acres); and TNC priority conservation areas (~1,050 acres).

The coastal barrier islands within the high environmental and cultural resources exposure index area in NJ4 include 1,060 orange acres of Moores Beach.

Rare, threatened, and endangered species within the high environmental and cultural resources exposure index area in NJ4 include shorebird species (rare species) designated habitat (~850 acres) and red knot (proposed threatened species) designated habitat (~960 acres).

Habitat within the high environmental and cultural resources exposure index area in NJ4 is primarily emergent marsh (~990 acres) but also includes unconsolidated shore (sand, gravel, cobble) (~26 acres) and freshwater forested/shrub wetland (~ 3 acres).

Cultural resources within the high environmental exposure area in NJ4 include the Caesar Hoskins Log Cabin and Maurice River Lighthouse; there are approximately 1,050 acres of cultural resources buffer.

Reach: NJ5

This analysis resulted in no high environmental and cultural resources exposure index area in NJ5.

Reach: NY_NJ1

This analysis resulted in approximately 234 acres of high (red and orange) environmental and cultural resources exposure index areas in planning reach NY_NJ1.

Jamaica Bay and Sandy Hook contribute to 228 acres of the CBRS in the high environmental and cultural resources exposure index area.

Approximately 6 acres of TNC priority conservation area exists in these exposure areas. Over 231 acres of habitat is provided for roseate terns, piping plovers, red knots, and rare colonial waterbirds. There are two acres of city, county, and state parks larger than 10 acres in size. There are no USFWS protected areas in this exposure area, but there are approximately 36 acres of Federal parks (units of the National Parks of New York Harbor).

The 36-acre shoreline is comprised of coarse-grained unconsolidated sand and gravel shoreline. Approximately 4 acres of freshwater emergent marsh and 2 acres of tidal emergent marsh also can be found in these exposure areas.

Reach NY_NJ1 has one national monument, Fort Tilden, and two Federal Parks, Breezy Point and Jacob Riis Park, within the high environmental and cultural resources exposure index area. There also are nearly 230 acres of cultural resources buffer in NY_NJ1.

Composite Exposure Index

All three of the exposure indices were summed together to develop one composite index that displays overall exposure. Figure 16 depicts the Composite Exposure Index for the State of New Jersey.

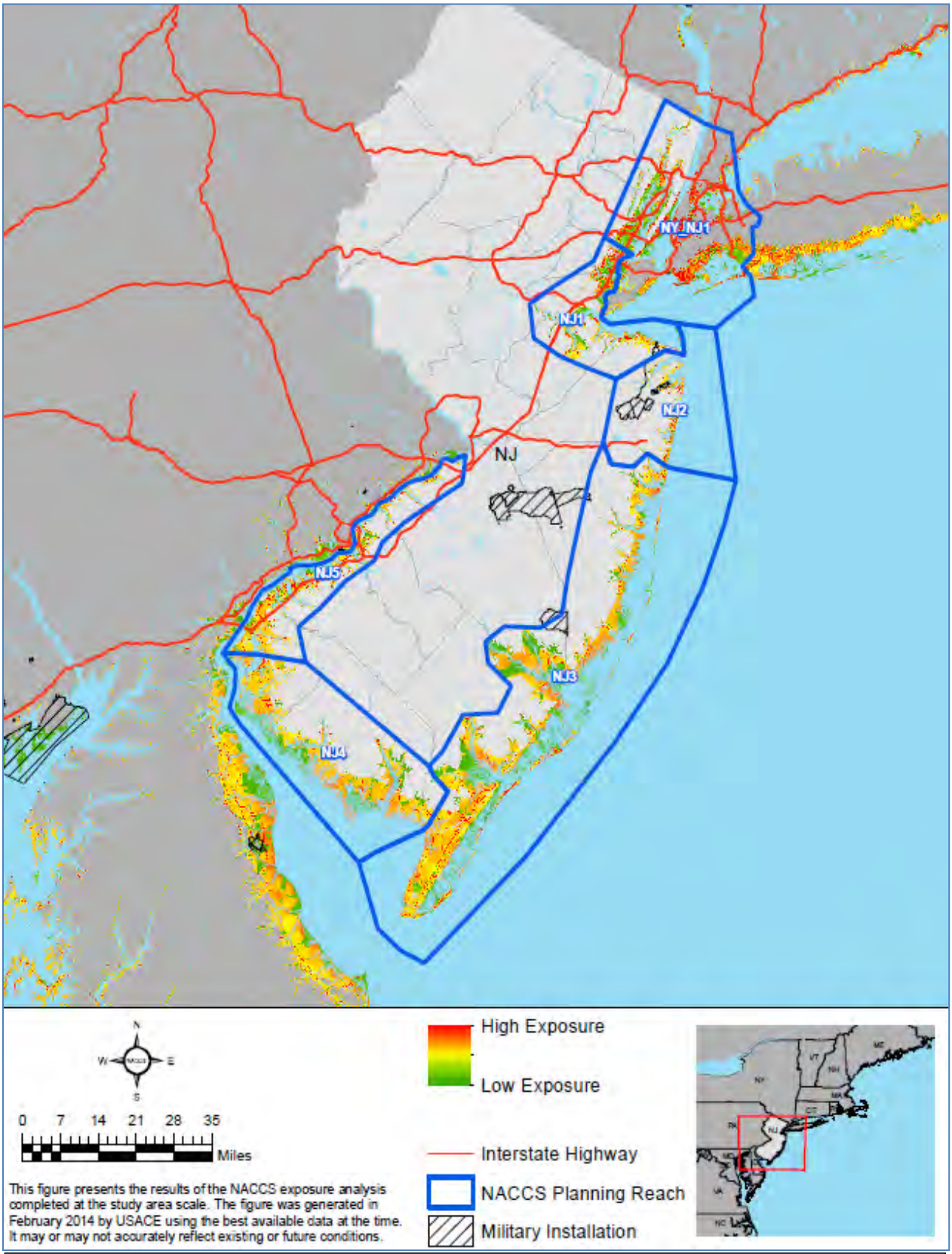

Figure 16. Composite Exposure Index for the State of New Jersey

IV.2 NACCS Risk Assessment

Exposure and coastal flood inundation mapping is used to identify the specific areas at risk. Once the exposure to flood peril of any area has been identified, the next step is to better define the flood risk. The Framework defines risk as a function of exposure and probability of occurrence. For each of the floodplain inundation scenarios, Category 4 MOM, 1 percent flood plus three feet, and the 10 percent flood, three bands of inundation were created. The bands correspond with the flooding source to the 10-percent inundation extent, the 10-percent to the 1-percent plus three feet extent, and the 1-percent plus three feet to the CAT4 MOM inundation extent. The 1-percent plus three feet extent was defined as the CAT2 MOM because at the study area scale there were areas that did not include FEMA 1-percent flood mapping. This process was completed for the composite exposure assessment in order to generate the NACCS risk assessment. The data was symbolized to present areas of relatively higher risk, which based on the analysis, corresponds with the three bands that were used in the analysis. Subsequent analyses could incorporate additional bands, which would present additional variation in the range of values symbolized in the figure. Figure 17 depicts the results of this risk assessment using the composite exposure data for the State of New Jersey.

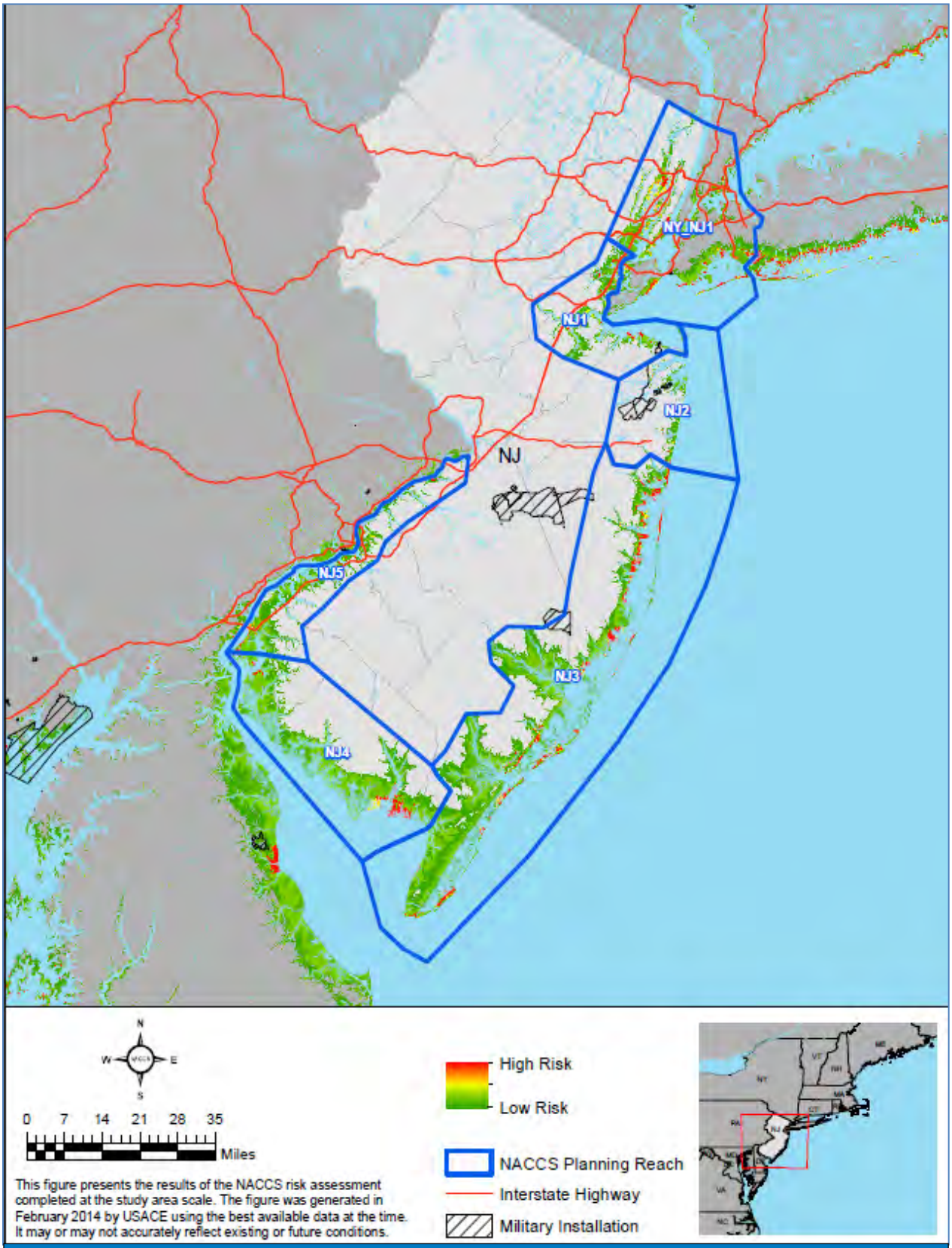

Figure 17. Risk Assessment for the State of New Jersey

IV.3 NACCS Risk Areas Identification

Applying the risk assessment to the State of New Jersey identified 37 areas for further analysis (Figure 18). These locations are identified by reach in Figures 19 through 24 and are described in more detail below.

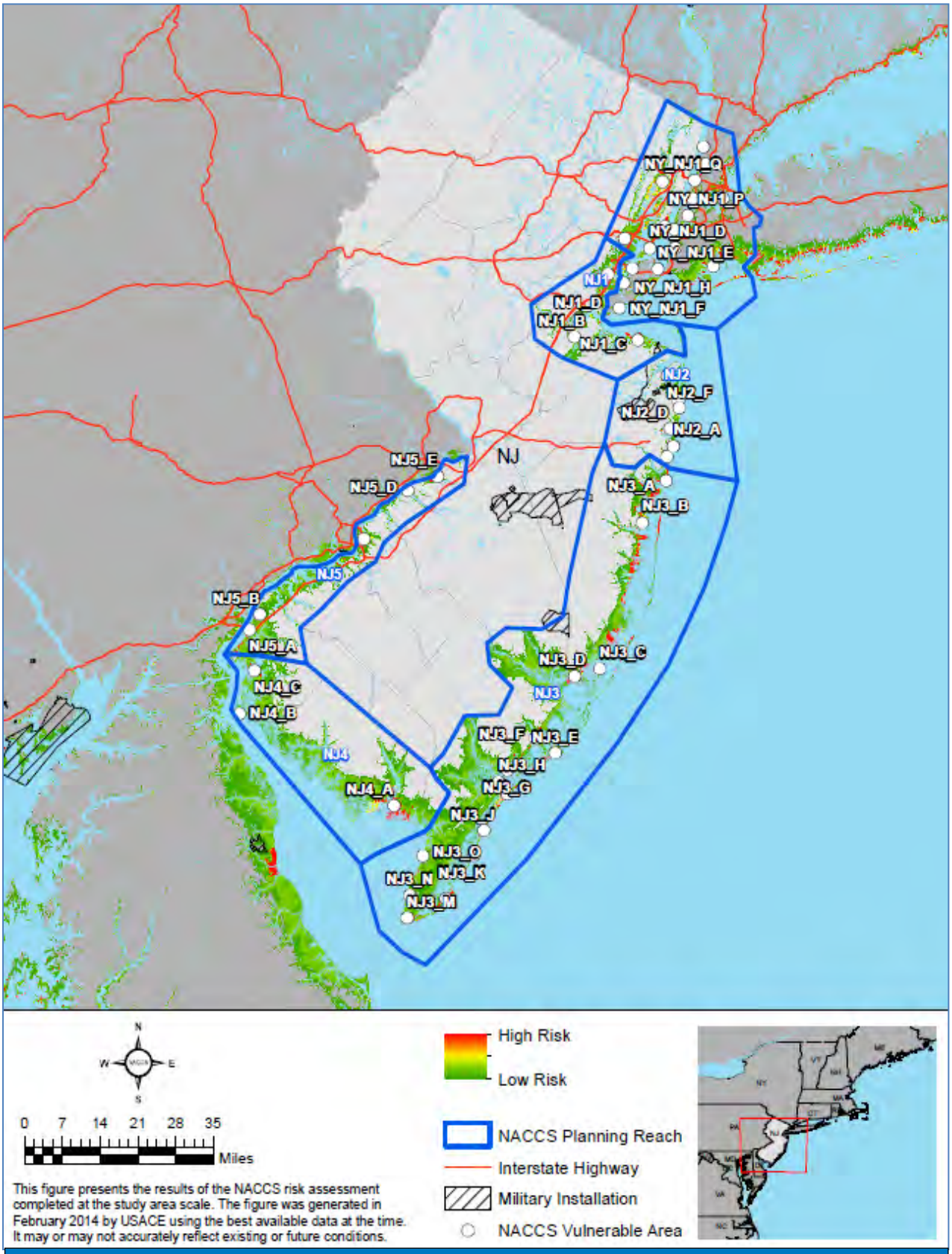

Figure 18. Risk Areas in the State of New Jersey

Reach: NJ1

The shoreline of New Jersey Reach 1 (Figure 19) is classified as mostly beach, with significant presence of USACE coastal flood risk management projects and an extensive 1 percent floodplain. Four areas of high exposure were identified in Reach NJ1 and are described in this section.

NJ1_A: Elizabeth River, Rahway River, and Woodbridge River Basins (Tidal Portions)

Communities in this risk area include Elizabeth, Linden, Rahway, Iselin, Carteret, Woodbridge, Avenel, and Perth Amboy. This area is characterized by dense, urban residential development, mixed industrial, and commercial use. Major roads include Interstate 95, the Goethals Bridge, and the Outerbridge Crossing. The shoreline is dominated by natural gas, oil, chemical, and petroleum facilities. There is a strong concentration of electric generation units (84) and electric substations (14). Additionally, there are eight ports within this risk area along the Arthur Kill and extensive railroad networks to transport the freight unloaded at this port as well as NJ Transit and Amtrak passenger trains. Three airports are located within this area. The three rivers flow into the Arthur Kill; these municipalities experience tidal flooding from the tidally influenced portions of the three rivers, and from the Arthur Kill itself. There are existing USACE Flood Risk Management (FRM) feasibility studies for each of the three river basins, but there are no constructed USACE FRM projects.

NJ1_B: Raritan River and South River Basins (Tidal Portions)

The Raritan River is tidally influenced for 14 miles from New Brunswick to South Amboy, at the western end of Raritan Bay. Tidal flooding from the Raritan River affects New Brunswick and Highland Park. There are extensive fluvial flood damages at Bound Brook and Manville, but fluvial damages are beyond the scope of the current study effort. The South River is the first major tributary of the Raritan River, located approximately 8 miles upstream of the mouth of the Raritan River at Raritan Bay. It is tidally controlled from its mouth upstream to Duhernal Lake Dam. Fluvial conditions prevail upstream of the dam where there are no widespread flooding problems. The flood prone areas are within the Boroughs of South River and Sayreville, the Township of Old Bridge, and the Historic Village of Old Bridge (located within the Township of East Brunswick). This area consists primarily of suburban developments with urban centers, with two airports, a port, rail facilities, and a wastewater treatment plant. There is an authorized but unconstructed USACE FRM project for South River, which is currently being reevaluated to account for changed conditions post-Sandy, pursuant to PL 113-2.

NJ1_C: Raritan Bay and Sandy Hook Bay

This risk area includes 21 miles of shoreline along Raritan Bay and Sandy Hook Bay in Monmouth and Middlesex Counties, NJ. This area is bounded by the Route 36 bridge over the Shrewsbury River at Highlands to the east, South Amboy at the entrance to the Raritan River to the west, and Route 36 in Monmouth County and Route 35 in Middlesex County on the landward side. Communities within this risk area include Highlands, Atlantic Highlands, Leonardo, Belford, Port Monmouth, Hazlet, Union Beach, Keyport, Keansburg, North Middletown, Laurence Harbor, Cliffwood Beach and Sayreville. These communities are fully developed with a mix of residential and retail and located on the low lying land along the bays. Beyond the typical infrastructure needed to support these communities, there is also a Navy Weapons Station located on Earle Pier. Additionally, there are 28 National Shelter System facilities. There are multiple ferries that run to New York, Highlands, Atlantic Highlands, and Belford. The coastline is fully developed, with seven ports and eight wastewater treatment plants. This area

experiences tidal storm surge and flooding from Raritan Bay, Sandy Hook Bay, and associated tidal creeks.

Within this risk area, the communities of Laurence Harbor, Morgan Beach, Seidler's Beach, Knollcroft, Keansburg, and North Middletown have existing Federal flood risk management projects that were authorized in 1962 and are in the process of being repaired and restored to the design profile pursuant to PL 113-2. The communities of Leonardo, Highlands, and Keyport have existing USACE FRM feasibility studies, of which Leonardo and Highlands have been included in the Second Interim Report pursuant to PL 113-2. Port Monmouth and Union Beach have authorized projects that also have been included in the Second Interim Report.

NJ1_D: Lower Raritan Bay – the Amboys (South Amboy and Perth Amboy)

Perth Amboy and South Amboy are cities located at the mouth of the Raritan River on Raritan Bay, with Perth Amboy on the north side and South Amboy on the south side. Tidal flooding comes from the Arthur Kill, the Raritan River, and Raritan Bay. Both cities are extensively developed along their waterfronts, which are low lying. Perth Amboy is also home to industrial enterprises, including oil and asphalt refineries. Infrastructure features within the risk area include ports and power plants.

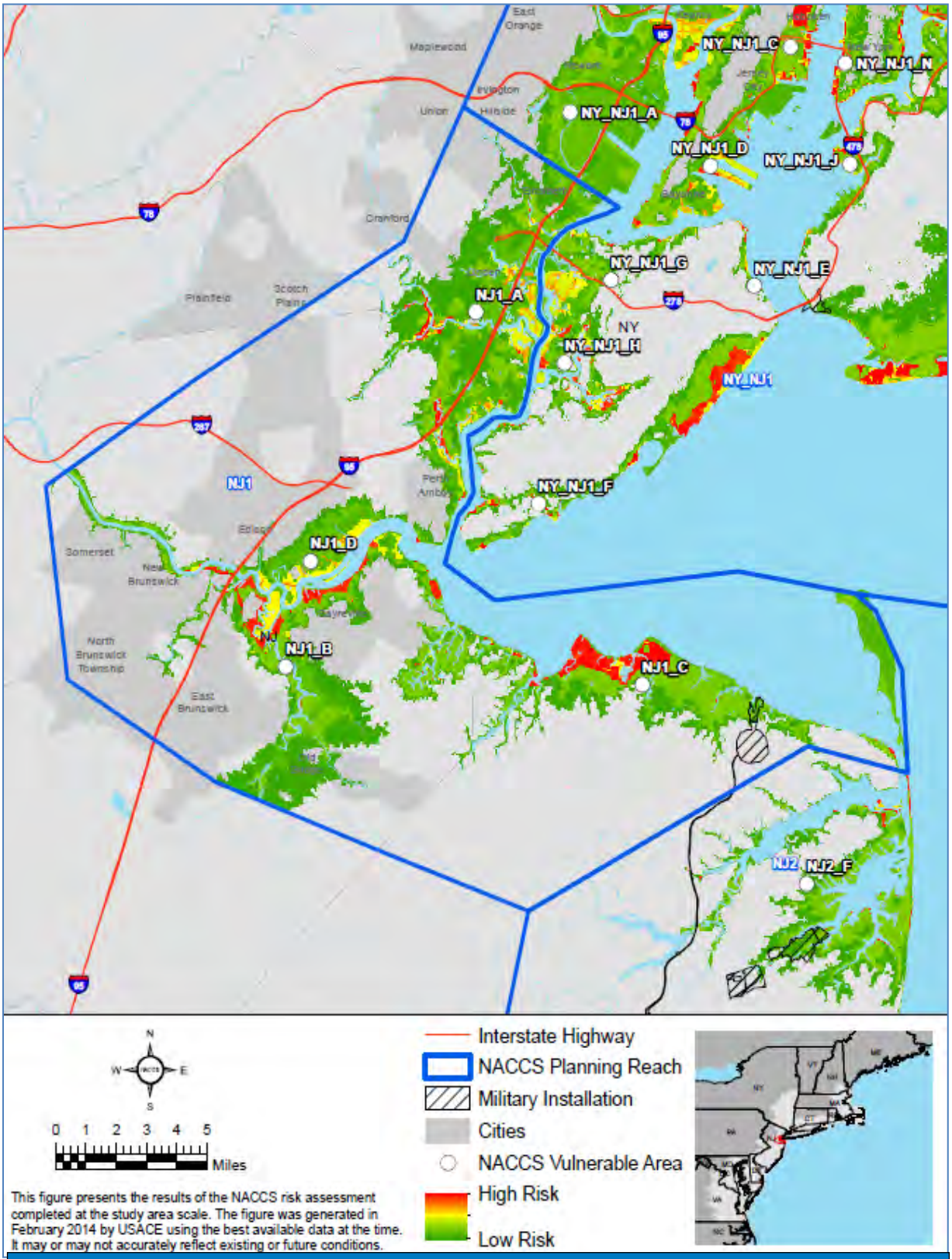

Figure 19. Reach NJ1 Risk Areas

Reach: NJ2

The shoreline of New Jersey Reach 2 (Figure 20) is mostly beach, with significant presence of USACE coastal flood risk management projects, and limited extent of the1 percent floodplain. Six areas of high exposure were identified in Reach NJ2 and are described in this section.

NJ2_A: Sandy Hook to Manasquan Constructed Beach Erosion Control Project Region

This risk area is approximately 21 miles long, extending a few blocks west (approximately 2,000 feet wide) through the communities of Manasquan, Sea Girt, Spring Lake, Lake Como, Belmar, Avon-by-the-Sea, Bradley Beach, Ocean Grove, Asbury Park, Loch Arbour, Allenhurst, Deal, Elberon, Long Branch, Monmouth Beach, and Sea Bright. The oceanfronts are characterized by full residential development. The main problems are tidal flooding and beach erosion. The existing USACE shore protection project is divided into two sections. Section 1, which extends 12 miles from Sea Bright to Loch Arbor, is partially complete; Sea Bright to Long Branch has been constructed. Section 2, which extends 9 miles from Asbury Park to Manasquan Inlet, was completed in 2001. To date, the segment from Elberon to Loch Arbor has not been constructed. The constructed reaches will be re-nourished to their original design profile, pursuant to PL 113-2 through the USACE Flood Control and Coastal Emergencies (FCCE) program.

NJ2_B: Manasquan Inlet to Spring Lake

This risk area extends from Manasquan Inlet northward to the northern boundary of Spring Lake and westward into Brielle, Wall Township, and Spring Lake Heights. It is on the landward side of NJ2_A. The area is characterized by dense residential development, with a commercial center in each town. Infrastructure includes cell towers, electrical facilities, rail facilities, fire stations, and National Shelter System facilities. The main problem is storm surge through Manasquan Inlet and the Wreck Pond outfall.

NJ2_C: Lake Como Northward to Southern Deal

This risk area spans Lake Como northward to southern Deal, encompassing Lake Como, Belmar, Avon-by the Sea, Bradley Beach, Ocean Grove (Neptune Township), Asbury Park, Loch Arbour, Allenhurst, and Deal. It is on the landward side of NJ2_A. Similar to NJ2_B, the area is characterized by dense residential development, with a commercial center in each town. Infrastructure includes wastewater treatment plants, rail facilities, hospitals, and National Shelter System facilities. The primary problem is tidal flooding through the Shark River Inlet and the Deal Lake flume.

NJ2_D: Northern Deal (Poplar Brook)

This risk area is in northern Deal, where potential surge impacts through Poplar Brook affect suburban developments. The area is on the landward side of NJ2_A, and its problems could be addressed through improvements or modifications to NJ2_A.

NJ2_E: Elberon (Takanassee Outfall)

This risk area is in a section of Long Branch called Elberon, on the northern and southern sides around the Takanassee outfall, where storm surge from the Takanassee outfall affects suburban development. The area is on the landward side of NJ2_A, and its problems could be addressed through improvements or modifications to NJ2_A.

NJ2_F: Shrewsbury River

The Shrewsbury River Basin is a back bay waterway that includes the Navesink River and multiple tributary creeks. The Shrewsbury and Navesink rivers generally flow northeast toward Sea Bright and then turn to the north to discharge into Sandy Hook Bay at Highlands, NJ. The shorelines of the Shrewsbury River and the Navesink River are almost entirely developed with single-family houses, but the Shrewsbury shoreline is low lying while the shores of the Navesink have steeper slopes. Storm surge flooding from the Shrewsbury River system affects the municipalities of Colts Neck, Eatontown, Fair Haven, Holmdel, Little Silver, Long Branch, Middletown, Monmouth Beach, Oceanport, Red Bank, Rumson, Sea Bright, Shrewsbury, and West Long Branch. There is a dense infrastructure network, including cell phone towers and electrical facilities, rail facilities and airports, and shelters. There is an existing flood risk management feasibility study for the Shrewsbury River focusing on Sea Bright, which is included in the Interim 2 Report. Additionally, there are existing Federal navigation channels in the main stems of the Shrewsbury and Navesink rivers and state navigation channels in the tributary creeks.

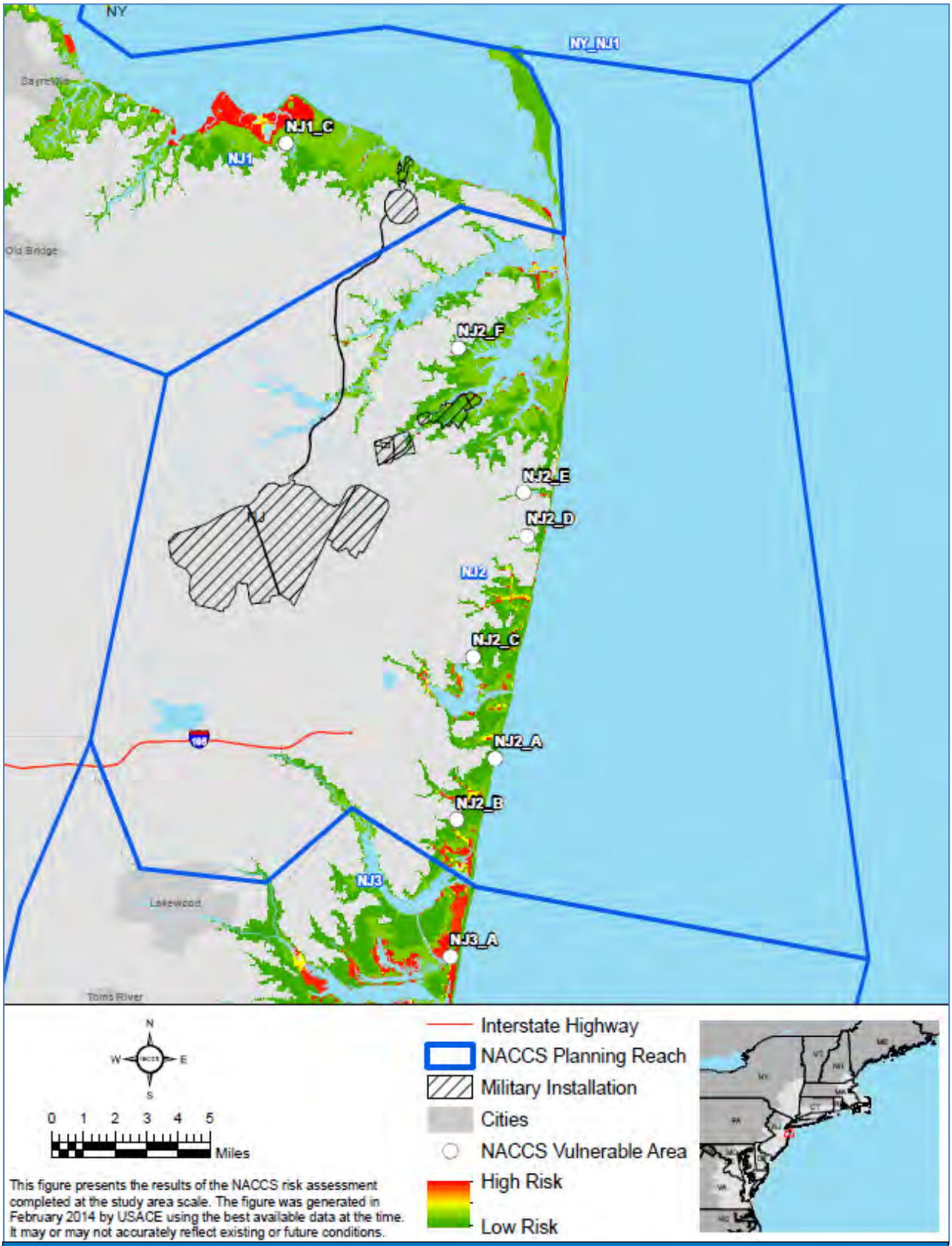

Figure 20. Reach NJ2 Risk Areas

Reach: NJ3

The shoreline of New Jersey Reach 3 (Figure 21) is classified as mostly beach with some wetland/estuarine, with significant presence of USACE coastal flood risk management projects, and an extensive 1-percent floodplain. Fifteen areas of high exposure were identified in Reach NJ3 and are described in this section.

NJ3_A: Manasquan River and Inlet and Vicinity

The Manasquan River, Metedeconk River, Kettle Creek, Barnegat Bay, Toms River, and the Atlantic Ocean are the present bodies of water influencing this area. The communities of Point Pleasant Beach, Point Pleasant, Bay Head, Mantoloking, Lavallette, Seaside Heights, and Seaside Park are within this risk area. This area is characterized as dense single-family homes in a low lying area, it is primarily a seasonal beach community. The shoreline for this area is constructed of beach, urban, and limited wetlands. Major roads include Highway 35 and 37. There is one airport, one power generation plant, and one rail station.

NJ3_B: Northern Barnegat Bay and Vicinity

The Metedeconk River, Kettle Creek, Toms River, Cedar Creek, Forked River, and Barnegat Bay are the present bodies of water influencing this area. The communities of Point Pleasant, Brick, Island Heights, Toms River Township, Toms River, South Toms River, Pine Beach, Ocean Gate, Bayville, Lanoka Harbor, and Forked River are within this risk area. This area is characterized as medium density single-family homes surrounded by back bay wetlands. The shoreline for this area is constructed by wetlands, urban, beach, and bluffs. Major roads include Highway 9. There is one airport, one prison, and five wastewater treatment plants.

NJ3_C: Southern Barnegat Bay and Vicinity

The Forked River, Oyster Creek, Mill Creek, Westecunk Creek, Manahawkin Bay, Little Egg Harbor, and the Atlantic Ocean are the bodies of water influencing this area. The communities of Waretown, Ocean Township, Barnegat, Manahawkin, Tuckerton, Barnegat Light, Harvey Cedars, Surf City, Ship Bottom, Long Beach Township, and Beach Haven are within this risk area. This area is characterized as medium to high density single-family homes in a low lying area. The shoreline types are dominant back bay wetland with a dominant beachfront on the ocean side. Included are large areas of urban development within the back bay as well. Major roads include Highway 72, which is the only bridge from the barrier island to the mainland. There is one airport and one wastewater treatment plant.

NJ3_D: Mullica River and Great Bay and Vicinity

The Mullica River, Great Bay, and Little Egg Harbor are the present bodies of water influencing the area. Little Egg Harbor Township is the city within this area. This area's shoreline type includes wetlands, urban (docks), small beach and small bluff areas. This area is characterized as medium density single-family homes in a low lying area. There are no major roads beyond localized neighborhood roads. There is one nuclear power plant (Oyster Creek) and one wastewater treatment plant present.

NJ3_E: Absecon and Brigantine Islands and Vicinity

Absecon Channel, Great Egg Harbor Inlet, the Atlantic Ocean, and various back bay meanders are the present bodies of water influencing this area. The communities of Brigantine, Atlantic City, Ventnor City, Margate City, and Longport are within this risk area. This area is characterized as high density urban multi-family dwellings, single-family homes, and casinos. The shoreline for this area is constructed beaches, urban back bay armoring, and minimal wetlands. Major roads include the Atlantic City Expressway (Highway 42), Brigantine Boulevard, and Atlantic Avenue. There are three airports, 26 electric generation units, three power generation plants, one rail station, and six wastewater treatment plants.

NJ3_F: Absecon Bay and Vicinity Including Pleasantville

Lakes Bay and Absecon Bay are the present bodies of water influencing this area. The City of Pleasantville is within this risk area. This area is characterized as medium density multi-family and single-family dwellings. The shoreline type for this area is wetlands and urban. Major roads include the Atlantic City Expressway (Highway 42). There is one airport present.

NJ3_G: Northern Great Egg Harbor Bay and Vicinity

Patcong Creek, Scull Bay, Steelman Bay, and Great Egg Harbor Bay are the bodies of water influencing this area. The communities of Linwood and Somers Points are within this area. This area is characterized as medium density single-family homes in a low lying area. The shoreline types include wetland, beaches, and minimal urban and bluffs. Major roads include Highway 9 and the Garden State Parkway. There is one airport and two wastewater treatment plants.

NJ3_H: Southern Great Egg Harbor Bay and Vicinity

Great Harbor is the body of water influencing this area. Beesley's Point is the city within this risk area. This area is characterized as a municipal/commercial area. The shoreline type includes wetland and urban. Major roads include Highway 9 and the Garden State Parkway. There are 21 electric generation units, one electric substation, and one power generation plant.

NJ3_I: Ocean City and Vicinity

Great Egg Harbor Inlet/Bay, Peck Bay, Corson Inlet, and the Atlantic Ocean are the bodies of water influencing this area. The City of Ocean City is within this risk area. This area is characterized as medium density single-family homes surrounded by back bay wetlands. The shoreline type for this area is wetlands and urban with a dominant beachfront. Major roads include Highway 52 and the Garden State Parkway. There is one airport, two electric generation units, and two power generation plants.

NJ3_J: Ludlam Island and Vicinity

Corson Inlet, Strathmere Bay, Ludlam Bay, Intracoastal Waterway, Townsends Inlet, and the Atlantic Ocean are the present bodies of water influencing this area. The communities of Strathmere and Sea Isle City are within this risk area. This area is characterized as medium density single-family homes surrounded by back bay wetlands. The shoreline type for this area includes a dominant wetland and beach with urban development. Major roads include Sea Isle Boulevard and Landis Avenue. There are three road-rail bridges.

NJ3_K: Seven Mile Island and Vicinity

Townsends Inlet, Gull Island Thorofare, Great Channel, Hereford Inlet, and the Atlantic Ocean are the bodies of water influencing this area. The communities of Avalon and Stone Harbor are within this risk area. This area is characterized as medium density single-family homes surrounded by back bay wetlands. The shoreline type for this area includes urban, wetland, and dominant beach. Major roads include Avalon Boulevard, Stone Harbor Boulevard, and Ocean Drive. There are three cellular towers and six road-rail bridges.

NJ3_L: Wildwoods and Vicinity

Hereford Inlet, Grassy Sound, Richardson Sound, Sunset Lake, and the Atlantic Ocean are the present bodies of water influencing this area. The communities of North Wildwood, West Wildwood, Wildwood, Wildwood Crest, Five Mile Beach, and Mile Beach are within this risk area. This area is characterized as medium density single and multiple family home dwellings surrounded by back bay wetlands. The shoreline type for this area includes urban, wetland, and dominant beach. Major roads include Highway 47 and 147. There are six bus stations and three road-rail bridges.

NJ3_M: Cape May and Vicinity

Intracoastal Waterway, Delaware Bay, and the Atlantic Ocean are the bodies of water influencing this area. The communities of Cape May, West Cape May, and Cape May Point are within this risk area. This area is characterized as medium to low density single-family homes. The shoreline type for this area includes urban, beach, and minimal wetland. Major roads include Sunset Boulevard and Highway 109. There are three bus stations, one ice plant, and two road-rail bridges.

NJ3_N: Western Cape May and Vicinity

Intracoastal Waterway and the Delaware Bay are the present bodies of water influencing this area. The communities of North Cape May and Villas are within this risk area. This area is characterized as medium to low density single-family homes. The shoreline type for this area includes beach and urban. Major roads include Bayshore Road and Town Bank Road. There is one airport, one ferry, and one wastewater treatment plant.

NJ3_O: Middle Township and Vicinity

Delaware Bay and Bidwell Creek are the present bodies of water influencing this area. The closest city is Middle Township. This area is characterized as low density rural. The shoreline type for this area is beach. There is no infrastructure present.

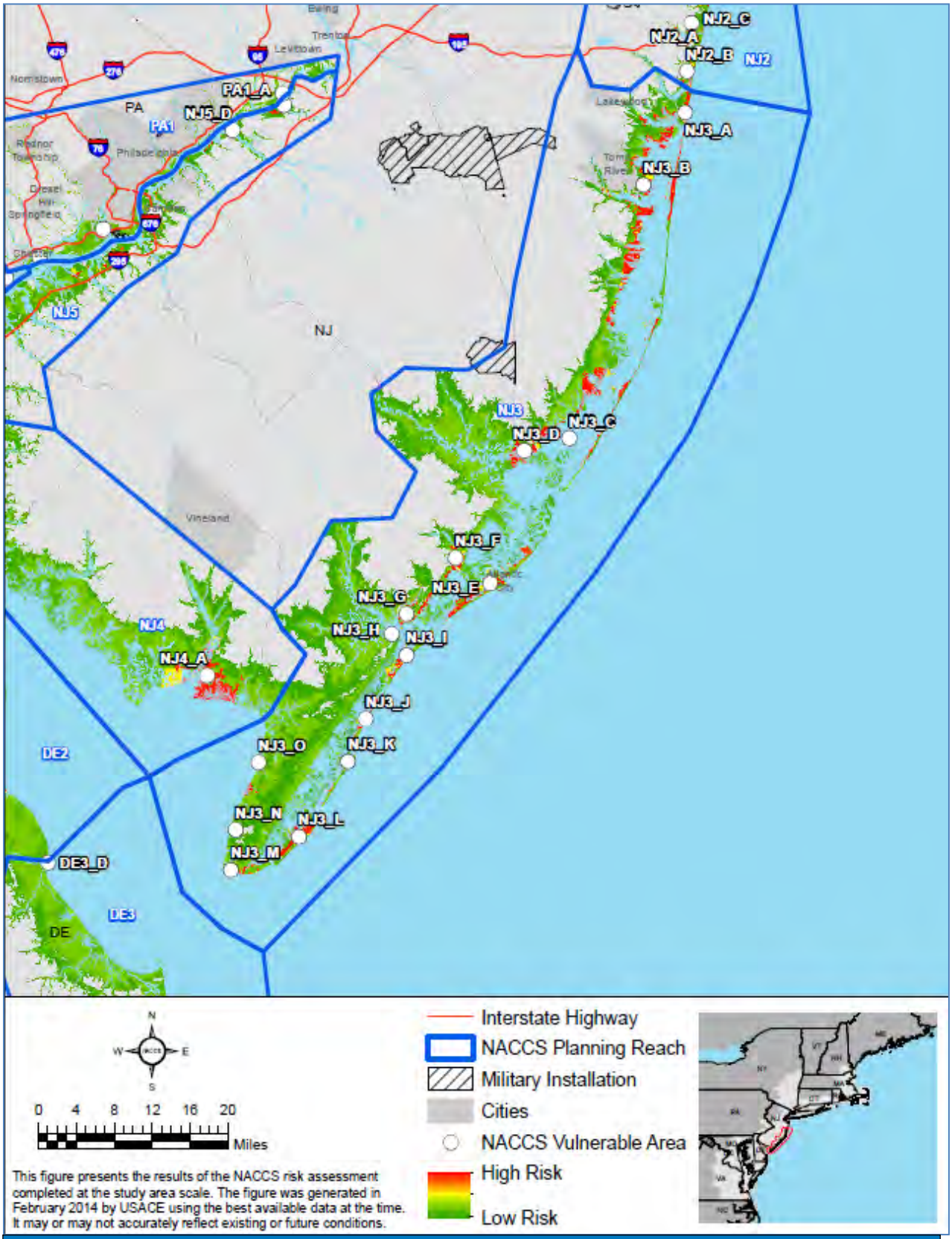

Figure 21. Reach NJ3 Risk Areas

Reach: NJ4

The shoreline of New Jersey Reach 4 (Figure 22) is classified as mostly wetland/estuarine, with very limited USACE coastal flood risk management projects, and an extensive 1-percent floodplain. Three areas of high risk were identified in Reach NJ4 and are described in this section.

NJ4_A: Maurice River and Vicinity

The Delaware Bay and Maurice River are the present bodies of water influencing this area. The communities of Delmont, Maurice River, and Port Norris, are within this risk area. This area is characterized as medium to low density single-family rural homes. The shoreline type for this area includes wetland and urban. Major roads include Highway 47. There are two prisons in this area.

NJ4_B: Delaware Bay Shoreline of Southern Salem County and Northern Cumberland County

The Delaware Bay/Estuary is the body of water influencing this area. This area is not populated with homes and is characterized as municipal and commercial infrastructure. The shoreline type for this area is partially urban. No major roads are present. There are six electric generation units, two nuclear power plants, and two power generation plants.

NJ4_C: Salem River and Vicinity

The Delaware Bay/Estuary and Salem River are the present bodies of water influencing this area. The City of Salem is within this risk area. This area is characterized as low density single-family rural homes. The shoreline type for this area includes wetland and low urban. Major roads include Highway 49. There is one electric generation unit, three ports, and one power generation plant.

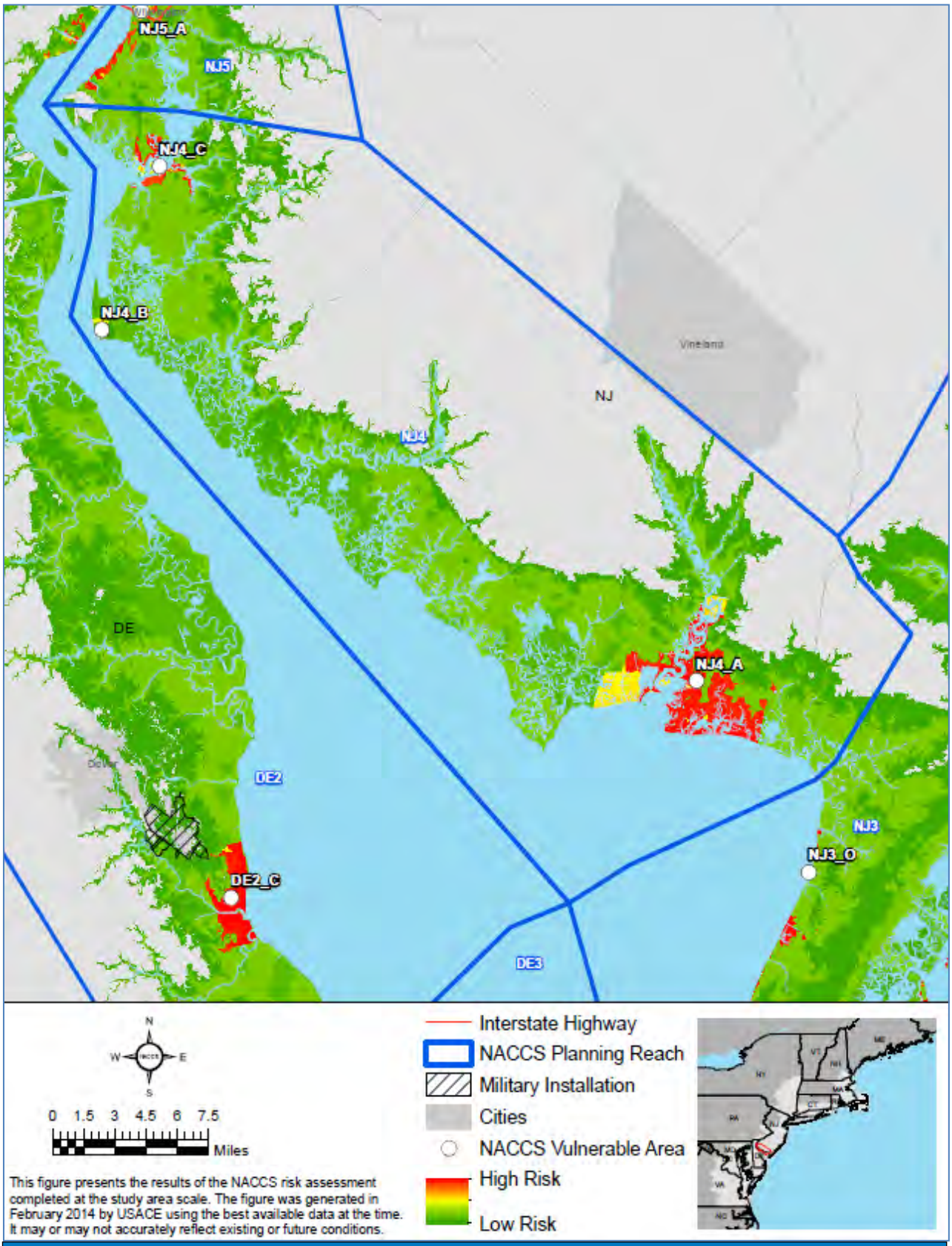

Figure 22. Reach NJ4 Risk Areas

Reach: NJ5

The shoreline of New Jersey Reach 5 (Figure 23) is classified as mostly wetland/estuarine, with significant presence of USACE coastal flood risk management projects, and an extensive 1 percent floodplain. Five areas of high risk were identified in Reach NJ-5 and are described in this section.

NJ5_A: Pennsville and Vicinity

The Delaware Bay/Estuary is the body of water in this area. The communities of Pennsville and Deepwater are within this risk area. This area is characterized as medium density single-family rural homes. The shoreline type for this area includes urban. Major roads include Highway 130, Highway 49, and Interstate 295. There is one airport, 24 electric generation units, one port, two power generation plants, and two wastewater treatment plants.

NJ5_B: Penns Grove and Vicinity

The Delaware Bay/Estuary is the body of water in this area. The City of Penns Grove is within this risk area. This area is characterized as medium density single-family rural homes. The shoreline type for this area includes urban. Major roads include North and South Virginia Ave. There are two wastewater treatment plants in this area.

NJ5_C: Camden/Cooper River and Vicinity

The Delaware Bay/Estuary, Mantua Creek, Big Timber Creek, Cooper River, and Pennsauken Creek are the bodies of water in this area. The communities of Paulsboro, West Deptford, Gloucester City, Collingswood, Camden, and Pennsauken Township are within this risk area. This area is characterized as medium to high density single and multiple family urban homes. The shoreline type for this area includes bluffs, wetland, and urban. Major roads include Interstate 76, 295, 676, and Highway 130. There are two airports, 35 electric generation units, one ferry, 46 ports, and 10 power generation plants.

NJ5_D: Palmyra and Vicinity

The Delaware Bay/Estuary and Rancocas Creek are the bodies of water in this area. The communities of Palmyra, Riverton, Riverside, Delanco, and Beverly are within this risk area. This area is characterized as medium to high density single and multiple family urban homes. The shoreline type for this area includes bluffs, wetland, and urban. Major roads include Highway 130. There is one port and six wastewater treatment plants.

NJ5_E: Burlington and Vicinity

The Delaware Bay/Estuary and Assiscunk Creek are the bodies of water in this area. The City of Burlington is within this risk area. This area is characterized as medium density single and multiple family homes. The shoreline type for this area includes bluffs, wetland, and urban. Major roads include Highway 413 and Highway 130. There is one airport, three ports, and one power generation plant.

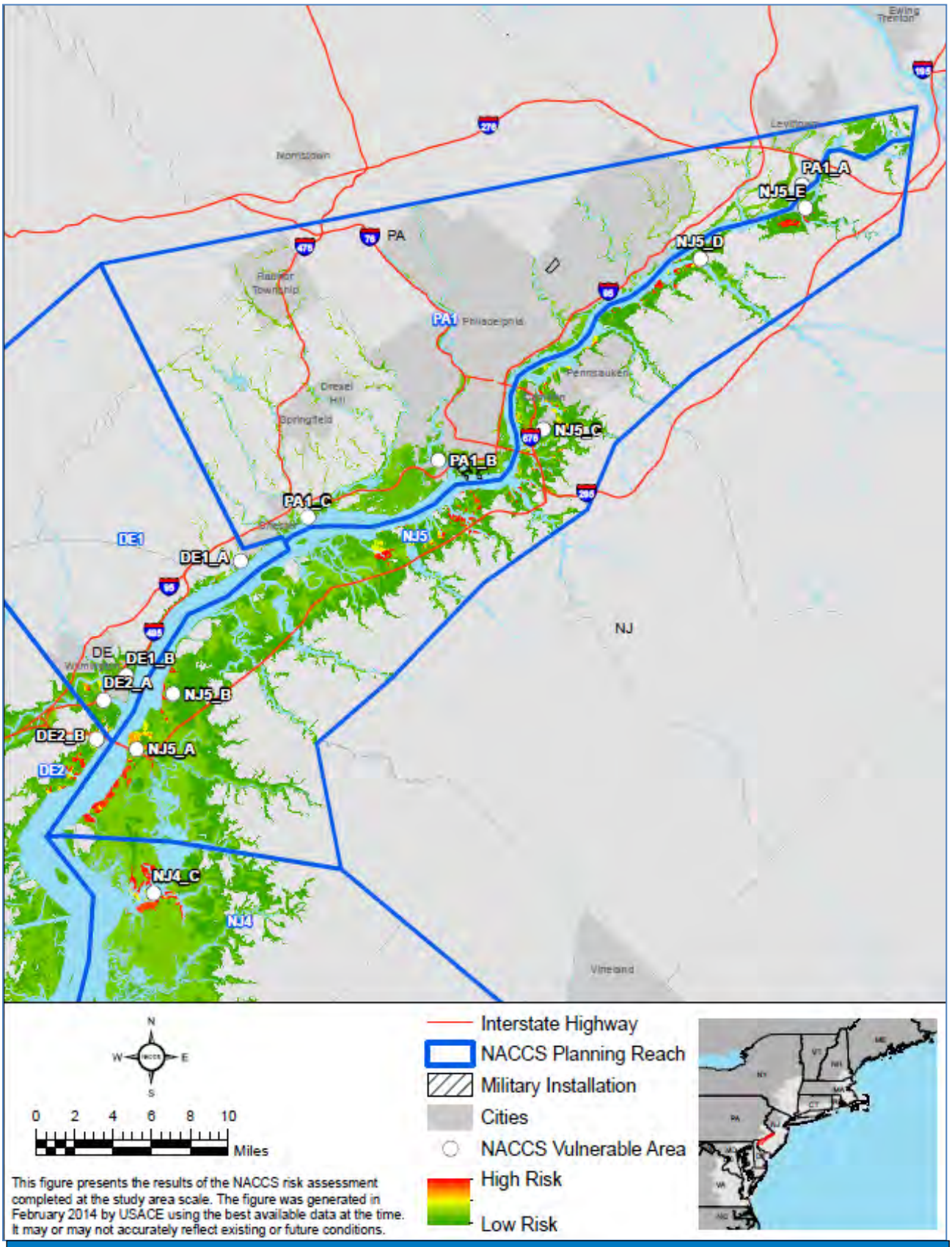

Figure 23. Reach NJ5 Risk Areas

Reach: NY_NJ1

The shoreline of New York and New Jersey Reach 1 (Figure 24) is the core of the New York metropolitan area. It is urban, with no USACE CSRM projects, and moderate floodplain. This reach includes northern New Jersey and the five boroughs of the City of New York: Manhattan, Brooklyn, Queens, the Bronx, and Staten Island. Of the five boroughs, only the Bronx is located on the continental United States mainland. Manhattan and Staten Island are islands, and Brooklyn and Queens are located on the western end of Long Island. The bridges and tunnels that serve as primary evacuation routes between the islands of New York City to the mainland are vitally important, considering that the five boroughs alone are home to more than 8 million people. Across the Hudson River, the New Jersey waterfront contains some of the most densely populated communities within the United States. This reach suffered grave and extensive damages from Hurricane Sandy, with 43 deaths within New York City alone from the storm. Details on the extent of damages from Hurricane Sandy and description of damages can be found in the Strategic Initiative for Rebuilding and Resiliency (SIRR) Report released by NYC Department of Planning in June 2013.

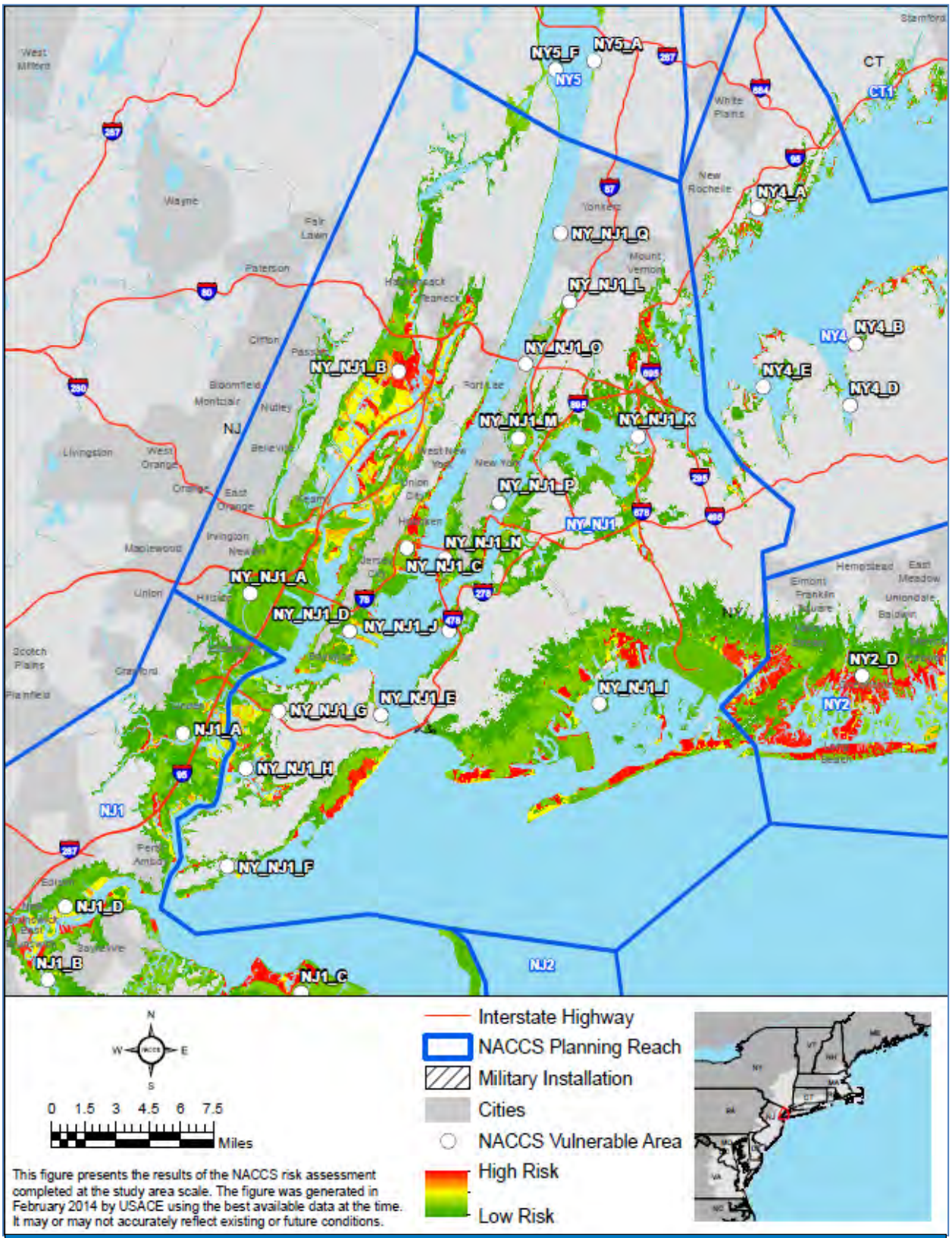

Figure 24. Reach NY_NJ1 Risk Areas

Seventeen areas of high risk were identified in reach NY_NJ1. Four of these areas are in the State of New Jersey and are included in the below list. Unless explicitly stated otherwise, the basic characterization of areas of high exposure within this reach is densely populated in terms of population and infrastructure.

NY_NJ1_A: Lower Passaic River

Flooding in the tidal portion of the Lower Passaic River affects municipalities from Newark Bay up to Dundee Dam. Municipalities within the Category 4 floodplain in this risk area include Newark, Harrison, East Newark, Kearny, North Arlington, Belleville, Lyndhurst, Rutherford, East Rutherford, Delawanna, Wallington, and Garfield. Of the listed communities, the communities of Newark, Kearny, and Harrison in the southern portion of the risk area are the most heavily populated and experienced the most reported damages. The storm surge from Hurricane Sandy inundated an extensive area of highly developed industrial, commercial, and residential neighborhoods. There was one documented fatality in this area due to the storm surge during Hurricane Sandy. The highly utilized urban transit systems of the Port Authority Trans-Hudson (PATH), NJ Transit, and Amtrak also operate through this area, and these transportation infrastructures were extensively damaged from the storm surge. Newark International Airport is one of nine airports located within this risk area as well. Other key infrastructure includes Amtrak and NJ Transit rail stations and lines, freight rail lines, bus stations, electrical power plants, wastewater treatment plant, and over 40 ports.

There is a USACE Passaic Tidal FRM study, which was originally formulated as a common element of the Passaic River Mainstem FRM project. The tidal risk reduction area consists of 5.5 miles of levees and 5.0 miles of floodwalls to provide a 500 year level of risk reduction to tidal flood prone areas in the communities of Harrison, Kearny, and Newark. A feasibility study is being developed by USACE for the Superfund site (Diamond Alkali).

NY_NJ1_B: Hacksensack River, Hackensack Meadowlands

The Hackensack River Basin, located in Hudson and Bergen Counties, NJ, is tidal from its mouth up to the Oradell Dam, a distance of 22 miles. Tidal flooding occurs along the Hackensack River and its tidal tributaries, specifically in the Hackensack Meadowlands. There are nine tidal tributaries: Berry's Creek, Losen Slofe, Mill Creek, Kingsland Creek, East River Ditch, Cromakill Creek, Penhorn Creek, Saw Mill Creek, and Bellman's Creek. The Hackensack Meadowlands is one of the largest wetland complexes in the New York metropolitan area, at 32 square miles. In Bergen County, communities within the Meadowlands include Carlstadt, East Rutherford, Little Ferry, Lyndhurst, Moonachie, North Arlington, Ridgefield, Rutherford, South Hackensack, and Teterboro. Jersey City, Kearny, North Bergen, and Secaucus are located within Hudson County. During Hurricane Sandy, a levee was overtopped, causing flooding in Moonachie, Carlstadt, and Little Ferry, with up to 5 feet of water, endangering hundreds of people who had to be rescued. Notwithstanding the presence of the wetland complexes, the Meadowlands district is developed, with airports, electrical power plants, prisons, wastewater treatment plants, nursing homes, and National Shelter System Facilities.

Under Section 324 of the Water Resources Development Act (WRDA) 1992, USACE is authorized to provide design and construction assistance to the New Jersey Meadowlands Commission (NJMC), the regional planning authority for the Hackensack Meadowlands. Under this project, USACE has examined possible flood risk management projects throughout the Meadowlands, including Berry's Creek and the Route 7/ Belleville Turnpike area.

NY_NJ1_C: Hudson Waterfront of New Jersey (Jersey City to Edgewater)

Risk area NY_NJ1_C is located within the Hudson Waterfront, which refers to the stretch of New Jersey between the Bayonne Bridge and the George Washington Bridge. This risk area includes the municipalities of Jersey City, Hoboken, Union City, Weehawken, West New York, Guttenberg, North Bergen, Fairview, Cliffside Park, and Edgewater and is among the most densely populated in the United States, with great ethnic and socioeconomic diversity. Hoboken and Jersey City suffered extensive inundation from Hurricane Sandy, and Hoboken is in the midst of developing a master plan for flood risk management. The Holland Tunnel is in Jersey City, and the Lincoln Tunnel is in Union City. Additionally, there are airports, ferries to New York, hospitals, nursing homes, ports, rail stations, and wastewater treatment plants.

NY_NJ1_D: City of Bayonne

The City of Bayonne in Hudson County is located on a peninsula bounded by Newark Bay, Kill van Kull, and Upper Bay. Located in the center of the Port of New York and New Jersey, it is a hub of industrial activity, with numerous ports and freight rail lines. In 2010, the Port Authority of New York and New Jersey agreed to acquire land from the Military Ocean Terminal at Bayonne from the city to build additional port facilities. Flood damages to Bayonne from Upper Bay, Kill Van Kull, and Lower Bay caused serious disruptions to port activity and the regional, if not national, economy.

V. Coastal Storm Risk Management Strategies and Measures

V.1 Measures and Applicability by Shoreline Type

The structural and NNBF measures were further categorized based on shoreline type for where they are best suited according to typical application opportunities and constraints and best professional judgment (Dronkers et. al, 1990; USACE 2014). Shoreline types were derived from the NOAA Environmental Sensitivity Index Shoreline Classification dataset (NOAA, n.d.). Figure 25 presents the location and extent of each shoreline type in the State of New Jersey. Table 4 summarizes the measures' applicability based on shoreline type. It is assumed non-structural measures could be considered in all geographic contexts, subject to further evaluation at a smaller scale.

Additionally, a conceptual analysis of geographic applicability of NNBF measures presented in Table 3 was completed, including beach restoration, beach restoration with breakwaters/groins, living shorelines, reefs, submerged aquatic vegetation, and wetlands. The geographic information system (GIS) operations that were used for the NNBF screening analysis are described in the Use of Natural and Nature-Based Features for Coastal Resilience Report (Bridges et. al., 2015). In addition to the NOAA Environmental Sensitivity Index Shoreline Classification dataset (NOAA n.d.), other criteria considered were habitat type, impervious cover, water quality, and topography/bathymetry. Consistent with the theme of the Framework, further evaluation of the results would be required at a smaller scale and with finer data sets. Figure 26 presents the location and extent of NNBF measures based on additional screening criteria. Additional information associated with the methodology and results of the analysis is presented in the Planning Analyses Appendix

Table 4 displays a summary of shoreline type by length by reach for the State of New Jersey. The lengths of shoreline type on an individual reach basis are provided in Figures 27 through 32.

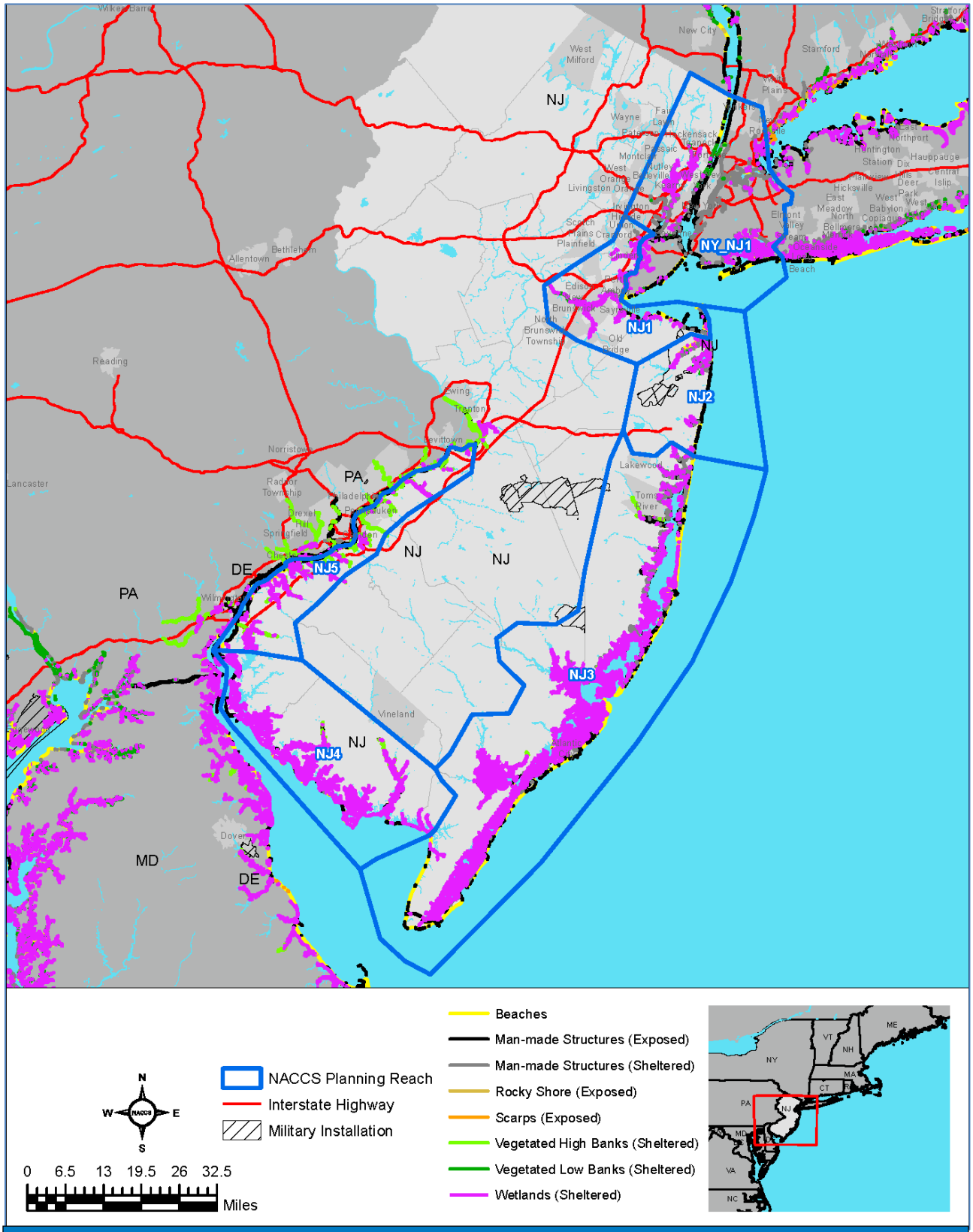

Figure 25. Shoreline Types for the State of New Jersey

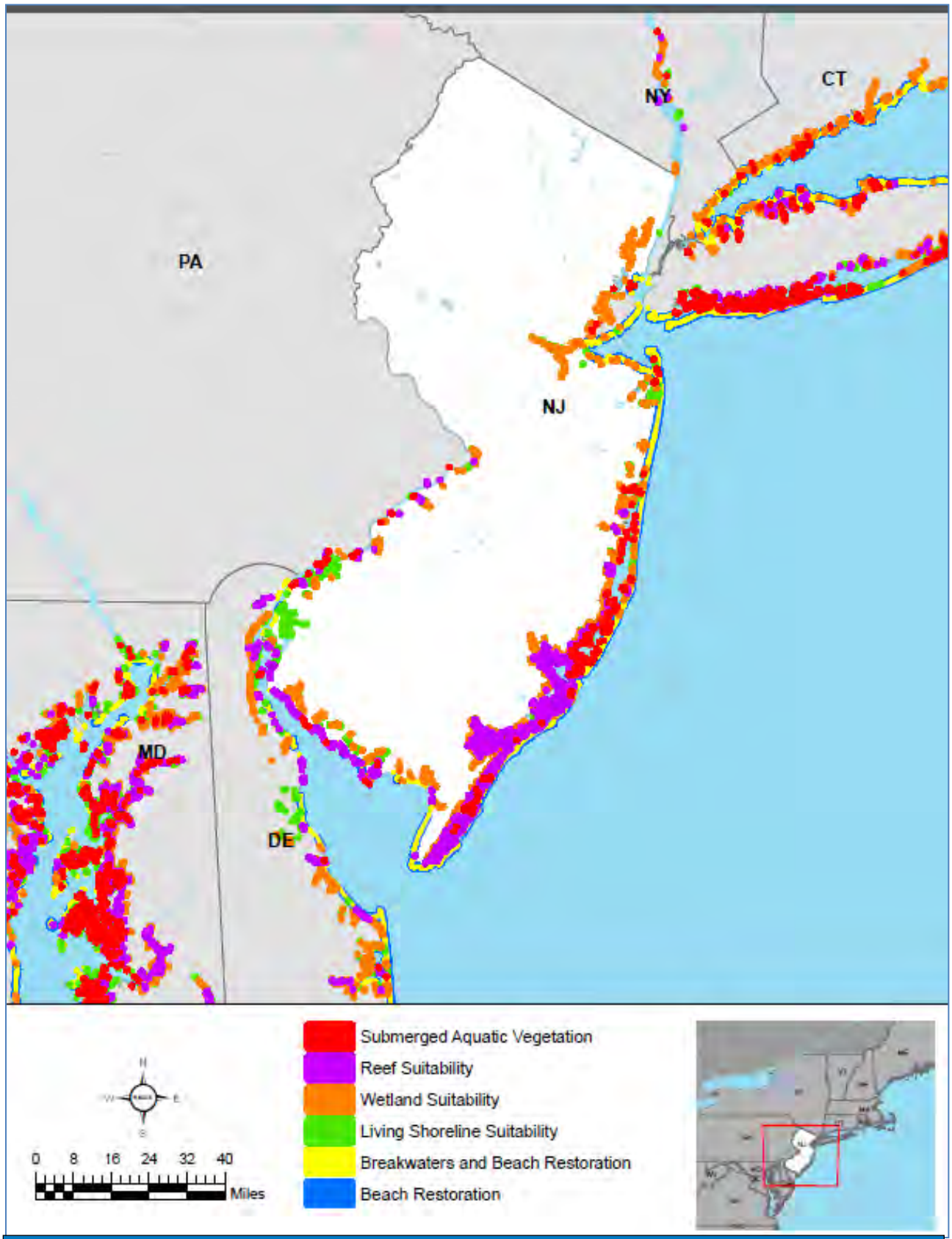

Figure 26. NNBF Measures Screening for the State of New Jersey

Table 3. Structural and NNBF Measure Applicability by NOAA-Environmental Sensitivity Index (ESI) Shoreline Type

Measures	Rocky Shores (Exposed)	Rocky Shores (Sheltered)	Beaches (Exposed)	Manmade Structures (Exposed)	Manmade Structures (Sheltered)	Scarps (Exposed)	Scarps (Sheltered)	Vegetated Low Banks (Sheltered)	Wetlands/Marshes/ Swamps (Sheltered)
Structural									
Storm Surge Barrier[1]									
Barrier Island Preservation and Beach Restoration (beach fill, dune creation)[2]			x						
Beach Restoration and Breakwaters[2]			x						
Beach Restoration and Groins[2]			x						
Shoreline Stabilization						x	x	x	
Deployable Floodwalls					x				
Floodwalls and Levees		x			x			x	
Drainage Improvements	x	x	x	x	x	x	x	x	x
Natural and Nature-Based Features									
Living Shoreline						x	x	x	x
Wetlands							x		x
Reefs	x	x				x			x
Submerged Aquatic Vegetation[3]									x
Overwash Fans[4]									
Drainage Improvements	x	x	x	x	x	x	x	x	x

[1] *The applicability of storm surge barriers cannot be determined based on shoreline type. It depends on other factors such as coastal geography.*

[2] *Beaches and dunes are also considered Natural and Nature-Based Features*

[3] *Submerged aquatic vegetation is not associated with any particular shoreline type. Initially assumed to apply to wetland shorelines.*

[4] *Overwash fans may apply to the back side of barrier islands, which are not explicitly identified in the NOAA-ESI shoreline database.*

Table 4. Shoreline Types by Length (feet) by Reach

Row Labels	Beaches	Manmade Structures (Exposed)	Manmade Structures (Sheltered)	Marshes / Swamps / Wetlands (Sheltered)	Scarps (Exposed)	Vegetated High Bank (Sheltered)	Vegetated Low Bank (Sheltered)	Grand Total
NJ1	**75,724**	**91,190**	**124,419**	**720,236**	**529**		**22,402**	**1,034,500**
NJ1_A	4,063	22,836	63,604	202,665			3,250	296,418
NJ1_B			15,463	181,788			19,152	216,403
NJ1_C	65,973	64,273	23,917	222,408	529			377,100
NJ1_D	5,688	4,081	21,435	113,375				144,579
NJ2	**120,806**	**76,132**	**189,146**	**281,348**			**20,347**	**687,779**
NJ2_A	75,635	47,510	14,996	284				138,425
NJ2_B	2,585	161	18,901	15,600			3,864	41,111
NJ2_C	1,580	21,735	8,748	31,268				63,331
NJ2_F	41,006	6,726	146,501	234,196			16,483	444,912
NJ3	**564,293**	**652,975**	**1,832,183**	**2,076,103**		**18,344**	**2,798**	**5,146,696**
NJ3_A	96,890	66,033	198,140	77,937			332	439,332
NJ3_B	42,682	165,509	657,617	419,087		12,319	2,466	1,299,680
NJ3_C	133,274	182,029	540,907	862,053				1,718,263
NJ3_D	1,273	134	234,439	116,764		3,571		356,181
NJ3_E	72,081	110,832	37,932	135,458				356,303
NJ3_F			2,982	18,698				21,680
NJ3_G	5,304	6,835	3,912	87,003		2,454		105,508
NJ3_H	845	1,924		4,203				6,972
NJ3_I	46,208	26,530	33,683	115,396				221,817
NJ3_J	32,560	18,889	16,160	85,337				152,946
NJ3_K	33,619	17,729	75,777	98,521				225,646
NJ3_L	25,667	32,585	29,112	48,648				136,012
NJ3_M	24,230	16,657	1,522	6,526				48,935
NJ3_N	40,087	3,170						43,257
NJ3_O	9,573	4,119		472				14,164
NJ4	**15,460**	**38,408**		**383,550**	**265**			**437,683**
NJ4_A	15,187	28,881		258,852	265			303,185
NJ4_B	273	7,913						8,186
NJ4_C		1,614		124,698				126,312
NJ5	**44,971**	**217,808**	**9,615**	**179,863**		**357,821**		**810,078**
NJ5_A	6,795	35,783		35,010		11,539		89,127
NJ5_B	772	13,605		742				15,119
NJ5_C	27,884	127,681	8,841	125,022		245,605		535,033
NJ5_D	4,654	26,397	774	15,608		72,241		119,674
NJ5_E	4,866	14,342		3,481		28,436		51,125
Grand Total	**821,254**	**1,076,513**	**2,155,363**	**3,641,100**	**794**	**376,165**	**45,547**	**8,116,736**

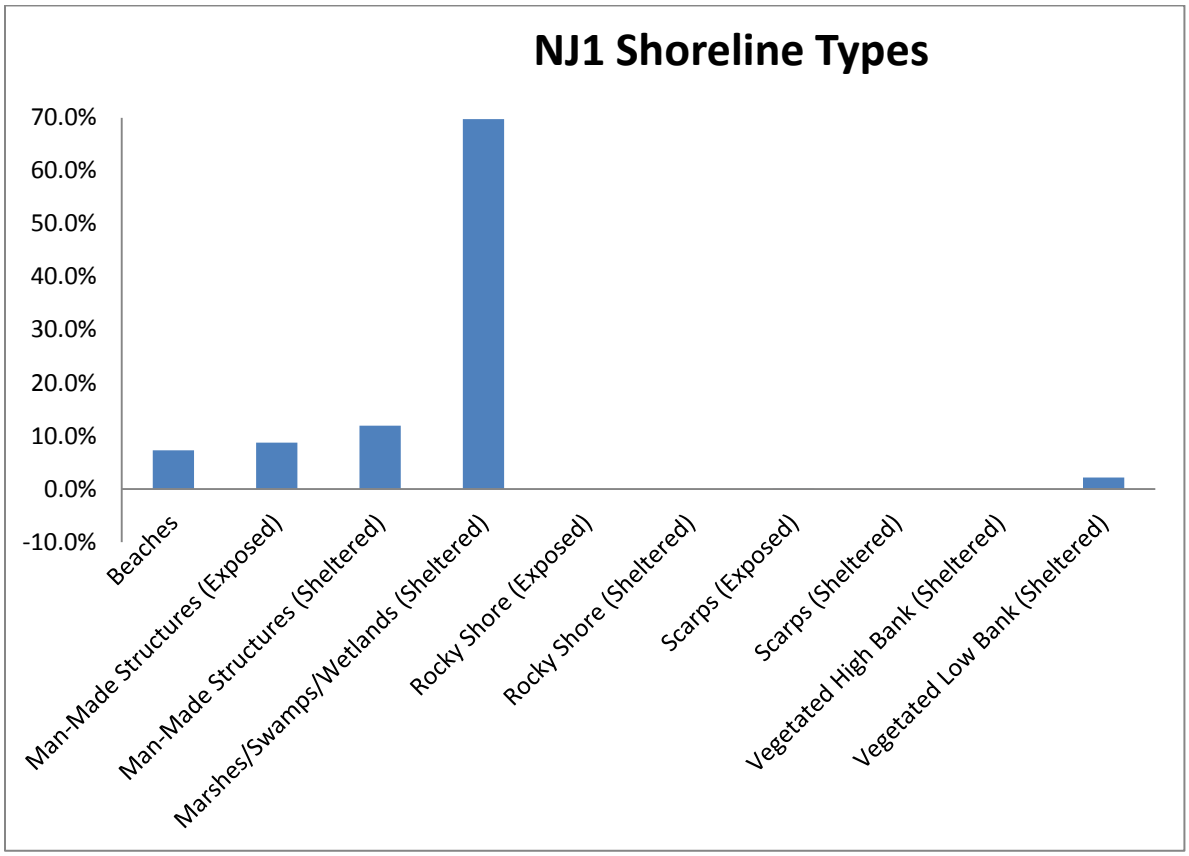

Figure 27. NJ1 Shoreline Types

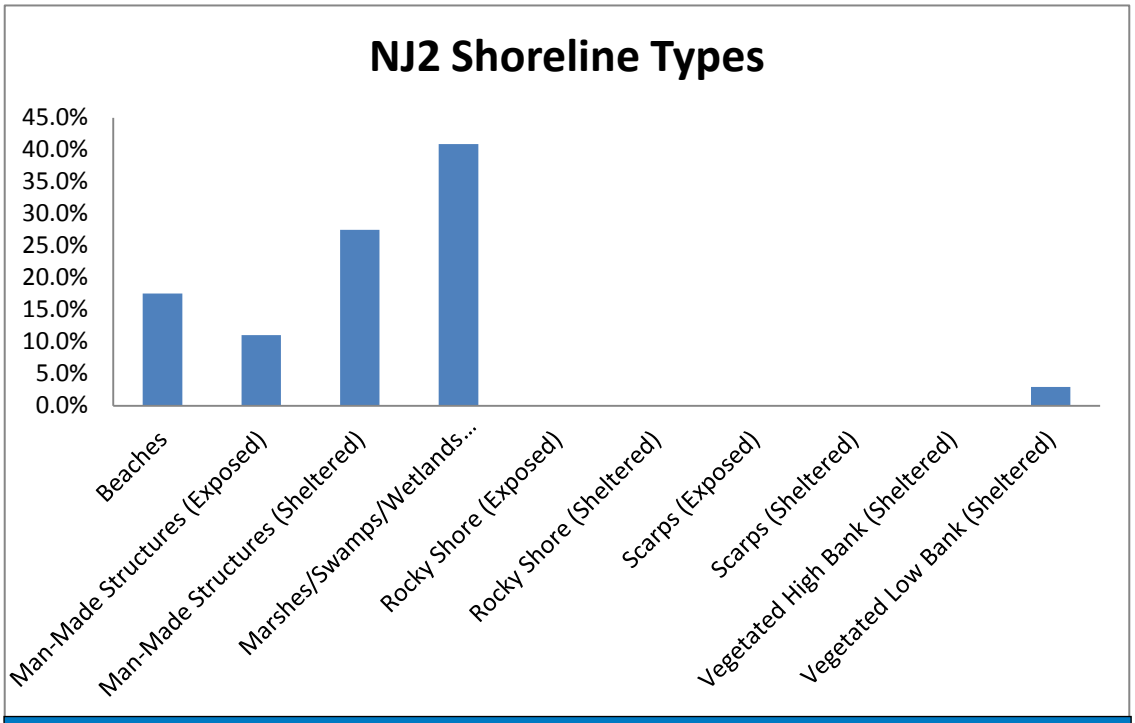

Figure 28. NJ2 Shoreline Types

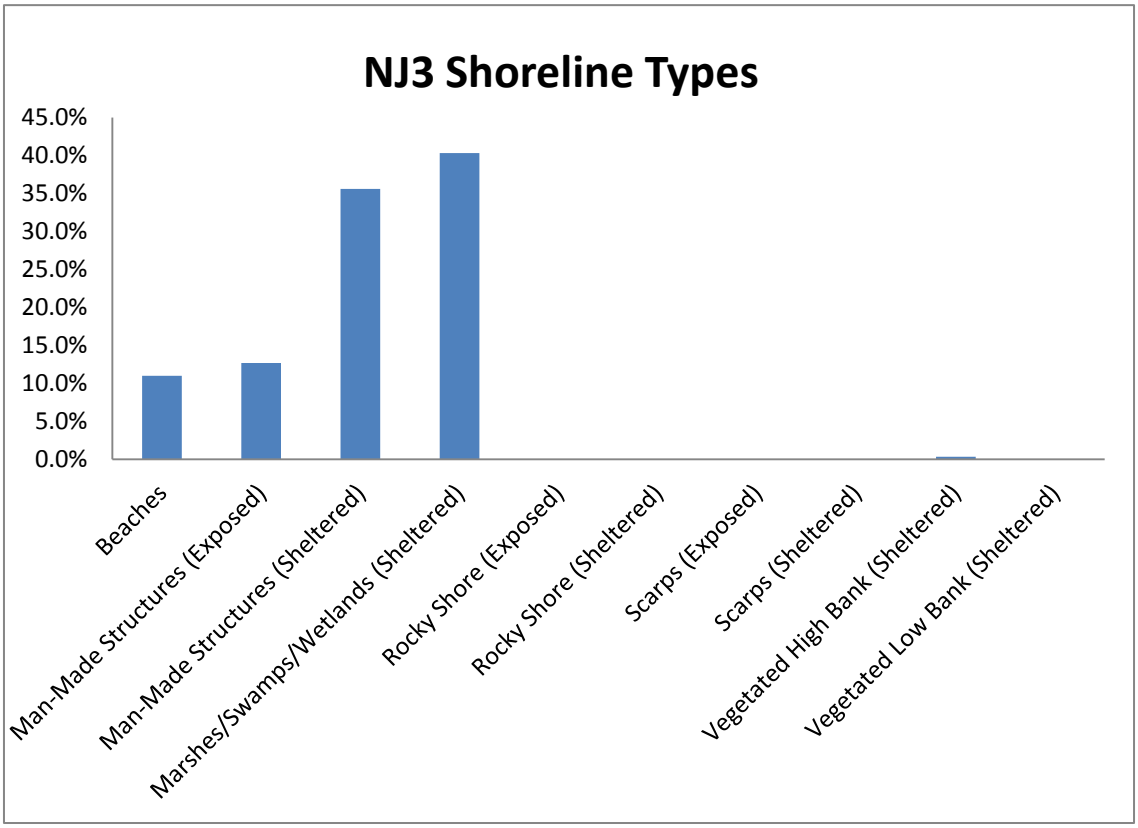

Figure 29. NJ3 Shoreline Types

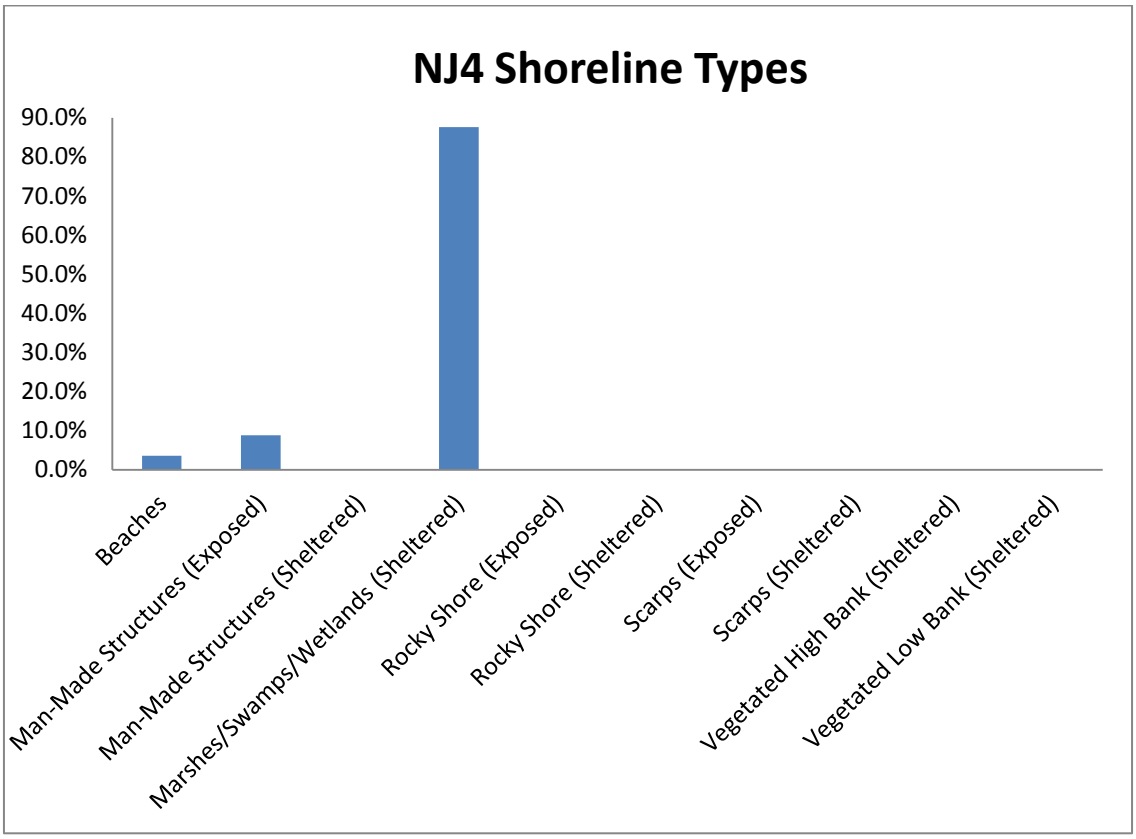

Figure 30. NJ4 Shoreline Types

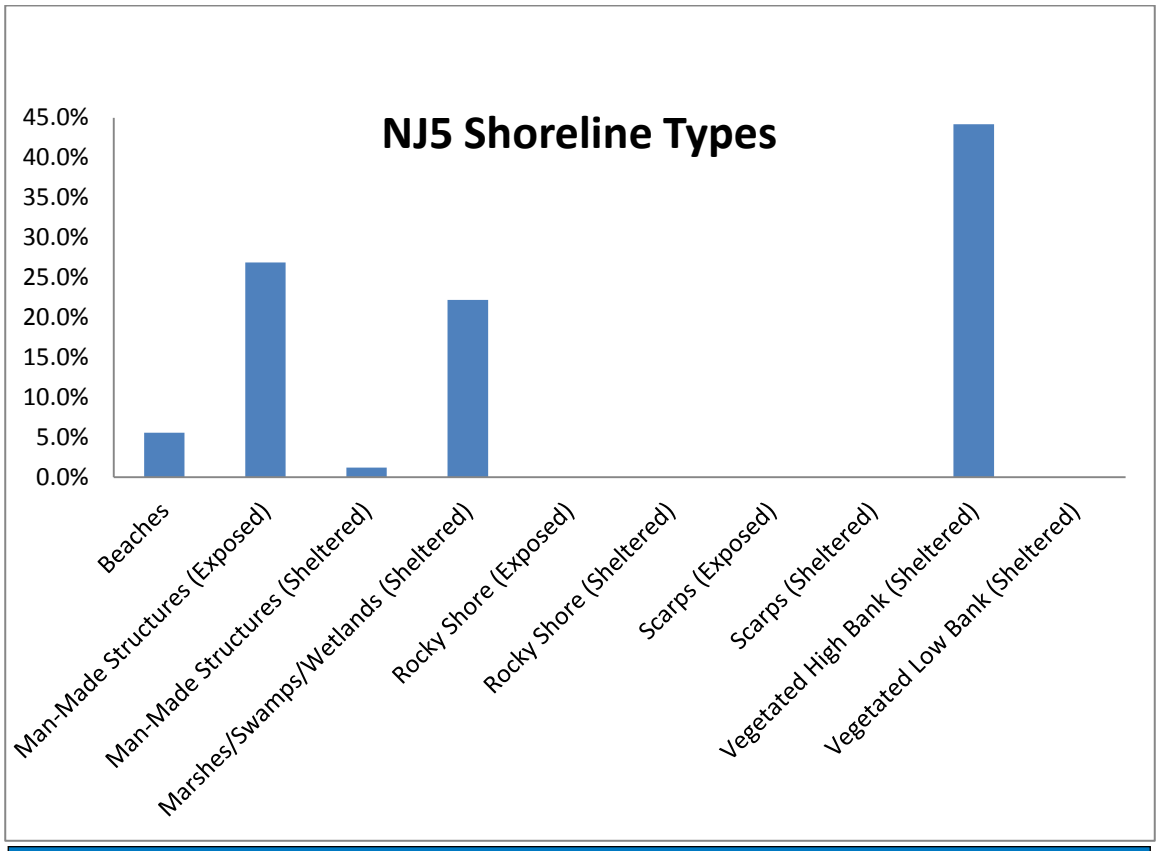

Figure 31. NJ5 Shoreline Types

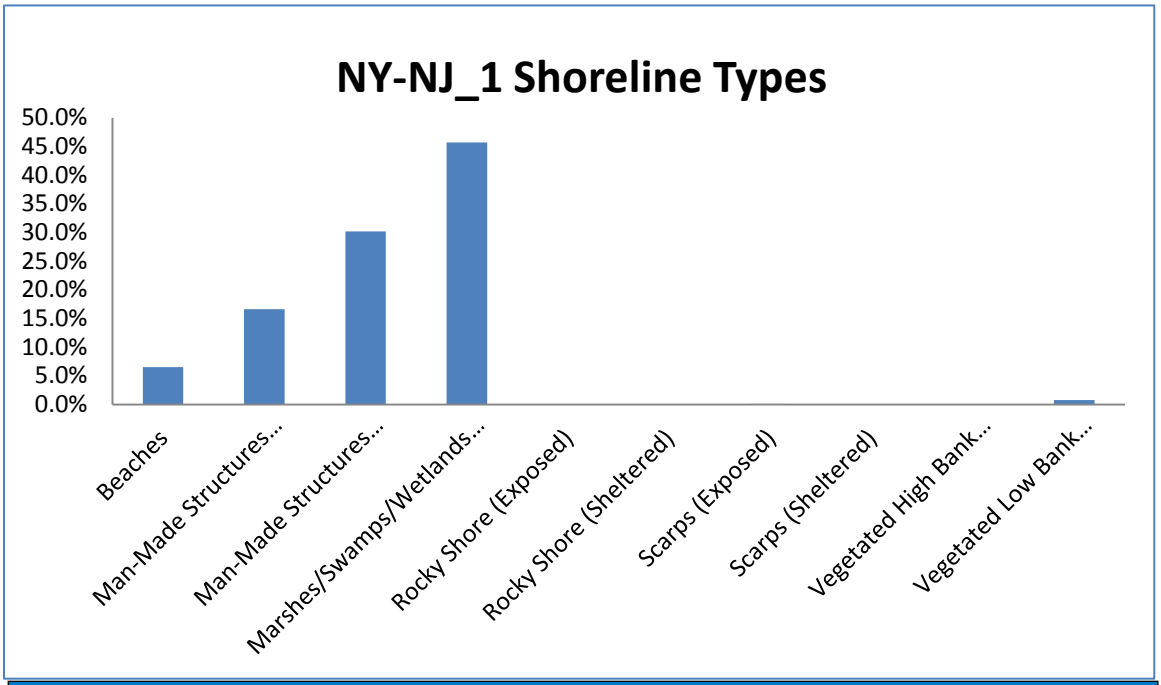

Figure 32. NY_NJ1 Shoreline Types

V.2 Cost Considerations

Conceptual design and parametric cost estimates (typically per linear foot of shoreline) were developed for the various CSRM measures based on a combination of available cost information for existing projects and representative unit costs for all construction items (e.g., excavation, fill, rock, plantings) based on historical observations.

VI. Tier 1 Assessment Results

Table 5 presents the results of the State of New Jersey risk areas and the comparison of management measures. The reference to the level of risk reduction in the table relates to the flooding attribute of the storm damage reduction and resilience storm damage reduction function presented in Table 1 of the overview section. The level of risk reduction (High or Low) is based on a 1 percent chance flood plus three feet (High) or 10 percent chance flood (Low) level. For each shoreline type within the risk area presented in Table 5, the numerical sequence of the measures for each shoreline type within the respective risk area relates to the change in risk and the parametric unit cost estimates for the applicable measures. Nonstructural measures could be considered in all geographic contexts, subject to further evaluation at a smaller scale. As a result, Table 5 only presents the change in risk and the parametric unit cost estimates for structural measures, including NNBF.

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
NJ1_A	Beaches	H	3	2	1									
NJ1_A	Manmade Structures (Exposed)	H												
NJ1_A	Manmade Structures (Sheltered)	H					3	2	1					
NJ1_A	Vegetated Low Banks (Sheltered	H						2	1					
NJ1_A	Vegetated Low Banks (Sheltered)	L				2					1			
NJ1_A	Wetlands	L									1	3	4	2

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
	(Sheltered)													
NJ1_A	Beaches	H	3	2	1									
NJ1_A	Manmade Structures (Sheltered)	H					3	2	1					
NJ1_B	Manmade Structures (Sheltered)	H					3	2	1					
NJ1_B	Vegetated Low Banks (Sheltered)	H						2	1					
NJ1_B	Vegetated Low Banks (Sheltered)	L				2					1			
NJ1_B	Wetlands (Sheltered)	L									1	3	4	2
NJ1_C	Beaches	H	3	2	1									
NJ1_C	Manmade Structures (Sheltered)	H					3	2	1					
NJ1_C	Scarps (Exposed)	L				2					1		3	
NJ1_C	Wetlands (Sheltered)	L									1	3	4	2
NJ1_D	Beaches	H	3	2	1									
NJ1_D	Manmade Structures (Sheltered)	H					3	2	1					
NJ1_D	Wetlands (Sheltered)	L									1	3	4	2
NJ2_A	Manmade	H					3	2	1					

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
	Structures (Sheltered)													
NJ2_A	Beaches	H	3	2	1									
NJ2_A	Wetlands (Sheltered)	L									1	3	4	2
NJ2_B	Beaches	H	3	2	1									
NJ2_B	Manmade Structures (Sheltered)	H					3	2	1					
NJ2_B	Vegetated Low Banks (Sheltered)	H						2	1					
NJ2_B	Vegetated Low Banks (Sheltered)	L				2					1			
NJ2_B	Wetlands (Sheltered)	L									1	3	4	2
NJ2_C	Beaches	H	3	2	1									
NJ2_C	Manmade Structures (Sheltered)	H					3	2	1					
NJ2_C	Wetlands (Sheltered)	L									1	3	4	2
NJ2_F	Beaches	H	3	2	1									
NJ2_F	Manmade Structures (Sheltered)	H					3	2	1					
NJ2_F	Beaches	H	3	2	1									
NJ2_F	Manmade Structures (Sheltered)	H					3	2	1					

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
NJ2_F	Vegetated Low Banks (Sheltered)	H						2	1					
NJ2_F	Vegetated Low Banks (Sheltered)	L				2					1			
NJ2_F	Wetlands (Sheltered)	L									1	3	4	2
NJ3_A	Beaches	H	3	2	1									
NJ3_A	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_A	Vegetated Low Banks (Sheltered)	L				2					1			
NJ3_A	Wetlands (Sheltered)	L									1	3	4	2
NJ3_B	Beaches	H	3	2	1									
NJ3_B	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_B	Vegetated Low Banks (Sheltered)	H						2	1					
NJ3_B	Vegetated Low Banks (Sheltered)					2					1			
NJ3_B	Wetlands (Sheltered)										1	3	4	2
NJ3_C	Beaches	H	3	2	1									
NJ3_C	Manmade	H					3	2	1					

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
	Structures (Sheltered)													
NJ3_C	Wetlands (Sheltered)	L									1	3	4	2
NJ3_D	Beaches	H	3	2	1									
NJ3_D	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_D	Wetlands (Sheltered)	L									1	3	4	2
NJ3_E	Beaches	H	3	2	1									
NJ3_E	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_E	Wetlands (Sheltered)	L									1	3	4	2
NJ3_F	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_F	Wetlands (Sheltered)	L									1	3	4	2
NJ3_G	Beaches	H	3	2	1									
NJ3_G	Manmade Structures (Sheltered)	L					3	2	1					
NJ3_G	Wetlands (Sheltered)	L									1	3	4	2
NJ3_H	Beaches	H	3	2	1									
NJ3_H	Wetlands (Sheltered)	L									1	3	4	2

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
NJ3_I	Beaches	H	3	2	1									
NJ3_I	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_I	Wetlands (Sheltered)	L									1	3	4	2
NJ3_J	Beaches	H	3	2	1									
NJ3_J	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_J	Wetlands (Sheltered)	L									1	3	4	2
NJ3_K	Beaches	H	3	2	1									
NJ3_K	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_K	Wetlands (Sheltered)	L									1	3	4	2
NJ3_L	Beaches	H	3	2	1									
NJ3_L	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_L	Wetlands (Sheltered)	L									1	3	4	2
NJ3_M	Beaches	H	3	2	1									
NJ3_M	Manmade Structures (Sheltered)	H					3	2	1					
NJ3_M	Wetlands (Sheltered)	L									1	3	4	2

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
NJ3_N	Beaches	H	3	2	1									
NJ3_O	Beaches	H	3	2	1									
NJ3_O	Wetlands (Sheltered)	L									1	3	4	2
NJ4_A	Beaches	H	3	2	1									
NJ4_A	Scarps (Exposed)	L				1					2		3	
NJ4_A	Wetlands (Sheltered)	L									1	3	4	2
NJ4_B	Beaches	H	3	2	1									
NJ4_C	Wetlands (Sheltered)	L									1	3	4	2
NJ5_A	Beaches	H	3	2	1									
NJ5_A	Wetlands (Sheltered)	L									1	3	4	2
NJ5_B	Beaches	H	3	2	1									
NJ5_B	Wetlands (Sheltered)	L									1	3	4	2
NJ5_C	Beaches	H	3	2	1									
NJ5_C	Manmade Structures (Sheltered)	H					3	2	1					
NJ5_C	Wetlands (Sheltered)	L									1	3	4	2
NJ5_D	Beaches	H	3	2	1									
NJ5_D	Manmade Structures (Sheltered)	H					3	2	1					
NJ5_D	Wetlands	L									1	3	4	2

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
	(Sheltered)													
NJ5_E	Beaches	H	3	2	1									
NJ5_E	Wetlands (Sheltered)	L									1	3	4	2
NY_NJ1_A	Beaches	H	3	2	1									
NY_NJ1_A	Manmade Structures (Sheltered)	H					3	2	1					
NY_NJ1_A	Vegetated Low Banks (Sheltered)	H						2	1					
NY_NJ1_A	Vegetated Low Banks (Sheltered)	L				2					1			
NY_NJ1_A	Wetlands (Sheltered)	L									1	3	4	2
NY_NJ1_B	Beaches	H	3	2	1									
NY_NJ1_B	Manmade Structures (Sheltered)	H					3	2	1					
NY_NJ1_B	Vegetated Low Banks (Sheltered)	H						2	1					
NY_NJ1_B	Vegetated Low Banks (Sheltered)	L				2					1			
NY_NJ1_B	Wetlands (Sheltered)	L									1	3	4	2
NY_NJ1_C	Manmade Structures (Sheltered)	H					3	2	1					

Table 5. Comparison of Measures within NACCS Risk Areas in the State of New Jersey

Risk Areas	NACCS Shoreline Type	Level of Risk Reduction	Beach Restoration with Breakwaters	Beach Restoration with Groins	Beach Restoration with Dunes	Shoreline Stabilization	Deployable Floodwall	Floodwall	Levee	Overwash Fans	Living Shoreline	Wetlands	Reefs	SAV Restoration
NY_NJ1_C	Wetlands (Sheltered)	L									1	3	4	2
NY_NJ1_C	Manmade Structures (Sheltered)	H					3	2	1					
NY_NJ1_C	Beaches	H	3	2	1									
NY_NJ1_C	Manmade Structures (Sheltered)	H					3	2	1					
NY_NJ1_C	Vegetated Low Banks (Sheltered)	H						2	1					
NY_NJ1_C	Vegetated Low Banks (Sheltered)	L				2					1			
NY_NJ1_C	Wetlands (Sheltered)										1	3	4	2
NY_NJ1_D	Beaches	H	1	2	3									
NY_NJ1_D	Manmade Structures (Sheltered)	H					3	2	1					
NY_NJ1_D	Vegetated Low Banks (Sheltered)	H						2	1					
NY_NJ1_D	Vegetated Low Banks (Sheltered)	L				2					1			
NY_NJ1_D	Wetlands (Sheltered)	L									1	3	4	2

VII. Tier 2 Assessment of Conceptual Measures

As part of the NACCS Tier 2 analysis for the State of New Jersey and in coordination with NJDEP, the Hudson Waterfront of New Jersey was selected as an example area to apply the NACCS Tier 2 assessment. Defined as Area NY_NJ1_C, this risk area includes the municipalities of Jersey City, Hoboken, Union City, Weehawken, West New York, Guttenburg, North Bergen, Fairview, Cliffside Park, and Edgewater. This area is at risk to coastal flooding from the New York-New Jersey Harbor and its tributaries, the Atlantic Ocean, and Long Island Sound. This area was selected for additional analysis due to the lack of existing Federal projects as well as the overall need for enhanced coastal resilience to surrounding communities due to significantly developed waterfront areas.

As demonstrated in Table 6, this risk area was subdivided into four sub-regions. Each sub-region offers a unique set of CSRM measures, which may act as an example for similar geomorphic settings in the State of New Jersey by state and local agencies and non-governmental organizations.

Table 6. Tier 2 Analysis Example Area Relative Cost/Management Measure Matrix for the NY_NJ1_C Risk Area

NY_NJ1_C Risk Area Strategy													
				Risk Management Strategies (NJ)									
				Preserve			***Accommodate***					***Avoid***	
		Existing Coastal FRM Projects		Structural Measures (100-year plus 3 feet)		Regional/ Gates (500-yr)		NNBF (10-yr)		Non-Structural (10-yr)		Acquisition (10-year floodplain)	
Sub Risk Area	Description	Existing Project - 2018 Post-Sandy	Estimated Design Level	Description	Cost Index	Description	Cost Index	Description	Cost Index	Description	Cost Index	Description	Cost Index
1	Developed waterfront within Jersey City, includes Liberty State Park	None	N/A	Floodwall/bulk head raising with local tide gate	0.08	Outside risk area (potentially would be at entrance to harbor)	N/A	Reuse of material excavated to create tidal marsh complex as part of larger environmental restoration project, creating a berm with ~6000 ft perimeter. May induce inundation in some areas while reducing	0.03	Floodproofing	0.67	Acquisition and Relocation	1.00

								inundation in others.					
2	Developed waterfront within Jersey city, industrial use	None	N/A	Floodwall/bulk head raising, local tide gate	0.22	Outside risk area (potentially would be at entrance to harbor)	N/A	Incompatible with industrial waterfront	N/A	Floodproofing	0.67	Acquisition and Relocation	1.00
3	Developed waterfront within City of Hoboken	None	N/A	Floodwall/bulk head raising	0.14	Outside risk area (potentially would be at entrance to harbor)	N/A	Incompatible with industrial waterfront	N/A	Floodproofing	0.67	Acquisition and Relocation	1.00
4	Developed waterfront spanning Weehawken to Edgewater	None	N/A	Floodwall/bulk head raising	0.45	Outside risk area (potentially would be at entrance to harbor)	N/A	Incompatible with industrial waterfront	N/A	Floodproofing	0.67	Acquisition and Relocation	1.00

The Tier 2 analysis, presented in Table 6, evaluates the relative costs associated with risk management measures included in the three primary strategies: avoid, accommodate, and preserve, for CSRM for this particular area. For each of the areas identified, management measures were selected based on knowledge of the area and available data and analyses, including shoreline type, topography, extent of development from aerial photography, sea level change inundation, extreme water levels, and flood inundation mapping. Other information considered in the identification of measures includes existing CSRM projects, conceptual costs, and the change in risk associated with a combination of measures.

The risk management associated with the management measures corresponds to the qualitative evaluation of measures presented in Table 6 such as high for a 1-percent-annual-chance flood plus 3 feet and low for a 10-percent-annual-chance flood. The cost index was derived from parametric unit cost estimates divided by the highest parametric unit cost of all the management measures in the area. The higher the cost index, the greater the relative costs. This enables the users to compare the measures associated with the risk management strategy in order to evaluate affordability and ultimately lead to an acceptable level of risk tolerance. The combination of measures leading to a selection of a plan as described in the NACCS Framework would further quantify risk management, and evaluate and compare the change in the risk based on the total cost of the plan. This would be completed at a smaller scale, Tier 3 analysis, which would be able to incorporate refined exposure and risk, and evaluation of other risk management measures, as well as refined costs.

VIII. Focus Area Analysis Summary

Two Focus Area Analyses (FAAs) have been developed for the State of New Jersey, including the New York-New Jersey Harbor and Tributaries FAA and the New Jersey Back Bays FAA. The purpose of the FAA is to determine if there is an interest in conducting further studies to identify structural, non-structural, NNBF, and policy/programmatic CSRM strategies and opportunities. The complete FAAs are provided in an attachment to this New Jersey State Chapter. A summary discussion of the content of this analysis for each FAA is provided below.

New York-New Jersey Harbor and Tributaries

The purpose of the New York-New Jersey Harbor and Tributaries (NYNJHT) FAA is to:

- Examine New York-New Jersey Harbor and Tributaries to identify problems, needs, and opportunities for improvements relating to CSRM, flood risk management, and related purposes.
- Identify a non-Federal sponsor(s) willing to cost share potential future investigations.

The study area encompasses New York-New Jersey Harbor and Tributaries, commonly aligned with the USACE Hudson-Raritan Estuary (HRE) Feasibility Study Comprehensive Restoration Plan (CRP). General sub-regions of the study area are employed in this study to identify geographically relevant problems, opportunities, and potential CSRM measures.

The study area was defined to include the following areas in New Jersey: Lower Raritan River; Arthur Kill and Kill Van Kull; and Newark Bay, Hackensack River, Passaic River, and the Hudson River. The HRE CRP Volume I introduction section presents greater geographic and geomorphic detail of these regions. The study area covers more than 1,380 square miles (Figure 33).

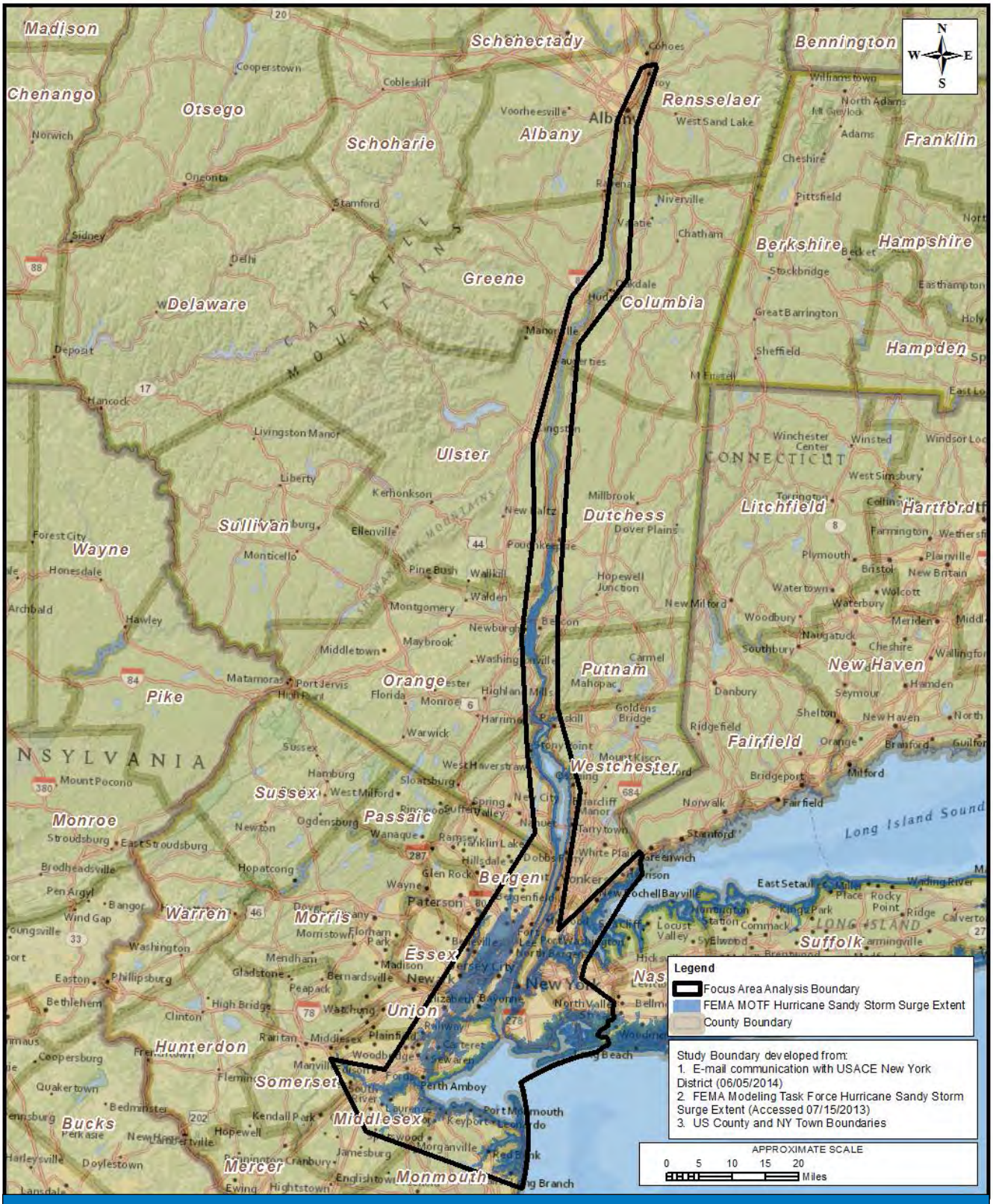

Figure 33. New York-New Jersey Harbor and Tributaries Focus Area Analysis Boundary

New Jersey Back Bays

The purpose of this FAA is to:

- Examine the back bay areas of the barrier islands on the Atlantic Ocean coast of New Jersey to identify problems, needs, and opportunities for improvements relating to CSRM and related purposes.
- Identify a non-Federal sponsor(s) willing to cost share potential future investigations.

The study area is located behind the barrier islands along the Atlantic Ocean in New Jersey and covers more than 450 square miles. It comprises part of five counties, including Cape May, Atlantic, Burlington, Ocean, and Monmouth counties (Figure 34).

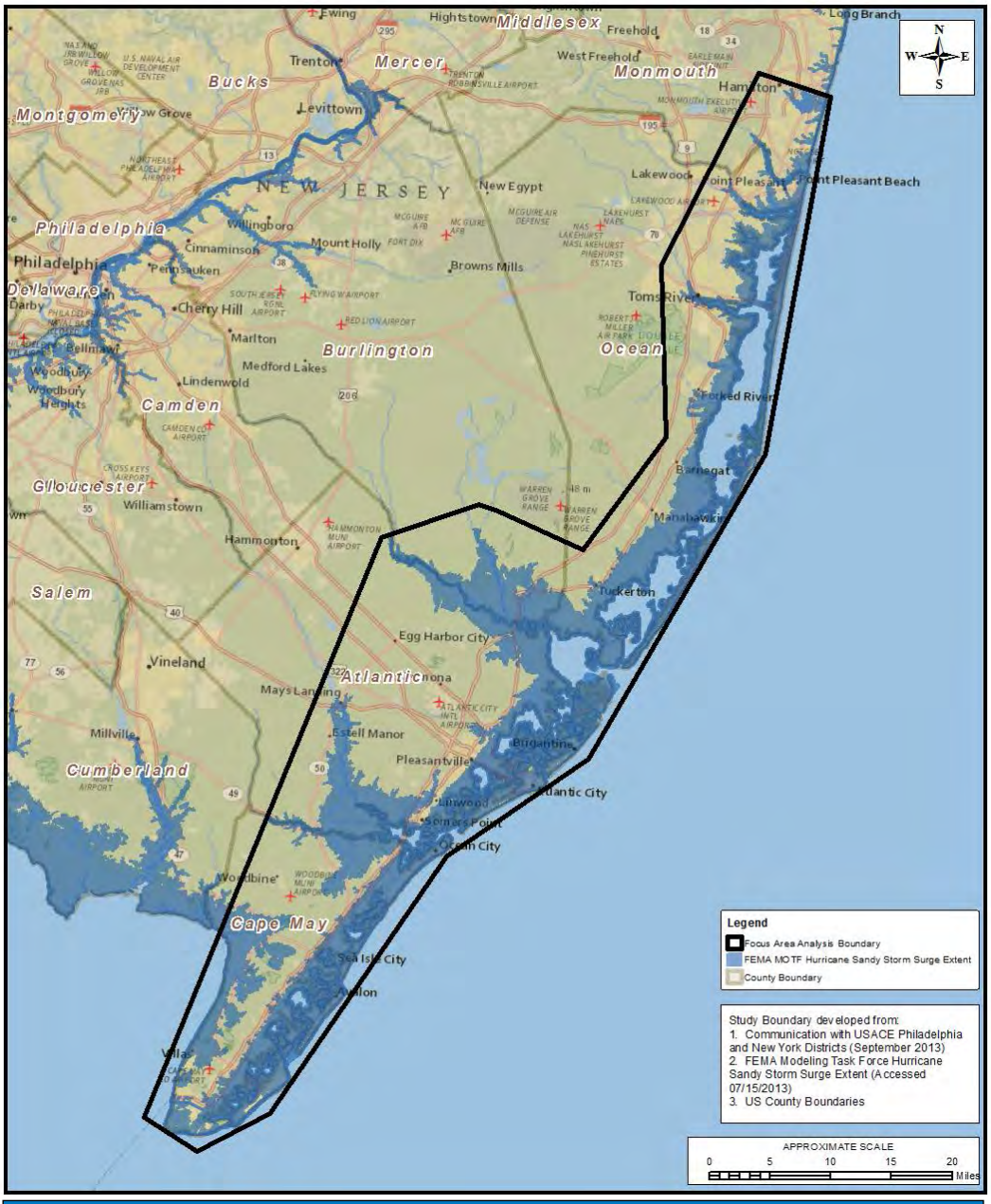

Figure 34. New Jersey Back Bays Focus Area Analysis Boundary

IX. Agency Coordination and Collaboration

IX.1 Coordination

As part of PL 113-2, Federal agencies received appropriations for various purposes within the agencies' mission areas in response to Hurricane Sandy. As part of the NACCS authorizing language, the NACCS was conducted in coordination with other Federal agencies and state, local, and tribal officials to ensure consistency with other plans to be developed, as appropriate. Extensive collaboration occurred as part of the NACCS, which is presented in the Agency Coordination and Collaboration Report.

Interagency points of contact and subject matter experts were asked in early 2013 to assist in preparing the scope for the NACCS and to be engaged in data gathering and development of analyses as part of the NACCS. This coordination complements the NACCS website located at http://www.nad.usace.army.mil/CompStudy.aspx and webinars for several coastal resilience topics. Several letters to NJDEP, commencing in mid-2013, requested feedback with respect to the preliminary problem identification; the post-Sandy "Most-Likely Future Conditions;" vulnerability mapping; and problems, needs, and opportunities for future planning initiatives. NJDEP also conducted a review in April 2014of a previous draft of this State of New Jersey State Chapter.

USACE received three separate response letters from NJDEP addressing comments on the draft project management plan and the draft scope of work; the agency review draft; and the problems, needs, and opportunities for future planning initiatives. Several meetings were held with NJDEP to discuss the original USACE correspondences. A letter also was received from the New Jersey General Assembly regarding coastal lake restoration projects. In response to the April 2014 USACE request letter regarding problems, needs and opportunities, NJDEP responded by letter in June 2014 (Attachment B of this State Chapter) stating that there is significant interest in the USACE development of more specific solutions for CSRM and resilience in the NYNJHT and New Jersey Back Bays focus areas. The letter further states NJDEP's interest in identifying and initiating multiple feasibility phase studies in both focus areas and that the studies will be achieved at full Federal expense given the potential significant cost of this endeavor. A request also was made for USACE to consider all of the NACCS CSRM (structural, non-structural, NNBF, and policy/programmatic) measures in the associated feasibility studies. Secondly, universities within the State of New Jersey developed six mitigation studies, which should be included upon availability in any USACE feasibility study effort. These university studies indicate the need for the USACE's significant technical and financial resources and its regional coordination capabilities. Thirdly, the U.S. Department of Housing and Urban Development (HUD) Rebuild by Design (RBD) research and design projects, specifically in Hoboken, Jersey City, Weehawken. NJ on the Hudson River, and Moonachie and Little Ferry, should be connected with the university studies if selected for continued HUD design, engineering, and construction funding. If these projects are not selected, USACE should consider the addition of these projects in future NACCS study efforts. Lastly, NJDEP stated an interest in working with the USACE and other regional partners to ensure the NACCS findings and opportunities are implemented and its intent be achieved.

IX.2 Related Activities, Projects, and Grants

Specific Federal, state and non-governmental organization (NGO) efforts that have been prepared in response to PL 113-2 are discussed below specifically for the State of New Jersey. Additional

information regarding Federal, and NGO projects and plans applicable to the entire NACCS Study Area are discussed in the Appendix D: State and District of Columbia Analyses, while additional information regarding the alignment of interagency plans and strategies is discussed in the Agency Collaboration and Coordination Report.

Federal Efforts

The U.S. Department of the Interior received $360 million in appropriations for mitigation actions to restore and rebuild national parks, national wildlife refuges, and other Federal public assets through resilient coastal habitat and infrastructure. The full list of funded projects can be found at http://www.nfwf.org/hurricanesandy/Documents/doi-projects.pdf.

In August 2013, the Department of the Interior (DOI) announced that USFWS and the National Fish and Wildlife Foundation (NFWF) would assist in administering the Hurricane Sandy Coastal Resiliency Competitive Grants Program, which will support projects that reduce communities' vulnerability to the growing risks from coastal storms, SLC, flooding, erosion, and associated threats through strengthening natural ecosystems that also benefit fish and wildlife (NFWF 2013). The Hurricane Sandy Coastal Resiliency Competitive Grants Program will provide approximately $100 million in grants for over 50 proposals to those states that were affected by Hurricane Sandy. States affected is defined as those states with disaster declarations as a result of the storm event. The grants range from $100,000 to over $5 million and were announced on June 16, 2014. More information on the program can be found at www.nfwf.org/HurricaneSandy, and the full list of projects can be found at http://www.doi.gov/news/upload/Hurricane-Sandy-2014-Grants-List.pdf.

Table 7 presents the list of specific Federal projects and plans that have been funded for the State of New Jersey that have been identified to date. Figure 35 presents proposed projects (including DOI grant projects that were not selected to receive grant funding because those that were not selected to receive grant funding represent an opportunity to potentially receive funding in the future) and other ongoing Federal actions using PL 113-2 funding.

Table 7. Post-Sandy Funded Federal Projects and Plans in New Jersey

Agency	State	Funded Projects	Cost
USFWS/DOI	NJ	Increase Resilience of Beach Habitat at Pierce's Point, Reed's Beach, and Moore's Beach, New Jersey.	$1,650,000
USFWS/DOI	NJ	Restoring Coastal Marshes in NJ NWRs.	$15,000,000
USFWS/DOI	NJ	Gandy's Beach Shoreline Protection Project, NJ.	$880,000
USFWS/DOI	NJ	Aquatic Connectivity & Flood Resilience in NJ: Removing the Hughsville Dam in Pohatcong and Restoring the Wreck Pond Inlet and Dune in Sea Girt and Spring Lake.	$3,050,000
USDA/NRCS	NJ	After demolition, removal, and restoration, the easements will provide ecological benefit and relief to 16 homeowners dealing with significant damage and continued flooding from the aftermath of Hurricane Sandy. This region is globally significant for a number of migratory bird species.	$4,000,000
DOI NFWF Grant/	NJ	Preventing Erosion and Restoring Hydrology in the Pine Barrens.	$280,000
DOI NFWF Grant/	NJ	Increasing Seven Mile Island's Beach Resiliency.	$1,280,000

Table 7. Post-Sandy Funded Federal Projects and Plans in New Jersey			
Agency	State	Funded Projects	Cost
DOI NFWF Grant/	NJ	Building Ecological Solutions to Coastal Community Hazards (NJ).	$1,280,000
DOI NFWF Grant/	NJ	Building Ecological Solutions to Coastal Community Hazards (NJ).	$3,440,000
DOI NFWF Grant/	NJ	Transforming Hoboken's Block 12 into a Green Infrastructure Asset.	$250,000
DOI NFWF Grant/	NJ	Reusing Dredged Material to Restore Salt Marshes and Protect Communities.	$3,420,000
DOI NFWF Grant/	NJ	Enhancing Liberty State Park's Marshes and Upland Habitats.	$250,000
DOI NFWF Grant/	NJ	Creating a Resilient Delaware Bay Shoreline in Cape May and Cumberland Counties.	$4,750,000
DOI NFWF Grant/	NJ	Strengthening Marshes Creek Through Green and Grey Infrastructure.	$2,720,000
DOI NFWF Grant/	NJ	Restoring Newark Bay's Wetlands.	$1,560,000
DOI NFWF Grant/	NJ	Strengthening Monmouth Beach's Marshes and Dunes.	$1,780,000
DOI NFWF Grant/	NJ	Restoring Hundreds of Wetland Acres in Great Egg Harbor Bay.	$2,630,000
DOI NFWF Grant/	NJ	Replenishing Little Egg Harbor's Marshes and Wetlands.	$2,130,000
DOI NFWF Grant/	NJ	Incorporating Green Infrastructure Resiliency in the Raritan River Basin.	$820,000
NOAA	NY/NJ/CT/RI	Activity 1: Install water level stations and collect water level and ellipsoidal data in NY, NJ, CT, and RI to refine datum models to support hydro and shoreline surveys from Rhode Island to New Jersey (CO-OPS). Activity 2: Establish global positioning system observations for determining geodetic to ellipsoid relationships at historic tidal gauge sites (NGS).	TBD
NOAA	NY/NJ	Contract topometric-bathymetric light detection and ranging (LiDAR) data collection of the shoreline in the highest impact areas (primarily NY/NJ).	TBD
NOAA	NY/NJ	Contract topometric-bathymetric LiDAR data collection of the shoreline in the highest impact areas (primarily NY/NJ).	TBD
NOAA	NJ	Hurricane Sandy caused extensive damage to the seawater system (part of the lab building) and building 74. Site is part of the National Park Service (NPS) Gateway National Recreation Area. The state of NJ has leases with the NPS and leases the NPS Building 74 and NJ-owned lab. Annex site is proposed on former lab site (burned down in 1985 from arson).	TBD

USDA – U.S. Department of Agriculture

NRCS – Natural Resources Conservation Service

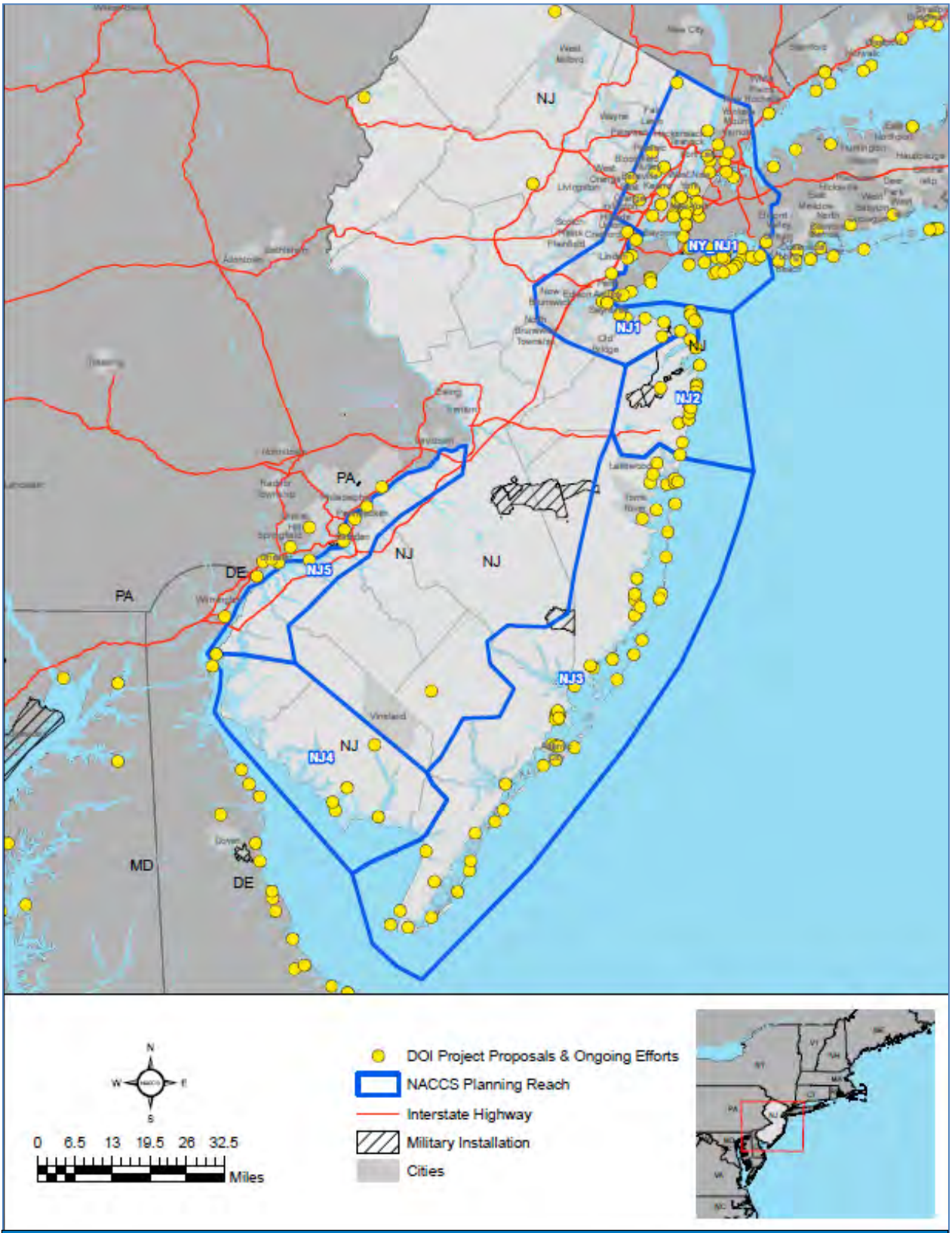

Figure 35 DOI Project Proposals and Ongoing Efforts

In addition to the Hurricane Sandy Rebuilding Task Force discussed in the overview section of this State Appendix, HUD has allocated approximately $13 billion for recovery actions, including Rebuild by Design, to rebuild areas affected by Hurricane Sandy through the Community Development Block Grant Program (CDBG), with an additional $2.5 billion identified for future allocation upon approval of the amendments to the State and City Disaster Recovery Plans. In the State of New Jersey, $3.79 billion of CDBG funds were made available for areas affected by Hurricane Sandy, with an additional $881 million identified for future allocation upon approval of the amendment to the State and City Disaster Recovery Plans. More information is available at www.hud.gov/sandy.

HUD is leading Rebuild by Design, an initiative following the Hurricane Sandy Rebuilding Task Force. The purpose of the initiative is to consider innovative and implementable solutions to address risk of future climate events. By creating a competition, the effort brings together experts from various fields to develop opportunities for resilience and innovation as part of the rebuilding process in areas with extensive impacts from Hurricane Sandy in Connecticut, New Jersey, and New York. Three geographical categories were identified: city, shore, and region. Ten projects were selected by HUD Secretary Shaun Donovan to proceed into a design phase. Five of the 10 projects address the hazards of coastal storms in New Jersey, including: (1) " Coastal Commercial Resiliency Financing (Red Hook, Rockaways, Asbury Park); (2) "New Meadowlands" (Meadowlands, NJ); (3) "Resist, Delay, Store, Discharge: A Comprehensive Strategy for Hoboken;" (4) "Resilience and the Beach" (New Jersey Atlantic Ocean shore); and (5) WXY/West 8: Off-Shore Island Landscapes in the Mid-Atlantic" (The New York and New Jersey Coast). On June 2, 2014, HUD announced six winning proposals, including proposals 2 and 3 discussed above. More information on the initiative and the various designs that were submitted for consideration for the competition is available at http://www.rebuildbydesign.org/.

Other Federal projects and efforts conducted within the agencies' mission areas in response to Hurricane Sandy, not associated with PL 113-2, are discussed below.

Following Hurricane Sandy landfall, President Obama issued an initial disaster declaration for several New Jersey counties. Federal partners were directed to enact the National Disaster Recovery Framework to conduct a comprehensive and collaborative response to the disaster (FEMA-4086-DR-NJ). This included six Recovery Support Functions (RSF) overseen by FEMA. Each RSF has the responsibility to coordinate and develop a Mission Scoping Assessment and a Recovery Support Strategy in one of six areas: Natural and Cultural Resources (including coastal resources such as beach, dunes, wetlands and estuaries); Infrastructure Systems; Health and Social Services; Housing, Economic, and Community Planning; and Capacity Building. More information is available at: www.fema.gov/disaster/4086.

Under the National Response Plan (NRP), the U.S. Department of Homeland Security calls for the establishment of a Joint Field Office (JFO) as one of the principal NRP organizational elements designed to implement the new single, comprehensive approach to domestic incident management. The JFO is a temporary Federal multiagency coordination center established locally at a central location to coordinate Federal, state, local, tribal, nongovernmental, and private-sector organizations with primary responsibility for activities associated with threat response and incident support. Hurricane Sandy JFOs were established in Connecticut, New York, and New Jersey.

FEMA also developed FEMA-942: "Mitigation Assessment Team Report: Hurricane Sandy in New Jersey and New York" (FEMA 2013). This report documents observations made during field visits to evaluate key building damage caused by Hurricane Sandy. The report presents recommendations with

regards to key engineering concepts, codes and standards, mitigation measures, and considerations that can be used in the planning and recovery process to help minimize future damage to structures and their related utility systems. Additional info can be found at www.fema.gov/media-library/assets/documants/85922.

State Efforts

The State of New Jersey and its coastal localities have implemented laws and programs to help protect people, infrastructure, and ecosystem resources from flooding and storm damage. The State of New Jersey has initiated two offices largely in response to Hurricane Sandy, including the Governor's Office of Recovery and Rebuilding (GORR) and the Office of Flood Hazard Risk Reduction Measures. The mission of the GORR is to ensure that every possible avenue of relief is pursued to assist in the recovery and rebuilding of our state and our residents' homes and businesses in response to Hurricane Sandy. The mission of the Office of Flood Hazard Risk Reduction Measures is to lead and coordinate the efforts of the NJDEP to acquire the necessary interests in real property to undertake Flood Hazard Risk Reduction Measures.

The NJ Office of Emergency Management has produced the State of New Jersey Hazard Mitigation Plan (State of New Jersey 2012) that details the risk to population and infrastructure from flooding, coastal storm damage, sea level change, and other factors. The localities have also produced similar plans, which are regularly updated. The New Jersey Department of Environmental Protection is the state's primary point of contact for CSRM and flood risk management laws and programs for the State of New Jersey.

The New Jersey Department of Community Affairs (NJDCA) Action Plan/NJ Community Development Block Grant (CDBG) Disaster Recovery Plan (NJDCA, 2014 is part of the process to allocate HUD CDBG Disaster Recovery funds to rebuild areas affected by Hurricane Sandy. This plan quantifies the level of damage known thus far based on current data and describes New Jersey's plan for spending the $3,290,000,000 Community Disaster Block Grant Disaster Recovery (CDBG-DR) funds, which HUD allocated to New Jersey as part of its initial $5,400,000,000 fund allocation. To address New Jersey's housing needs, the state will undertake a number of initiatives including: (1) Providing funding assistance for reconstruction and rehabilitation programs that focus primarily, but not exclusively, on low and moderate income households; (2) developing adequate, storm-resistant housing that will meet building standards and incorporate mitigation measures, including green technologies, where feasible and/or housing elevations, which may require construction to FEMA's Advisory Base Flood Elevation maps; (3) providing resettlement and reoccupancy incentives to homeowners contemplating selling or abandoning their homes post-storm; (4) developing affordable rental housing across household income levels, with a focus on serving low and moderate income households and priority given to the nine counties identified by HUD as most impacted by the storm.

Several State of New Jersey universities were tasked with analyzing vulnerable storm affected regions in order to identify structural, non-structural, and natural flood mitigation solutions and strategies. Broad applicability to other regions of the state with similar risk profiles also is being considered in these evaluations. Final reports of these studies are still under development. Draft reports made available in May 2014 are summarized below.

The beneficial use of dredged material to identify and restore wetlands for coastal flood mitigation in Barnegat Bay was analyzed by Richard Stockton College (Stockton College, 2014). This report discusses that there is a need to beneficially reuse dredged material since existing capacity at placement sites is limited and many state channels are shoaled as a result of Hurricane Sandy. As a result, there is a sufficient amount of dredged material for marsh edge restoration projects within Barnegat Bay that has the potential to reduce coastal storm surge and wave damage to communities along the Barnegat Bay shoreline.

The New Jersey Institute of Technology (NJIT) conducted an investigation of alternative measures for flood mitigation in the Hackensack/Moonachie/Little ferry area (NJIT, 2014a). The project involved assessment of the flood impacts, and evaluation of a range of capital improvement, maintenance and operations and regulatory measures, including structural and non-structural engineering alternatives, regulatory and system design and redundancy measures. Specific study recommendations include structural flood protection alternatives, non-structural mitigation alternatives, and maintenance, asset management and regulatory improvements such as tide gates, pumping stations, and regulatory, organizational and policy operational improvements.

Strategies for addressing flood impacts specifically in Little Ferry and Moonachie was also considered by the NJIT (NJIT, 2014b). Flood mitigation strategies were discussed at two scales: municipal, and block and lot. Municipal scale strategies in the two municipalities consider cleaning and dredging of open trenches, green infrastructures and mapping and simulation of existing drainage systems.

Stevens Institute of Technology analyzed storm surge reduction alternatives for Barnegat Bay (Stevens, 2014). The Barnegat Bay Inundation Model was used as a flood mitigation tool to consider surge barrier and floodwall mitigation options to further reduce the overland flood elevation in Barnegat Bay. Findings suggest that wetland restoration and oyster reef flood mitigation options should be considered.

Rutgers also identified flood risk reduction strategies for Barnegat Bay (Rutgers, 2014a). Existing strategic solutions are reviewed, and new strategic solutions are presented which can be further applied to areas with similar field conditions. These solutions include new and enhanced bulkheads and concrete flood walls with movable panels/parts to increase structure height, levees with culvert/pipe with check valve, elevation of residences and roadways as well as consideration of sluice gates, flood gates and pump stations. A Framework for Coastal Flood Risk Reduction is also provided which addresses both short-term as well as more regional long-term solutions. These efforts are considered for five municipalities including Point Pleasant Borough, Brick Township, Toms River Township, Stafford Township and Little Egg Harbor Township.

Rutgers identified regional flood mitigation strategies for Cumberland county, New Jersey including: 1) rebuilding, reinforcing and elevating dikes and levees (total of 68 levees); 2) recover damaged marsh coastal area; 3) restoring beaches and dunes along the developed Bay shore communities and; 4) performing road elevations and improvements (Rutgers, 2014b). These strategies are considered for Commericial Township (including Port Norris), Downe Township (including Fortesque), Greenwich Township and Maurice River Township.

Rutgers identified regional and municipal flood risk reduction strategies for the Hudson River waterfront including the municipalities of Hoboken and Jersey City (Rutgers 2014c). Regional strategies include sea walls and gates at open channels. Municipal strategies for both municipalities include surface

storage of water during storm events, separation of combined sewer outfall pipes, and green infrastructure.

The 'Arthur Kill Study Area Flood Mitigation Project Report' conducted by Rutgers University: a) determined the causes of flooding in the Cities of Elizabeth, Linden and Rahway, and Woodbridge Township; b) determined current measures and measures envisioned by officials; and c) offered recommendations to mitigate flood risks (Rutgers 2014d). Individual assessments of each jurisdiction are provided. Some synergies exist between the jurisdictions may allow them to share the flood mitigation benefits of some of the proposed measures.

The Rutgers Climate Change Adaptation Alliance developed a report titled "Resilience: Preparing New Jersey for Climate Change," which identifies steps to be taken towards the goal of developing policy recommendations to enhance climate change preparedness.

The New Jersey Living Shorelines Program has been developed to encourage and effectively implement New Jersey-appropriate living shorelines and related natural and nature-based infrastructure methodologies and policies tailored to New Jersey's coastal environment. The program addresses (1) excessive shoreline erosion and SLC causing the loss of beneficial natural areas and related habitat and (2) the adverse impacts of traditional "hard" structural-only stabilization in order to protect/enhance natural systems that will provide resilient ecological and economic protection/mitigation for the expected changes due to future coastal shoreline impacts.

The City of Hoboken developed a Strategic Recovery Planning Report in accordance with the New Jersey Department of Community Affairs CDBG Recovery Action Plan, which offers to serve as a guide for actions taken to recover from the effects of Hurricane Sandy as well as reduce vulnerabilities to future disasters for the city.

Non-Governmental Organization Efforts

The Partnership for the Delaware Estuary (PDE) and the Barnegat Bay Partnership (BBP) continue to advance the principles of the Delaware Estuary Living Shoreline Initiative by inventorying living shoreline opportunities towards building coastal wetland resilience for the Delaware Estuary and Barnegat Bay (PDE, 2013). The BBP also discusses restoration and recovery principles for coastal resilience in Barnegat Bay in a document titled 'Building a Resilient Barnegat Bay' (http://bbp.ocean.edu/).

Structures of Coastal Resilience (SCR) is a Rockefeller Foundation supported project dedicated to studying and proposing resilient designs for urban coastal environments in the North Atlantic region. The Princeton team favors an approach to resilience that considers non-structural strategies, including elevating houses and infrastructure, which anticipates rising sea levels and calibrates wetland migration to create a livable future in the back bay of Atlantic City.

IX.3 Sources of Information

A review of Federal, state, municipal, and academic literature was conducted, and various reports covering topics related to coastal resilience and risk reduction in New Jersey were considered in the development of this state narrative. These are listed in Table 8.

Table 8. Federal and State of New Jersey Sources of Information

Resource	Source/Reference	Subject
FEDERAL SOURCES OF INFORMATION		
New Jersey DR-4086-NJ Federal Recovery Support Strategy (RSS)	Provides a guide for Federal actions in support of recovery from Hurricane Sandy in NJ. Approaches for Federal agencies and departments are proposed to support the State of NJ and impacted communities.	
Mission Scoping Assessment: Infrastructure Systems Recovery Support Function: Hurricane Sandy DR-4086-NJ		Infrastructure
Mission Scoping Assessment Natural and Cultural Resources Recovery Support Function: Hurricane Sandy DR-4086-NJ	\\nab-netapp1\CENAB\Projects\Civil-Projects\North Atlantic Coast Comp Study\References\NJ_2013.01.26 NCR RSF v(3)-1 (1).pdf The purpose of the Natural and Cultural Resources (NCR) RSF Mission Scoping Assessment (MSA) is to collect and compile relevant NCR data and contact information specific to impacts by Hurricane Sandy in DR-4086-New Jersey (NJ) and identify current and anticipated recovery challenges, issues, and opportunities to improve resilience for New Jersey communities particular to the Natural and Cultural Resources sector. The MSA findings will inform and shape the RSS and guide the implementation of the National Disaster Recovery Framework (NDRF) in DR-4086-NJ.	(1) Assist the state with the creation of a long-term plan for restoring and enhancing the functional value of beaches and shorelines to preserve ecological values and protect the economic engine of many coastal communities; (2) Help the state develop a program that encourages community stewardship of beach and dune resources to support long-term management; (3) Encourage a regional approach to beach and dune restoration and maintenance that considers the
NJ JFO Report and Project Spreadsheet	Host of shore protection measures; very broad and general; cannot be applied to NACCS in present form as of 5/13/13.	Various measures (shore protection, ER, and programmatic); need to be more specific
STATE OF NEW JERSEY SOURCES OF INFORMATION		

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
New Jersey Governor's Office of Recovery and Rebuilding (GORR)	http://www.state.nj.us/gorr/	Coordinate effort to identify relief sources to assist in the recovery and rebuilding of our state and our residents' homes and businesses in to response to Hurricane Sandy.
Economic Vulnerability study prepared by Rutgers University, which examines the economic vulnerability of the Barnegat Bay region to climate hazards	http://bbp.ocean.edu/Reports/Leichenko-March2013_FinalReport%20with%20logos.pdf Economic vulnerability prepared by Dr. Robin Leichenko of Rutgers University; examines the economic vulnerability of the Barnegat Bay region to climate hazards	
State of New Jersey 2012 State Hazard Mitigation Plan	Mitigation recommendations are presented in Section 5 of the report. http://www.state.nj.us/njoem/programs/mitigation_plan2012.html	Hazards; mostly policy and programmatic
NJ Coastal Zone Management Plan	http://www.state.nj.us/dep/cmp/czm_hazards.html	
Resilience: Preparing New Jersey for Climate Change: A Gap Analysis from the New Jersey Climate Adaptation Alliance	http://njadapt.rutgers.edu/	This report is an essential step toward the goal of developing policy recommendations to enhance climate change preparedness. To that end, we summarize key gaps identified to date through a thorough and ongoing stakeholder engagement process that will inform thoughtful evolution of policy recommendations.
NJ Structures database	http://www.state.nj.us/dep/gis/stateshp.html#SHORSTRC	
NJ Coastal Resiliency planning	http://www.state.nj.us/dep/cmp/docs/coastal-resiliency-planning-fact-sheet.pdf	Vulnerability
USACE New Jersey Shore Protection Study: Report of Limited Reconnaissance	Appendix D: Existing Coastal Projects	

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
Study (September 1990)		
New York-New Jersey Harbor Estuary Program	http://www.harborestuary.org/; http://www.harborestuary.org/watersweshare/pdfs/CRP/Cover_to_Acknowledgements.pdf	Coastal risk reduction in the New York-New Jersey Harbor including the Hudson-Raritan Estuary Comprehensive Restoration Plan
New Jersey Ocean Atlas	http://www.nj.gov/dep/cmp/ocean_atlas_map.pdf	Coastal risk reduction
NJDEP Barnegat Bay Estuary Program: State of the Bay Report (2011)	http://www.nj.gov/dep/watershedmgt/bbep.htm	Significant areas of tidal wetlands have been identified as degraded since 1995. Utilizing dredged material to enhance tidal wetlands within Barnegat Bay is timely due to the ever decreasing capacity of the state's confined disposal facilities to accommodate increased dredging needs from sedimentation within the state's channels.
NJ Meadowlands Commission (NJMC) study on Hurricane Sandy impacts to the Hackensack River area	http://www.northjersey.com/littleferry/187303351_Berm_breach_not_cause_of_flooding_in_Little_Ferry__Meadowlands_Commission_says.html	Sandy's impacts
NJ Living Shorelines Program: Strategic Direction	NJDEP http://www.nj.gov/dep/cmp/docs/living-shorelines2011.pdf	Discusses the NJ Living Shorelines Program
NY_NJ Harbor Coalition Sandy Funding Requests	The NY-NJ Harbor Coalition is working with its members, partners and fellow advocates to ensure that as federal officials allocate funding from the Superstorm Sandy supplemental package they consider projects that provide environmental, public access and other community benefits – while also improving economic conditions and flood protection in our region. Through its grassroots outreach, the Coalition identified 20 shovel-ready projects that have extensive community and local government support and serve as examples of the kind of work that deserves consideration for investment through the Sandy funding package. http://capwiz.com/harborcoalition/utr/1/EHMTSXYREU/KRTASYAWEY/9442629441	

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
STATE OF NEW JERSEY SOURCES OF SEA LEVEL CHANGE/COMMUNITY ASSESSMENT INFORMATION		
Future Sea Level Rise and the New Jersey Coast	Increasing rates of SLC caused by global warming are expected to lead to permanent inundation, episodic flooding, beach erosion, and saline intrusion in low lying coastal areas. SLC is a significant and growing threat to the coastal region of New Jersey, and this study presents a comprehensive assessment of the expected impacts. We project future SLC based on historical measurements and global scenarios and apply them to digital elevation models to illustrate the extent to which the New Jersey coast is vulnerable. We estimate that 1 to 3 percent of New Jersey's land area will be affected by inundation and 6.5 to over 9 percent by episodic coastal flooding over the next century. We also characterize potential impacts on the socioeconomic and natural systems of the New Jersey coast, focusing on Cape May Point for illustrative purposes. We then suggest a range of potential adaptation and mitigation opportunities for managing coastal areas in response to SLC. Our findings suggest that where possible a gradual withdrawal of development from some areas of the New Jersey coast may be the optimum management strategy for protecting natural ecosystems. https://www.princeton.edu/step/people/faculty/michael-oppenheimer/recent-publications/Future-Sea-Level-Rise-and-the-New-Jersey-Coast-Assessing-Potential-Impacts-and-Opportunities.pdf	Sea Level Change
New Jersey's Coastal Community Risk Assessment and Mapping Protocol (CCVAMP)	This document is intended as a guide for entities interested in assessing their vulnerability to coastal hazards. Coastal vulnerability is a complex topic that requires an understanding of some basic terms, concepts, and historical context to be effectively assessed. This document will navigate through these steps in the following way: (1) Explanation of basic definitions and relevant concepts on hazards that face our coastal areas; (2) explanation of the assessment tools developed by the New	

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
	Jersey Office of Coastal Management; (3) The Coastal Community Vulnerability and Mapping Protocol is presented in a 'Cookbook' format that will introduce publically available data and walk the user through the steps to create a Coastal Vulnerability Index (CVI) for their area of interest. Vulnerability can be assessed by overlaying built environment, natural environment, and social vulnerability data over the CVI. http://www.state.nj.us/dep/cmp/docs/ccvamp-final.pdf	
Interactive sea level rise mapping website for NJ	www.njfloodmapper.org; http://slrviewer.rutgers.edu/about.html	Help decision-makers visualize the vulnerability of key infrastructure within their communities to sea level rise or storm surge. The project had three main outcomes: 1)Enhanced GIS/LiDAR- based assessment of coastal infrastructure and habitat vulnerability to sea level rise; 2)Collaboration with user groups to develop a suite internet-accessible, user-friendly mapping and visualization tools to meet their identified needs; and 3) Extensive outreach to local communities to promote enhanced preparedness and land use planning decisions in the face of continued sea level rise.
Getting to Resilience: A Community Planning Evaluation Tool	http://www.prepareyourcommunitynj.org/	To help assess their communities' vulnerability and resilience to coastal hazards, coastal decision makers need access to resources and science-based information. The New Jersey Coastal Management Program developed two assessment resources to ensure that coastal communities have consistent and comprehensive guidance to assess their vulnerability and capacity for resilience. Aonline self assessment process is a tool to assist communities to reduce vulnerability and increase preparedness by linking planning, mitigation, and adaptation. Through this assessment you will find out how your preparedness can

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
		be worth valuable points through FEMA's Community Rating System and Sustainable Jersey.
ADDITIONAL INFORMATION		
The New Orleans Hurricane Protection System: What Went Wrong and Why, American Society of Civil Engineers (ASCE)	The members of the ASCE Hurricane Katrina External Review Panel have conducted an in-depth review of the comprehensive work of the USACE IPET. We are indebted to the dedicated efforts of more than 150 engineers and scientists, who have, in the year and a half following Hurricane Katrina, evaluated the causes of the New Orleans area hurricane protection system failures. As a result of this excellent work, we now better understand what went wrong and why. The ASCE Hurricane Katrina External Review Panel has an obligation to share its findings and insights, which go beyond the scope of the IPET review, so that others may learn from this tragedy and prevent similar disasters from happening again, not only in New Orleans, but in other communities throughout the United States that are also vulnerable to hurricanes and flooding. http://www.asce.org/uploadedFiles/Publications/ASCE_News/2009/04_April/ERPreport.pdf	The American Society of Civil Engineers, Hurricane Katrina External Review Panel has identified 10 critical actions they believe are critical to help minimize the risks of another "Katrina" in the future. These include (1) Keep safety at the forefront of public priorities; (2) quantify the risks; (3) communicate the risks to the public and decide how much risk is acceptable; (4) rethink the whole system, including land use in New Orleans; (5) correct the deficiencies, (6) put someone in charge, (7) improve interagency coordination, (8) upgrade engineering design procedures, (9) bring in independent experts, and (10) place safety first.
The New Orleans Hurricane Protection System: Assessing Pre-Katrina Vulnerability and Improving Mitigation and Preparedness, National Academy of Engineering (NAE)/ National Research Council (NRC)	Jeffrey Jacobs, a scholar with the Water Science and Technology Board of the National Research Council, served as the study director for the National Academy of Engineering and National Research Council's Committee on New Orleans Regional Hurricane Protection Projects. The Council is the operating arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine of The National Academies. The academies operate under an 1863 charter from Congress to provide independent advice to the Federal government on scientific and technical matters. Their committee was convened in December 2005 at the request of then-Assistant Secretary of the Army for	There were several lessons learned as a result of Hurricane Katrina discussed within the document. These were (1) There are many inherent hydrologic vulnerabilities of living in the greater New Orleans metropolitan region, especially in areas below sea level. Post-Katrina repairs and strengthening have reduced some of these vulnerabilities. Nevertheless, because of the possibility of levee/ floodwall overtopping—or more importantly, levee/floodwall failure—the risks of inundation and flooding never can be fully eliminated by protective structures no matter how large or sturdy those structures may be. (2) The pre-Katrina footprint of the New Orleans hurricane protection system consisted of

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
	Civil Works, Mr. J.P. Woodley, to provide an independent review of the work of the IPET. The IPET group was assembled by USACE to evaluate the performance of the New Orleans hurricane protection system during Hurricane Katrina and to provide advice in repairing the system. During its 3.5-year tenure, our committee issued five reports, all of which reviewed draft reports issued by the IPET. Their committee's fifth and final report was issued in April 2009, and it reviewed the IPET draft final report and commented on important "lessons learned" during Hurricane Katrina and its aftermath. The document was a summary of those lesson learned as identified in their final report.	roughly 350 miles of protective structures, including levees, I-walls, and T-walls. There was undue optimism about the ability of this extensive network of protective structures to provide reliable flood protection. Future construction of protective structures for the region should proceed with these lessons firmly in mind and in the context of a more comprehensive and resilient hurricane protection plan. (3) The planning and design for upgrading the current hurricane protection system should discourage settlement in areas that are most vulnerable to flooding due to hurricane storm surge. The voluntary relocation of people and neighborhoods out of particularly vulnerable areas, with adequate resources designed to improve their safety in less vulnerable areas, should be considered as a viable public policy option. (4) When voluntary relocations are not viable, floodproofing measures will be an essential complement to protective structures, such as levees and floodwalls, in improving public safety in the New Orleans region from hurricanes and induced storm surge. This committee especially endorses the practice of elevating the first floor of buildings to at least the 1-percent flood level, and preferably to a more conservative elevation. The more conservative elevation reflects a subsequent finding in this report regarding the inadequacy of the 1-percent flood as a flood protection standard for a large urban center such as New Orleans. Critical public and private infrastructure—electric power, water, gas, telecommunications, and flood water collection and pumping facilities—should be strengthened through reliable construction, ensuring reliable interdependencies among critical infrastructure systems. (5) The disaster response plan for New Orleans, although extensive and instrumental in successfully evacuating a very large portion of the New Orleans metropolitan area population, was inadequate for the Katrina event. Thus, there is a need for more extensive and systematic evacuation studies, plans, and

Table 8. Federal and State of New Jersey Sources of Information		
Resource	Source/Reference	Subject
		communication of evacuation plans. A comprehensive evacuation program should include not only well designed and tested evacuation plans, protocols, and criteria for evacuation warnings, but also alternatives, such as improved local and regional shelters, that could make evacuations less imposing. It also should consider longer-term strategies that can enhance the efficiency of evacuations such as locating facilities for the ill and elderly away from more vulnerable areas that may be subject to frequent evacuations.
Performance Evaluation of the New Orleans and SE Louisiana Hurricane Protection System, IPET, USACE	The final report of a series concerning the in-depth analysis of the New Orleans and Southeast Louisiana Hurricane Protection System (HPS) conducted by the Interagency Performance Evaluation Task Force (IPET). The analyses conducted by the IPET and the information presented in this report are designed to answer five principal questions that comprised the IPET mission: (1) The System: What were the pre-Katrina characteristics of the HPS components; how did they compare to the original design intent? (2) The Storm: What was the surge and wave environment created by Katrina and the forces incident on the levees and floodwalls? (3) The Performance: How did the levees and floodwalls perform, what insights can be gained for the effective repair of the system, and what is the residual capability of the undamaged portions? What was the performance of the interior drainage system and pump stations and their role in flooding and unwatering of the area? (4) The Consequences: What were the societal-related consequences of the flooding from Katrina (including economic, life and safety, environmental, and historical and cultural losses)? (5) The Risk: What were the risk and reliability of the HPS prior to Katrina, and what will they be following the planned repairs and improvements (June 2007)?	The prototype risk assessment for New Orleans identified the areas most vulnerable to future flooding and with the highest residual risk. Residual risk is the vulnerability that remains after all risk reduction measures are considered. Risk assessment provides a new and more comprehensive method to understand the inherent vulnerability of areas protected by complex protection systems and subjected to uncertain natural hazards. It provides a direct view into the sources of vulnerability, providing a valuable tool for public officials at all levels to focus resources and attention on the most serious problems and to seek solutions that reduce risk through both strengthening physical structures and reducing exposure of people and property to losses by non-structural means. Given a relatively uniform level of reliability of the protection system, the relative risk values are largely related to elevation (below sea level) and the value of property or number of people who occupy those areas. The emergency response preparedness and efficiency of evacuation prior to a storm is a key component to reducing risk to life and human safety. This is especially important for those who need assistance to evacuate.

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ATTACHMENT A

Focus Area Analyses Report

ATTACHMENT A

New Jersey Back Bays Focus Area Report

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Appendices

1. Study Authority

The focus area analysis presented in this report is being conducted as a part of the North Atlantic Coast Comprehensive Study (NACCS) authorized under the Disaster Relief Appropriations Act of 2013 (Public Law [PL] 113-2), Title X, Chapter 4 approved 29 January 2013.

Specific language within PL 113-2 states, *"…as a part of the study, the Secretary shall identify those activities warranting additional analysis by the Corps".* This report identifies coastal storm risk management activities warranting additional analysis that could be pursued for the New Jersey Back Bays study area. Public Law 84-71 is a plausible method for further investigation.

2. Study Purpose

The purpose of this focus area report is to capture and present information regarding possible cost-shared, future phases of study to provide structural and/or non-structural coastal storm risk management, flood risk management, ecosystem restoration, and other related purposes for the New Jersey Back Bays study area.

The focus area report will:

- Examine the back bay areas of the barrier islands on the Atlantic Ocean coast of New Jersey to identify problems, needs, and opportunities for improvements relating to coastal storm risk management and related purposes.
- Identify a non-Federal sponsor(s) willing to cost-share the potential future investigation.

3. Location of Study Area / Congressional District

The study area is located behind the barrier islands and ocean-facing coastal areas along the rivers and bays that lead to the Atlantic Ocean in New Jersey. The study area includes coastal areas that were subject to recent flooding, storm surge and damages as a result of Hurricane Sandy. The study area covers more than 450 square miles. It comprises portions of five counties, including Monmouth, Ocean, Atlantic, Burlington and Cape May Counties. A map of the study area is included as **Figure 1.**

The study area contains parts of the 2nd (Representative Frank LoBiondo), 3rd (Representative Jon Runyan), 4th (Representative Chris Smith), 6th (Representative Frank Pallone), 12th (Representative Rush Holt) New Jersey Congressional Districts. In addition, Congressional interest in the study area lies with New Jersey Senators Robert Menendez and Jeffrey Chiesa.

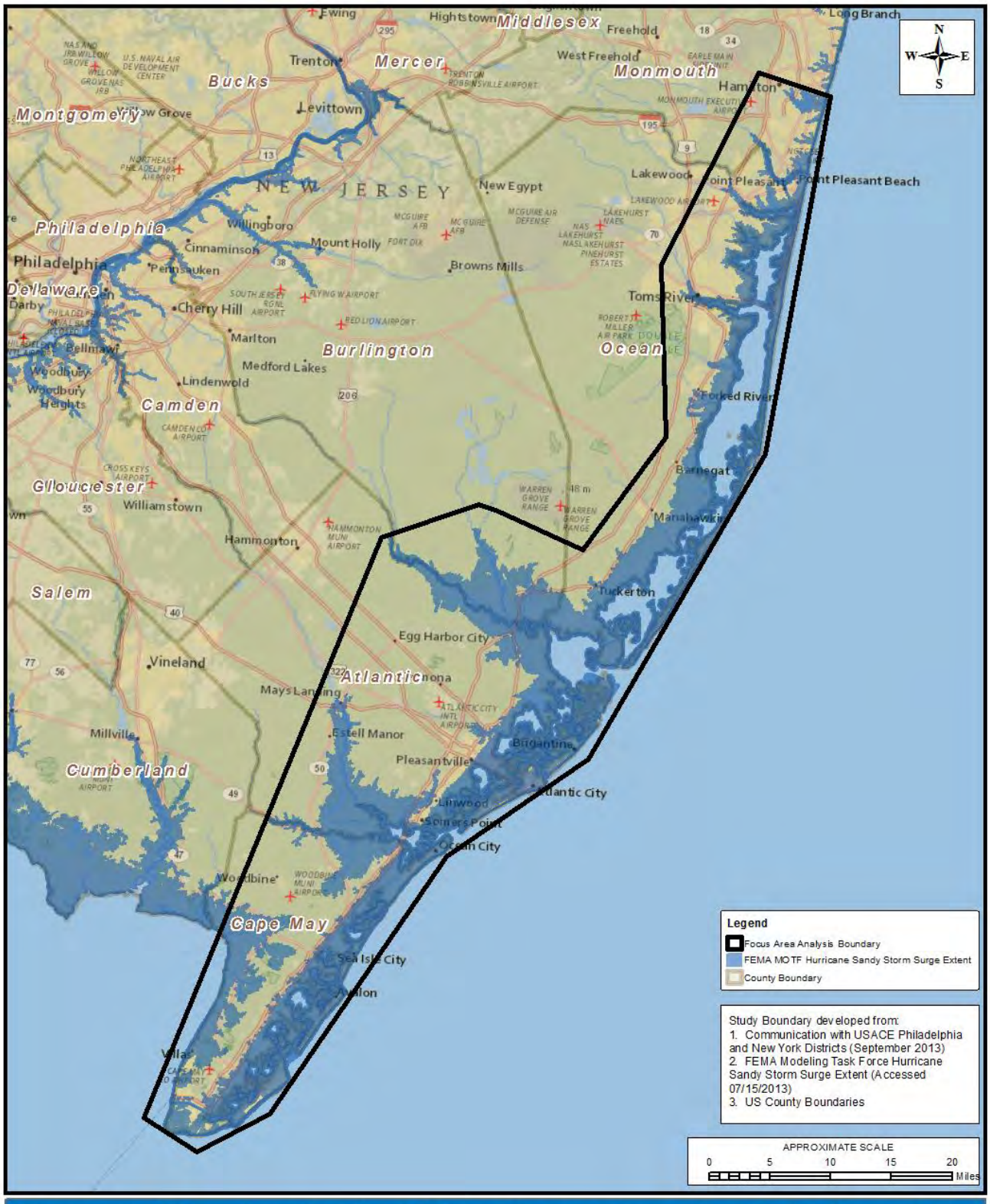

Figure 1. New Jersey Back Bays Focus Area Analysis Boundary

4. Prior Studies and Existing Projects

This focus area report will identify problems and opportunities within the New Jersey Back Bays study area as they relate to coastal storm risk management and related purposes. The occurrence of flooding within the study area is well documented. Various prior studies and existing projects in the study area were reviewed for relevancy to this analysis. Types of projects and studies include those related to navigation, coastal storm risk management, ecosystem restoration, and water resources management. Community resilience is also an increasingly relevant topic included for consideration in projects and studies. The intent of community resilience is to consider past, present, and future exposure to hazards such as coastal flooding, and to influence and improve the capacity to withstand and recover from adverse situations.

All of these projects and studies illustrate the importance of balancing competing coastal system interests and needs with preservation of the surrounding environment. These projects and studies could provide useful information and concepts as coastal storm risk management measures are considered for the New Jersey Back Bays study area.

Table 1 summarizes various studies and projects undertaken by Federal, state, and local agencies. Sections 4.1 through 4.2 provide brief descriptions of studies and projects.

4.1 Federal

USACE has several ongoing studies/projects in the study area, related to coastal storm risk management, ecosystem restoration and navigation. The Seaside Park Continuing Authorities Program (CAP) Section 103 Hurricane Storm Damage Reduction Study, Mordecai Island Coastal Wetlands, and Barnegat Bay Watershed Study all have project purposes of coastal storm risk reduction, pollutant reduction, restoration of nearshore environments, and contribution to improved water quality and habitat recovery at specific locations within the New Jersey Back Bays.

The Mordecai Island Coastal Wetlands Restoration Project is a CAP Section 1135 Aquatic Restoration project. The project design has been initiated but not completed.

The Seaside Park, New Jersey, CAP Section 103, Hurricane and Storm Damage Reduction Feasibility Study area is located on the back bay side of the Borough of Seaside Park, south of the State Route 37 bridge which connects the barrier spit to the mainland. The study area is subject to erosion of the bayside beaches, which contributes to the larger problem of tidal flooding of streets and residences. Investigation of the area in 1995 resulted in a recommendation to proceed to a feasibility study. The feasibility study has now been initiated with NJDEP as the non-Federal sponsor.

Table 1. Summary of Prior Studies and Projects

Study / Report	Focus Area	Structural / Non-Structural	Time Frame [ongoing / proposed near term / proposed long term]	Status	Navigation	Coastal Storm Risk Management	Flood Risk Management	Ecosystem Restoration	Water Resource Management	Community Resilience
Federal										
Seaside Park Hurricane Storm Damage Reduction Feasibility Study	Flood damage Reduction on bayside of Seaside Park	S	LT	Ongoing		X	X			
Mordecai Island Coastal Wetlands Restoration	Ecosystem Restoration	S	ST	Ongoing				X		
Barnegat Bay Watershed Study	Comprehensive Watershed Study of Barnegat Bay Estuary	S	LT	Ongoing	X	X	X	X	X	
Shark River Inlet, Manasquan Inlet, NJ ICWW, Toms River, Barnegat Inlet, Absecon Inlet and Cold Spring (Cape May) Inlet	Navigation Channels	S	LT	O&M	X					
State of New Jersey										
State of New Jersey 2011 State Hazard Mitigation Plan (updated 2012)	State-wide	S/N	LT	Plan		X	X		X	X
Local										
Multi-Jurisdictional Natural Hazard Mitigation Plan – Monmouth County, NJ	Monmouth County	S/N	LT	Plan		X	X		X	X
Atlantic County Multi-Jurisdictional Natural Hazard Mitigation Plan (2010)	Atlantic County	S/N	LT	Plan		X	X		X	X
Cape May County Multi-Jurisdictional All Hazards Mitigation Plan	Cape May County	S/N	LT	Plan		X	X		X	X

4.2 State

The State of New Jersey 2011 State Hazard Mitigation Plan (NJ HMP) characterizes the State's vulnerabilities to natural hazards and provides a summary of the jurisdictions that are at risk from the effects of natural hazards. Because the State Hazard Mitigation Plan is intended as a resource for local and regional planners, it avoids any ranking or scoring of hazards or jurisdictions to discourage planners from ignoring the lower-ranking hazards or vulnerable areas. The NJ HMP provides a general framework to guide state-level mitigation strategies. The plan advises local jurisdictions to perform more detailed and locally focused hazard profiles and risk assessments to develop appropriate strategies and actions when carrying out their own planning processes.

4.3 Local

Monmouth, Atlantic and Cape May Counties have county-wide, multi-jurisdictional Hazard Mitigation Plans. Ocean County is currently preparing a Hazard Mitigation Plan in response to damages caused by Hurricane Sandy.

5. Plan Formulation

Six planning steps in the Water Resource Council's Principles and Guidelines are followed to focus the planning effort and recommend a plan for potential future investigation. The six steps are:

- Identifing problems and opportunities
- Inventorying and forecast conditions
- Formulating alternative plans
- Evaluating effects of alternative plans
- Comparing alternative plans
- Selecting a recommended plan

The iterations of the planning steps typically differ in the emphasis that is placed on each of the steps.

This focus area report emphasizes identification of problems and opportunities. The following sections present the results of the initial iterations of the planning steps conducted as part of this focus area analysis. This information will be refined in future iterations of the planning process that will be accomplished during future study phases.

5.1 Problems and Opportunities

Floods have been and continue to be the most frequent, destructive, and costly natural hazard facing the State of New Jersey (NJ HMP, 2012). The study area is vulnerable to damage from storm surge, wave attack, erosion, and rainfall-stormwater runoff events that cause riverine and/or inland flooding. The States of New Jersey and New York, in their respective state hazard mitigation plans, have documented the numerous, historic instances of flooding, Presidential disaster declarations, and damage estimates. Historic sea level change has exacerbated the problem over the past century, and the potential for accelerated sea level change in the future will only increase the magnitude and frequency of the problem. These forces constitute a threat to human life and increase the risk of flood damages to public and private property and infrastructure.

The shorelines of most of New Jersey's Back Bays are characterized by low elevation areas, developed with residential and commercial infrastructure, and subject to tidal flooding during storms. Public and private property at risk involves densely populated sections of the barrier island back bay coastline and also mainland portions of the areas bordering the bays and tidal tributaries of the study area. It includes private residences, businesses, schools, infrastructure, roads, and evacuation routes for coastal emergencies. Additionally, New Jersey's Back Bays region includes undeveloped areas that provide ecological, fisheries and recreational benefits. Healthy marshes in back bay areas have the potential to dampen coastal flooding and storm surge. These areas are subject to erosion, loss and alteration due to coastal storms. Back Bay dune, beach, marsh and estuarine ecosystems are quite fragile in some locations and are threatened by sea level change. Inundation of sites identified through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), otherwise referred to as Superfund sites, or other hazardous waste sites may also severely impact water quality.

Based on history, National Flood Insurance Program (NFIP) records, and analysis of engineering data about floodplains it is clear that New Jersey is one of the more flood-prone States in the nation. The NOAA National Climatic Data Center (NCDC) database reports 1169 flood events just since 1996 (NOAA NCDC, 2013). According to NFIP statistics, flood claims payouts have totaled more than $5.3 billion since the beginning of the NFIP program in 1978 through July 2013. Out of that, nearly $2.9 billion was paid for flood damages to the coastal counties of Monmouth, Ocean, Atlantic and Cape from Hurricane Sandy damages alone.

New Jersey's 210-miles of low-lying coastline, stretching from Raritan Bay in the north, along the Atlantic Coast to Delaware Bay is highly susceptible to coastal flooding. This region has experienced frequent coastal flooding events over the years, causing extensive beach erosion, marsh loss, damage to dunes and other coastal flood risk management structures, as well as tidal flooding impacts. Recent events in the coastal region include floods associated with Tropical Storm Ida and a nor'easter in December 2009, a severe storm in April 2010 and more recently Hurricane Sandy in October 2012.

Hurricane Sandy made landfall near Brigantine, NJ, on October 29, 2012 resulting in a significant impact to life and property in both the Caribbean and continental United States. The National Hurricane Center's Tropical Cyclone Report estimated the death count from Hurricane Sandy at 147 direct deaths. Sandy damaged or destroyed at least 650,000 houses and left approximately 8.5 million customers without power during the storm and its aftermath. (NOAA, 2013).

Damage estimates from Sandy exceeded $50 billion, with 24 states impacted by the storm. Hurricane Sandy caused devastation along the coast of New Jersey and the back bay areas, damaging property and disrupting millions of lives. Hurricane Sandy was so large that tropical storm force winds extended over an area about 1,000 miles in diameter. Hurricane Sandy caused water levels to rise along the entire east coast of the United States. The highest storm surges and greatest inundation, which reached record levels, occurred in New Jersey, New York, and Connecticut. Storm surge caused flooding exceeding 8 feet above ground level in some locations. Power outages from the combined effects of wind and surge left several New Jersey coastal communities without power for months. More than 12 inches of rainfall resulted in river, stream, and creek flooding over portions of the Mid-Atlantic (NOAA, 2013).

As part of this focus area analysis, plan formulation will include identification of potential measures to help these vulnerable areas become more resilient to coastal storm damage.

In order to collect data on problems and opportunities in the New Jersey Back Bays study area, stakeholder meetings and webinars were conducted with USACE, state and local agencies. **Appendix A** includes a list of points of contact (POCs) invited to participate in meetings and webinars, meeting materials and letters requesting feedback. **Appendix B** includes meeting minutes with a list of participants, and **Appendix C** includes comments received from agencies and stakeholders that were unable to attend meetings and/or webinars or from attendees that provided additional feedback following meetings and webinars. Stakeholder input was incorporated into the development and analysis of potential measures for this focus area analysis. A summary of stakeholder input is included in **Table 2.**

Table 2. Summary of Stakeholder Input – Problems and Opportunities

Stakeholder	Source	Water Resources Problem Identification	Areas	Damage Description	Prior Studies	Structural Measures
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	Ocean Drive and Lagoon Blvd.	60" outfall pipe buried/ not functional	None	New outfall system
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	Ocean Drive West, 5th St. N to 14th St. N.	Bulkhead Improvements	None	Gabion system
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	12th St. N. and Evans Blvd.	Drainage	None	Raise road and install pipe
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	15th St. N. to Beach Avenue	Lack of protection	None	Gabions and tide flex valves
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	26th St. S.	Replace and raise bulkhead	None	Bulkhead
City of Brigantine	404 Hazard Mitigation Grant Request	Flooding due to storm surge	34th St. and Bayshore Avenue, West Shore Drive	New Pump Stations	None	Pump stations, flood gates
City of Brigantine	Letter dated Sept 9, 2013	Flooding due to storm surge	15th St. N.	Seawall Extension	None	Extension of Brigantine seawall
City of Margate	Letter to NJDEP dated June 16, 2013	Flooding due to storm surge	Amherst Avenue	Reconstruction of bulkheads	Inspection and initial cost estimate	Replace bulkheads
City of Margate	Response dated Sept 2013	Flooding due to storm surge	Various locations	Reconstruction of bulkheads	City bulkhead and deck inspection 2008 and elevation study 2013	Replace bulkheads
Bass River Township	Response to survey	Flooding due to storm surge	All rivers, streams and creeks	Erosion, Flooding and overtopping	None	Bulkheads
Borough of Manasquan	Response to Survey	Flooding due to storm surge	All areas east of Rt. 71	Erosion, flooding	USACE	Bulkheads

Stakeholder	Source	Water Resources Problem Identification	Areas	Damage Description	Prior Studies	Structural Measures
Borough of Point Pleasant Beach	Response to Survey dated 9 Sept., 2013	Flooding due to Storm Surge	Lake Louise, Inlet Drive, Fishermen's Memorial Park	Erosion, Flooding and overtopping, damaged boardwalk	None	Pump station
Borough of Oceanport	Response to Survey dated 5 Sept., 2013	Flooding due to Storm Surge	All waterways	Flooding	Previously elevated Gooseneck Point Rd. and Cayuga Ave.	Outfall check valves
City of Sea Isle City	Response to Survey dated 4 Sept., 2013	Flooding due to Storm Surge	Most of the city except the south end	Flooding and erosion	USACE	Refurbish bulkheads
Cape May Court House	Response to Survey	Flooding due to Storm Surge	NJIWW and Delaware Bay	Flooding, erosion and shoaling	USACE – Bayfront Areas	Beach and dune
City of Cape May	Letter to NJDEP dated 26 June 2013	Flooding due to Storm Surge	Beach Avenue Floodwall	Flooding and erosion	N/A	Repair seawall
City of Atlantic City	Response to Survey dated 6 Sept., 2013	Flooding due to Storm Surge	6 Zones comprising much of the City	Erosion, structural damage, flooding due to overtopping	Storm Damage Mitigation Project	Bulkheads, pumping systems, flood gates and tide valves
Citizens for Strathmere and Whale Beach	Phone Communication	Flooding Due to Storm Surge	Bayview Avenue	Flooding	None	Raise and replace bulkhead, replace tide valves
Upper Township	Response to Survey dated 25 Sept 2013	Flooding Due to Storm Surge	Bayview Avenue, Garden State Parkway, Rt. 50, CR-631	Flooding of State Evacuation Routes	None	Raise roads
Middle Township	Response to Survey	Erosion, Flooding due to Storm Surge	Avalon Manor, Stone Harbor Manor, Delaware Bay	Flooding and erosion, salt water infiltration	USACE Feasibility Study of certain areas	Beachfill

Stakeholder	Source	Water Resources Problem Identification	Areas	Damage Description	Prior Studies	Structural Measures
Barnegat Bay Partnership	Response to Survey dated 27 Sept 2013	Erosion, Water quality	Entire Bay	Wetland and shoreline erosion	USACE Barnegat Bay Watershed Study	Beach and wetland restoration, land acquisition
Downe Township	Response to survey dated Sept. 18, 2013	Erosion, Flooding due to Storm Surge	Gandy's Beach	Flooding, loss of marsh	None	Beachfill, groins

5.1.1 Regions

Three distinct regions were evaluated as part of this focus area analysis.

The Northern Region of the New Jersey Back Bays study area includes Shark River and the communities that border this tidal river. This region has a higher year-round population density than the other regions, and is comprised of uplands and headland beaches with wide coastal rivers. This region also saw the highest storm surges from Sandy.

The Central Region extends from the Manasquan River to the Great Bay and Little Egg Harbor Inlet. This region includes Barnegat Bay and the communities that border this large and important water body. This region has experienced dramatic population increases in the last 20 years.

The Southern Region extends from Great Bay to Cape May. This region includes several back bays that are connected to the Atlantic Ocean by tidal inlets, the Mullica River and estuary, and the Great Egg Harbor River. This region is comprised of barrier islands separated from the mainland by small bays and coastal marsh. Tidal inlets separate each island. The communities in this region have year-round populations (such as Atlantic City, Ocean City and Cape May) as well as smaller communities which swell in population during the summer months.

A fourth region that is not included within the scope of this focus area analysis, but was impacted by Hurricane Sandy, is the New Jersey mainland side of the Delaware Bay. Stakeholder responses were received from this area including Middle Township in Cape May County and Downe Township in Cumberland County. Both communities are vulnerable due to eroding beaches which allow damage to occur to both the developed and natural areas. The natural areas are highly valuable horseshoe crab habitat. The developed portions of the bay are home to New Jersey's oyster fishery. Greenwich Township, also in Cumberland County reported damage and vulnerability to their dike system.

Northern Region

The northernmost region of the New Jersey Back Bays study area includes Shark River and the communities that border this tidal river. The community of Shark River Hills in Neptune Township suffered total losses of small businesses due to the flooding, and extensive damage to the Shark River Beach and Yacht Club. Seven foot waves reportedly damaged the municipal marina building which was condemned after the storm. As in other communities, many homes were damaged.

Central Region

The central region of the New Jersey Back Bays study area extends from the Manasquan River to the Great Bay and Little Egg Harbor Inlet. This region includes Barnegat Bay and the communities that border this large and important water body. This region also includes the Manasquan inlet and the entire Manasquan River basin.

Two examples of communities along the Manasquan River are the Borough of Manasquan and the Borough of Point Pleasant Beach. In Manasquan, flooding along the Glimmerglass, Crabtown Creek, Judas Creek and Robert's Swamp contributed to the damages experienced during Hurricane Sandy. In all, over 1,800 single family homes were either destroyed or suffered major damage, with losses estimated greater than $200 million in Manasquan. Businesses and public buildings were destroyed. Parks and recreation damages totaled $2,050,000. Lake Louise, in Point Pleasant Beach, is directly connected to the Manasquan River. Streets bordering this lake were significantly flooded causing residential and commercial property damage.

Communities on the western shore of Barnegat Bay and Little Egg Harbor such as Brick, Berkeley, Toms River, Beach Haven West, Stafford, Little Egg Harbor Township, Tuckerton and Port Republic suffered severe damage to homes and infrastructure. This area is characterized by medium density single family homes surrounded by back bay wetlands. The shoreline includes marsh, bulkheads, beaches and bluffs. Cattus Island and Berkeley Island County Parks suffered notable erosion from Hurricane Sandy. Since these areas represent natural buffers between the bay and the mainland, degradation to these parks also represents a loss of natural protection to developed areas.

Large bird populations are found on marsh islands. Some of these "waterbird islands" originated, or in the case of Mordecai Island were expanded as dredge disposal sites. While some of the small islands in Barnegat Bay and Little Egg Harbor are several feet above mean higher high water, portions of other islands are very low, and some islands are currently disappearing. This trend could increase as a result of rising seas. Many of these vulnerable islands are used by several species of conservation concern, including Foster's terns, black skimmers, American oystercatchers, gull-billed terns, common tern, least tern and piping plover. Diamondback terrapin, a state species of special concern and a regional priority, is also known to feed on marsh islands in the bays.

Southern Region

The southern region of the New Jersey Back Bays study area extends from Great Bay to Cape May. This region includes several back bays that are connected to the Atlantic Ocean by tidal inlets, the Mullica River and estuary, and the Great Egg Harbor River.

Bass River Township is located on the Bass River which feeds into the Mullica River. The community has identified continuing erosion of the riverbanks and the lack of an adequate bulkhead as contributors to the flooding of homes and businesses. Bass River is the home of one of New Jersey's largest yacht manufacturers.

Many of the barrier island communities within this region suffered less damage from beach erosion or flooding from the ocean than from the back bays. This is due to the fact that Hurricane Sandy was less severe in this area, and the barrier island oceanfronts have Federal and State funded beach and dune nourishment projects. Many communities such as Brigantine, Atlantic City, Margate, Ocean City, Strathmere in Upper Township, Sea Isle City, Avalon, Stone Harbor and Cape May suffered interior flooding due to high storm surge in the back bays and low on the bay side of the barrier islands. Upper

Township has noted that the Garden State Parkway and other coastal evacuation routes flooded during Huricanne Sandy.

Absecon Island is characterized as high density urban multifamily dwellings, single family homes, and casinos. The shoreline in this area is comprised of constructed beaches, urban back bay armoring and bulkheads, and minimal wetlands. Margate, south of Atlantic City on Absecon Island, reported that the low height and age of many bulkheads allowed them to be overtopped and damaged. The city had previously adopted an ordinance requiring the height of the bulkheads along the bay to be raised to elevation +7.5 and +9.0 National Geodetic Vertical Datum (NGVD) 1929, depending on the location, when replaced or reconstructed. Specific problem areas identified by the city during Hurricane Sandy included flooding adjacent to the Bayshore Lagoon along Beach Thorofare, and the deterioration of the Amherst Avenue bulkhead. The Amherst Avenue area is the lowest area in the city with current elevations between +5 and +6 feet North American Vertical Datum (NAVD) 88. The area sustained significant damage to homes and businesses due to flooding.

Similarly, the City of Brigantine has identified three locations where low-lying residential areas are vulnerable to flooding during coastal storms. Bulkhead replacement and installation have been recommended by the city. Brigantine has an ordinance requiring elevation +9.0 mean sea level (MSL) for all new bulkheads on the bay. Other potential solutions recommended by the city to minimize recurring flood losses include flood gates at the boat ramp, elevate roads, gabion walls, replacement of undersized outfalls and pump station improvements.

The tidal marshes of the Cape May Peninsula provide stopover areas for hundreds of thousands of shorebirds, songbirds, raptors and waterfowl during their seasonal migrations and are an important staging area and overwintering area for seabird populations. As feeding habitats are lost due to sea level change and erosion, local bird populations may no longer be sustainable. For example, avian biologists suggest that if marsh pannes and pools continue to be lost in Atlantic County as a result of sea level change, the tens of thousands of shorebirds that feed in these areas may shift to feeding in impoundments in the nearby Forsythe Refuge, increasing shorebird densities in the refuge by tenfold and reducing population sustainability because of lower per capita food resources and disease from crowding.

5.2 Objectives

5.2.1 National Objectives

The national or Federal objective of water and related land resources planning is to contribute to National Economic Development (NED) consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Contributions to NED are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation.

USACE also has a national objective for National Ecosystem Restoration (NER) in response to legislation and administration policy. This NER objective is to contribute to the nation's ecosystems through ecosystem restoration, with contributions measured by changes in the amounts and values of habitat.

Projects which produce both NED and NER benefits will result in a “best” recommended plan so that no alternative plan or scale has a higher excess of NED benefits plus NER benefits over total project costs. This plan shall attempt to maximize the sum of net NED and NER benefits, and to offer the best balance between two Federal objectives. Recommendations for multipurpose projects will be based on a combination of NED benefit-cost analysis, and NER benefits analysis, including cost effectiveness and incremental cost analysis.

In addition to Federal water resources planning objectives, the main goals of the NACCS under which this focus area analysis is being conducted, are to:

1) Reduce risk to which vulnerable coastal populations are subject.
2) Ensure a sustainable and robust coastal landscape system, considering future sea level change and climate change scenarios, to reduce risk to vulnerable populations, property, ecosystems, and infrastructure.

Specific objectives for this focus area analysis are to:

1) Manage risk from storm surge.
2) Manage flood risk.
3) Provide adaptive and sustainable solutions for future development that account for future changes such as sea level change, land subsidence and climate change.
4) Maintain or improve ecosystem goods and services provided (social, economic and ecological balance).
5) Incorporate opportunities for nature-based infrastructure, alone and in combination with traditional measures.
6) Maintain economic viability of the working coastline.
7) Improve emergency response and evacuations by improving the transportation systems before and during flood events.
8) Incorporate problems, needs, and opportunities identified by stakeholders to manage flood risk.
9) Manage erosion occurring along the shoreline.
10) Manage risk to National Register of Historic Places and other cultural resources.
11) Better incorporation of regional sediment management into non-Federal Projects.

5.3 Planning Constraints

Planning constraints are both institutional (policy/programmatic, legislative, and funding-related) and physical (such as sensitive ecosystem areas, land use, etc.).

5.3.1 Institutional Constraints

1) Comply with all Federal laws and executive orders, such as the National Environmental Policy Act (NEPA), the Clean Water Act, the Endangered Species Act, and Executive Order 11988.
2) Avoid increasing the flood risk to surrounding communities and facilities.

3) Avoid solutions that cannot be maintained, whether due to expense or complicated technologies, by the non-Federal sponsors.
4) Comply with local land use plans and regulations.
5) Difficulty in funding long-term operation and maintenance costs.
6) Permitting with Federal, state, and local agencies.
7) Many of the beaches within the study area are recognized as a recreational resource. It is important that this resource not be compromised.
8) Acquisition of real estate and easements.

5.3.2 Physical Constraints

1) Some areas within this study area are highly developed, and the density of population may limit the amount of space available for staging and constructing a project.
2) Avoid additional degradation of water quality, which would put additional stress on aquatic ecosystems.
3) Avoid impacting or exacerbating existing hazardous, toxic, and radioactive wastes (HTRW) that have been identified within the project area.
4) Minimize the impact to authorized navigation projects.
5) Minimize the impact to other projects and areas where risk has been managed, such as sensitive wetlands, wildlife management areas, etc.
6) Minimize effects on cultural resources and historic structures, sites, and features.
7) Loss of streetscape character and potential economic losses from elevation of structures or placement of floodwall/levee.

5.4 Future Without Project Condition

The future without project (FWOP) condition is the most likely condition expected to exist in the future in the absence of proposed projects. The FWOP condition is the baseline against which all project plans are evaluated. FWOP conditions, including sea level change considerations, will be developed along with the no-action alternative during the future phases of study.

5.5 Measures to Address Identified Planning Objectives

This section identifies a broad range of potential solutions (measures) to address the study area objectives. Many of these measures are outlined in “Coastal Risk Reduction and Resilience: Using the Full Array of Measures” (USACE, September 2013). Any of these potential measures will be weighed against a “No-action Plan” in the future phases of study.

5.5.1 Structural Measures

Structural measures are used for flood risk management. Broad-based structural measures identified include:

1) Seawall/Revetment: Seawalls are built parallel to the shoreline with the purpose of reducing overtopping and consequent flooding of areas behind the seawall due to storm surge and

waves. Revetments are onshore sloping structures which manage shoreline erosion. Areas immediately seaward of seawalls or revetments may be impacted because of isolation from an inland sediment source.

2) Groins: Groins are narrow structures, built perpendicular to the shoreline, that stabilize a beach experiencing longshore erosion. Beach material will accumulate on the updrift side of a groin, but the downdrift side will experience erosion caused by isolation from the longshore sediment transport source. Both the accretional and erosional effects extend some distance alongshore away from the groin.

3) Detached Breakwaters: The primary function of a detached breakwater is to reduce beach erosion by reducing wave heights in the lee of the structure. The reduction in wave heights reduces longshore and cross-shore sediment transport. Detached breakwaters are built nearshore, in shallow water, and generally parallel to the shoreline. They are low-crested structures which decrease wave energy and help promote an even distribution of material along the coastline. Since detached breakwaters can impact the transport of beach material, there can be erosional impacts in downdrift areas. In addition, detached breakwaters, when submerged can cause a non-visible hazard to boats and swimmers.

4) Berms / Levees: Berms, levees or dunes can be constructed along the shoreline, tying into high ground or surrounding an area entirely, to reduce risk of storm surge, wave run-up, and erosion to the landward shoreline. These measures have a large footprint, since their stability is partially dependent on a maximum side slope from the top to the toe, and are often composed of earthen materials. Levees or berms also need to be constructed to prevent or control underseepage of flood waters through the existing soils. They may need to include pumping stations to remove interior stormwater drainage. Roads sometimes need to be ramped to cross these features.

5) Multipurpose Berms/Levees: Berm and levee features require a large footprint to remain stable. However, it is possible to incorporate features in the design of the levees, such as parking areas/garages, commercial or residential development, recreational greenways, etc. to take advantage of the increased elevation.

6) Floodwalls and Bulkheads: Floodwalls or bulkheads can be constructed along the shoreline, tying into high ground or surrounding an area entirely, to reduce risk of storm surge, wave run-up, and erosion to the landward shoreline. These measures have smaller footprints than berms and levees, but require concrete or steel pilings for stability to withstand force from flood waters, including waves. Floodwalls must also be designed to prevent or control underseepage in the existing soils. Floodwalls may need to include pumping stations to remove interior stormwater drainage, and often include floodgates to allow for access roads to any waterside property.

7) Flood/Tide Gates: A flood or tide gate can be constructed across a waterway to provide risk reduction from coastal inundation upstream of the gate. Flood and tide gates are constructed with openings to allow for recreational or industrial uses of a tributary to continue, and also allow for some connectivity of the ecosystem. There are several types of flood gates; two types include an Obermeyer gate and a steel gate. The Obermeyer gate lifts a steel gate flap to close the gate, whereas a steel gate slides horizontally into closing position. Inflatable dams can also be used as a gate, as they can be filled with air or water to inflate and act as a closed gate.

If the watershed upstream of the flood or tide gate does not have enough natural floodplain storage to hold increases in water level due to precipitation runoff, then either additional storage will need to be created and/or pumping stations will need to be added to remove interior drainage upstream of a flood or tide gate.

8) Portable Floodwalls: Portable floodwalls are a potentially viable measure when complete portability is necessary and no permanent fixings or structures are desired. The portable floodwalls are typically constructed of lightweight aluminum and rely on the weight of the water to press down and stabilize the wall to create a watertight seal. Temporary flood walls can vary in height to accommodate the change in existing elevation and optimize cost. However, installation of a system of portable floodwalls may need to begin several days prior to a pending event depending on available resources. Therefore, portable floodwalls may not be suitable for some events and areas when installation time exceeds event warning time. Additionally, portable floodwalls are not applicable where subject to storm wave action.

9) Portable Berms/Cofferdams: Portable cofferdams are another rapidly deployable, temporary method that can be used for flood risk management. The coffer dam, made of commercial grade vinyl coated polyester, is a water inflated dam which consists of a self-contained single tube with an inner restraint baffle/diaphragm system for stability. The dam has the ability to stand alone as a positive water barrier without any additional external stabilization devices. The system can be installed easily in the field when needed and removed when the threat is over. Once laid out, it can be inflated using any available water source. Each unit is up to 100 feet long and 8 feet high. Portable coffer dam units can be joined together by overlapping end to end at any angle to provide risk reduction to large areas.

   Temporary pumps are required to fill the cofferdam units; however, the pumps can be used as temporary pump stations to pump trapped water on the “dry” side of the cofferdam and discharge the water into the “wet” side.

   Portable floodwalls, berms or cofferdams are less than ideal in areas subject to even modest wave energy and would, in many cases, still require a substantial permanent foundation. Inflatable water barriers are subject to sliding when fully loaded and prone to catastrophic failure due to sliding, punctures, tears along seams and vandalism, and are not recommended where issues of life and safety are involved.

10) Storm Surge Barrier: Storm surge barriers are often coupled with levees to prevent storm surge from propagating up waterways. Storm surge barriers generally consist of a series of movable gates that are normally open to let flow pass, but will close when storm surge exceeds a certain water level.

11) Road, Rail, or Light Rail Raises: Roads can be raised on berms or levees. The advantage of raising main evacuation routes is to prevent them from being flooded during a coastal and heavy precipitation event. Secondly, existing easements can provide some of the property needed for the footprint for building a berm or levee. In order to raise existing main routes, a large amount of property along the roadways will likely need to be acquired and this could have a major impact on the main business corridors. Additionally, the side roads leading to these main roads would need to be ramped for access.

Another option is raising existing rail or light rail lines on berms or levees. A road, rail, or light rail line raise may create interior drainage problems if stormwater storage is insufficient. Additional storage space and/or pumping stations may be required to remove interior stormwater drainage

12) Beach and Dune Restoration: Shoreline restoration by sand nourishment or replenishment of beaches subject to erosion. Restoration often includes dune restoration/enhancement to provide additional risk reduction for flooding and wave action.

13) Stormwater System Improvements: Existing stormwater systems can be improved by increasing capacity, through additional piping and stream channelization, increasing pipe sizes and inlets, and adding more storage areas, adding gates to outfall pipes to prevent storm surge from entering the storm sewer system, and pumping water from the storm system.

14) Bridge Trash Racks: Trash racks can be installed upstream of critical bridges to collect debris during a flood event to help preserve the structural integrity of the bridge support structure.

5.5.2 Non-Structural Measures

Broad-based non-structural measures identified include:

1) Acquisition / Buyouts: Homes that are subject to repetitive loss from flooding and are outside of an area for a proposed structural flood risk management project are viable candidates for buyouts or relocations. A buyout occurs when the homeowner is paid fair market value for the property, and moves to a new location. Relocations can occur when the homeowner has a parcel large enough that a home can be moved to higher ground on the existing parcel or a home can be relocated to a different parcel entirely. Acquisitions and buyouts restore the natural floodplain in the location of previous development.

2) Early Warning Systems: Flood warning systems are important to notify citizens of a flooding event. Coastal storms typically have a several-day timeframe where the community is aware of the possibility of impact, but last minute changes in speed and direction can alter the level of impact dramatically, and evacuations need to be planned well in advance for these types of storms in flat coastal areas. It is important for communities to have the means to reach out to their citizens before and during a large storm event. Large precipitation events from storms other than coastal storms may develop with little notice. Road signs that indicate flooded areas using real-time communications from citizens are one way to alert the community of these issues.

3) Elevating Structures: This measure involves elevating the building in place so that the lowest floor is above the flood level for which floodproofing is provided. The building is jacked up and set on a new or extended foundation consisting of pilings, concrete pillars or concrete blocks.

4) Floodproofing: There are two types of floodproofing techniques: dry floodproofing and wet floodproofing. Dry floodproofing keeps the floodwaters from entering the structure, while wet floodproofing allows the floodwaters to enter the building, but minimizes the damages. Dry floodproofing involves sealing the walls of structures such as buildings with waterproofing compounds, impermeable sheeting, or other materials and using closures for covering openings from floodwaters. Dry floodproofing is most applicable in areas of shallow, low-velocity flooding.

Wet floodproofing allows the structure to flood inside while ensuring minimal damage to the building and any contents. By allowing the force of the water to pass through a building, the interior flooding allows hydrostatic force on the inside of the building walls to equally counteract the hydrostatic force on the outside, thus eliminating the chance of structural failure. Wet flooding practices include installation of flood vents in the ground floor or crawl space to allow floodwater to flow through the building without causing structural damage or conversion of ground floor living space to uninhabitable space such as a carport or open garage.

5) Increase Storage: In order to manage flooding from precipitation as part of some coastal storms, natural storage of the watershed can be restored or additional storage can be added. Restoration of natural storage includes restoring wetlands and returning floodplains to undeveloped states in riverine areas. Increasing natural storage in stormwater systems includes reducing impervious areas to allow infiltration of runoff from precipitation events. Additional storage can be added through detention ponds and on a more localized basis through rain barrels or cisterns. A major component of increasing natural infiltration in stormwater management includes the use of green stormwater management.

6) Public Engagement and Education: A community can aid in flood risk management by educating its citizens about the existing flooding hazards and what can be done to reduce risk to their property. Additionally, if a flood risk project is constructed, educating the community on residual project risk must occur.

7) Relocating Utilities and Critical Infrastructure: A community can manage risk to its own public infrastructure by relocating utilities underground and moving critical infrastructure out of floodplain areas. Examples of critical infrastructure include hospitals and shelters.

8) Preservation: Develop land preservation programs to place environmentally sensitive land in permanent easements to better manage watersheds and their interrelated systems.

9) Resilience Performance Standards: Develop resilience performance standards for infrastructure to be used when making investment decisions. These standards may include information such as the recurrence interval of a storm that infrastructure should be designed to withstand, how long different end users can be without power, or how and when to include climate change or sea level change into design standards.

10) Emergency Response Systems: Emergency response systems include preparation for floods in anticipation of the flood event and flood-fighting plans to assist after the fact. The plans should include contingency and emergency floodproofing and must be properly integrated with emergency evacuation plans.

11) Modify/Remove Structures for Better Channel Function: Channel alterations such as modifying or removing features or widening/deepening channels can help reduce flooding by improving channel function.

12) Design or Redesign and Location of Services and Utilities: Services and utilities can be relocated to areas of low risk or to areas not subject to flooding such as higher ground. Additionally, existing services/features can be elevated above the flood elevation or can include floodproofing features in the design.

13) Surface Water//Stormwater Management: Management of stormwater and surface water systems can improve water quality, decrease erosion, and increase storage in the event of a storm which minimizes flood risks. The development of a surface water or stormwater management plan can help facilitate best management practices of the systems.

14) Building Codes and Zoning: Climate change and coastal hazard considerations should be incorporated into building and zoning codes. Building codes can promote construction techniques that reduce damages to future construction or to areas of redevelopment. Some examples include requiring new structures to be elevated above flood elevations and structures to be built on piling foundations in areas of wave action. Zoning can be used to avoid using the floodplain for activities other than those compatible with periodic flooding.

15) Strategic Acquisition: Purchase of undeveloped land for flood risk management.

16) Emergency Plans/Hazard Mitigation Plans: Emergency planning allows a community to be prepared for storm events, such as flood inundation from coastal storms. Hazard mitigation plans are developed to document hazards a community is exposed to and determine mitigation measures a community would like to implement to reduce risk from these hazards. It is important for both of these plans to be kept up to date with local issues in order to prepare and recover after a flooding event.

17) Retreat: Consider managed retreat, allowing wetlands and beaches to take over land that is currently dry, but will be affected by sea level change. Include land use and zoning appropriate for coastal storm risk management.

18) Wetland Migration: Adjust zoning laws to allow for wetland migration

19) Regional Sediment Management (RSM): Continuation of RSM practices in place and identifying new opportunities.

20) Coastal Zone Management: Coastal Zone Management regulates activities within the “Coastal Zone” to ensure that development is accomplished with the least amount of damage to the coastline.

5.5.3 Natural and Nature-Based Infrastructure

Nature-Based Infrastructure (NBI) refers to the intentional use of natural and engineered features to produce engineering functions in combination with ecosystem services and social benefits. Natural and nature-based features include a spectrum of features, ranging from those that exist due exclusively to the work of natural process to those that are the result of human engineering and construction. The built components of the system include nature-based and engineered structures that support a range of objectives, including coastal storm risk management (e.g., seawalls, levees), as well as infrastructure providing economic and social functions (e.g., navigation channels, ports, harbors, residential housing). Natural coastal features can take a variety of forms, including reefs (e.g., coral and oyster), barrier islands, dunes, beaches, wetlands, and maritime forests. The relationships and interactions among the natural and built features comprising the coastal system are important variables determining coastal vulnerability, reliability, risk and resilience.

1) Green Stormwater Management: Management practices can be used to reduce impervious areas and increasing storage on a localized basis for stormwater. Some examples include bio-swales, rain gardens, green roofs, rain barrels or cisterns. Green stormwater management

practices that involve plantings also allow for evapotranspiration of stormwater, and provide for an aesthetic component. Reducing impervious areas allows for infiltration of stormwater which reduces runoff quantity and improves runoff quality. Green stormwater management can also allow for opportunities to add public recreational features and provide for ecosystem restoration, while providing for wave attenuation and stormwater storage.

2) Constructed or Rehabilitated Reefs: Reefs can act as a natural barrier to dampen storm wave activity.

3) Salt Marshes: Salt marshes can provide sediment stabilization to an area, and can dissipate and/or attenuate oncoming wave action. Depending on the cross-shore width of a salt marsh, it has the potential to reduce storm surge effects. The traditional rule of thumb (USACE, 1963) was that for every 2.7 miles of marsh, storm surge is reduced by one foot; however, the degree of risk reduction that wetlands provide from storm surge is extremely complicated.

4) Freshwater Wetlands: Freshwater wetlands can provide flood risk management by detention and/or storage for floodwaters. Infiltration through a freshwater wetland to an aquifer below can assist in groundwater recharge and provide water quality benefits. Freshwater wetlands also provide sediment stabilization benefits.

5) Vegetated Dunes and Beaches: Vegetation helps to stabilize dunes and beaches from erosion due to wind and wave action.

6) Vegetated Submerged Aquatic Vegetation (SAV), Salt Marshes and Wetlands: Vegetated features help to break waves, attenuate wave energy, slow the inland transfer of stormwater and increase infiltration.

7) Oyster and Coral Reefs: Reefs can act as a natural barrier to dampen wave action, while providing essential habitat to marine organisms.

8) Barrier Island Restoration: Barrier islands act as the first line of defense in reducing risk to the mainland from storm surge and wave action. Restoration includes increasing barrier island elevation or plan form (length/width) and can include vegetation components such as dune/beach grass to stabilize sediments and increase wave dissipation.

9) Maritime Forests / Shrub Communities: The dense vegetation of maritime forests and shrub communities helps to stabilize soils while dissipating wave action and slowing the inland transfer of stormwater.

The broad measures identified herein, structural, non-structural, and natural/nature-based, have the potential for further development to target specific areas for coastal storm risk management. The goal of measures development is to achieve the objectives by combining one or more measures while avoiding constraints. Measures identified will be further evaluated, screened and used in combination (as appropriate) in future phases of study to determine area-specific project viability to meet the planning objectives.

5.5.4 Area Specific Measures

The previously described broad-based measures (structural, non-structural, and natural/nature-based infrastructure) are applicable to most areas within the study area. Specific area-focused measures

provided through stakeholder input and/or otherwise dervied from previous studies are listed below. This comprehensive list includes some measures that are beyond the purview of USACE. Potential measures that could be evaluated as part of future study phases are included herein.

Northern Region:

Potential measures for coastal storm risk management for Monmouth County communities along the Shark and Manasquan Rivers include:

- Elevating structures.
- Raising, replacing or adding to bulkheads and dikes along the shoreline.
- Stabilizing and armor unprotecting eroding shorelines with vegetation or stone.
- Developing integrated flood risk reduction systems using structural (engineering) and non-structural (wetlands) measures.
- Reviewing and enhancing coastal area design guidelines to better mitigate the impacts of flooding.
- Enhancing and strengthening waterfront zoning and permitting.
- Evaluating green corridors and parks for possible improvements for flood management.
- Acquisiting, elevating or floodproofing of existing structures to better mitigate the impacts of flooding.
- Designing or redesigning and relocating services and utilities.

Central Region:

Potential measures for coastal storm risk management for Ocean County communities along the Barnegat Bay and adjoining Rivers include:

- Raising, replacing or adding to stone revetments along the shoreline.
- Stabilizing and armor unprotecting eroding shorelines with vegetation or stone.
- Restoring island and coastal wetland (e.g. close the breach in Mordecai Island).
- Beach and dune nourishment (e.g. shoreline restoration at Cattus Island and Berkeley Island County Parks)
- Developing integrated flood risk management systems using structural (engineering) and non-structural (wetlands) measures.
- Reviewing and enhancing coastal area design guidelines to better mitigate the impacts of flooding.
- Enhancing and strengthening waterfront zoning and permitting.
- Evaluating green corridors and parks for possible improvements for flood management.
- Acquiring, elevating or floodproofing existing structures to better mitigate the impacts of flooding.
- Designing or redesigning and relocating of services and utilities.

Southern Region:

Potential measures for coastal storm risk management for Atlantic, Cape May and Burlington County communities along the back bays and adjoining rivers include:

- Raising, replacing or adding to bulkheads and dikes along the shoreline.
- Stabilizing and armor unprotecting eroding shorelines with vegetation or stone.
- Developing integrated flood risk Management systems using structural (engineering) and non-structural (wetlands) measures.
- Reviewing and enhancing coastal area design guidelines to mitigate the impacts of flooding.
- Enhancing and strengthenin waterfront zoning and permitting.
- Evaluating green corridors and parks for possible improvements for flood management.
- Dredging existing navigable waterways on rivers such as the Bass River to authorized depths to increase water storage.
- Raising roadways (e.g. Garden State Parkway and other coastal evacuation routes).
- Improving storm drainage and installing tide valves and flood gates.
- Acquiring, elevating or floodproofing existing structures to better mitigate the impacts of flooding.
- Designing or redesigning and relocating services and utilities.

Potential measures for coastal storm risk management in Atlantic City include:

- Raising, replacing or adding to bulkheads and dikes along the shoreline (e.g. Gardiner's Basin, Venice Park, and North Riverside Avenue).
- Stabilizing and armor unprotecting eroding shorelines with vegetation or stone (e.g. Chelsea Heights).
- Developing integrated flood risk management systems using structural (engineering) and non-structural (wetlands) measures.
- Reviewing and enhancing coastal area design guidelines to mitigate the impacts of flooding.
- Enhancing and strengthening waterfront zoning and permitting.
- Evaluating green corridors and parks for possible improvements for flood management.
- Raising roadways.
- Improving storm drainage and installing tide valves and flood gates (e.g. Atlantis Avenue Flood gate).
- Raising home and business elevation.
- Improving coastal evacuation routes.
- Acquiring, elevating or floodproofing of existing structures to better mitigate the impacts of flooding.
- Designing or redesigning and relocating of services and utilities.

6. Preliminary Financial Analysis

Given the size of the New Jersey Back Bay study area (450 square miles) and the coastal storm risk management problems facing the region, there are both state agencies and other alliances with interest in a being a potential non-Federal sponsor of one or more studies.

Currently, there is a high level of interest from NJDEP to be a non-Federal sponsor. Due to the region's highly valued environmental resources, fisheries, and open spaces, there is also very high interest by The Barnegat Bay Partnership and other potential partners for multi-party collaborative efforts. An additional possibility for a non-Federal sponsor includes building coalitions of the various agencies and organizations to contribute available expertise and funding toward non-Federal sponsorship of one or more future investigations to address the coastal storm risk management problems and opportunities in the New Jersey Back Bays study area. Together, the compilation of one or more potential future studies can serve as a comprehensive approach to the problems, needs, and opportunities of the region.

The potential non-Federal sponsor would be required to provide 50 percent of the cost of the potential future investigation. Up to 100% of the non-Federal sponsor's share could be work in-kind. The potential non-Federal sponsor(s) are also aware of the cost sharing requirements for potential project implementation. A letter of support from any non-Federal sponsor(s) stating a willingness to pursue a potential future investigation and to share in its cost, and an understanding of the cost sharing that is required for project implementation will be required.

7. Summary of Potential Future Investigation

Based on the identified measures, potential alternative plan development, and future screening of alternatives, there appears to be a large array of solutions that have the potential to be economically justified, environmentally acceptable, addressable through engineering solutions, and consistent with USACE polices and the Infrastructure Systems Rebuilding Principles (NOAA and USACE, 2013).

Table 3 summarizes the entities interested in these potential future investigations. The specific geographic areas and the various priorities for these entities are also shown. The listing also reflects the level of interest as indicated by the potential non-Federal sponsors in coordination with USACE to date.

Table 3. Potential Future Investigation and Non-Federal Sponsors

Agency/Organization	Portion of Study Area Interest	Priorities
NJDEP	450 sq. mi. (Entire study area)	1) Coastal Storm Risk Management 2) Flood risk management 3) Ecosystem Restoration
Barnegat Bay Partnership	96 sq. mi. (Barnegat Bay, Little Egg Harbor, Great Bay, Manahawkin Bay)	1) Water quality 2) Ecosystem protection and restoration
Coastal Monmouth Group Local Resilience Partnership	TBD	TBD
Island Beach Group Local Resilience Partnership	TBD	TBD
Southern Ocean Group Local Resilience Partnership	TBD	TBD

8. Views of Other Resource Agencies

Initial study scoping efforts have been coordinated with appropriate State and local agencies including NJDEP. Coordination has also been initiated with the Barnegat Bay Partnership. Coordination with other resource agencies is being conducted as part of the overall comprehensive study. Additional coordination would occur during the future phases of study.

9. References

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Watson, S. (2013, April 20). Stricter building standards will change the bayfront after Sandy. The Press of Atlantic City.

APPENDIX A

STAKEHOLDER INQUIRY LETTER

LIST OF CONTACTS

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

CENAP-PL-PS

23 August 2013

Dear Stakeholder,

The United States Army Corps of Engineers (USACE) is conducting the North Atlantic Coast Comprehensive Study (NACCS) under the authority of Public Law 113-2, the Disaster Relief Appropriations Act of 2013, Chapter 4, which authorized USACE investigations as follows:

- *"That using up to $20,000,000 of the funds provided herein, the Secretary shall conduct a **comprehensive study** to address the flood risks of **vulnerable coastal populations** in areas that were affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the Corps.*
- *"…as a part of the study, the Secretary shall **identify those activities warranting additional analysis by the Corps**".*

The goals of the NACCS are to:

- Promote resilient coastal communities with sustainable and robust coastal landscape systems, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable populations, property, ecosystems, and infrastructure; and
- Provide a risk reduction framework (reducing risk to which vulnerable coastal populations are subject) consistent with USACE-NOAA Rebuilding Principles.

To identify those activities warranting additional analysis, USACE is conducting a Reconnaissance-Level Analysis (RLA) for the New Jersey Back-bays. The area that will be studied as part of this RLA is shown in Figure 1.

The purpose of the RLA is to determine if there is a Federal (USACE), interest in participating in a cost-shared feasibility study to formulate and evaluate specific coastal flood risk management projects in the New Jersey Back-bays study area. Possible coastal flood risk management measures could include: structural, non-structural, natural, nature-based, and policy and programmatic measures or a combination of them, if a feasibility study is initiated.

To conduct the RLA, **USACE requests feedback from your jurisdiction** on related problems and potential opportunities to address these issues such as those experienced during Hurricane Sandy and other storms.

Specific feedback requested is as follows:

1) **Problem identification for your area:**
   a. Did your area experience tidal or tidally influenced storm surge?
   b. Be specific on particular areas and water bodies within your jurisdiction that experienced storm surge.
   c. What factors, if any, exacerbated damages from storm surge?

2) **Description of damages for your area:**
   a. Provide a narrative including the types of infrastructure damaged or temporarily out of use, structure (building) damages, personal injuries/fatalities.
   b. Provide a map depicting the spatial extent of damages.

3) **Prior related studies or projects (local, state, federal) in the damaged area.**

4) **List measures that your jurisdiction has considered to address the problem** (for documentation purposes, should there be a follow-on study).

Responses should be emailed to:

Ginger Croom, croomgl@cdmsmith.com (USACE Contractor)
Or faxed to Ginger Croom at 617-452-6594

Due to the aggressive schedule to complete the RLA and to meet the Congressional mandate to complete the NACCS, please provide responses to these questions by **September 6, 2013**.

If you have any questions related to this request, please contact Ginger Croom, CDM Smith (USACE Contractor) at 617-452-6594 or me at 215-656-6599.

For more information on the NACCS, please visit:

http://www.nad.usace.army.mil/Missions/CivilWorks/HurricaneSandyCoastalRecovery/NorthAtlanticComprehensiveStudy.aspx

Sincerely,

Brian J. Mulvenna

Brian J. Mulvenna P.E.
USACE, Philadelphia District

Encl
1. Figure 1: Study Area Map

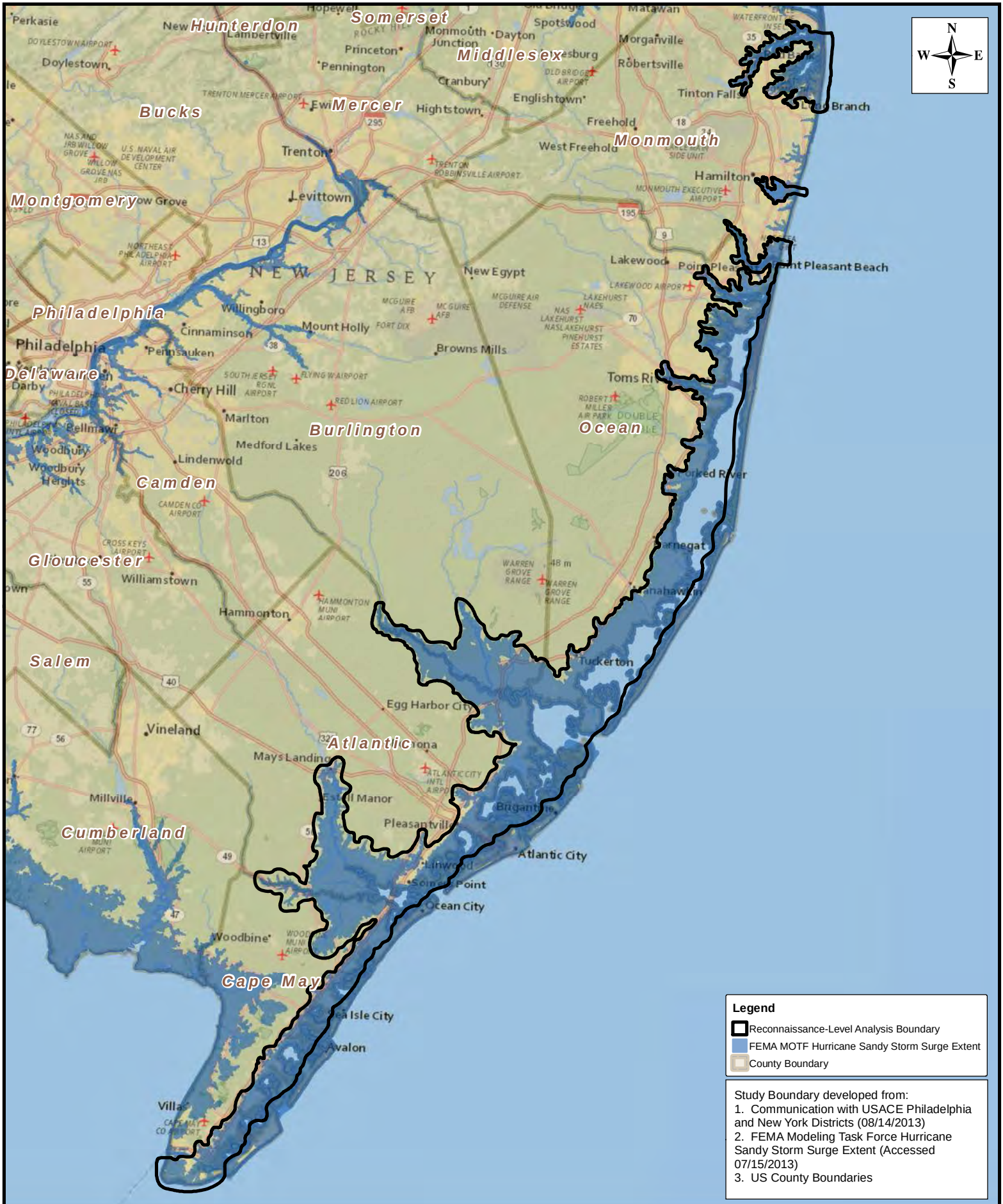


FIGURE 1

U.S. ARMY CORPS OF ENGINEERS

NEW JERSEY BACK-BAYS

NORTH ATLANTIC COAST COMPREHENSIVE STUDY

APPROXIMATE SCALE

0 5 10 15 20 Miles

RECONNAISSANCE-LEVEL ANALYSIS BOUNDARY MAP

Path: C:\GIS\NACCS\MXD\NJ_Back_Bays.mxd

USACE, Philadelphia District
New Jersey Back-Bays Focus Area Analysis
Point of Contact List

NJ MAYORS

Locality	State	Locality	Title	First	Middle	Last	Address	Email
Borough of Allenhurst	New Jersey	Allenhurst	Mayor	David	J.	McLaughlin	125 Corlies Avenue Allenhurst, New Jersey 07711	dmclaughlin@allenhurstnj.org
Town of Asbury Park	New Jersey	Asbury Park	Mayor	Tom		Walsh	P.O. Box 1415 Asbury Park, New Jersey 07712	
City of Atlantic City	New Jersey	Atlantic City	Mayor	Lorenzo	T.	Langford	1301 Bacharach Blvd Atlantic City, NJ 08401	rwilliams@cityofatlanticcity.org
Borough of Atlantic Highlands	New Jersey	Atlantic Highlands	Mayor	Frederic		Rast	100 First Ave Atlantic Highlands, 07716	
Borough of Avalon	New Jersey	Avalon	Mayor	Martin		Pagliughi	3100 Dune Dr Avalon, NJ 08202-1799	akleuskens@avalonboro.org
Borough of Avon-by-the-Sea	New Jersey	Avon-by-the-Sea	Mayor	Robert		Mahon	301 Main Street Avon-by-the-Sea, New Jersey 07717	avonboro@aol.com
Borough of Barnegat Light	New Jersey	Barnegat Light	Mayor	Kirk	O.	Larson	P.O. Box 576 Barnegat Light 08006-0576	Gail.wetmore@barnegatlight.com
Borough of Bay Head	New Jersey	Bay Head	Mayor	William	W.	Curtis	PO Box 248 Bay Head, NJ 08742-0248	bhclerk@verizon.net
Borough of Beach Haven	New Jersey	Beach Haven	Mayor	Robert		Keeler	300 Engleside Ave Beach Haven, NJ 08008	BoroughClerk@beachhaven-nj.gov
Borough of Belmar	New Jersey	Belmar	Mayor	Matthew		Doherty	601 Main Street Belmar, New Jersey 07719	mayor@belmar.com
Township of Berkeley	New Jersey	Berkeley	Mayor	Carmen	F.	Amato, Jr	P.O. Box B Bayville 08721-0287	townshipclerk@twp.berkely.nj.us
Borough of Bradley Beach	New Jersey	Bradley Beach	Mayor	Gary		Engelsted	701 Main Street Bradley Beach, New Jersey 07720	bradley@monmouth.com
Township of Brick	New Jersey	Brick	Mayor	Stephen	C.	Acropolis	401 Chambers Bridge Rd Brick, NJ 08723-2898	clerk@twp.brick.nj.us
City of Brigantine	New Jersey	Brigantine	Mayor	Philip	J.	Guenther	1417 W Brigantine Ave Brigantine, NJ 08203-2186	lsweeney@brigantinebeachnj.com
City of Cape May	New Jersey	Cape May	Mayor	Edward	J.	Mahaney, Jr.	643 Washinton St. Cape May, NJ 08204	emahaney@capemaycity.com
Borough of Deal	New Jersey	Deal	Mayor	Harry		Franco	Durant Square Norwood at Roseld Avenue P.O. Box 56 Deal, New Jersey 07723	administrator@dealborough.com
Township of Elsinboro	New Jersey	Elsinboro	Mayor	Sean		Elwell	619 Salem-Ft. Elfborg Rd. Salem, NJ 08079	
Town of Harrison	New Jersey	Harrison	Mayor	Raymond	J.	McDonough	318 Harrison Ave Harrison, NJ 07029	
Borough of Harvey Cedars	New Jersey	Harvey Cedars	Mayor	Jonathan		Oldham	PO Box 3185 Harvey Cedars, NJ 08008-0337	clerk@harveycedars.org
Borough of Highlands	New Jersey	Highlands	Mayor	Frank		Nolan	171 Bay Avenue Highlands, NJ, 07732	
City of Hoboken	New Jersey	Hoboken	Mayor	Dawn		Zimmer	94 Washington St. Hoboken, NJ 07030	
Borough of Keansburg	New Jersey	Keansburg	Mayor	George		Hoff	29 Church Street Keansburg, NJ 07734	
Town of Kearny	New Jersey	Kearny	Mayor	Alberto	G.	Santos	402 Kearny Ave Kearny, NJ 07032	
Borough of Lavallette	New Jersey	Lavallette	Mayor	Walter	G.	LaCicero	1306 Grand Central Avenue Lavallette, NJ 08735	cparlow@lavalletteboro.com
Village of Loch Arbour	New Jersey	Loch Arbour	Mayor	Paul		Fernicola	550 Main Street Loch Arbour, New Jersey 07711	
Town of Long Beach	New Jersey	Long Beach	Mayor	Joseph		Mancini	6805 Long Beach Blvd. Brant Beach, NJ 08008	
Township of Long Beach	New Jersey	Long Beach	Mayor	Joseph	H.	Mancini	6805 Long Beach Blvd Brant Beach, NJ 08008-3661	wells@longbeachtownship.com
City of Long Branch	New Jersey	Long Branch	Mayor	Adam		Schneider	Long Branch Municipal Building 344 Broadway, Second Floor Long Branch, New Jersey 00740	cityoflongbranch@longbranch.org

Borough of Longport	New Jersey	Longport	Mayor	Nicholas		Russo	2305 Atlantic Ave Longport, NJ 08403-1103	clerk@longport-nj.us
Township of Lower	New Jersey	Lower	Mayor	Michael	E.	Beck	2600 Bay Shore Road Villas, NJ 08251-1399	jpicard@townshipoflower.org
Borough of Manasquan	New Jersey	Manasquan	Mayor	George		Dempsey	Mayor of the Borough of Manasquan 201 East Main Street, 2nd floor Manasquan, New Jersey 08736	gdempsey@manasquan-nj.com
Borough Mantoloking	New Jersey	Mantoloking	Mayor	George	C.	Nebel	PO Box 4391 Brick, NJ 08723	boroclerk@mantoloking.org
City of Margate	New Jersey	Margate	Mayor	Michael		Becker	Municipal Building 9001 Winchester Ave Margate, NJ 08402	hiltnertd@aol.com
Township of Middletown	New Jersey	Middletown	Mayor	Gerard		Scharfenberger	One Kings Highway Middletown, NJ, 07748	
Borough of Monmouth Beach	New Jersey	Monmouth Beach	Mayor	Susan		Howard	22 Beach Road Monmouth Beach, New Jersey 07750	Mayor@MonmouthBeach.us
Borough of Neptune City	New Jersey	Neptune City	Mayor	Robert		Brown	106 West Sylvania Avenue Neptune City, New Jersey 07753	
City of Newark	New Jersey	Newark	Mayor	Cory		Booker	City Hall, Room 200 920 Broad Street Newark, NJ 07102	
City of North Wildwood	New Jersey	North Wildwood	Mayor	William		Henfey	901 Atlantic Avenue North Wildwood, NJ 08260	sjett@northwildwood.com
Town of North Wildwood	New Jersey	North Wildwood	Mayor	William		Henfey	901 Atlantic Ave. P.O. Box 499 North Wildwood, NJ 08260	
City of Ocean City	New Jersey	Ocean City	Mayor	Jay	A.	Gillian	861 Asbury Avenue Ocean City, NJ 08226-3444	lmacintyre@ocnj.us
Borough of Point Pleasant Beach	New Jersey	Point Pleasant Beach	Mayor	Vincent		Barrella	416 New Jersey Ave Point Pleasant Beach, NJ 08742-3330	mellsworth@pointbeach.org
Borough of Sea Bright	New Jersey	Sea Bright	Mayor	Dina		Long	1167 Ocean Avenue Sea Bright, New Jersey 07760	seabrightmayor@verizon.net
Borough of Sea Girt	New Jersey	Sea Girt	Mayor	Ken	E.	Farrell	321 Baltimore Boulevard P.O. Box 296 Sea Girt, New Jersey 08750	
City of Sea Isle	New Jersey	Sea Isle	Mayor	Leonard		Desiderio	4416 Landis Ave Sea Isle City, NJ 08243-0125	cgriffith@seaislecitynj.us
Borough of Seaside Heights	New Jersey	Seaside Heights	Mayor	WIlliam		Akers	901 Boulevard Seaside Heights, NJ 08751-0038	municipalclerk@seaside-heightsnj.org
Borough of Seaside Park	New Jersey	Seaside Park	Mayor	Robert	W.	Matthies	1701 North Ocean Ave Seaside Park, NJ 08752	clerk@seasideparknj.org
Borough of Ship Bottom	New Jersey	Ship Bottom	Mayor	WIlliam		Huelsenbeck	1621 Long Beach Blvd Ship Bottom, NJ 08008-5499	sbclerk@comcast.net
Borough of Spring Lake	New Jersey	Spring Lake	Mayor	Jennifer		Naughton	Borough Hall 423 Warren Avenue Spring Lake, New Jersey 07762	
Borough of Stone Harbor	New Jersey	Stone Harbor	Mayor	Suzanne		Walters	9508 Second Ave Stone Harbor, NJ 08247-1999	stanfords@stone-harbor.nj.us
Town of Stone Harbor	New Jersey	Stone Harbor	Mayor	Susanne		Walters	9508 Second Avenue Stone Harbor, New Jersey 08247	
Borough of Surf City	New Jersey	Surf City	Mayor	Leonard	T.	Connors Jr	813 Long Beach Blvd Surf City, NJ 08008	
Town of Surf City	New Jersey	Surf City	Mayor	Leonard	T.	Connors	813 Long Beach Boulevard Surf City, NJ 08008	
Township of Toms River	New Jersey	Toms River	Mayor	Thomas	F.	Kelaher	33 Washington St P.O. Box 728 Toms River, NJ 08754-0728	jmmutter@tomsrivertownship.com
Township of Upper	New Jersey	Upper	Mayor	Richard		Palombo	PO Box 205 Tuckahoe, NJ 08250	clerk@uppertownship.com
City of Ventnor	New Jersey	Ventnor	Mayor	John	Michael	Bagnell	6201 Atlantic Ave Ventnor, NJ 08406-2797	jcallaghan@ventnorcity.org
City of Wildwood	New Jersey	Wildwood	Mayor	Ernie		Troiano, Jr.	4400 New Jersey Ave Wildwood, NJ 08260-1799	cw@wildwoodnj.org
Borough of Wildwood Crest	New Jersey	Wildwood Crest	Mayor	Carl	H.	Groon	6101 Pacific Avenue Wildwood Crest, NJ 08260	kyecco@wildwoodcrest.org

USACE, Philadelphia District
New Jersey Back-Bays Focus Area Analysis
Point of Contact List

NGOs									
Organization	**State**	**Title**	**First**	**Middle**	**Last**	**Address**	**Phone**	**Email**	**Web Address**
Nature Conservancy	New Jersey	Director of Conservation Science	Robert		Allen	Delaware Bayshores Program 2350 Route 47 Delmont, NJ 08314	609-862-0600 x-121	rallen@tnc.org	
America Littoral Society	New Jersey		Tim		Dillingham	18 S Hartshorne Dr , Highlands, NJ 07732		tim@littoralsociety.org	
Ocean County Soil Conservation District						714 Lacey Road Forked River, NJ 08731		craabe@soildistrict.org	
Alliance for a Living Ocean			Carol Elliott			2007 Long Beach Boulevard North Beach Haven, NJ 08008	609-492-0222	livingoceanalo@comcast.net	http://www.livingocean.org/
Barnegat Bay Partnership-			Martha Maxwell Doyle and Stan Hales					shales@ocean.edu	
								mmdoyle@ocean.edu	
Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Cook College, Rutgers University								bbay@crssa.rutgers.edu	
Stockton Coastal Research Center								crc@stockton.edu	
ReClam the Bay			**Rick Bushnell, President**			1623 Whitesville Rd. Toms River, NJ 08755-1199	732/349 1152	rickb@quadii.com	http://reclamthebay.org/
Forked River Mountain Coalition			Kerry Jennings			**P.O. Box 219** **Forked River, New Jersey 08731**	609-971-1635	FRMC@frmc.org	http://www.frmc.org/mountain.htm

USACE, Philadelphia District
New Jersey Back-Bays Focus Area Analysis
Point of Contact List

OTHERS CONTACTS

Locality	State	Title	First	Middle	Last	Address	Phone	Email
City of Ocean City	New Jersey	City Engineer	Arthur		Chew	Henry J. Knight Building 115 12th St. Ocean City, NJ 08226	609-525-9400 x-9715	achew@ocnj.us
City of Ocean City	New Jersey	Business Administrator	Mike		Dattilo	City of Ocean City 861 Asbury Ave Ocean City, NJ 08226	609-399-6111 x-9333	mdattilo@ocnj.us
Township of Upper	New Jersey	Township Engineer	Paul		Dietrich, SR, PE, PP	2100 Tuckahoe Rd. P.O. Box 205 Tuckahoe, NJ 08250-0205	609-628-2011 x-244	engineer@uppertownship.com
City of Ocean City	New Jersey	Director of Financial Management	Frank		Donato	861 Asbury Ave, Room 308 Ocean City, NJ 08226	609-525-9349 x-9350	fdonato@ocnj.us
Richard Stockton State College	New Jersey		Stu		Ferrell			farrells@stockton.edu
Stevens Institute of Technology	New Jersey		Tom		Harrington	Davidson Laboratory Stevens Institute of Technology Hoboken, New Jersey 07030		Thomas.Herrington@stevens.edu
City of Cape May Point	New Jersey	Administrator and Municipal Clerk	Kimberley		Hodsdon	215 Lighthouse Ave. P.O. Drawer 490 Cape May Point, NJ 08212	609-884-8468 x-12	khodsdon@capemaypoint.org
Urban Coast Institute	New Jersey		Tony		MacDonald	Monmouth University West Long Branch, New Jersey 07764		amacdona@monmouth.edu
City of Cape May	New Jersey	City Manager	Bruce		MacLeod	643 Washinton St. Cape May, NJ 08204	(609) 884-9537	brucem@capemaycity.com
Township of Middle	New Jersey	Business Administrator	Connie		Mahon	33 Mechanic St. Cape May Court House, NJ 08210	(609) 465-8732	cmahon@middletownship.com
City of Hoboken	New Jersey	Assistant Business Administrator	Stephen	D.	Marks	94 Washington Street Hoboken, NJ 07030	(201) 239-6643	smarks@hobokennj.org
Cape May Point State Park	New Jersey	Park Superintendent	Lorraine		McCay	P.O. Box 107 Cape May Point, NJ 08212	609-884-2159	cmpsupt@comcast.net
Rutgers University	New Jersey		Norb		Psuty			psuty@imcs.rutgers.edu
City of Sea Isle City	New Jersey	Business Administrator	George		Savastano	4501 Park Rd. Sea Isle City, NJ 08243	609-263-4461 x-223	gsavastano@seaislecitynj.us

USACE, Philadelphia District
New Jersey Back-Bays Focus Area Analysis
Point of Contact List

FEDERAL AGENCIES								
Agency	**State**	**Title**	**First**	**Middle**	**Last**	**Address 1**	**Email**	Phone
New Jersey Department of Transportation	New Jersey	Chief	Genevieve		Boehm-Clifton	Office of Maritime Resources NJ Department of Transportation P.O. Box 600 Trenton, NJ 08625-0600		
New Jersey Meadowlands Commission	New Jersey	Supervisor of Natural Resources Management	Dr. Ross	M.	Feltes	One DeKorte Park Plaza Lyndhurst, New Jersey 07071-3707	Ross.Feltes@njmeadowlands.gov	(201) 460-4919
U.S. Fish and Wildlife Service	New Jersey	Project Leader	Eric		Davis	USFWS–New Jersey Field Office 927 N. Main Street Heritage Square, Building D Pleasantville, New Jersey 08232	Eric_Davis@FWS.GOV	(609) 646 931

APPENDIX B

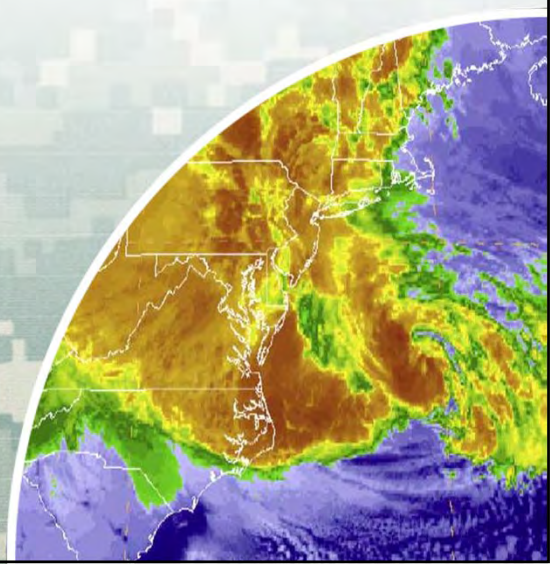
PRESENTATION

MEMORANDUM FOR RECORD

PRESENTATION

North Atlantic Coast Comprehensive Study
New Jersey Back-bays
Reconnaissance-Level Analysis

U.S. Army Corps of Engineers
Coastal Storm Risk Management
Planning Center of Expertise
29 August 2013



Background

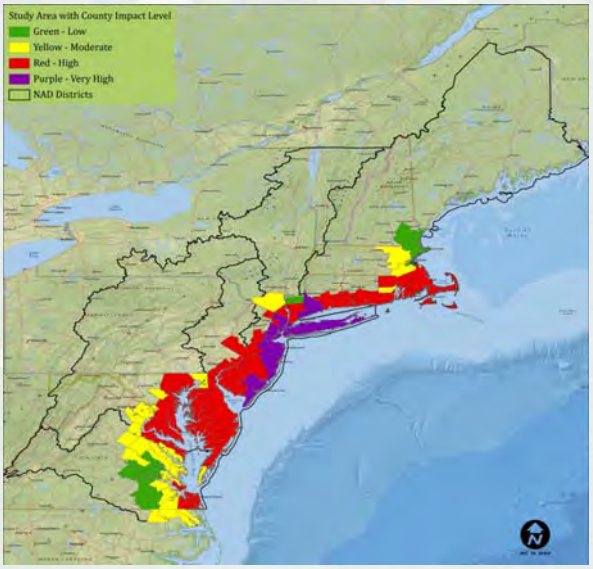
- Greatest areas of Sandy's impact: NJ, NY, CT
- Public Law 113-2
- "That using up to $20,000,000 of the funds provided herein, the Secretary shall conduct a **comprehensive study** to address the flood risks of **vulnerable coastal populations** in areas that were affected by Hurricane Sandy within the boundaries of the North Atlantic Division of the Corps…"
- Comprehensive Study to be complete by Jan 2015

NACCS Study Goals

1. *Provide Risk Reduction Framework– Reduce risk to which vulnerable coastal populations are subject.*
2. *Promote Resilient Coastal Communities – Ensure a sustainable and robust coastal landscape system, considering future sea level rise and climate change scenarios, to reduce risk to vulnerable population, property, ecosystems, and infrastructure.*

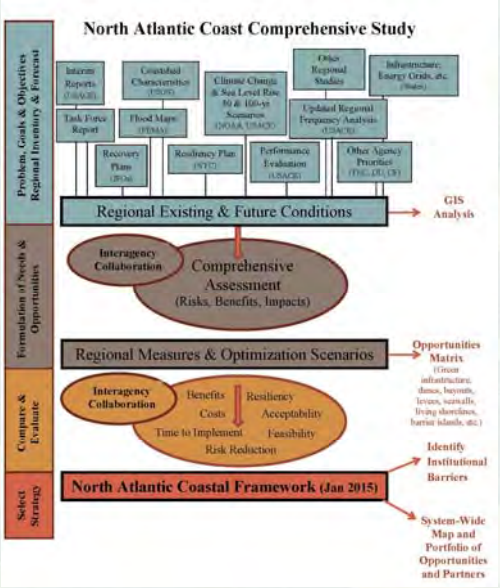
**Consistent with USACE-NOAA Rebuilding Principles*

NACCS Study Area



NACCS Scope

- **Coastal Framework**
  - ❑ Regional scale
  - ❑ Interagency collaboration
  - ❑ Opportunities by region/state
  - ❑ Identify range of potential solutions and parametric costs by region/state
  - ❑ Identify activities warranting additional analysis



Key Technical Components

- Engineering
- Environmental, Cultural, and Social
- Sea Level Rise and Climate Change (SLR & CC)
- Economics
- Plan Formulation
  - ►Policy & programmatic
- Coastal GIS Analysis

NACCS Schedule

- ✓ April 2013 – Existing/Future Conditions
- ✓ May – Problems/Opportunities
- ✓ June – Hydrodynamics and Measures Working Meetings
- ✓ July –Aug – Refine Analyses & Measures
- July - Dec 2013 – Interagency Collaboration Webinar Series
- Oct-Dec 2013– Reviews of analyses
- ~Jan-March 2014– Opportunities for Additional Feedback
- April-July 2014 – Alignment & Refinement
- Aug-Sept 2014 – Final Draft Report production
- Oct-Dec 2014 – NAD, HQ, ASA(CW), OMB Reviews
- Jan 2015- Submit to Congress

Reconnaissance-Level Analyses

Reconnaissance-Level Analyses

- Investigation is being conducted as a part of the North Atlantic Coast Comprehensive (NACC) Study under the authority of Public Law 113-2, the Disaster Relief Appropriation Act of 2013
- Specific language within PL 113-2 states, "…*as a part of the study, the Secretary shall identify those activities warranting additional analysis by the Corps*
- Reconnaissance-level analyses will identify activities warranting additional analysis that could be pursued

Reconnaissance-Level Analyses

- The purpose is to determine if there is a Federal, (USACE) interest in participating in a cost-shared feasibility phase study in the interest of providing potential types of projects in the New Jersey Back-bays
- Possible coastal flood risk management measures could include: structural, non-structural, natural, nature-based, and policy and programmatic measures or a combination of them, if a feasibility study is initiated.

Reconnaissance-Level Analyses

- What is the water resources problem to be solved?
- Is there a viable engineering solution to the problem?
- Are there potential National Economic (NED) benefits associated with a potential project?
- Is there a need/interest for Federal (USACE) participating and is there a qualified non-federal sponsor?

Reconnaissance-Level Analyses

Typically identify the following:

- Study area boundaries
- Problems and Opportunities
- Planning Objectives
- Planning Constraints
- Measures to Address Planning Objectives
- Next Steps

Feedback Requested

1. Problem identification for your area:

- ► Did your area experience tidal or tidally influenced storm surge?
- ► Specify particular areas and water bodies within your jurisdiction that experienced storm surge.
- ► What factors, if any, exacerbated damages from storm surge?

Feedback Requested

2. Description of damages for your area:

- Provide a narrative including the types of infrastructure damaged or temporarily out of use, structure (building) damages, personal injuries/fatalities.
- Provide a map depicting the spatial extent of damages.

Feedback Requested

3. Prior related studies or projects (local, state, federal) in the damaged area.

4. Measures that your jurisdiction has considered to address the problem

Stakeholder Outreach

- Letters emailed by USACE New York District (August 26)
- Feedback requested by September 6

Next Steps

- Fall 2013 – Draft RLA
- FY 2014 – sign letters of intent with local sponsor, work towards Project Management Plan (PMP) for Feasibility Phase
- FY 2015 – Move to Feasibility phase IF:
  - Federal interest is determined during Recon-phase
  - Non-federal Sponsor is identified
  - Federal funding is available

Questions/POCs

- Brian Mulvenna – USACE Philadelphia District
  - Brian.J.Mulvenna@usace.army.mil
  - 215-656-6599 (ph)
- Ginger Croom – CDM Smith (USACE Contractor)
  - croomgl@cdmsmith.com
  - 617-452-6594 (ph and fax)
  - 617-999-9631 (mobile)

8/27/2013 STAKEHOLDER WEBINAR MEETING MINUTES

New Jersey Back-bays
Focus Area Analysis
27 Aug 2013
3 pm
Stakeholder Meeting/Telecon/Webinar

Attendees:
Donald Cresitello – USACE New York District
Brian Mulvenna – USACE Philadelphia District
Sue Howard – Mayor of Monmouth Beach
Bonnie Heard – Monmouth Beach Zoning /Engineering
Ray Savacool – Borough of Point Pleasant Beach, T&M Associates
Lori Thompson - T&M Associates (web only)
Frannie Bui, Ginger Croom – CDM Smith

Presentation

1. Donald Cresitello presented the overview of the North Atlantic Coast Comprehensive Study (NACCS)
    a. $20 million allotted for study.
    b. NACCS reaches are defined as the coastlines between Virginia to Maine with emphasis on NY/NJ Metro Area because of Sandy impacts
        i. Maine had limited shoreline impacts. NACCS study area is from Virginia to New Hampshire
    c. Coastal framework is regional in scale, but cooperation with federal interagency partners, states/local officials/academia/tribal nations will have opportunity to provide input given draft scheduled outlined in presentation
    d. Focus area analysis – 9 area, $50,000 level effort with greater level of detail included in NACCS
    e. Updated storm surge modeling for the NACCS area
        i. similar to what is used in the FEMA NFIP, USACE will complement FEMA Region II modeling
        ii. USACE performing modeling, including Sandy-like tracks with a West-Northwest track
        iii. Assessing vulnerability of coastal areas to sea level rise, climate change
        iv. No additional data gathering
2. Donald described the current focus area analysis efforts
    a. Feedback requested by September 6
    b. Draft focus area analysis reports due at the end of September
    c. Focus area analysis could result in PMP to move to feasibility studies

Community Questions

1. Ray confirmed that any local information will be sent to CDM Smith.

Meeting adjourned 3:30 PM.

8/28/2013 STAKEHOLDER WEBINAR MEETING MINUTES

New Jersey Back-bays
Focus Area Analysis
28 Aug 2013
9 am
Stakeholder Meeting/Telecon/Webinar

Attendees:
Donald Cresitello – USACE New York District
Brian Mulvenna – USACE Philadelphia District
Patty Doerr – The Nature Conservancy
Tim Bellingham – American Littoral Society
Mayor Gary Giberson - City of Port Republic
Kimberly Campellone – Clerk, City of Port Republic
Frannie Bui, Ginger Croom – CDM Smith

Presentation

1. Donald Cresitello presented the overview of the North Atlantic Coast Comprehensive Study (NACCS)
    a. $20 million allotted for study.
    b. NACCS reaches are defined as the coastlines between Virginia to Maine
        i. Study reaches known as "Hurricane Sandy As it Happened, Where it Happened" – impacts of storm surge
        ii. Area of impact between Virginia to New Hampshire
    c. Coastal framework is regional in scale, but cooperation with other federal agencies, NGOs/states/local officials/academia/tribal nations
    d. Focus area analyses for 9 other areas
    e. Updated storm surge modeling for the NACCS area
        i. Build upon current FEMA Region II modeling
        ii. USACE performing modeling, including Sandy-like tracks with a West-Northwest track
        iii. Assessing vulnerability of coastal areas to sea level rise, climate change
2. Donald described the focus area analysis efforts
    a. Feedback requested by September 6
    b. Draft focus area analysis reports due at the end of September
    c. Focus area analysis could result in PMP to move to feasibility studies

Community Questions

1. Patty (TNC) inquired about whether the feasibility study would identify projects to fix any Sandy-related damages or whether it would only mitigate risk from future events.
    a. Donald replied that the feasibility study would identify alternatives to mitigate future risk.
2. Patty (TNC) inquired about the extent of the Delaware Back-bays Focus Area Analysis and if it included the entirety of Delaware Bay.
    a. Donald and Brian replied that Delaware Bay is not part of the focus area analysis. Delaware Bay is being studied as a separate effort and as part of the Beneficial Use Study in conjunction with the State of Delaware.

    b. The Delaware Bay Region is included as a reach in the overall Comprehensive Study
3. Mayor Gary Giberson (City of Port Republic) offered to provide the City's in-progress Hazard Mitigation Plan. Documentation has already been compiled and will be sent along.
4. Patty (TNC) inquired about public outreach after the focus area analysis stage to incorporate other issues such as planning objectives or constraints.
    a. Ginger replied that additional public outreach, such as meetings, workshops, and feedback opportunities will occur after January 2014 for the overall Comprehensive Study. The focus area analyses will become part of the overall Comprehensive Study.

Meeting adjourned 9:30 AM.

8/29/2013 STAKEHOLDER WEBINAR MEETING MINUTES

New Jersey Back-bays Study Area
Focus Area Analysis
29 Aug 2013
1 Pm
Stakeholder Meeting/Teleconference/Webinar

Attendees:
Brian Mulvenna – USACE Philadelphia District
Jim Rutala – representing Brigantine, Atlantic City, Ventnor, Margate, Pleasantville, Somers Point, Cape May City and Downe Township
Jill Gougher – Borough of Stone Harbor
Doug Gaffney – Gahagan & Bryant
Frannie Bui, Ginger Croom – CDM Smith

Presentation

1. Ginger Croom presented the overview of the North Atlantic Coast Comprehensive Study (NACCS). See PowerPoint presentation.

Stakeholder Questions/Discussion

1. Jim Rutala, representing multiple NJ jurisdictions, inquired if and why the study did not include the Delaware area. He also inquired about the timeline.
    a. Brian responded that in order to constrain the study area only inland back-bay portions of the shore would be considered. The NJ portion of the Delaware Bay will not be included in this focus area analysis.
2. Jim Rutala inquired about the study area extent and the inclusion of Cape May and Cumberland Counties.
    a. Brian responded that there are existing USACE study authorities for the Delaware Bay area of NJ - Beneficial Use of Dredged Material. Also, there is additional USACE watershed study authority for the Delaware Bay.
    b. Ginger added that the focus area analysis includes areas that experienced storm surge as a result of Sandy, but may not be covered under an existing USACE study authority.
3. Jim Rutala inquired about the inclusion of projects in oceanfront communities in the focus area analysis
    a. Brian responded that projects in oceanfront communities are a separate, ongoing study as part of either existing projects or existing, authorized projects that have not been constructed.
    b. Ginger added that the Comprehensive Study will take into account risk reduction measures for the entire area (NJ coast) in a broader framework, which would include oceanfront communities
4. Brian asked Jim about his role as a town representative.
    a. Jim replied that he has primarily worked on different storm-related grant applications (FEMA/USACE) for multiple communities.
    b. Ginger inquired to Jim about his involvement in the FEMA 404 HMGP grant applications. Information collected for the FEMA 404 HGMP proposals are beneficial to the focus area analysis.

Meeting adjourned 1:30 PM.

9/03/2013 STAKEHOLDER WEBINAR MEETING MINUTES

New Jersey Back-bays Study Area
Focus Area Analysis
September 3, 2013
1 Pm
Stakeholder Meeting/Teleconference/Webinar

Attendees:
Brian Mulvenna – USACE Philadelphia District
Jay Smith – USACE Philadelphia District
Lauren Klonsky, Ginger Croom – CDM Smith
Doug Gaffney – Gahagan & Bryant Associates
Brenda Taube – Commissioner in Margate, NJ
Joseph Johnston – Remington Vernick and Walberg Engineering representing Margate NJ
Lin Fater – Resident of Cape May County

Presentation

1. Ginger Croom presented the overview of the North Atlantic Coast Comprehensive Study (NACCS). See PowerPoint presentation.

Stakeholder Questions/Discussion

1. Brenda Taube asked Joe from Remington Vernick Engineering to send information along as response to the Feedback Requested.
2. There was a question from Brenda Taube about the extent of the NACCS and why it did not extend to Florida. Ginger explained that the extent of the NACCS was defined by areas that were impacted by hurricane sandy.
3. Ginger will email PDF copies of the Powerpoint presentations to meeting participants.

Meeting adjourned 1:30 PM.

APPENDIX C

STAKEHOLDER FEEDBACK

STAKEHOLDER FEEDBACK – BOROUGH OF OCEANPORT, MONMOUTH COUNTY, NJ

• INCORPORATED • 1920 •

BOROUGH OF OCEANPORT

- COUNTY OF MONMOUTH -
MUNICIPAL BUILDING
222 MONMOUTH BOULEVARD • OCEANPORT, N.J. 07757
(732) 222-8221 • FAX (732) 222-0904

September 5, 2013

Via: Facsimile (617) 452-6594 and email (croomgl@cdmsmith.com)

Ginger Croom
CDM Smith

Re: North Atlantic Coast Comprehensive Study
Borough of Oceanport, Monmouth County, NJ

Dear Ms. Croom:

The Borough of Oceanport is a peninsula that juts out into a tributary to the Raritan Bay known as the Shrewsbury River. The Borough and its residents sustained significant damage from Super Storm Sandy (SSS) as did many of our neighboring shore communities.

In addition to the feedback which was requested in Donald Cresitello's August 23, 2013 letter, the Borough's Emergency Management Department has collected data and prepared inundation maps for not only from SSS but from other storms such as Irene, the December 1992 storm, and others that can be made available to the Corps.

The Borough offers the following information in response the Corps request, provided with the original questions in italic.

1) Problem identification for your area:

a. Did your area experience tidal or tidally influenced storm surge?

The Borough of Oceanport experienced significant tidal storm surge from not only SSS but also various other storms including northeasters.

b. Be specific on particular areas and water bodies within your jurisdiction that experienced storm surge.

All of the municipally controlled waterways were affected: Oceanport Creek, Branchport Creek, Blackberry Bay, Mill Brook and Parkers Creek

c. What factors, if any, exacerbated damages from the storm surge?

In addition to over 400 homes being flooded by the tidal surge high winds bought down trees blocking numerous streets which increased emergency response time, damaging several homes and also brought down utility lines leaving a majority of the Borough without electricity and phone service for an extended period.

It has been theorized that the breaching of the Atlantic Ocean through Sea Bright significantly added to the storm surge.

2) Description of damages for your area:

2a. Provide a narrative including the types of infrastructure damaged of temporarily out of use, structure (building) damages, personal injuries/fatalities

Recreational facility at Blackberry Bay Park- equipment sheds and restroom building sustained water damage. Youth athletic gear was lost.

Borough Hall- four feet water in council chambers, two feet in the remainder of the building. Building is presently only partially occupied.

Public Works, lost equipment and structure was flooded and partially damaged.

Emergency Medical Services- building sustained water damage

The Borough is grateful that we experienced no injuries or fatalities.

2b. Provide a map depicting the spatial extent of damages.

Damage was consistent with Category 1 storm surge. See mapping attached.

3) Prior related studies or Projects (Local, state, federal) in the damaged area.

The Borough had previously elevated portions of Gooseneck Point Road and Cayuga Avenue to decrease the roadway flooding frequency.

4) List measures that your jurisdiction has considered to address the problem

The Mayor and Council are investigating options to elevate Borough Hall and Public Works or relocate to a new site outside of the 0.2% Flood Plain. The Borough is considering elevating a few key collector roadways in addition to providing outfall check valves on the Borough's storm sewer systemn

Should you have questions or require additional information, please do not hesitate to contact me.

Very truly yours,

Phil Huhn
Oceanport Borough Administrator

PH/whw
cc: Jeanne Smith RMC, Clerk

STAKEHOLDER FEEDBACK – BURROUGH OF MANASQUAN, MONMOUTH COUNTY, NJ

BOROUGH OF MANASQUAN
Reconnaissance- Level Analysis (RLA)
North Atlantic Coast Comprehensive Study (NACCS)
US Army Corps of Engineers (USACE) New York District

1) Problem Identification for your area:

a. Did your area experience tidal or tidally influenced storm surge?
Yes

b. Be specific on particular areas and water bodies within your jurisdiction that experienced storm surge.
All areas east of SR 71 including Stockton Lake, Debbies Creek, Watson's Creek, Crabtown Creek, Glimmer Glass, Manasquan Inlet & Atlantic Ocean

c. What factors, if any, exacerbated damages from storm surge?
Sea level rise, land subsidence & erosion from previous storms (namely Hurricane Irene)

2) Description of damages for your area:

a. Provide a narrative including the types of infrastructure damaged or temporarily out of use, structure (building) damages, personal injuries/fatalities.

- **62 single-family homes destroyed, 1,792 suffered major damage, 1,100 suffered minor damage with an estimated loss of $268,700,000.**
- **14 apartment units destroyed at an estimated total loss of $3,500,000.**
- **7 Businesses were destroyed, 11 suffered major damage and 25 suffered minor damage with an estimated total loss of $94,050,000.**
- **10 public buildings suffered major damage totaling $2,310,000. DPW, Beach & Police Department operations significantly hindered by loss of facilities/equipment.**
- **Public utilizes suffered $250,000 in damages including complete loss of two sewer lift stations and damage to water treatment plant.**
- **Parks and recreation damages totaled $2,050,000**
- **Damage to roadway & transportation infrastructure totaled $1,300,000**
- **Estimated loss of sand from previous USACE beachfill and dune system is $35,000,000.**
- **Numerous borough vehicles & equipment ruined.**
- **150 injuries reported, majority minor.**

Spatial Extent of Damages Courtesy USGS Hurricane Sandy Storm Tide Mapper

3) Prior related studies or projects (local, state, federal) in the damaged area:

USACE Federal Beach Nourishment Project - Sandy Hook to Manasquan Reach (replenishment scheduled for Nov 2013)

4) List measures your jurisdiction has considered to address the problem (for documentation purposes, should there be a follow-on study):

- **Private property Elevation program**
- **Elevation of roadways and critical infrastructure in flood-prone regions**
- **Modifying or elevating dune systems**
- **Flood mitigation/control projects along Glimmerglass, Crabtown creek, Judas Creek & Robert's Swamp**

09/02/2013

Prepared by:

Christopher Tucker, P.E.
Manasquan Office of Emergency Management
201 East Main Street
Manasquan, NJ 08736
(732) 528-2277
oem@manasquan-nj.com

STAKEHOLDER FEEDBACK – BURROUGH OF POINT PLEASANT BEACH, OCEAN COUNTY, NJ

BOROUGH OF POINT PLEASANT BEACH

CHRISTINE RIEHL
Borough Administrator
Chief Financial Officer
Tax Collector

(732) 892-8770
criehl@pointbeach.org

416 New Jersey Avenue
Point Pleasant Beach
New Jersey 08742
Fax: (732) 892-8092

September 9, 2013

Attn: Ginger Croom,

Please find the submission for the Borough of Point Pleasant Beach attached. Please contact me directly if you have any questions.

Sincerely,

Christine Riehl,
Borough Administrator
Chief Financial Officer
Tax Collector

1. Identification of problem areas:

The Borough of Point Pleasant Beach experienced significant tidally influenced flooding in the following areas:

Manasquan Inlet Area:

Fisherman's Memorial Park: During the incident period of October 26th thru November 9, 2012, heavy winds, heavy rain, high tides and heavy surf in the Manasquan River caused damage to our Fisherman's memorial park Inlet Facility. There was damage to the decking, walkway and railing surrounding the memorial, the electrical system and lighting. In addition, when the water came over the Inlet bulkhead, it washed away the benches around the Memorial.

Inlet Comfort Station: Located in the Municipal Inlet Parking Lot was a comfort station facility built in 1993. It was approximately 30' from the inlet bulkhead. It was a single story, concrete building with a slab foundation and shingled roof. When the surf overtopped the bulkhead, it WASHED AWAY THE ENTIRE STRUCTURE. Replacement values are in the range of $450,000.00

Residential Homes/Businesses, Inlet Drive: Virtually every home/business located adjacent to the seawall were substantially damaged, or completely destroyed by the storm surge and flooding. The volume of sand deposited in the streets exacerbated the situation.

Beachfront: The Sandy reported storm surge of up to eleven (11) feet along the shore caused widespread damage to our beachfront homes, businesses and boardwalk, along with severe coastal erosion and a large volume of storm related debris. The Atlantic Ocean breached at virtually every street end, resulting in flooding from the ocean, west as far as the New Jersey Transit Railroad tracks, more than four (4) blocks.

Approximately 2800 linear feet of boardwalk was either damaged or destroyed. The Borough owns a bath house/concession stand, located on the boardwalk, on the South East corner of New Jersey Avenue. The record high storm surge flooded the building to 2 (two) foot deep, and debris filled waves forced sand under the building and debris stacked up and was pushed into the buildings interior causing extensive damage.

Lake Louise: Lake Louise is located in the northern portion of Point Pleasant Beach, and is directly connected to the mouth of the Manasquan River/Manasquan Inlet. It is a tidally influenced lake. Harvard Avenue, Riverside Place, Broadway, Baltimore Avenue, Niblick Street and Randall Avenue border Lake Louise. All of these streets were significantly flooded, causing substantial residential and commercial property damage.

2. Description of damages for area:

The Borough of Point Pleasant Beach had over 2000 homes/businesses damaged by flood and wind. Our Ocean Fire Company #1 building was flooded and completely out of service, Other Borough losses include the Inlet Comfort Station, extensive boardwalk damage, bath house and concession stand, and extensive dune loss. We experienced 4 (four) severe water main breaks, storm drains filled with sand, debris filled lakes, road erosion and sink holes. There were no fatalities.

3. Prior related studies or projects:

None on file.

4. Problem solving measures:

The Borough has instituted discussion with the Department of Transpiration in reference to a pump station installation in Point Pleasant Beach. We have also applied for Hazard Mitigation funding for the same purpose.

SUPER STORM SANDY ACQUISITIONS

Point Pleasant Beach Boro, Ocean Co.

- Municipal Boundary
- Local Open Space
- State of New Jersey Open Space
- Property owner received a Substantially Damaged Determination letter from the municipality.
- Property owner requested buy-out through the municipality.

Storm Surge Water Depth (ft.)

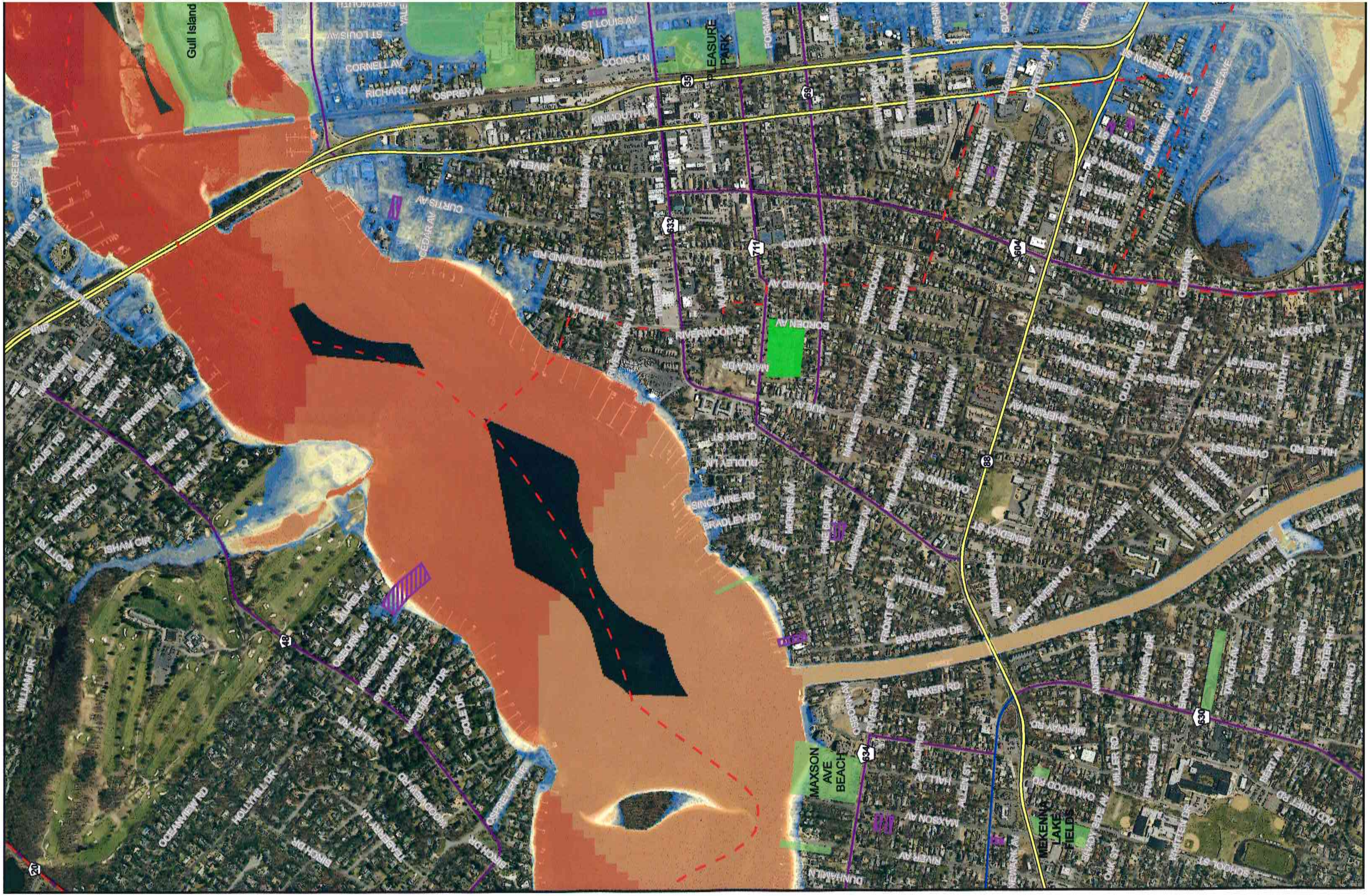
0 to 1	6 to 7
1 to 2	7 to 8
2 to 3	8 to 9
3 to 4	9 to 10
4 to 5	> 10
5 to 6	

N

0 0.125 0.25 Miles

as of 9/6/13

SALMON AV
RIVERSIDE DR
TARPON AV
FIRST AV
PERCH AV
INLET DR
OCEAN AV
RIVERSIDE AV
CHICAGO AV
BOSTON AV
BROADWAY
SANBORN AV
HARVARD AV
RANDALL AV
WATER
CHICAGO AVENUE
HOMESTEAD AV
712
NIELLICK ST
635
POINT PLEASANT PKWY
CENTRAL AV
ARNOLD AV
Little Silver Lake
FREEDOM LN
LAUREL CT
LIBERTY LN
ATLANTIC AV
NEW YORK AV
PHILADELPHIA AV
WASHINGTON AV
MAKIN AV
Lake of the Lillies
ELIZABETH AV
CARTER AV
LAKE AV
MARYLAND AV
BEACON LN
TWILIGHT RD



Gull Island
PLEASURE PARK
MAXSON AVE BEACH
MCKENNA LAKE FIELDS
CORNELL AY
RICHARD AV
OSPREY AV
COOKS LN
KINMOUTH LN
RIVERWOOD PK
SINCLAIRE RD
BRADLEY RD
BRADFORD DR
PARKER RD
JACKSON ST
ISHAM CIR

STAKEHOLDER FEEDBACK – BASS RIVER TOWNSHIP, BURLINGTON COUNTY, NJ

Feedback—Bass River Township

1. A. Yes
   B. Bass River, Mullica River, Wading River and all streams and creeks south of Leektown Road
   C. Continued erosion of the river banks and lack of adequate seawall (bulk heading) protection

2. A. Flooding of private homes and businesses forcing some to relocate. Allen's dock (marina) suffered %100 destruction of building and had to relocate to a trailer to continue to operate business. No government buildings or infrastructure sustained damage. No personal injuries/fatalities.
   B. Map Provided

3. No Prior related studies or projects noted

4. Flood Control measures are being considered with funding resources sought.

FIGURE 1

U.S. ARMY CORPS OF ENGINEERS

NEW JERSEY BACK-BAYS

NORTH ATLANTIC COAST COMPREHENSIVE STUDY

APPROXIMATE SCALE

0 5 10 15 20 Miles

RECONNAISSANCE-LEVEL ANALYSIS BOUNDARY MAP

Path: C:\GIS\NACCS\MXD\NJ_Back_Bays.mxd


ROUTE 9
DECKER LN
PARKWAY
STAGE ROAD
PHILLIPS ROAD
WOODPILE ROAD
TOLL PLAZA
CATHERINE
WALKER
WEST
CO. RTE. 654
E. GREENBUSH RD.
GREENBUSH RD.
SHERWOOD ROAD
Bass River State Forest
BASS RIVER
NEW GARDEN
OAK
JOB'S
ISLAND
ROAD
WOLF CREEK
RUN
OAK ISLAND
RIVER
MATHIS
THOROFARE
FISH CREEK
Forsythe Wildlife Refuge
DOCTOR'S POINT
BROAD CREEK
BLOOD DITCH
BLOOD POINT
MULLICA RIVER
N. MAPLE AVE.
MILLER
ADAMS
RIVERSIDE
BOWERS
S. MAPLE
MATHIS
FRENCH'S
ROUTE
CRAMER
TEABERRY
GRETNA
AMASA LNDG. RD.
AMASA LNDG RD
STATE PKWY.
PERCH CREEK
OLD ROUTE 9
SOOY
REESES
BOGANS LANE
OLD N.Y. RD.
HILLSIDE
FRANTZ
LE PPA
CRAMER CREEK
THOROFARE
EAST MINK PATH
MERRYGOLD CREEK
LAUREL LANE
PLYMOUTH ROAD
EKTOWN
Bass River State Forest
LOVELANDS
ROBINSONS
LOVELAND
RTE. 542
WEST MINK PATH
WADING RIVER
WADING
RIVER
CITY OF PORT
ATLANTIC
MULLICA
R RD.

STAKEHOLDER FEEDBACK – CITY OF MARGATE CITY, ATLANTIC COUNTY, NJ

North Atlantic Coast Comprehensive Study (NACCS) Survey

City of Margate City
Atlantic County, New Jersey

September 2013

Prepared by:
Remington, Vernick & Walberg Engineers
845 North Main Street
Pleasantville, NJ 08232

1) Problem identification for your area:

a. Did your area experience tidal or tidally influenced storm surge?
Margate City, Atlantic County , New Jersey experienced storm surge during Hurricane Sandy.

b. Be specific on particular areas and water bodies within your jurisdiction that experienced storm surge.
The entire south side of the City along the Atlantic Ocean experienced storm surge.

c. What factors, if any, exacerbated damages from storm surge?
The low height and age of the wooden bulkheads along the beach allowed the storm surge to overtop the bulkheads and destroy some of the bulkheads.

2) Description of damages for your area:

a. Provide a narrative including the types of infrastructure damaged or temporarily out of use, structure (building) damages, personal injuries/fatalities.
The bulkheads along the Atlantic Ocean were damaged. The following is a listing of the City owned bulkheads damaged:

Street End	Repair/Replace
Delevan Ave.	Replace lower wale, 6" x 8"
Douglass Ave.	Replace lower wale, 6" x 8"
Franklin Ave.	Replace lower wale, 6" x 8"
Granville Ave.	Replace 25' of bulkhead, Type B
Huntington Ave.	Replace 15 feet of bulkhead, Type B
Iroquois Ave.	Replace 20 feet of bulkhead, Type B, Replace 2 piles north side, 12" butt 25' long
Jerome Ave.	Replace 10' of Bulkhead, Type B
Plymouth Road	Replace 50' of double 2" x 8" top cap
Knight Ave.	Replace 50 feet of bottom wale, 6" x 8" replace 20 feet of top wale, 6" x 8"
Kenyon Avenue	Replace 140' of Bulkhead, Type B
Lancaster Avenue	Replace 40' of Bulkhead, Type B
Mansfield Ave.	Reface bulkhead
Osborne Ave.	Replace 25 feet of bulkhead, Type A
Rumson Ave.	Replace 20 feet of bulkhead, Type A
Sumner Avenue	Replace 93' of Bulkhead
Thurlow Ave.	Replace 20 feet of top cap, 2" x 8"
Union Ave.	Replace 25 feet of bulkhead, Type C, replace 25 feet of top cap, 2" x 8"
Vendome Ave.	Replace 50 feet of bottom wale, 6" x 8", replace 20 feet of top wale, 3" x 10"
Washington Ave.	Replace 25 feet of top wale, 6" x 8"
Adams Ave.	Replace 25 feet top wale, 6" x 8", replace one pile, 12" butt, 25' long
Monroe Ave.	Replace 35 feet of top wale, 6" x 8"
Coolidge Ave.	Replace 5 feet of top wale, 6" x 8"

The City experienced flooding that required blackwater remediation at the following buildings:
1.Margate City Hall @ 1 South Washington Avenue.
2.Public Works Building
3. Mechanic's Shop
4. First Aid Station/Lifeguard Headquarters
5. Sign Shop
6.Electric and Carpentry Shop
7. Senior Citizens Center
8. Police Garage

b. Provide a map depicting the spatial extent of damages.
A map depicting areas of flooding is attached.

3) Prior related studies or projects (local, state, federal) in the damaged area.
The Army Corps has proposed a beachfill and dune project for the Atlantic Ocean Beach in 2000 and 2013. The City performed a study of the bulkheads and decks along the bay in 2008 and performed a limited bulkhead elevation study along the bay in 2013.

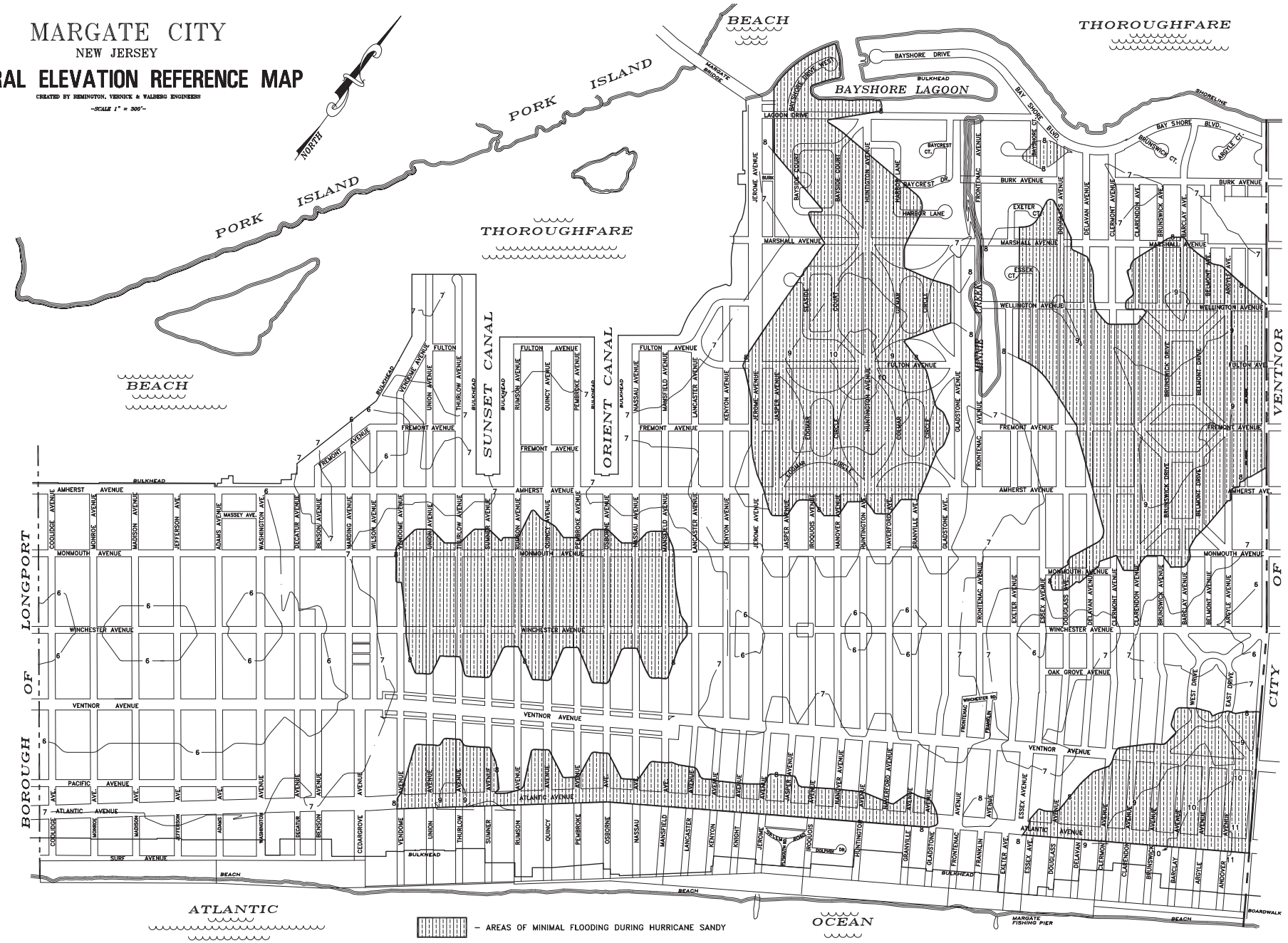
4) **List measures that your jurisdiction has considered to address the problem** (for documentation purposes, should there be a follow-on study).
Margate City has previously adopted an ordinance requiring the height of the bulkheads along the Atlantic Ocean to be raised to elevation 13.0 (N.G.V.D. 1929) and along the bay to be raised to an elevation between 7.5 and 9.0 (N.G.V.D.1929) when replaced or reconstructed. The ordinance is in Chapter 103 Bulkheads of the City Code. The City has also adopted an ordinance amending and supplementing Chapter 145 Flood Hazard Areas. This ordinance was adopted as Ordinance No. 2013-07. The City has authorized the City Engineer to review the bulkhead elevations in relation to the FEMA Preliminary Work Map with the intent of raisin the required bulkhead elevations.

MARGATE CITY
NEW JERSEY

GENERAL ELEVATION REFERENCE MAP

CREATED BY REMINGTON, VERNICK & WALBERG ENGINEERS

-SCALE 1" = 300'-



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June 16, 2013

Benjamin Keiser, Manager
NJDEP, Bureau of Coastal Engineering
1510 Hooper Avenue, Suite 140
Toms River, NJ 08753

Re: New Jersey Shore Protection Program
Amherst Avenue Bulkhead
City of Margate, Atlantic County

Dear Mr. Keiser:

On behalf of the City of Margate, we are submitting this New Jersey Shore Protection Program application for the reconstruction of the bulkheads along Amherst Avenue.

The Amherst Avenue Bulkhead Improvements will address a deteriorated bulkhead, sea level rise, and the naturally low elevation of the area. The Amherst Avenue area is the lowest area in the City with current elevations between five and six feet NAVD88. The Preliminary Flood Maps that were released earlier this month FEMA recommend that this area be in the AE Zone and that the elevation by nine feet NJVD88. Given this recommendation and the fragile aspects of this area, the City plans to build the new bulkhead at an elevation of nine feet NAVD88.

An inspection of this bulkhead was completed on January 31, 2013 by Roger D. McLarnon, PE, and a memorandum to Richard Deaney, Business Administrator, dated February 1, 2013, which documents this evaluation is attached for your review. The memorandum concludes that:

- The bulkhead south of the municipal pier to approximately Coolidge Avenue is beyond repair and complete replacement is required.
- Sister piles should be installed immediately to help stabilize the bulkhead.
- Failure will occur in the near future if left unattended. No time frame can be estimated on the remaining life of the structure.
- Failure of the bulkhead will cause failure of the parking areas, possibly as far back as the curbline.

717 River Drive ▪ Linwood, New Jersey ▪ Phone: 609.743.0354 ▪ E-mail: jmrutala@comcast.net

This area sustained significant damage during Superstorm Sandy. Businesses and homes in the area were damaged. The solution consists of the installation of new bulkheads. By installing these improvements the flooding of this area will be reduced; thereby, reducing damage to the City's infrastructure and the businesses and homes in the area. Hence, this project will promote disaster resistant development and reduce the possibility of damage and losses due to flooding.

The proposed project extends from the Borough of Longport boundary and Decatur Avenue, a distance of approximately 1,250 linear feet of new bulkhead.

This project is eligible for the New Jersey Shore Protection Program since it will result in the protection and stabilization of the bayfront area of Margate. The proposed improvement is located on the Intracoastal Waterway.

The new bulkhead will be installed directly in front of the existing bulkhead. Since the property line for the bulkhead runs along the existing improvements, easement will be required for the new bulkhead. The City is in the process of obtaining easements from five private property owners who own property along this bulkhead. These easements will be completed and recorded in accordance with the NJDEP requirements. Assuming that NJDEP funding is received and this new bulkhead is installed, the City will be responsible for the maintenance of the new bulkhead in perpetuity.

The City is considering the installation of an elevated boardwalk along the water side of Amherst Avenue to provide enhanced access to the water for the public. When this boardwalk is built, improved ADA access will also be constructed.

Project Schedule

This project can be completed within eighteen months of award of funding.

Task	Timeframe
Approval of Engineering Design Contract	60 days
Engineering Design	60 days
Permitting	180 days
Construction Bid Process	60 days
Construction	180 days

This project is estimated to cost $3,249,930. Project costs include:

Engineering and Inspection	$300,000
Estimated Construction Cost	$2,949,930
Total	**$3,249,930**

The City of Margate appreciates the NJDEP's interest in providing for coastal protection and we look forward to continuing to work with you to complete this project.

Kind regards,

Rutala Associates, LLC

James M. Rutala, PP, AICP, MBA

cc: David Rosenblatt, Administrator, NJDEP, Office of Eng. and Construction
Mayor Michael Becker
Richard Deaney, Business Administrator
John Scott Abbott, Esq., City Solicitor
Edward Walberg, PE, City Engineer
Roger Rubin, PP, AICP, Zoning Officer
Jim Galantino, Construction Code Official

Remington, Vernick & Walberg Engineers

Client: City of Margate
Project: Bay Bulkhead Replacement
Date: June 24, 2013

ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	AMOUNT
1	New Bulkhead	L.F.	1,250	$ 1,750.00	$ 2,187,500.00
2	Stormwater Discharge Pipe Extensions	UN	7	$ 1,500.00	$ 10,500.00
3	Pinch Check Valve - 36" Dia	UN	1	$ 35,000.00	$ 35,000.00
4	Pinch Check Valve - 24" Dia	UN	1	$ 23,500.00	$ 23,500.00
5	Pinch Check Valve - 20" Dia	UN	1	$ 14,000.00	$ 14,000.00
6	Pinch Check Valve - 18" Dia	UN	1	$ 7,000.00	$ 7,000.00
7	Pinch Check Valve - 15" Dia	UN	3	$ 6,300.00	$ 18,900.00
8	Pinch Check Valve - 12" Dia	UN	1	$ 3,500.00	$ 3,500.00
9	Remove & Replace Decking	SF	1,500	$ 50.00	$ 75,000.00
10	Move Building at Blue Water Marina	LS	1	$ 50,000.00	$ 50,000.00
11	Concrete Sidewalk, 4" Thick	SY	425	$ 45.00	$ 19,125.00
12	Reset Fence	L.F.	950	$ 15.00	$ 14,250.00
ESTIMATED COST OF CONSTRUCTION:					**$ 2,458,275.00**
20% CONTINGENCIES					**$ 491,655.00**
ESTIMATED CONSTRUCTION COST					**$ 2,949,930.00**
ENGINEERING AND INSPECTION					**$ 300,000.00**
ESTIMATED PROJECT COST					**$ 3,249,930.00**

City of Margate City
Department of Public Works

9001 Winchester Avenue
Margate City, New Jersey 08402
(609) 822-5562
Fax: (609) 822-4032

MEMORANDUM

To: Richard Deaney, Business Administrator

From: Roger D. McLarnon, PE, PP, CME, CPWM, CFM

Re: Bayfront Bulkhead Inspection

Date: February 1, 2013

As requested, I inspected the bulkhead system between Coolidge and Decatur Avenues (approximately). The site inspection started at around 3 pm on Thursday January 31 at or near low tide and I have several comments that will soon follow in this memo. A visual inspection only was performed.

Observations:

1. The existing original bulkhead is creosote timber pile, creosote timber wales with 3"x 10" creosote tongue and groove sheets, double wall.
2. There have been several areas where the bulkhead has been repaired by installing newer CCA treated sheeting of unknown thickness.
3. Most of the CCA sheeting installed has no embedment into the soil, therefore very little, if any structural capacity.
4. The wales are in poor conditions and have very little if any structural capacity.
5. The timber face piles are in poor condition and in some location the piles are completely rotted out or missing. Therefore very little structural capacity of the piles exists.
6. The hardware includes galvanized bolts, nuts, washers and tie rods of unknown lengths and sizes (due to corrosion).
7. The tie rods are about ¾" to 1" in diameter and appear in good condition. However, they are likely not original and may not even go directly back to the dead man system typically found with this type of bulkhead system.
8. The sheeting is in poor condition throughout the length observed.
9. Upland fill loss is visible in multiple areas.
10. The bulkhead is leaning outward from the top in various locations.
11. The bulkhead is kicking out at the bottom at various locations.
12. There was not any noticeable settlement on the upland portion of the bulkhead although any evidence of movement may have been disturbed when the parking stalls were reconstructed.
13. The portion of the bulkhead north of the municipal pier is supported by a batter pile system vs., or complimenting, a tie back system.
14. The bulkhead in this location is in fair condition as this section is not as old.

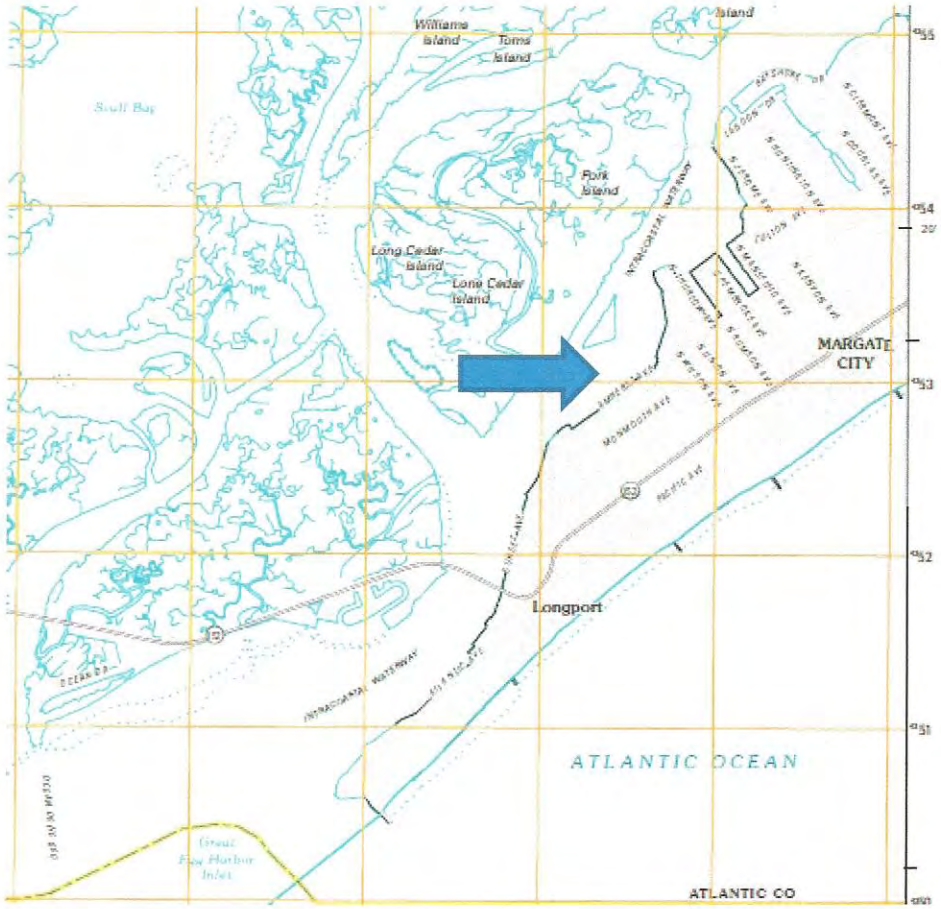
15. There was not any evidence of another bulkhead behind the one visible.
16. There are several large diameter storm outfall pipes protruding through the bulkhead, each outfall having a tideflex check-valve attached.
17. Each outfall also had discharge, possibly indicating groundwater intrusion into the storm system.
18. Some pilings are actually suspended above the mud-line and are held in place by hardware alone.

Conclusions:

1. The bulkhead south of the Municipal pier to approximately Coolidge Avenue is beyond repair and complete replacement is required.
2. Sister piles should be installed immediately to help stabilize the bulkhead.
3. Failure will occur in the near future if left unattended. No time frame can be estimated on the remaining life of the structure.
4. Failure of the bulkhead will cause failure of the parking areas, possibly as far back as the curbline.

Location Map

USGS Quad Map



Photos

Photo No. 1 – near Coolidge Avenue

Photo No. 2 – near Sunset Marina

Photo No. 3 – near Sunset Marina

Photo No. 4 – near Sunset Marina

Photo No. 5 – near Sunset Marina

Photo No. 6 – near Sunset Marina

Photo No. 7 – near Sunset Marina

Photo No. 8 – near Sunset Marina

Photo No. 9

Photo No. 10

Area where sheets were "repaired"

Photo No. 11

Photo No. 12

Photo No. 13

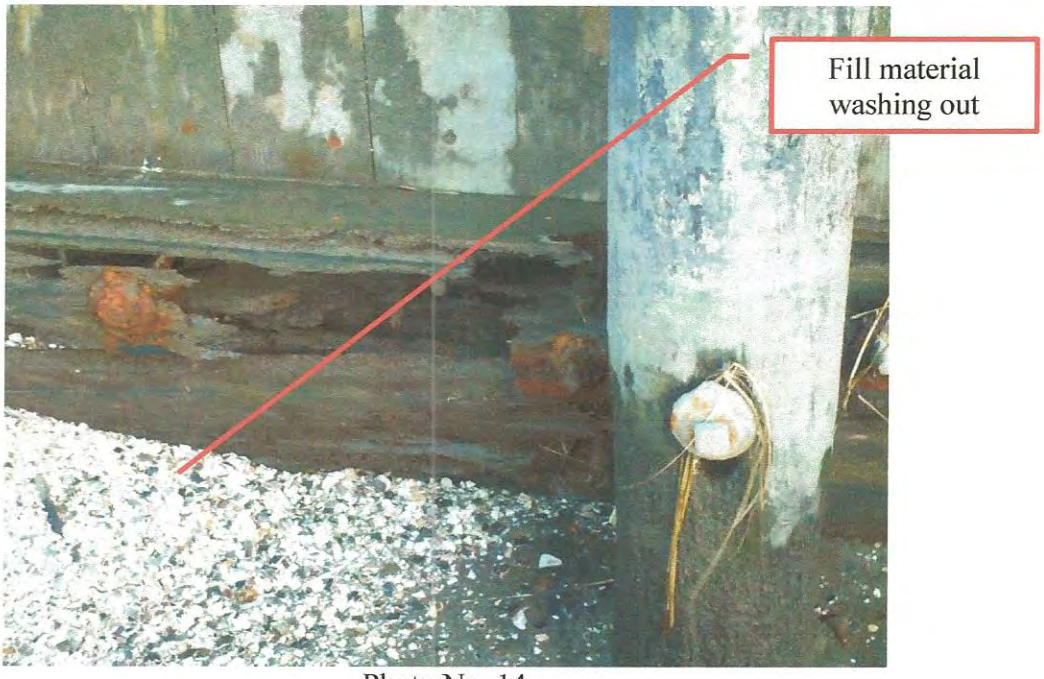


Photo No. 14

Photo No. 15

Photo No. 16

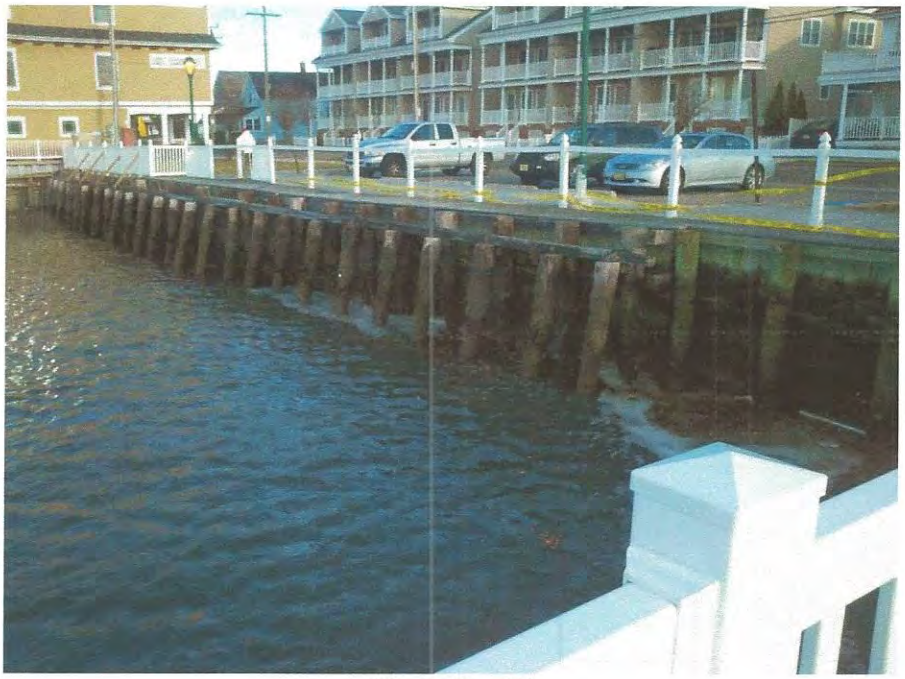


Photo No. 17

Photo No. 18

Cc: Frank Ricciotti, Director PW
Commissioner Brenda Taube
Jim Galantino, Code Enforcement
Scott Abbott, City Solicitor

U:\ROGER MC\020113 RDM City of Margate Bulkhead inspection report.docx

STAKEHOLDER FEEDBACK – CITY OF BRIGANTINE, ATLANTIC COUNTY, NJ

DORAN

ENGINEERING , PA

ENGINEERS • PLANNERS • SURVEYORS

840 NORTH MAIN STREET • PLEASANTVILLE, NJ 08232
(609) 646-3111 FAX (609) 641-0592

PATRICK J. DORAN, P.E., P.P. (1927-1993)
MATTHEW F. DORAN, P.E., P.P., P.L.S., C.M.E., C.P.W.M.
PATRICK J. DORAN JR., B.S. ACCOUNTING

EDWARD P. STINSON, P.E., C.M.E.
DEBORAH L. WAHL, P.E., P.P.

MATTHEW F. DORAN, JR., E.I.T.

MEMBER
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
AMERICAN SOCIETY OF CIVIL ENGINEERS
N.J. SOCIETY OF MUNICIPAL ENGINEERS
CERTIFIED MUNICIPAL ENGINEERS
N.J. SOCIETY OF PROFESSIONAL LAND SURVEYORS

December 9, 2011

Ben Keiser, Manager Bureau of Coastal Engineering
1510 Hooper Avenue, Suite 140
Toms River, NJ 08753

Re: Project No. 6030-I06-Brigantine Inlet to Great Egg Harbor Inlet, Brigantine Island
City of Brigantine 2011 PL 84-99 Emergency Corps Funding
Doran #11620

Dear Ben:

On behalf of the Mayor, Council and residents of the City of Brigantine, I would like to thank the Bureau of Coastal Engineering and the Army Corps of Engineers for all your work ensuring the successful completion of the Flood Control and Coastal Emergency Repair Project [FCCE Truck Fill] in Brigantine. The approximately 240,000 ton of sand placed along Brigantine's north end beach will provide valuable protection to the residents and property in the area.

During the construction of this project, I believe that we all were aware of the extreme rate of erosion at the north end of the sea wall. In fact, the erosion was so extreme that the contractor was unable to maintain the Army Corps' minimum design template within this "hot spot" area. As the project nears completion, the city would like to request that the Army Corps and Bureau of Coastal Engineering reconsider the construction of groins along the north end of the project area as part of the Shore Protection plan for Brigantine Island.

It is my understanding that the Army Corps considered the construction of several groins in the original cost benefit analysis for the Brigantine Shore Protection project and determined that this was not a cost effective option. We request that the Army Corps reconsider the number of groins anticipated in the original analysis and also consider combining the construction of groins with a back passing project where sand is trucked from the south end of the island and delivered to the north end "hot spot" area.

We believe that the strategic placement of groins will significantly slow the movement of sand from the north end area, thereby reducing the frequency of renourishment, and the back passing of sand from the south end to the north end will be a cost effective option to a traditional beach renourishment. In the long run, this combination will provide the needed protection to Brigantine at a lower total cost.

I would like to meet with you and the Army Corps to discuss these ideas and any idea to provide shore protection for Brigantine at the most efficient cost. Please advise of available dates to meet with your office and the Army Corps. If you have any questions or require further information, please do not hesitate to contact me.

Respectfully,

Edward P. Stinson, P.E., C.M.E.
Doran Engineering, P.A.
Encl.

cc: *Mayor and Council*
Ellie Derrickson, City Manager
Dr. Stuart Farrell, Stockton Coastal Research Center

CITY OF BRIGANTINE

Edward Stinson, City Engineer & Zoning Officer

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September 9, 2013

James M. Rutala, PP, AICP, MBA
Rutala Associates, LLC
Linwood, New Jersey 08221-1226

Re: Extension of the Brigantine Seawall

Dear Jim,

The City of Brigantine hereby requests that the Army Corps of Engineers and the NJDEP Bureau of Coastal Engineering extend the Brigantine Seawall northwardly approximately 275' to the four wheel Drive entrance to the beach (see attached aerial). The area north of the seawall is within the project area for the current Army Corps Shore Protection project in Brigantine however the current project scope does not include the construction/maintenance of dunes within this area even though the area is subject to extensive erosion during coastal storms. In fact several homes in the area were severely damaged during Super Storm Sandy as waves from the Atlantic Ocean breached the area north of the seawall.

The existing Brigantine seawall was constructed in the early 1990's in a joint shore protection effort by the City of Brigantine, Atlantic County and the State of New Jersey. The seawall extends along the easterly right of way of Brigantine Avenue from 9th Street North to 15th Street North and has protected the adjacent properties from coastal storms while the promenade on the seawall provides for passive recreation all year long.

The requested extension of the seawall will serve to protect the existing 12 single family homes between 14th Street North and 15th Street North and will also protect the 9 single family homes approved for construction on the vacant tract between 14th Street North and 15th Street North west of the existing homes.

Sincerely,

Edward P. Stinson, P.E., C.M.E.
Brigantine City Engineer

Google earth

feet 600
meters 100

Proposed Expansion of the Brigantine Seawall

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – Boat Ramp Area Flood Control Improvements

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The installation of flood gates at the Boat Ramp and the elevation of Bayshore Avenue will protect public infrastructure and reduce flooding in the surrounding neighborhood. The proposal to elevate Bayshore Avenue is specifically discussed in the County HMP.

The Atlantic County AHMP specifically identifies the drainage areas of these improvements as Repetitive Loss Areas on Figure 3a-61 attached.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing stormwater management systems in this area public and private property will be protected and the safe passage of first responders and blocking evacuation routes will be provided.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

The city installed a stormwater pump station in 1980 and alleviated the flooding in one area. Two additional stormwater pump stations were installed in 2007 with funding support from FEMA.

The Boat Ramp is located at 5th St. South and Bayshore Avenue. A permit to use the ramp is required from May 15th to September 15th.

The project includes a pump station and emergency generator to service the stormwater needs of this area along with water proofing the boat ramp which is at elevation 7 ft. Flood gates will provide this protection. Also planned is the elevation of the boat ramp apron and Bayshore Avenue to reduce flooding.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing improvements

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

F. Cost Estimates:

Grant Requested	$525,836
Local Share	$175,279
Total Costs	**$701,115**

4. Severe Repetitive Loss and Repetitive Loss Properties Impacted

There are at least five Severe Repetitive Loss Properties and at least ten Repetitive Loss Properties in the drainage area served by this pump station and associated improvements.

5. Cost Benefit

A Cost Benefit Analysis has not been completed

6. Permitting

All necessary permitting will be secured.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure including the boat ramp and the Bayshore Avenue, reduce flooding in this low lying area, and improve access for needed services to residents and visitors.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

The proposal to elevate Bayshore Avenue is specifically discussed in the County HMP.

The Atlantic County AHMP specifically identifies the drainage areas of these improvements as Repetitive Loss Areas on Figure 3a-61 attached.

There are at least five Severe Repetitive Loss Properties and at least ten Repetitive Loss Properties in the drainage area served by this pump station and associated improvements.

This project is clearly for Storm Preparedness, not maintenance.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was

$5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

The planned stormwater improvements will help this barrier island community to reduce flooding at a public facility and the surrounding neighborhood.

12. Supporting Maps, photographs.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – South End Flood Control Improvements (Revised)

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). . The installation of a new outlet system for the South End of the island will protect public infrastructure and reduce flooding in the surrounding neighborhood.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing stormwater management systems in this area public and private property will be protected and the safe passage of first responders and blocking evacuation routes will be provided.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

The city installed a stormwater pump station in 1980 and alleviated the flooding in one area. Two additional stormwater pump stations were installed in 2007 with funding support from FEMA.

Currently the outlet structure that serves the Ocean Drive and Lagoon Boulevard section of the Inlet area of the City is totally clogged and non-functional. **The current 60" outfall pipe is buried and the system no longer functions as designed. It is estimated that the current system operates at or near 25% capacity, resulting in localized flooding.** This project calls for a new outlet system to be designed that will reroute stormwater within the Seaport Area Drainage Basin to a new outfall.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing outfall system

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

4. Cost Estimates:

Grant Requested	$581,303
Local Share	$193,768
Total Costs	**$775,071**

5. Cost Benefit

A Cost Benefit Analysis has not been completed.

6. Permitting

All necessary permitting will be secured.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure including City streets, reduce flooding in this low lying area, and improve access for needed services to residents and visitors.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

This project is clearly for Storm Preparedness, not maintenance.

The project will have a significant impact on flooding. The planned stormwater improvements will help this barrier island community to reduce flooding at throughout the Inlet neighborhood.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

12. Supporting Maps, photographs.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – City Docks – 26th Street South

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The installation of new bulkheads will protect this heavily used public recreation area and reduce flooding in the surrounding area.

The Atlantic County AHMP specifically identifies the drainage areas of these two pump stations as Repetitive Loss Areas on Figure 3a-61 attached.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing new, higher bulkheads in this area public and private property will be protected.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by

the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

The city installed a stormwater pump station in 1980 and alleviated the flooding in one area. Two additional stormwater pump stations were installed in 2007 with funding support from FEMA.

The City Dock is located at 26th Street South and provides for kayaking, boating, swimming and other water sports.

The project includes replacing the bulkhead that is severely damaged and raising it from 7 ft. to 9 ft. along the park water frontage.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing new bulkhead and associated improvements.

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

4.	**Cost Estimates:**	Grant Requested	$297,360
		Local Share	$99,120
		Total Costs	**$396,480**

5. Cost Benefit

A Cost Benefit Analysis has not been completed.

6. Permitting

All necessary permitting will be secured.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure namely the City Dock and Bayshore Avenue, reduce flooding in this low lying area, and improve access for emergency services to residents and visitors.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

The project will have a significant impact on flooding at a heavy used public park and the surrounding area.

This project is clearly for Storm Preparedness, not maintenance.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

12. Supporting Maps, photographs.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – Flood Control Improvements

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The elevation of 12th Street North and the installation of piping on E Evans Boulevard are specifically recommended in the County AHMP.

The Atlantic County AHMP specifically identifies the drainage area for these improvements as Repetitive Loss Area on Figure 3a-61.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing these improved stormwater management systems the potential for flooding will be decreased thereby protecting property and permitting continuation of services.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by

the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

The city installed a stormwater pump station in 1980 and alleviated the flooding in one area. Two additional stormwater pump stations were installed in 2007 with funding support from FEMA.

This project includes:

1. 12th Street North Stormwater Project – Located on the far northern section of the City. The plan includes raise 12th Street North. The elevation of 12th Street North is specifically included in the County AHMP.

2. Evans Boulevard Stormwater Project – E Evans Boulevard intersects 12th Street North at a 90 degree angle. The improvements on this street include installing 1,800 LF of piping along E Evans Boulevard to 12 Street North. The planned pipe system is specifically included in the County AHMP.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing new pump stations and associated improvements.

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

F. Cost Estimates:

Grant Requested	$484,750
Local Share	$161,583
Total Costs	**$646,333**

4. Severe Repetitive Loss and Repetitive Loss Properties Impacted

There are at least twenty-seven Severe Repetitive Loss Properties and twenty-nine Repetitive Loss Properties in the drainage area served by this drainage system.

5. A Cost Benefit Analysis has not been completed.

6. Permitting

All necessary permitting will be secured.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to reduce flooding in this low lying area, protect public infrastructure including the affected streets, reduce cost of public works and public safety personnel to close streets and provide access to local residents.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

The elevation of 12th Street North and the installation of piping on E Evans Boulevard are specifically recommended in the County AHMP.

The Atlantic County AHMP specifically identifies the drainage area for these improvements as Repetitive Loss Area on Figure 3a-61.

There are at least twenty-seven Severe Repetitive Loss Properties and twenty-nine Repetitive Loss Properties in the drainage area served by this drainage system.

This project is clearly for Storm Preparedness, not maintenance.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in

Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

12. Supporting Maps, photographs.

Maps depicting the drainage area for each of the three stormwater pump station are attached.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – Gabion Protection, 15th Street N to Beach Avenue

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The installation of gabions on the north end of the island will help to protect this area from flooding and reduce erosion. The Atlantic County AHMP specifically identifies the project site as a Repetitive Loss Area on Figure 3a-61.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing new gabions in an area where no protection exists the public infrastructure and surrounding properties will be protected.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south and has areas that flood repeatedly by various coastal storms.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

This project will include a new gabion system along 14th Street North, East Beach Avenue, 15th Street North, Edgewater Drive, and Cherokee Boulevard. Three new tide flex valves will be included.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing gabions and associated improvements.

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

4. Cost Estimates:	Grant Requested	$516,707
	Local Share	$172,236
	Total Costs	**$688,943**

5. Cost Benefit

A Cost Benefit Analysis has not been completed.

6. Permitting

All necessary permitting will be secured.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure, reduce flooding in this low lying area, and improve access for emergency services to residents and visitors in this neighborhood.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

This project is clearly for Storm Preparedness, not maintenance.

A number of Repetitive Loss Properties are positively impacted by this project.

The Atlantic County AHMP specifically identifies the Library Site as a Repetitive Loss Area on Figure 3a-61.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

12. Supporting Maps, photographs.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – Bulkhead Improvements

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The installation of bulkhead in various areas around the island will help to protect this area from flooding and reduce erosion. The Atlantic County AHMP specifically identifies the project site as a Repetitive Loss Area on Figure 3a-61.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

To prepare this application the City has mapped all of the repetitive loss properties. As depicted by this mapping the majority of the repetitive loss properties are in the water front areas adjacent to bulkheads that are in need of replacement. This application will provide for needed improvements that will reduce the potential of flooding.

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing new bulkheads in an area where damaged, deteriorated or no bulkheads exists the public infrastructure and surrounding properties will be protected.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a year round population of 9,443 and a summer population of 25,000. The City is bordered by the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south and has areas that flood repeatedly by various coastal storms.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

This project includes (see attached summary for details):

1. Replacement of Inlet Beach Bulkhead adjacent to Ocean Drive West
2. Bulkhead Installation, 13th Street North to 14th Street North
3. Replacement of Ocean Front Bulkhead, 9th Street North to 5th Street North

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing gabions and associated improvements.

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

4. Cost Estimates:

Grant Requested	$2,819,499
Local Share	$930,833
Total Costs	**$3,759,333**

5. Cost Benefit

A Cost Benefit Analysis has not been completed.

6. Permitting

All necessary permitting will be secured.

7. Public Property

The public benefits of this project are to protect critical public infrastructure, reduce flooding in this low lying area, and improve access for emergency services to residents and visitors in this neighborhood.

8. Local Match

The City or CDBG funds will be used for the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

This project is clearly for Storm Preparedness, not maintenance.

A number of Repetitive Loss Properties are positively impacted by this project.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

12. Supporting Maps, photographs.

Project Summary
404 Hazard Mitigation Grant Program
FEMA #4086-DR-NJ
City of Brigantine, Atlantic County, New Jersey
Project Name: Flood Control – Pump Station Improvements

1. Hazard Addressed Consistent with local Hazard Mitigation Plan

This project is consistent with the high priority hazard mitigation action identified by the City of Brigantine in the Atlantic County Multi-Jurisdictional All-Hazard Mitigation Plan (AHMP), approved in September 2010 and is on-file at the Atlantic County Emergency Management Offices.

The Atlantic County AHMP goals that are meet by this project are #1 (promote disaster-resistant development) and #3 (reduce the possibility of damage and losses due to flooding caused by floods, hurricanes and nor'easters including storm surges). The Hackney Place and 34th Street South Pump Stations will provide for more disaster-resistant development and reduce the potential of flood damage.

The Atlantic County AHMP specifically identifies the drainage areas of these two pump stations as Repetitive Loss Areas on Figure 3a-61 attached.

Both projects are specifically discussed in the Implementation Strategy Worksheet of the Atlantic County AHMP, a copy is attached.

This project is generically identified in the Atlantic County AHMP in Section 6 – Range of Alternative Mitigation Actions Considered. In the discussion of Goal #3, 3.G the action is to:

> "Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and it necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties."

This project is also consistent with the New Jersey State Multi-Hazard Mitigation Plan. The projects meets goals #1(Protect Life) and #2 (Protect Property and Ensure Continuity of Operations). By providing stormwater management systems the residents in low-lying areas of Brigantine are afforded additional protection from flooding the streets and homes and inhibiting the safe passage of first responders and blocking evacuation routes.

2. Consistent with Hazard Mitigation Assistance Unified Guide

This proposal has been developed using the FEMA Hazard Mitigation Assistance Unified Guide.

3. Support Information

The City of Brigantine is a barrier island community in Atlantic County, New Jersey, with a summer population of 25,000 and a year round population of 9,443. The City is bordered by the Atlantic Ocean on the east and the back bays on the west, inlets on the north and south and has areas that flood repeatedly by various coastal storms.

The highest street elevation on the island is 10 foot above sea level. The bayside street elevations are five to six feet above sea level which leaves the City's low-lying residential areas vulnerable to flooding during coastal storms. In an attempt to reduce the flooding, the City installed nine foot bulkheads in some critical areas along the bay side. However, a seven foot tide still caused backflow from the bays to flood streets, threaten homes, inhibit the safe passage of first responders, and block the only evacuation route available to residents.

The city installed a stormwater pump station in 1980 and alleviated the flooding in one area. Two additional stormwater pump stations were installed in 2007 with funding support from FEMA.

Two additional stormwater management projects are proposed in this application. Each of the pump stations described below will include an Emergency Generator to insure operation during electric power outages:

1. New Lighthouse Circle Stormwater Pump Station – 34th Street and Bayshore Avenue. This pump will serve a drainage area that includes portions of Brigantine Boulevard, the only access route off of the island.

2. New Hackney Place Stormwater Pump Station – to be located off of West Shore Drive in the Golf Course Section of the City.

The project will include, but not be limited to, the following scope of work:

- Obtaining necessary permits
- Designing the project and preparing specifications
- Installing new pump stations and associated improvements

D. Coordination with Other Applications

NA

E. Classify Project: Flood Control

F. Cost Estimates:

Grant Requested	$517,934
Local Share	$172,645
Total Costs	**$690,579**

G. This project can be completed within eighteen months of award of funding.

Task	Timeframe
Approval of Engineering Design Contract	60 days
Engineering Design	60 days
Permitting	180 days
Construction Bid Process	60 days
Construction	180 days

4. Severe Repetitive Loss and Repetitive Loss Properties Impacted

There are six Severe Repetitive Loss Properties and at least seventeen Repetitive Loss Properties in the drainage area served by the Hackney Place Pump Station.

Also there are at least three Severe Repetitive Loss Properties and three Repetitive Loss Properties in the drainage area of the 34th Street South Pump Station.

5. Cost Benefit

A Cost Benefit Analysis has not been completed.

6. Permitting

The permitting process for this project should be completed within 180 days.

7. Public Property

The entire project will occur on public property. The public benefits of this project are to reduce flooding in this low lying area, protect public infrastructure including the various streets, and reduce cost of public works and public safety personnel to close streets and address flooding issues and provide access to local residents.

8. Local Match

The City will fund the local share of this project.

9. NFIP and CRS

The City of Brigantine is a National Flood Insurance Policy (NFIP) Community Rating System Community. The City has a Class 6 rating which results in a 20 percent discount on NFIP. This is the lowest rating achieved by a municipality in Atlantic County. A Community Assistance Visit was conducted in 1995.

10. Maintenance

The project cannot be resolved through maintenance.

11. Uniqueness

The Atlantic County AHMP specifically identifies the drainage areas of these two pump stations as Repetitive Loss Areas on Figure 3a-61.

Both pump stations are specifically discussed in the Implementation Strategy Worksheet of the Atlantic County AHMP.

According to FEMA records of flood insurance claims there are at least nine Severe Repetitive Loss Properties and twenty Repetitive Loss Properties that will be affected by this project.

This project is clearly for Storm Preparedness, not maintenance.

The Lighthouse Circle Stormwater Pump Station will help to reduce flooding along Brigantine Boulevard where it intersects with Bayshore Avenue. Brigantine Boulevard is the only access road off the island and access through this area is imperative to evacuate residents and visitors.

The Atlantic County AHMP documents that the Annual Loss Estimates due to flooding in Brigantine for the period of 1993 to 2008 is $354,810 and the total county wide loss was $5,862,000 for the same period. The annual losses in Brigantine are the third highest value in Atlantic County behind Atlantic City and Margate. Hence, this project will address flooding in one of the most flood prone communities on Atlantic County.

According to the Flood Study, Atlantic County, NJ presented by FEMA Region II on July 12, 2011 the value of structures in Brigantine that are covered by the National Flood Insurance Program was more than any other community in Atlantic County. Total coverage in Brigantine was $1,645,732,800 of the $6,403,447,600 in coverage County wide or 25% of the insured structures. There were 7,559 policies in Brigantine, second only to Atlantic City. There were 386 repetitive losses. By providing HMGP funding for this project, FEMA will be targeting funding to a community that historically has witnessed losses. This project is designed to reduce future losses.

The project will have a profound impact on flooding. The planned stormwater improvements will help this barrier island community to reduce flooding is two distinct neighborhoods.

12. Supporting Maps, photographs.

Maps depicting the drainage area for each of the three stormwater pump station are attached.

STAKEHOLDER FEEDBACK – VENTNOR CITY, ATLANTIC COUNTY, NJ

City of Ventnor City

Municipal Building, 6201 Atlantic Avenue
Ventnor City, New Jersey 08406
Tel. # 609-823-7900 Fax # 609-823-8032

MEMOMORANDUM

David Rosenblatt, Administrator NJDEP
Office of Engineering and Construction
Mail Code 501-01A
PO Box 420
Trenton, NJ, 08625
Tel. # 609-292-9236
dave.rosenblatt@dep.state.nj.us

Date: 6-11-13

Re: Shore Protection Program Request for Funding
City of Ventnor
Atlantic County
Ventnor City, NJ, 08406

Dear Mr. Rosenblatt:

Below are our priority locations for bulkhead repairs for Ventnor City.

1. Winchester Avenue (Lilly Park) between Little Rock Avenue & Victoria Avenue 235 LF. Cost $364,240.00.
2. Winchester Avenue between Marion Avenue & Austin Avenue 145 LF. Cost $224,750.00.
3. Ventnor Garden Plaza at Wissahickon Avenue 165LF. Cost $255,750.00.
4. Sacramento Avenue street end off of Monmouth Avenue 50 LF. Cost $77,500.
5. Derby Avenue street end at Winchester Avenue 50 LF. Cost $77,500.

The total estimated construction cost is $999,740.00.

Should you have any questions, please feel free to contact me directly at (609) 822-2101 Ex. 1901.

Sincerely,

Charles Sabatini
Ventnor City Municipal Engineer
Ventnor City Municipal Building
6201 Atlantic Avenue
Ventnor, NJ, 08406

STAKEHOLDER FEEDBACK – ATLANTIC CITY, ATLANTIC COUNTY, NJ

James M. Rutala Associates, LLC

September 6, 2013

Ginger Croom, PE, Associate
CDM Smith
50 Hampshire Street
Cambridge, MA 02139

Doug Gaffney, PE
Gahagan & Bryant Associates, Inc.
3460 North Delaware Avenue, Suite 308
Philadelphia, PA 19134-6311

Re: Atlantic City Storm Mitigation Plan
North Atlantic Coast Comprehensive Study
New Jersey Back-Bays
Reconnaissance-Level Analysis

Dear Ginger and Doug:

Please find enclosed a copy of the Atlantic City Storm Damage Mitigation Plan for your use in preparing the Reconnaissance-Level Analysis for the North Atlantic Coast Comprehensive Study. We understand that this study is designed to address the flood risks of vulnerable coastal populations in areas that were affected by Superstorm Sandy.

As you will see by the attached Plan, the City of Atlantic City has prepared an aggressive agenda to make the City stronger and more resistant to future storms. Much of the Mitigation Plan focuses on improvements along the back-bay including bulkheads, stormwater pump systems, tide flex valves and other structures.

Once you have had a chance to review this Plan we would like to meet with you to further explore ways that the Army Corps of Engineers and the City can work together to implement a back-bay protection program.

We look forward to working with you.

Regards,
Rutala Associates, LLC

James M. Rutala, PP, AICP, MBA

cc: Keith Mills, Director, Planning & Development
William England, PE, City Engineer
Brian Mulvenna, USACE Philadelphia District

717 River Drive ▪ Linwood, New Jersey ▪ Phone: 609.743.0354 ▪ E-mail: jmrutala@comcast.net

STAKEHOLDER FEEDBACK – SOMERS POINT, ATLANTIC COUNTY, NJ

Bay Avenue Public Improvement Project for Storm and Flood Mitigation

Existing Conditions

Extremely shallow water at low tide along Bay Avenue

Existing Conditions

Extremely shallow water at low tide along Bay Avenue

Existing Conditions

Low tide at the City's Municipal Beach

Existing Conditions

Existing Bulkhead along Bay Avenue

Existing Conditions

Existing Bulkhead along Bay Avenue

Existing Conditions

Hurricane Sandy

Flooding along Bay Avenue. Next high tide approximately 1.5’ higher

Hurricane Sandy

Hurricane Sandy

Fishing Pier and Gazebo destroyed by Sandy

Major Plan Elements for Storm and Flood Protection and Improved Access to Waterfront

- New bulkhead along Bay Avenue
- Upgrade of stormwater system
- New public walkway along Bay Avenue
- Dredging
- Pier and marina replacement and expansion

New Bulkhead

- Existing bulkheads are not sufficient to provide flood and storm protection to public and private parties
- Proposed engineered bulkhead will be part of an overall plan designed to promote public safety and flood protection
- Proposed bulkhead top elevation and improved stormwater system will be designed to minimize the effects and impacts of future flood events
- Shift in the location of the bulkhead alignment will provide a means for new public waterfront access

Upgrade of Stormwater System

- Tidal influences often flood the stormwater system and create situations where positive discharge into the Bay may not be achieved.
- In addition, flooding currently occurs first in the street before the existing bulkhead is breached by surcharging the system
- The stormwater system would be upgraded by installing tidal check valves to prevent tidal waters from entering the stormwater system
- Installation of pumps that would activate during times of heavy rain events and high tides to remove runoff from the street

New Public Walkway

- Waterside “bridge-to-beach” walkway linking waterside attractions to the new bikeway on the Route 52 bridge between Somers Point and Ocean City
- Would enhance public access to the Bay in contrast to the limited or nonexistent access available today
- Would be built along proposed bulkhead
- Identified in the City’s 2012 Vision Plan

Dredging

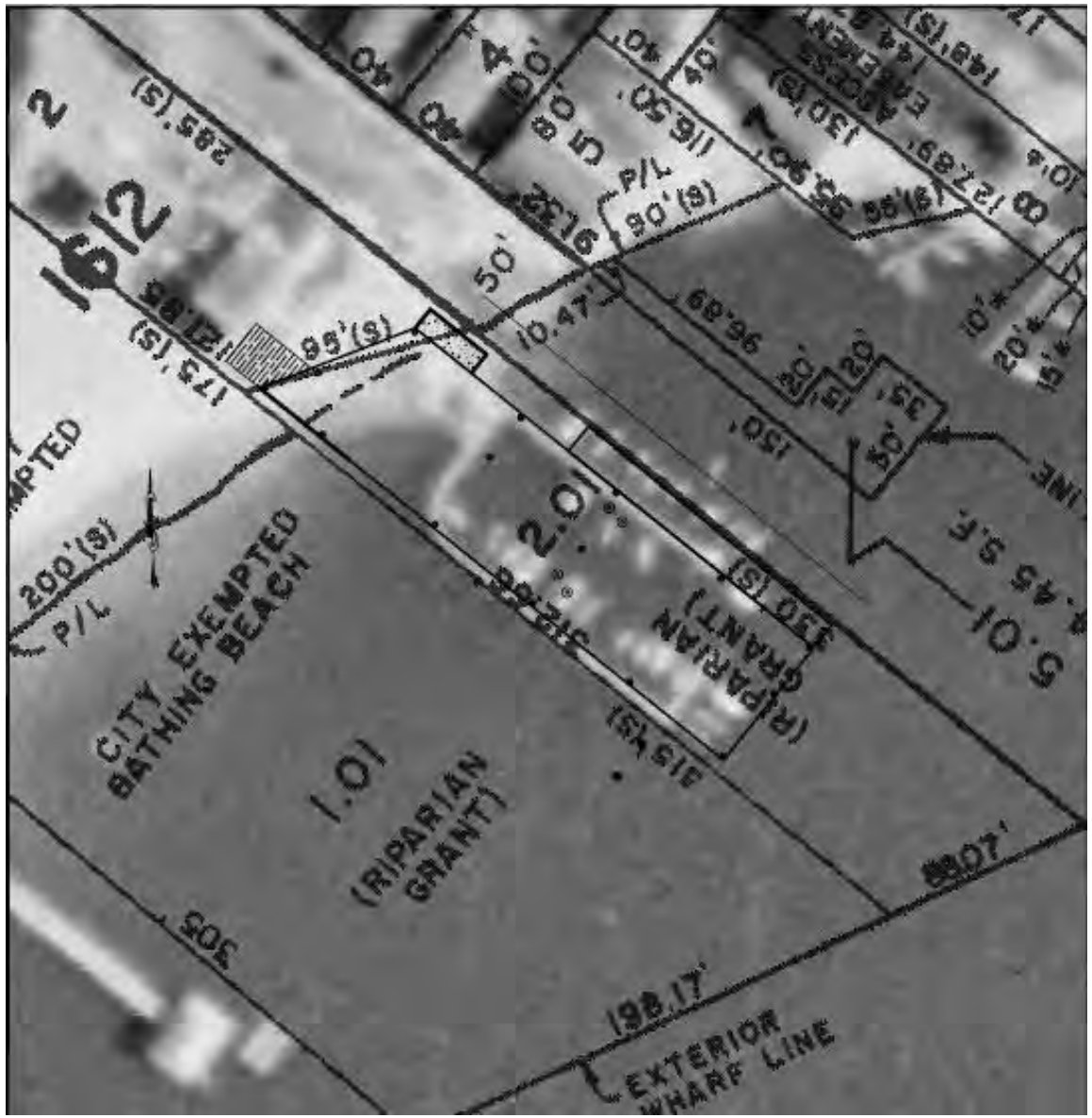
- Shoaling of ship channel along Bay Avenue resulting from Sandy (and other storm activity) and from upland erosion due to deteriorated bulkheads has created unsafe navigation and boating conditions
- Extreme impacts have resulted to all properties along Bay Avenue due to these shoaling conditions affecting property values and the historic use of the area for recreational boating and marina activities

Pier and Marina Replacement

- Intended to promote waterfront public access and recreational opportunities
- Will provide docking for transient vessels, water taxi, tour boats, fishing boats and the like
- Proposed in the same location as a former marina which improvements were heavily damaged during Sandy


PROPOSED 10' X 30' RAMP FOR KYAKS WITH KYAK RACK
PROPOSED RAISED PIER TO MEET EXISTING BULKHEAD
PROPOSED 20' RAMP
PROPOSED FLOATING DOCK
CITY EXEMPTED BATHING BEACH
1.01 (RIPARIAN GRANT)
212'
247'
200'(S)
P/L
EXTERIOR WHARF LINE

1956 Aerial


1612
2
50'
10.47'
2.0'
1.0
(RIPARIAN GRANT)
CITY EXEMPTED BATHING BEACH
200'(S)
P/L
90'(S)
95'(S)
150'
198.17'
EXTERIOR WHARF LINE
5.0'

Conclusions

- The Bay Avenue section of Somers Point received significant damages during Superstorm Sandy – this plan is focused on making new improvements to safeguard the City from future storm events and protect both private and public properties
- Public waterfront access is a critical component to the future viability of our City – the City's vision is to bring that access to Bay Avenue for all of the City's residents and visitors to enjoy

STAKEHOLDER FEEDBACK – MIDDLE TOWNSHIP, CAPE MAY COUNTY, NJ

Responses to your questions on behalf of Middle Township in Cape May County:

1. Certain areas of Middle Township experienced tidal or tidally influenced storm surge, they are inclusive but limited to:

Avalon Manor and Stone Harbor Manor along the Inter Coastal Waterway

Reeds Beach, Pearce's Point, Cook's Beach, Sunray Beach, Del Haven and the Delsea Woods Campground area along the Delaware Bay

The storm surge was exacerbated by the lack of drainage, topography and prevailing west wind throughout the duration of the storm.

2. Roadways suffered severe flooding and some damage. Beaches were severely eroded and several houses in these areas suffered substantial damage. The areas surrounding Avalon Manor and Stone Harbor Manor have experienced shoaling in the channels and lagoons.

3. The bayfront areas including Del Ray Beach, Reeds Beach and Pearse's Point have been authorized for an Ecosystem Restoration Project by the USACE which has not been funded at this time. The area near Bidwell Creek and Dias Creek may have been studied previously due to drainage issues. The areas along the Delaware Bay listed are particular importance as they are breading grounds for Horseshoe crabs which are vital to existence of shore birds and important part of the bayshore ecosystem. The areas along the bay are extremely vulnerable to storms as winds generally prevail from the west through the duration of Hurricane Season and beyond. This low-lying area is a maze of creeks and estuaries that reach far inland and cause severe tidal flooding throughout the Township. There is a general fear that salt water infiltration will affect the aquifers if flooding continues to be a problem.

4. The Township of Middle has contracted with Landberg Construction to increase drainage and resurface the roadways throughout Avalon Manor. The roadways reconstruction includes the heightening of the roadways to reduce flooding. We have been in close contact with the USACE and NJDEP to lobby for funding for the placement of a berm in the areas of Del Ray Beach, Pearse's Point and Reeds Beach and have contacted Dewberry regarding the widespread debris removal throughout our municipality. FEMA Mitigation grants are currently being considered for these areas for various projects.

If you require further information please let me know. I am happy to provide any additional information as required. My telephone number is (609) 465-6641. Thank you for your time.

Constance A. Mahon, RMC, CMC
Administrator
Township of Middle
33 Mechanic Street
Cape May Court House, NJ 08210


Reeds Beach
Pierces Point
Rutgers Lab
Middle Twp breach and flood problem
(30 July 2012 letter)
Middle Twp flood problem (4 October 2012 letter)
Del Haven
South Limit, Villas and Vicinity

STAKEHOLDER FEEDBACK – CITY OF CAPE MAY, CAPE MAY COUNTY, NJ

James M. Rutala Associates, LLC

June 26, 2013

Benjamin Keiser, Manager
NJDEP, Bureau of Coastal Engineering
1510 Hooper Avenue, Suite 140
Toms River, NJ 08753

Re: New Jersey Shore Protection Program
Beach Avenue Floodwall
Cape May City, Cape May County

Dear Mr. Keiser:

This New Jersey Shore Protection Program application is being submitted on behalf of Cape May City for mitigation improvements to the Beach Avenue Floodwall from Madison Avenue to New Jersey Avenue.

By repairing the Beach Avenue Floodwall the chance of damage to infrastructure and property will be reduced. Between 1978 and 2012 there were 1,316 flood insurance claims paid in the City of Cape May at a cost of $8.2 M. Over $2M or 25% of these claims were in the seven block area along Beach Avenue from Philadelphia Avenue to Wilmington Avenue. This proposed project represents the first and most important phase of a mitigation project to protect this section of the City from future storm damage.

During Superstorm Sandy the Beach Avenue area was the only section of Cape May City to witness significant damage. Sand washed from the beaches to Beach Avenue and nearby streets causing flooding and detours. A private company was dispatched to clean this area and they worked extended hours from November 6th to November 10th to remove sand from the street and surrounding properties. In some sections, sand was in excess of eight feet in depth.

The seawall is many decades old and is in a deteriorated state. The existing homes and property are vulnerable to storm generated waves and run up.

717 River Drive ▪ Linwood, New Jersey ▪ Phone: 609.743.0354 ▪ E-mail: jmrutala@comcast.net

The City of Cape May proposes to repair up to 2,200 linear feet of existing seawall between Pittsburgh and Wilmington Avenues along Beach Avenue and between New Jersey and Beach Avenue along Wilmington Avenue. The seawall in this area is low in some locations due to settling of the large armor stone which allows overtopping and flooding. The project would elevate the seawall about two feet. Additionally, the timber wall on the landward side has failed in some locations allowing sand to be pushed into the street by waves during large storms. Repairs include insuring that the elevation adequately addresses the repetitive flooding that occurs in this area, repairs will be made to cracked grout and missing stone and the timber wall would be replaced with a concrete retaining wall. The reconstructed wall would be capped with concrete to provide a smooth walling surface. Three ADA ramps would be constructed to provide enhanced access to the beaches.

The entire project will occur on public property. The public benefits of this project are to protect critical public infrastructure, reduce flooding in this low lying area, improve access for emergency services to residents and visitors in this neighborhood and enhancing public access to the beaches.

Project Schedule

This project can be completed within eighteen months of award of funding.

Task	**Timeframe**
Approval of Engineering Design Contract	60 days
Engineering Design	60 days
Permitting	180 days
Construction Bid Process	60 days
Construction	180 days

This project is estimated to cost $4,670,000. Project costs include:

Survey, Design, Construction Services	$450,000
Construction 2,200 lf retaining wall	$4,220,000
Total	**$4,670,000**

We appreciate all the work that the NJDEP has done to enhance the City's beaches, and we look forward to continuing to work with you to complete this important coastal protection project.

Kind regards,

Rutala Associates, LLC

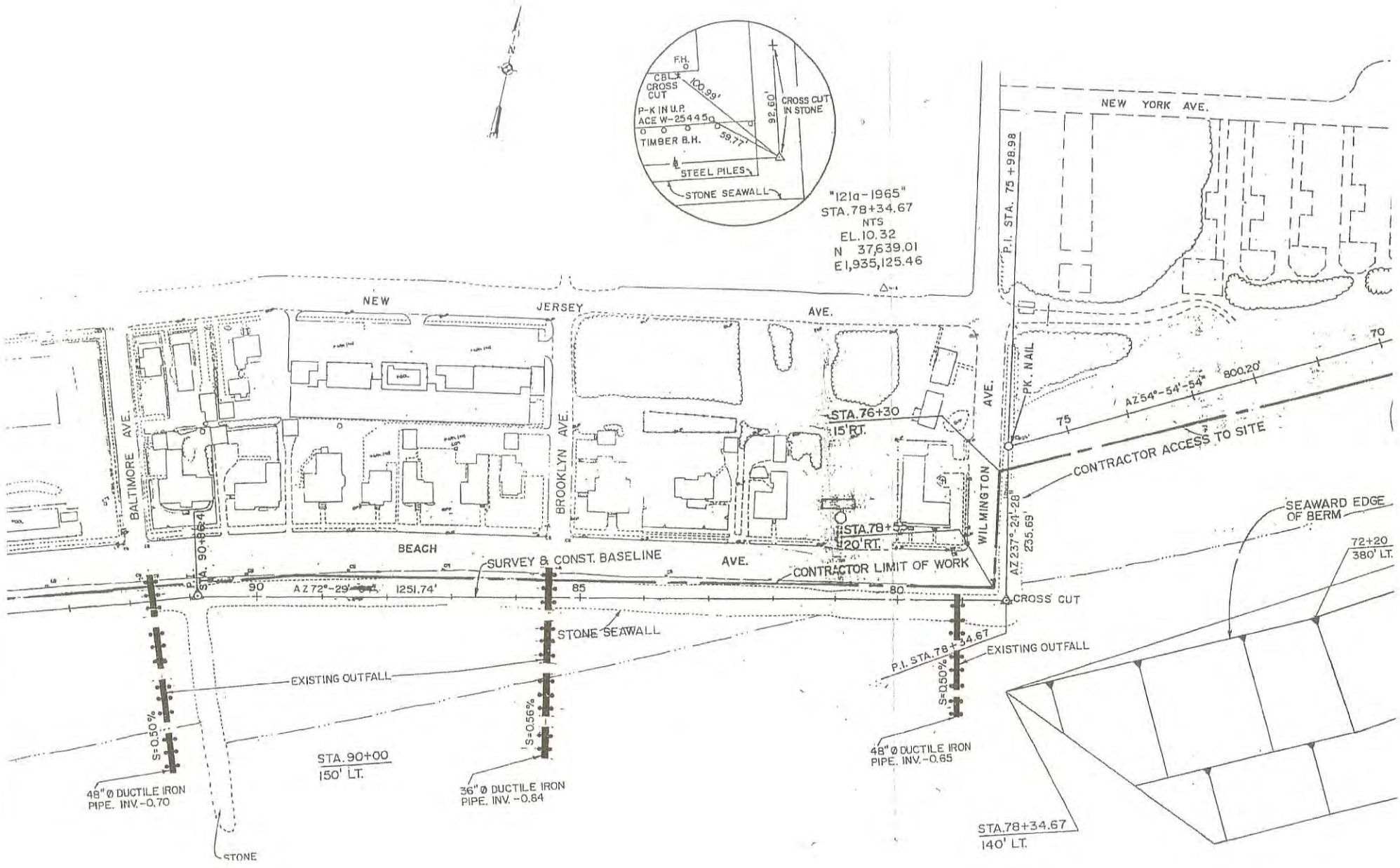
James M. Rutala, PP, AICP, MBA

cc: David Rosenblatt, Administrator, NJDEP, Office of Eng. and Construction
Mayor Edward Mahaney
Bruce MacLeod, City Manager
Ed Walberg, Remington, Vernick & Walberg

R V & W **Remington, Vernick & Walberg Engineers**

Client: City of Cape May
Project: Beach Avenue Floodwall Reconstruction (Pittsburgh Avenue to New Jersey Avenue)
Opinion of Probable Construction Cost
Project No. 05-02-T-201
Date: June 24, 2013

ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	AMOUNT
1	Concrete Retaining Wall	LF	2,200	$ 500.00	$ 1,100,000.00
2	Boulders	CY	7,500	$ 240.00	$ 1,800,000.00
3	Concrete Cap	SY	3,500	$ 60.00	$ 210,000.00
4	Railing	LF	5,200	$ 50.00	$ 260,000.00
5	ADA Ramps	EA	3	$ 50,000.00	$ 150,000.00
COST OF CONSTRUCTION					**$ 3,520,000.00**
CONSTRUCTION CONTINGENCY					**$ 700,000.00**
TOTAL CONSTRUCTION COST					**$ 4,220,000.00**
SURVEY, DESIGN, CONSTRUCTION SERVICES					**$ 450,000.00**
TOTAL PROJECT COST					**$ 4,670,000.00**


F.H.
CBL CROSS CUT
P-K IN U.P. ACE W-25445
TIMBER B.H.
100.99'
92.60'
59.77'
CROSS CUT IN STONE
STEEL PILES
STONE SEAWALL
"121a-1965"
STA. 78+34.67
NTS
EL. 10.32
N 37,639.01
E 1,935,125.46
NEW YORK AVE.
P.I. STA. 75+98.98
NEW JERSEY AVE.
BALTIMORE AVE.
BROOKLYN AVE.
WILMINGTON AVE.
PK. NAIL
AZ 54°-54'-54"
800.20'
CONTRACTOR ACCESS TO SITE
STA. 76+30
15' RT.
STA. 78+55
20' RT.
BEACH
SURVEY & CONST. BASELINE
CONTRACTOR LIMIT OF WORK
P.T. STA. 90+86.4
AZ 72°-29'-
1251.74'
AZ 237°-24'-28"
235.69'
CROSS CUT
SEAWARD EDGE OF BERM
72+20
380' LT.
STONE SEAWALL
EXISTING OUTFALL
P.I. STA. 78+34.67
S=0.50%
S=0.56%
S=0.50%
STA. 90+00
150' LT.
48" Ø DUCTILE IRON PIPE. INV.-0.70
36" Ø DUCTILE IRON PIPE. INV.-0.84
48" Ø DUCTILE IRON PIPE. INV.-0.65
STONE
STA. 78+34.67
140' LT.

Cape May mayors rally to strengthen seawall

By RICHARD DEGENER Staff Writer | Posted: Sunday, March 10, 2013 12:00 am

CAPE MAY — Hurricane Sandy may finally provide the argument the city has been searching for to raise the seawall and extend the oceanfront Promenade on the east side of town.

The issue goes back almost two decades and has been broached by at least three mayors. According to Mayor Ed Mahaney, it has been shot down by the state Department of Environmental Protection five times.

With state and federal government focused on mitigating coastal flooding, the fact that waters from Hurricane Sandy breached in this area could make the proposal — which officials say could prevent damage to life and property — more sellable.

"We are going back again," Mahaney said. "We're approaching the state and federal governments again to strengthen the seawall and hopefully extend The Promenade."

While east-side businesses and residents have pushed for a Promenade extension for years to provide a place to walk along the ocean, Mahaney said any recreational benefits would be secondary to storm protection.

The city once had a boardwalk on the east side of town, but it was destroyed in the 1944 hurricane and the boards caused a lot of damage as waves crashed them against oceanfront properties. It was never rebuilt. The 1962 northeaster destroyed the rest of the city's boardwalk and it was replaced with a massive rock and concrete barrier that was topped with a walkway, now made of asphalt, called the Promenade.

The Promenade began on the west side of the beachfront and ran about 1.5 miles to the east but ended just past Madison Avenue. It may have stopped there for financial reasons but nobody is quite sure. In 1962, there was much less development east of Madison Avenue so there was less to protect. For whatever reason, it left the last half mile of the oceanfront with a lower sea wall and no Promenade.

Mahaney said he tried to extend the Promenade during an earlier term as mayor in 1995, and came close. Then-DEP Commissioner Bob Shinn was in favor of it, and even came to survey the area, but the project never materialized, Mahaney said.

Columbia Avenue resident Bob Elwell, a former mayor who also tried to get the project done, and who worked as a laborer on the seawall project as a 20-year-old, said the main issue was sand that accumulated on the unpaved portion of the seawall.

The seawall was sloped downward toward a wooden retaining wall along Beach Avenue. Over the years, this area has trapped sand, resulting in it getting the type of protection dunes receive. Even though concrete and rock is under this thin layer of sand, Elwell said DEP staffers argued against

disturbing it.

"The DEP said we couldn't disturb virgin sand between the retaining wall and the seawall," Elwell said.

The DEP was willing to allow a boardwalk, but there were concerns about the boards becoming battering rams in a storm. It would also be extremely difficult to drive piles through the seawall to support a boardwalk.

Mahaney said he hopes to at least get approval for work on Baltimore, Brooklyn and Wilmington avenues, an erosion hot spot because Beach Drive takes a slight jog toward the ocean in this area. Mahaney also hopes hazard mitigation funding help pay for it. He said the city engineers are just starting to look into how high to extend the seawall to alleviate flooding.

"It's our weakest link in recent storms," Mahaney said. "That is the area of greatest vulnerability to us."

Aside from stopping water, he said, it would also prevent a constant problem of removing sand from east-side streets after storms.

Another issue is emergency access.

With no Promenade, emergency vehicles are limited to the beach on the east side but in the Wilmington Avenue area erosion is so prevalent there often is no beach to drive on.

"Usually we can't get Beach Patrol vehicles around there," Mahaney said.

Elwell recalled the seawall project after the '62 storm. The rocks were brought in by train and dropped behind Swain's Hardware before being trucked down Jackson Street, he said.

"We dug down, I forget how many feet, and put in large stones, then core stones maybe grapefruit sized, poured concrete, put in more core stones, more concrete, and just kept building it up," he said. "The top of the Promenade was finished with concrete."

Elwell said the Beach Avenue side was solid, but rocks were left open without concrete on the ocean side to accept some water and diffuse the energy of waves. Beach replenishment, which didn't happen until more than a quarter century later, was also important in protecting the city. He said the larger beach makes the waves break earlier so they lose energy before hitting the seawall.

"They used to break at the seawall and come over," Elwell said.

That likely helped deposit the sand that has been the main argument against extending a project.

Contact Richard Degener:

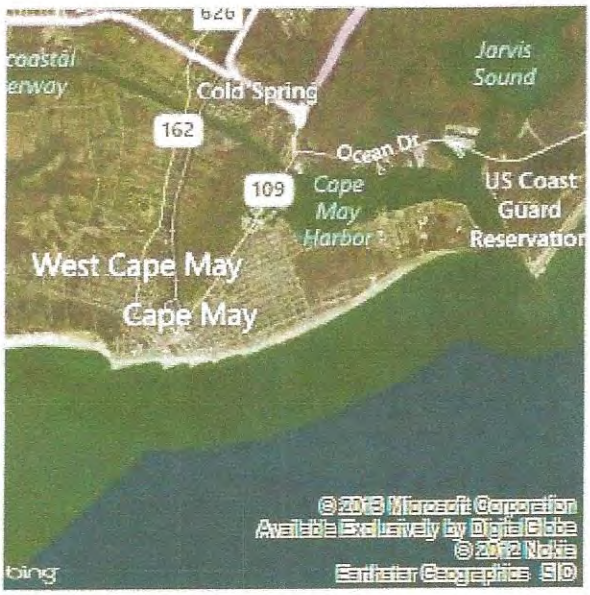
609-463-6711

RDegener@pressofac.com

bing Maps

Seawall Improvement Area
Madison to Wilmington Avenues
Cape May City, NJ

On the go? Use **m.bing.com** to find maps, directions, businesses, and more



bing Maps

Seawall Enhancement
Baltimore to Wilmington Avenues
Cape May City,NJ

STAKEHOLDER FEEDBACK – SEA ISLE CITY, CAPE MAY COUNTY, NJ

Ginger Croon 04 September 2013
Department of the Army
Philadelphia District, Corps of Engineers
Philadelphia, PA 19107

Dear Ms. Croom;

This is a response to the letter dated 23 August 2013 concerning the North Atlantic Coast Comprehensive Study. I will respond to the questions in the order they were asked.

1) ***Problem identification for your area:***
   a) ***Did your area experience any tidal or tidally influence storm surge?*** Yes. As the storm's eye came over land during the evening hours of 29 October 2012, it brought an estimated ten foot storm surge. This estimate is based on first hand observation during the course of the event.
   b) ***Be specific on particular areas and water bodies within your jurisdiction that experience storm surge.*** A large portion of our island was affected by the storm surge including our entire north end as well as most of the center of town through the Townsend Inlet sections.
   c) ***What factors, if any, exacerbated damages from the storm surge?*** There were several factors that enhanced the damage from the surge. The tides breaching the dunes along the beach front allowing an unrestricted flow of sea water to push forward into town. Certain bulkheads/Geo-tubes being breached allowing for the same unrestricted flow. The storm surge picking up debris along the way which added much more destructive force to the structures the surge came into contact with during the height of the tide.

2) ***Description of Damages for your area:***
   a) ***Provide a narrative including types of infrastructure damaged or temporarily out of use, structure (building) damages, personal injuries/fatalities.*** As mentioned previous, the tides from Sandy eroded and then breached several sections of dunes which protect roadways and properties within our town. Our paved promenade along the beachfront was underpinned in several sections but specifically around 29th to 33rd street. This promenade is a fortified structure which provides an avenue for pedestrians to walk along the beach as well to provide protection to the properties behind it.
   During the last tide and during the storm surge our City Hall and the Police/Fire building became flooded causing the eventual evacuation of both buildings which are currently still unused. Both buildings received severe damage to the interior walls and contents as well as posed a serious safety hazard from electrical issues during the course of the storm.
   The Beach Patrol Headquarters at 44th and the beach sustained heavy damage from tidal flow as well as from direct contact with waves. The City's Marina Building which is located by the bay sustained severe damage to its contents to salt water incursion. The City's Dealy Field section which contains the bulk of recreation facilities sustained heavy damage to its

buildings, structures, and surfaces such as the Skate Park's poured surface from salt water saturation.
There were no fatalities or injuries related to the storm itself. There was a fatality and injuries post Sandy as workers started to clean up and remove debris and the risks that that work presented.

b) ***Provide a map depicting the spatial extent of damages.***

See Map.

3) Prior related studies or projects (local,state,federal) in the damaged area:

"Feasibility Study for Beaches from Great Egg Inlet to TI Inlet", published in September of 2001 from the Army Corps of Engineers.

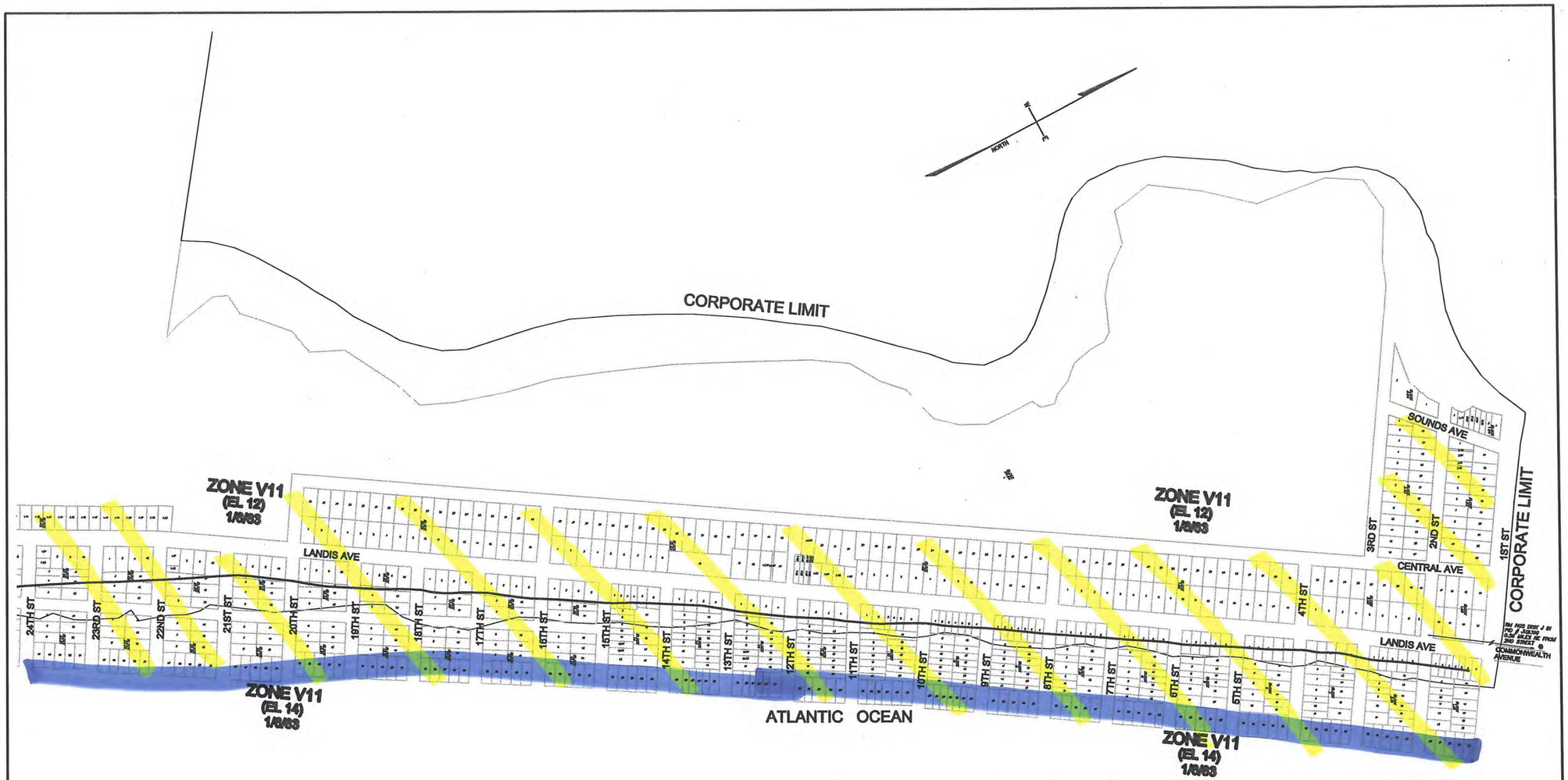
4) List measure that your jurisdiction has considered to address the problem:

The City is combining City Hall with Police and Fire in a new building which will be raised above the current requirements required by FEMA. All replacement bulkheads and structures will be rebuilt/refurbished using state of the art materials recommended to withstand future storm related issues.

Should you need to speak with me further concerning the content of this reply, please do not hesitate to call me at your convenience.

Thank you,

Michael A. Jargowsky
Deputy Coordinator,
Sea Isle City OEM
609 425 4371
sicoem@police.seaislecitynj.us



TIDE INCURSION IN HI-LITE

DUNE DAMAGE IN BLUE

LEGEND	
A1 – A30 ZONE A7 EL 10 1/9/83	= AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED
BLOCK 00.00	= MUNICIPAL TAX MAP BLOCK NUMBER
0.00	= MUNICIPAL TAX MAP LOT NUMBER
LANDIS AVE	= ROAD NAME
CORPORATE LIMIT	= MUNICIPAL BOUNDARY
⊕	= NGS MONUMENT

NOTES:
1. FLOOD ZONE BOUNDARIES HAVE BEEN PLOTTED FROM THE FLOOD INSURANCE RATE MAP FOR THE CITY OF SEA ISLE CITY, N.J., COMMUNITY–PANEL NUMBERS 345318 0001C AND 345318 0002C, REVISED JANUARY 6, 1983.

2. THE ENTIRE AREA OF THE CITY OF SEA ISLE CITY IS LOCATED IN A SPECIAL FLOOD HAZARD AREA (SFHA).

3. THIS MAP HAS BEEN PREPARED AS PART OF ACTIVITY 440– FLOOD DATA MAINTENANCE OF THE CITY'S NFIP/COMMUNITY RATING SYSTEM MODIFICATION REQUEST.

200 0 200 400
SCALE IN FEET
(1"=200')

REV.	DATE	DRAWN BY	DESCRIPTION

ANDREW A. PREVITI
PROFESSIONAL ENGINEER
NEW JERSEY LIC. NO. 24GE03068300

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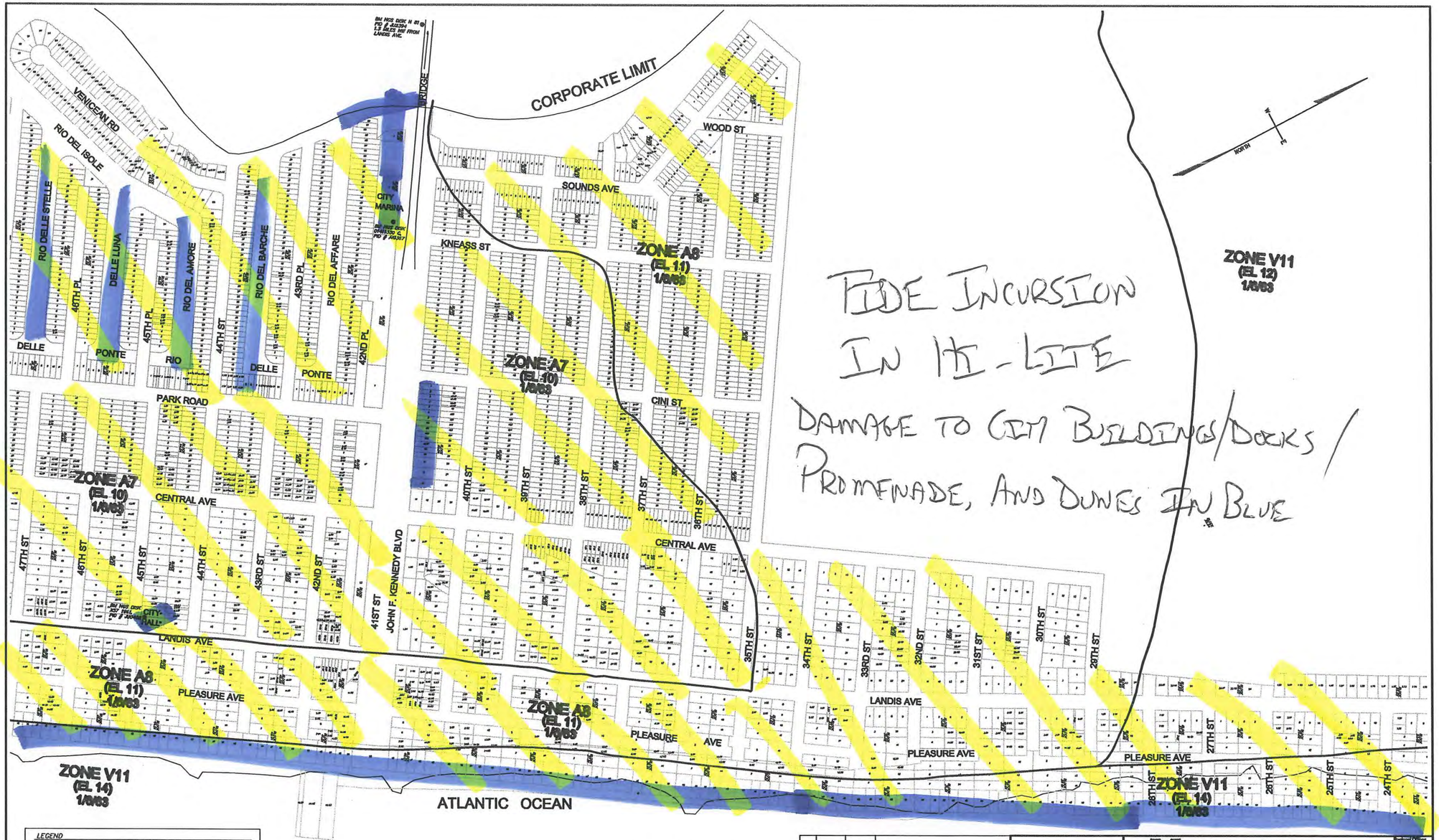
West Nyack, N.Y.
Chestnut Ridge, N.Y.
Bethlehem, PA.

CITY OF SEA ISLE CITY
CAPE MAY COUNTY, NEW JERSEY
NFIP # 345318
FLOOD DATA MAP
ACTIVITY 440

JOB NUMBER SIC4115	DATE MAR., 2012
SCALE AS SHOWN	LATEST REVISION
PROJECT MANAGER MA000777	DESIGN BY AAP
SHEET NUMBER 4 of 4	



TIDE INCURSION IN HI-LITE

DAMAGE TO CITY BUILDINGS/DOCKS / PROMENADE, AND DUNES IN BLUE

LEGEND

A1 – A30 ZONE A7 (EL 10) 1/8/03	= AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED
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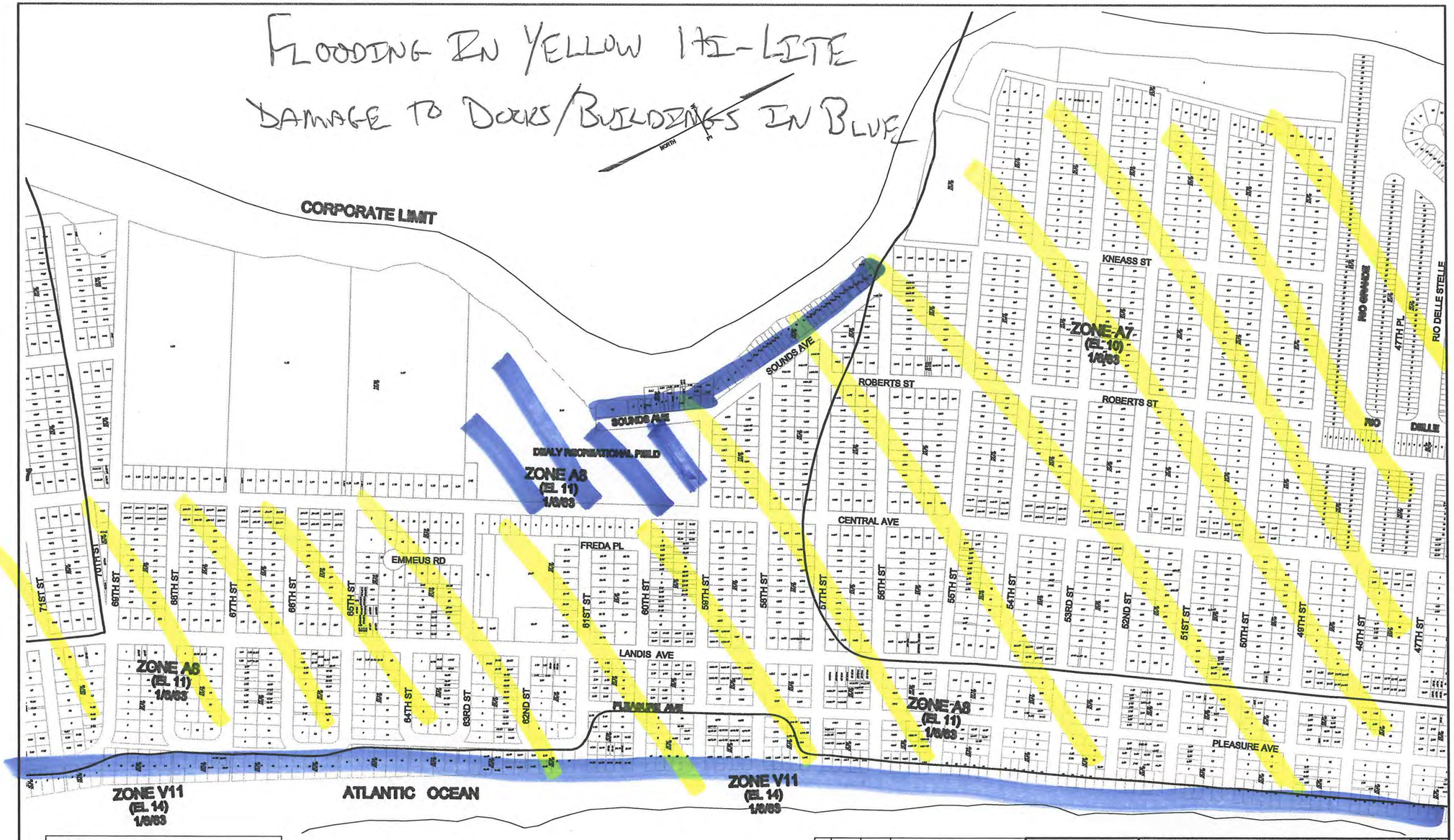
Bethlehem, PA

CITY OF SEA ISLE CITY
CAPE MAY COUNTY, NEW JERSEY
NFIP # 345318
FLOOD DATA MAP
ACTIVITY 440

JOB NUMBER	DATE
SC4115	MAR., 2012
SCALE	LATEST REVISION
AS SHOWN	
INDEX NUMBER	DESIGN BY
MA000777	AAP
SHEET NUMBER	
3 of 4	

FLOODING IN YELLOW HI-LITE

DAMAGE TO DOORS/BUILDINGS IN BLUE



LEGEND	
A1 – A30 / ZONE A7 (EL 10) lines	= AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED
BLOCK 00.00	= MUNICIPAL TAX MAP BLOCK NUMBER
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CITY OF SEA ISLE CITY
CAPE MAY COUNTY, NEW JERSEY
NFIP # 345318
FLOOD DATA MAP
ACTIVITY 440

JOB NUMBER	DATE
SC4115	MAR., 2012
SCALE	LATEST REVISION
AS SHOWN	
INDEX NUMBER	DESIGN BY
MA000777	AAP
SHEET NUMBER	
2 of 4	

FLOODING IN YELLOW 1½-2FT
DAMAGE IN BLUE

LEGEND

A1 – A30 ZONE A7 (EL 10) 1/0/83	= AREAS OF 100 YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED
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CITY OF SEA ISLE CITY
CAPE MAY COUNTY, NEW JERSEY
NFIP # 345318
FLOOD DATA MAP
ACTIVITY 440

JOB NUMBER: SIC4115	DATE: MAR., 2012
SCALE: AS SHOWN	LATEST REVISION
DRCP NUMBER: MA000777	DESIGN BY: AAP
SHEET NUMBER: 1 of 4	

STAKEHOLDER FEEDBACK – GREENWICH TOWNSHIP, CUMBERLAND COUNTY, NJ

Subject: **Levees along the Cohansey River**
Greenwich Township, Cumberland County

These issues can be best summarized by the findings (p. 27) of the June 2011 *Coastal Community Vulnerability & Resilience Assessment Report for Greenwich Township,* prepared by the Office of Coastal Management of the NJ Department of Environmental Protection:

> *Knowing that freshwater resources are threatened by saltwater intrusion and habitat conversion, Greenwich Township has some difficult and potentially costly decisions to make now and into the future. Agricultural dikes were established in the township over three centuries ago. These dikes not only provide water for irrigation, they provide habitat and groundwater recharge. While these dikes were not installed for flood protection, many of them now serve that purpose, as homes and roads have been built in the areas behind them. These dikes now serve a much greater purpose than they were originally intended, and their failure could impact water supply, agriculture, and habitat for threatened and endangered species. Partnership for dike restoration will be costly, but restoration should also consider at least 1.0 meters of sea level rise by 2100. This minimum level of rise is consistent with research being supported by the New Jersey's Climate Office and local research. In order to account for sea level rise, dikes will need to be built higher and longer than a design that does not consider sea level rise. While this may appear to be costly upfront, it will ensure the investment is not futile due to an inadequate design.*

Three major dikes protect the natural, historic and agricultural resources of Greenwich from tidal salt water of the Cohansey River and from Category 1 and Category 2 hurricane flooding predicted by the *NJ DEP Coastal Vulnerability Report* (Annotated Map 10), attached):

- Pine Mount Dike at the Cohansey River which, before being breached in 1997, protected the southwest corner of the village, as well as large swath of farmland, including farmland protected by the NJ State Farmland Preservation program (annotated Map 18 attached), along Pine Mount Creek. The breached Pine Mount Dike causes regular tidal flooding at houses on Delaware Avenue, and the salt water intrusion has resulted in extensive tree kill along edges of farm fields bordering Pine Mount Creek. This dike should protect County Road 642, an evacuation route and emergency access to the western side of the township.
  The breach at Pine Mount Dike has been the subject of numerous state and federal agency discussions to secure funds for repair or reconstruction, but without results. Immediate action for this dike is needed. In the very short term, tide gates at CR642 bridge need to be reinstalled;
- Mill Creek (Watson) Dike protects the east side of Greenwich's historic village, one of the first National Register Historic Districts in NJ, and the greatest concentration of township ratables. This levee protects large farmland tracts on the east side of the township, many of these tracts being preserved farmland (Map 18). Failure of the tide gates has resulted in salt water intrusion and tree kill along the edges of the farm fields, as well as abutment and embankment damage to the bridge at CR 607, an evacuation route.
  Mill Creek Dike is at the end of its service life. The tide gates need immediate repair and the CR 607 bridge needs replacement. A funding/repair/replacement plan for the dike is needed;

- Market Lane Dike protects the west side of the historic village, and farmland bounded by the village. The dike protects CR 641 and to the north CR 642.
  Tide gates at Market Lane Dike do not work properly, and water leaks through the dike across CR 641 during routine high tides. Market Lane Dike is past its service life and has required emergency intervention during recent storms.

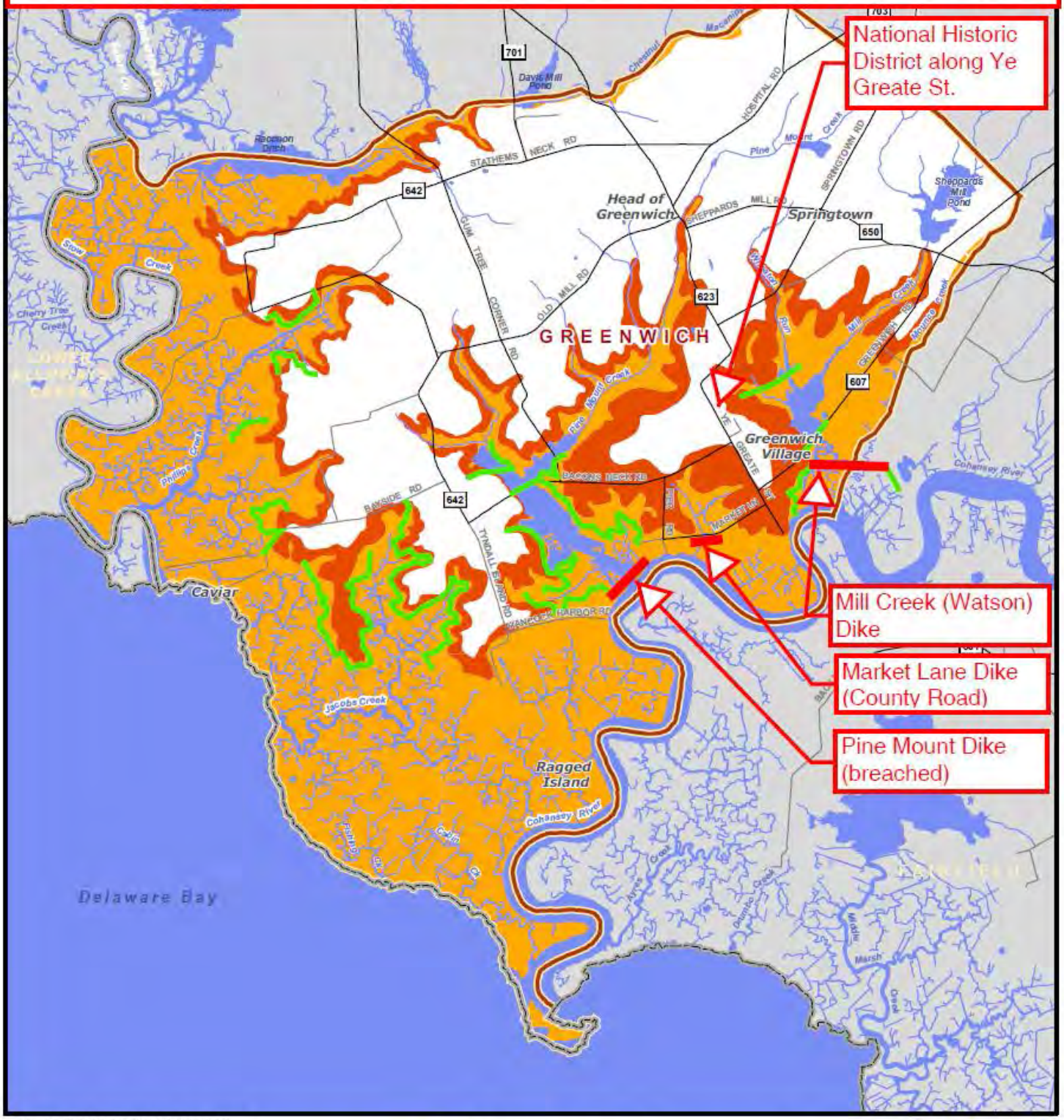
In Greenwich, we are proud of our stewardship and management of our natural, historic and agricultural resources, and the results are clearly evident to anyone who visits the Township. However, the economic, regulatory, legal and technical issues associated with preserving these resources from salt water intrusion and flooding are beyond our capacity. The Township requests and welcomes assistance in gaining the expertise, agency cooperation, and financial resources to enable us to plan for future management of the levees and undertake immediate actions.

July 2012

GREENWICH TOWNSHIP

Map 10: Flood Hazard Areas (1996)

Greenwich Twp. Flood Hazard Areas (1996) with Major Cohansey River Protective Levees Noted
(Map 10 of ERI Modified)
Note that 1996 100 year limit roughly correlates with Cat. 1 Hurricane and 1.5 meter sea level rise
Note that 1996 500 year limit roughly correlates with Cat. 2 Hurricane and 1.5 meter sea level rise



Sources : NJDEP, NJDOT, DVRPC, FEMA, Cumberland County Department of Planning. This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Dike (Approximate Location)

ZONE

100-Year Floodplain

500-Year Floodplain

N

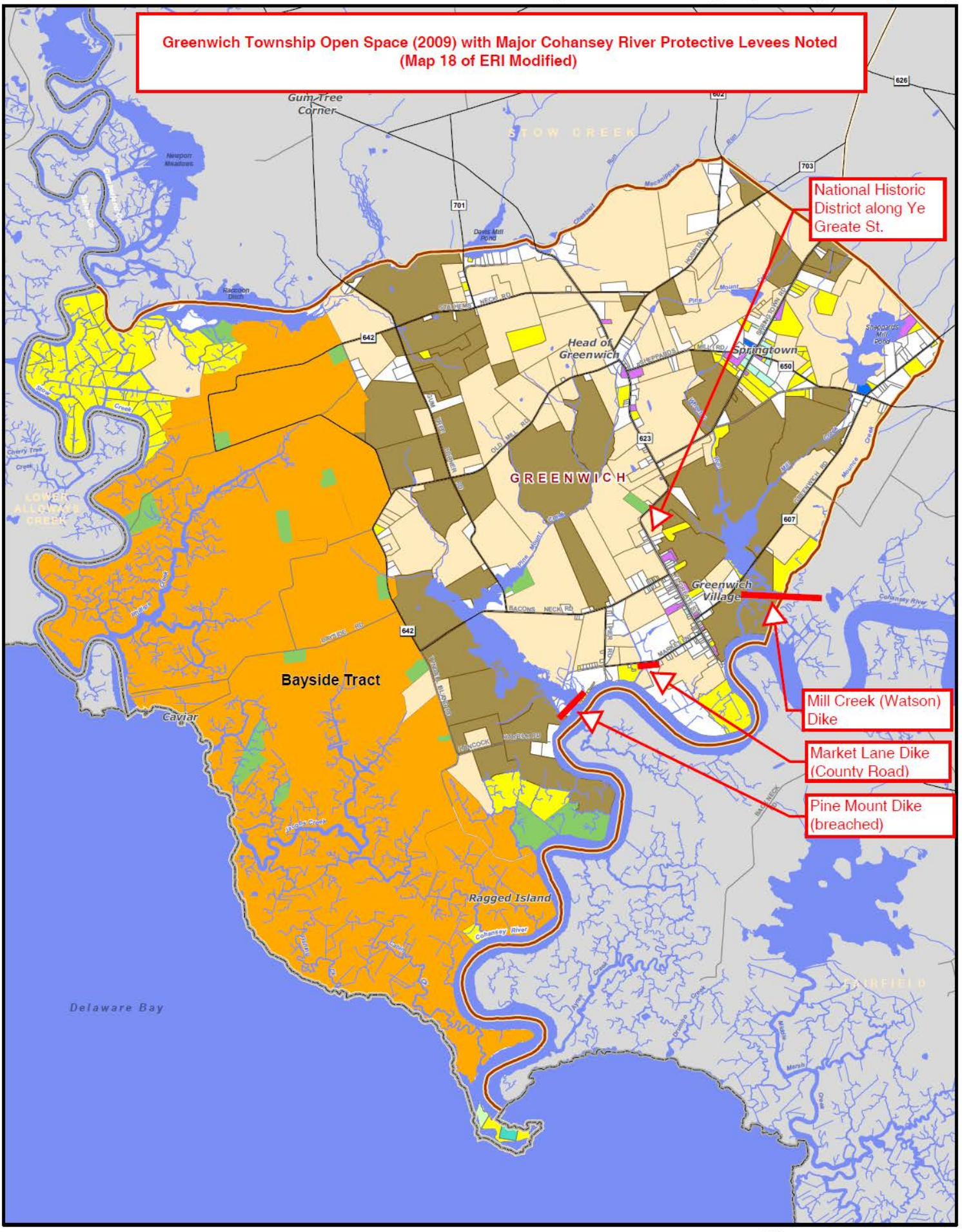
0 0.25 0.5 1

Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

GREENWICH TOWNSHIP

Map 18: Existing Open Space (2009)



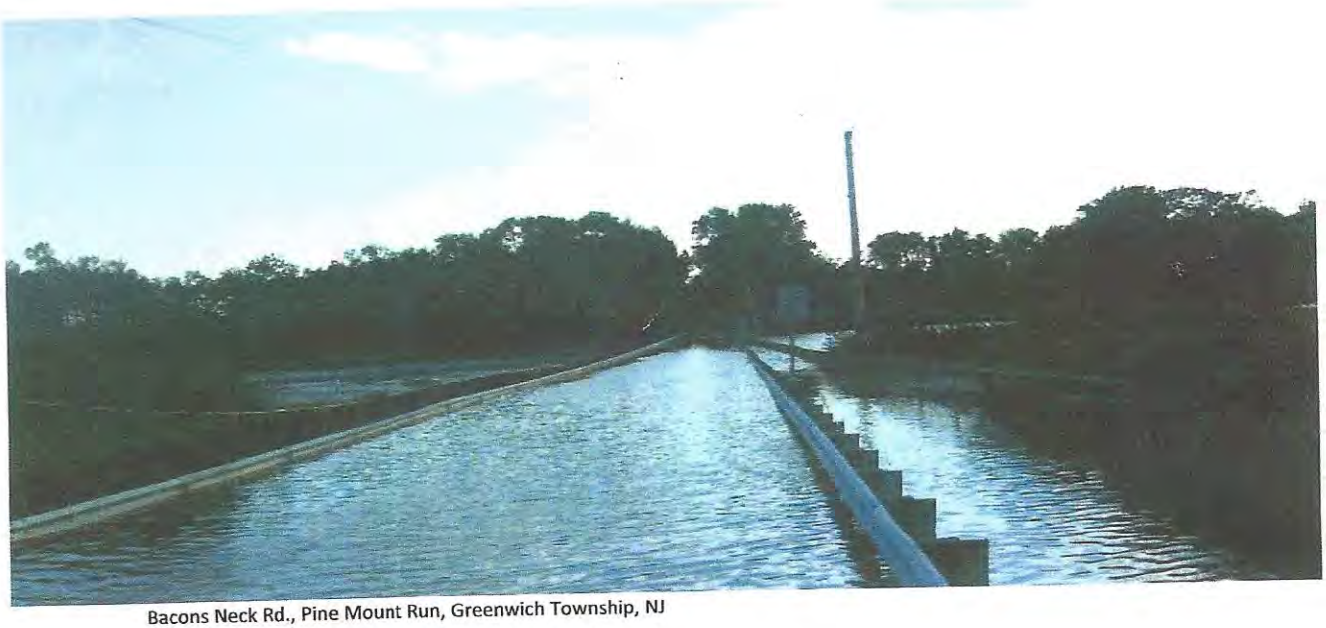
N

0 0.25 0.5 1

Greenwich Dike Restoration and Cohansey River Mouth Stabilization
Delaware Bayshore
Cumberland County, NJ

Concept: Rebuild the dikes in Greenwich Township and stabilize the mouth of the Cohansey River.

Reason: The mouth of the Cohansey River at Greenwich Township provides boating access for the Bridgeton area to the Delaware Bay. Greenwich Township is an historic farming community with two marinas. The dike system protecting local roads, farmland, residences, and water supply has been in place for centuries and now needs significant improvement. The largest dike in Greenwich, Pine Mount Run, is completely washed out, and now unimpeded saltwater flooding inland occurs daily with every high tide. Two other dikes (Watsons, Market Lane) are eroding and have damaged tide gates, resulting in the potential for breaching and flooding with every storm event. The shoreline at the mouth of the Cohansey is eroding and in need of bank stabilization to protect the navigation channel.



Bacons Neck Rd., Pine Mount Run, Greenwich Township, NJ

Proposal: Rebuild the Pine Mount Dike new from the ground up, and reinforce the Watson and Market Lane Dikes to modern flood elevations. First and foremost the dikes would be built for community flood protection. Fish ladders, flood gates, public access would also be incorporated into each dike. Public access would be for water oriented recreation and include features such as such as fishing and crabbing areas, trails and scenic lookouts.

Use living shoreline techniques to slow bank erosion at the mouth of the Cohansey River. Living shorelines is a "soft" approach using wetland plants, submerged aquatic vegetation, oyster reefs, fiber logs, sand fill, and stone. The benefits of living shorelines include stabilization of the shoreline; protection of surrounding riparian and intertidal environment; and creation of habitat for aquatic and terrestrial species.

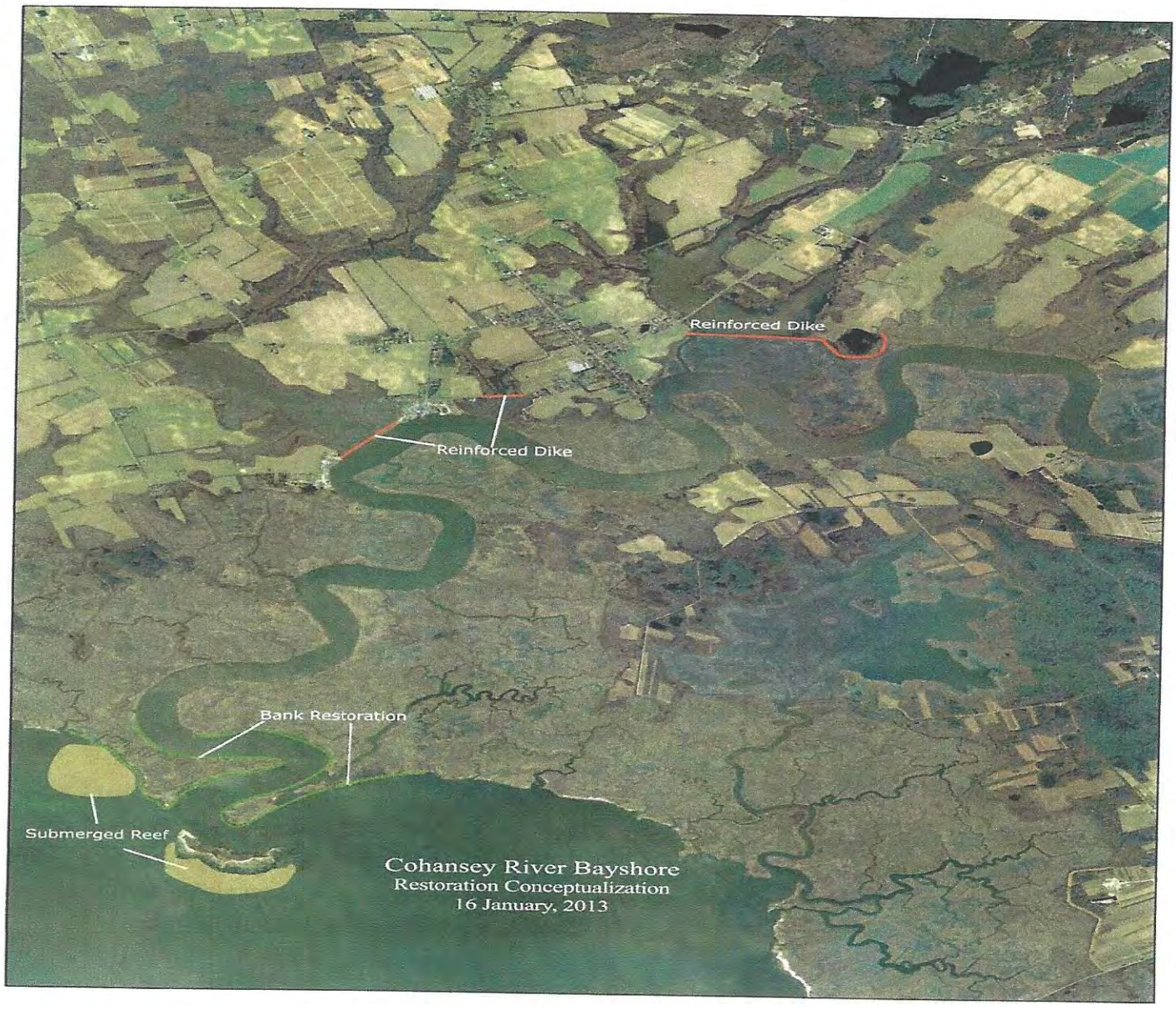
Needed Agency Commitments: State of New Jersey, DEP, EDA; US Environmental Protection Agency; US Army Corps of Engineers; US Economic Development Administration; Federal Emergency Management Agency.

Length of Dike

Pine Mount Run: 1,500 feet

Market Lane: 725 feet

Watsons: 5,000 feet



STAKEHOLDER FEEDBACK – DOWNE TOWNSHIP, CUMBERLAND COUNTY, NJ

State of New Jersey
Hazard Mitigation Grant Program
Municipality Letter of Intent

Project Summary	
1. Applicant:	DOWNE TWP. / FORTESQUE CAPTAINS & BOAT OWNERS ASSOC.
2. County:	CUMBERLAND | STATE OWNED MARINA
3. a. Project Eligibility: Did the municipality participate in the Multi-Hazard Mitigation Planning Process?	☒ Yes ☐ No. If no, does the municipality have its own multi-Hazard mitigation plan? ☒ Yes ☐ No
b. Is the mitigation strategy identified in your MHMP?	☒ Yes ☐ No
4. a. Project Type:	☒ Flood Control ☐ Acquisition ☐ Elevation ☒ Planning ☒ Other** BULKHEAD REPAIR AND REPLACEMENT,
b. Describe Other:	SILT AND SAND DEBRIS REMOVAL FROM GAS DOCKS + CHANNEL
5. a. Primary Point of Contact:	ROBERT CAMPBELL | ROCK JETTYS
b. Title:	MAYOR, DOWNE TWP.
c. Address:	288 MAIN ST., NEWPORT, N.J. 08345
d. Phone:	856-305-6213
e. Fax:	856-447-3533
f. Email:	rgc4downe@comcast.net
6. Is the community a small and impoverished community as defined by the State Hazard Mitigation Plan (reference)?	☒ Yes ☐ No
7. a. Does your jurisdiction participate in the NFIP?	☒ Yes ☐ No
b. If so, does your jurisdiction participate in the Community Rating System (CRS)?	☐ Yes ☒ No
8. a. Do you have Flood Insurance? N/A	☐ Yes ☐ No
b. If so, is this a repetitive loss property? N/A	☐ Yes ☐ No
9. Cost Estimates* — Total Grant Request:	$3,200,000

*Cost estimates are rough estimates that are subject to change. Cost estimate sources can include but are not limited to RS Means, contractor estimates, historical data, etc.

10. **Endorsement:** I understand that the local share of project funding will be 25% of the total project cost and that we will contribute [✓] all or [ ] seek funding elsewhere for the matching share of the mitigation project.

Signed: _____ Date: 3-14-13

Title: MAYOR

State of New Jersey
Hazard Mitigation Grant Program
Municipality Letter of Intent

Municipality Letter of Intent Instructions
1. **Applicant** - The applicant is a Municipalities, Borough, City, Township and Private Non-Profit.
2. **County** - The name of the County the project is located in.
3. **Project Eligibility** – a. You are an eligible applicant If you, participated in a Multi-Hazard Mitigation Plan (MHMP). b. Please state if the project is identified as a mitigation action in the MHMP
4. **Project Type** – (Please provide a brief description of the project, attach form if needed) a. Identify mitigation project type b. See page one for examples of other eligible mitigation projects
5. **List contact information for the primary point of contact.**
6. **Check yes or no if this community is identified as impoverished.**
7. a. Identify whether or not your community participate in the National Flood Insurance Program NFIP. http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book b. To verify if you community participate in CRS use the link below. http://www.fema.gov/sites/default/files/orig/fema_pdfs/pdf/nfip/manual201105/content/19_crs.pdf
8. a. If the sub-applicant have flood insurance please check the box b. Check box if the property is a repetitive loss property
9. Give an estimate of the project cost
10. Endorsement – The cost share is 75% FEMA and 25% Applicant. The cost share can be in the form of In-kind or cash. Check if you will contribute all or seek funding elsewhere and sign.

COPY

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF PARKS AND FORESTRY

LEASE AGREEMENT

THIS AGREEMENT, made the 2nd day of June in the year One Thousand Nine Hundred and Ninety-~~eight~~ (1998)

BETWEEN

THE STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF PARKS AND FORESTRY
P. O. Box 404
Trenton, New Jersey 08625

,hereinafter referred to as Landlord,

AND

THE FORTESCUE CAPTAINS & BOAT OWNERS ASSOCIATION, INC., a corporation of the State of New Jersey having its principal office at Fortescue, New Jersey 08321

,hereinafter referred to as Tenant.

WHEREAS, Landlord is charged with the responsibility and is empowered to acquire, hold, lease, operate, manage, protect and develop lands for recreation, conservation, historic, cultural and educational purposes; and

WHEREAS, Landlord owns the land and improvements comprising the Fortescue State Marina and administers the Marina under authority of the State Park and Forestry Resources Act, N.J.S.A. 13:1L-1 et seq.; and

WHEREAS, pursuant to various lease agreements, the most recent dated June 28, 1982, Tenant has improved, maintained and operated the hereinbelow described property referred to as the Leased Premises and commonly known as the Fortescue State Marina ("Marina") as a public marina; and

WHEREAS, the most recent lease has expired and Tenant has requested a new lease for the continued improvement, maintenance and operation of the Leased Premises as a public marina for a lease term of twenty (20) years; and

WHEREAS, Landlord has determined that Tenant has improved, maintained and operated the Leased Premises as a public marina in substantial compliance with the terms and conditions of the lease dated June 28, 1982 and that the objectives and interests of Landlord and Tenant with respect to the continued improvement, maintenance and operation of the Leased Premises as a public marina are mutual and that the best interest of the public will be served by entering into an agreement leasing the Leased Premises to Tenant subject to the terms and conditions hereinbelow provided.

NOW THEREFORE, in consideration of the payment of rent by Tenant as hereinbelow provided and the mutual covenants hereinbelow made, Landlord and Tenant hereby agree as follows:

THAT, IN ACCORDANCE with the provisions of N.J.S.A. 13:1L-6 and 8, Landlord does hereby lease to Tenant and Tenant does hereby lease from Landlord for the term hereinbelow provided: ALL of that certain tract or tracts of land ("Land") including Garrison Avenue and Creek Road situated in the Town of Fortescue, Township of Downe, County of Cumberland, State of New Jersey, together with all buildings, structures, walkways, piers, bulkheads and other improvements, and all fixtures, equipment and other property attached to and/or physically incorporated therein situated on the Land as of the Effective Date (as hereinbelow defined) of the Term of this Lease ("Present Improvements") and such additional and/or replacement buildings, structures, walkways, piers, bulkheads and other improvements, and all fixtures, equipment and other property attached thereto and/or physically incorporated therein and/or renovation of any Present Improvements and/or renovation of any such additional or replacement buildings, structures, walkways, piers, bulkheads and/or other improvement, and all fixtures, equipment and other property attached thereto and/or physically incorporated therein constructed or installed on the Land after the Effective Date of the Term of this Lease ("Future Improvements" which together with the Present Improvements are hereinafter referred to collectively as the "Improvements") commonly known as the Fortescue State Marina (such Land and Improvements being hereinafter collectively referred as the "Leased Premises"). The

Leased Premises, as of the Effective Date of this Lease, are more fully and particularly described on the Lease Map, dated January 22, 1982, attached to and made a part of this Lease as Exhibit A.

There is hereby excluded from the description of the Leased Premises all that certain land owned by Landlord together with all improvements thereon comprising part of the United States Coast Guard Rescue Station. The land and improvements hereby excluded from the description of the Leased Premises are more fully and particularly described on the Map thereof dated a copy of which is attached to and made a part of this Lease as Exhibit A-1.

Landlord and Tenant hereby mutually covenant and agree as follows:

1. TERM

This Lease shall be in effect for a period of twenty (20) Calendar Years ("Term") unless sooner terminated as hereinafter provided, commencing on the Effective Date of this Lease which for the purposes hereof shall be the date on which the last of the following has occurred:

(i) this Lease has been signed on behalf of Landlord and Tenant;

(ii) the Management Plan and Annual Plan have been approved by Landlord as required under paragraph 13 hereof;

(iii) Tenant provides Landlord with satisfactory written evidence that Tenant has obtained all licenses, permits and approvals for operation of the Marina as required under paragraph 8 hereof;

(iv) the certificate of insurance required under paragraph 24 hereof is approved by Landlord;

(v) Landlord has received a current copy of Tenant's certificate of incorporation and by-laws as required under paragraph 50 hereof;

(vi) Landlord receives a certificate of standing issued by the Secretary of State's Office as required under paragraph 52 hereof; and

(vii) this Lease signed by Landlord and Tenant is dated and forwarded to Tenant.

The term "Calendar Year" shall mean a period of twelve consecutive months beginning on January 1 and ending on December 31 except with respect to the "First Calendar Year" which shall commence on the Effective Date and shall expire on December 31 of said calendar year and the "Last Calendar Year" which shall expire on the last day of the calendar year in which the term of this Lease expires.

2. USE OF LEASED PREMISES

A. Tenant shall not use or occupy the Leased Premises for any purpose other than for the improvement, management, maintenance and operation thereof as a public marina (including the berthing and storage of boats and general marine related services such as the sale and/or lease of boats, accessories, supplies, fuel, motors, trailers and other activities directly related to the operation of a public marina) in accordance with this Lease. Tenant shall not use or allow or permit others to use the Leased Premises for any purpose or in any manner other than as expressly provided herein. No use or manner of use shall be implied from the purposes expressed herein. If Tenant uses or permits or allows others to use the Leased Premises for any purpose or in any manner other than as expressly provided herein without first obtaining the express written approval thereof by Landlord, such use shall constitute grounds for termination of this Lease.

B. In the event that Tenant uses the Leased Premises or any part thereof for any purpose not authorized under this Lease, abandons or ceases to actively use the Leased Premises for the purpose described in paragraph 2A above, Landlord may terminate this Lease upon thirty (30) days written notice served upon Tenant by certified mail return receipt requested. This paragraph 2B shall not apply to the annual period from November 1 to March 31 during which Landlord and Tenant agree that the Leased Premises may not be open for operation.

3. RENT

A. Commencing on the Effective Date of this Lease, Tenant shall pay to Landlord an annual rent calculated at the rate of fifteen and two tenths percent (15.20%) of the net profits, calculated in accordance with generally accepted accounting principles, by Tenant from the fuel dock operation and fifteen and two tenths percent (15.20%) of the Total Gross Revenue (collectively hereinafter referred to as "Rent"). The term "Total Gross Revenue" as used in this Lease, shall mean the total amount computed in accordance with generally accepted accounting principles, excluding only New Jersey State Sales Tax and fuel dock revenue, from all rentals, sales, subleases and all other income from operation of the Marina. Rent shall be collected on a Calendar Year basis and shall be paid as follows:

(i) 15.20% of the Total Gross Revenue from annual berth rentals shall be paid on or before April 1 of the Calendar Year for which the berth is rented;

(ii) 15.20% of the net profit from the fuel dock shall be paid on or before February 1 for the previous Calendar Year ending on December 31; and

(iii) 15.20% of the Total Gross Revenue from all transient berth rentals, sales, subleases and all other income by Tenant from operation of the Marina shall be paid on or before March 31 for the previous year ending on December 31.

Immediately upon Tenant's receipt of monies from all operations under this Lease, the portion of said monies belonging to Landlord as Rent shall immediately vest in and become the property of Landlord and are hereby deemed to be trust funds and shall be held by Tenant as trustee for the benefit of Landlord until same are paid to Landlord.

B. Landlord shall make a determination of the total rent due for each Calendar Year as provided in paragraph 3A above based on the certified audit submitted for said Calendar Year by Tenant and prepared by a certified public accountant as provided in paragraph 14D hereof. In the event that Landlord determines that additional

rent is due, Tenant shall immediately, upon written demand by Landlord, pay such amount. Landlord may accept any amount tendered by Tenant without prejudicing Landlord's right to recover the full and correct amount which is due. Tenant waives the right to insist that any tender be accepted in full, if at all.

C. Any amount of Rent not paid on or before the date therefor set forth in paragraph 3A hereof shall be past due. All past due payments shall, as Additional Rent, be assessed a monthly penalty of one and one-half percent (1.50%) of the total amount past due calculated on the tenth day of each month.

D. All Rent shall be paid by certified check payable to "Treasurer-State of New Jersey" and shall be mailed to Landlord care of Supervisor, Office of Marina Services.

E. During the fourth Calendar Year and every four years thereafter during the Term, Landlord reserves the right to review and adjust the Rent to be paid by Tenant effective on January 1 of the immediately following Calendar Year. Any adjustment shall be to such annual rent as Landlord determines to be the then fair market rental value of the Leased Premises as indicated by, but not limited to, changes in the United States Consumer Price Index and changes in the comparable real estate values for marinas similarly situated.

4. ADDITIONAL RENT - ADVANCES BY LANDLORD

A. Where expressly provided herein, the cost of Tenant's compliance with this Lease shall constitute "Additional Rent".

B. If Tenant shall fail to make or perform any payment or any act on its part to be made or performed under this Lease, then: (i) upon Tenant's failure to make such payment within ten (10) days after Landlord gives Tenant written notice thereof, or (ii) upon Tenant's failure to perform such act within thirty (30) days after Landlord gives Tenant written notice thereof or if such act is not capable of being performed within such thirty (30) day period, upon Tenant's failure to commence to perform such act within such thirty (30) day period and proceed in good faith to diligently complete such act thereafter, or (iii) without notice to Tenant upon occurrence of any emergency situation, Landlord may (but shall not be obligated to), without waiving any default or releasing Tenant

from any obligation, make such payment or perform such act for the account and at the cost and expense of Tenant. All sums so paid by Landlord and all reasonably necessary and incidental costs and expenses (including reasonable attorney's fees and expenses) incurred in connection with the performance of any such act by Landlord, together with interest not to exceed the Prime Rate plus three percent (3%) per annum from the date of the making of such payment or of the incurring of such costs and expense by Landlord, shall be payable by Tenant to Landlord as Additional Rent.

C. The Additional Rent shall be due and payable as Rent within thirty (30) days after written demand therefor by Landlord. Nonpayment of Additional Rent gives Landlord the same rights against Tenant as if Tenant failed to pay the Rent. Tenant's obligation to pay any Additional Rent accruing during the Term of this Lease shall survive and remain a continuing obligation of Tenant after the expiration or termination of this Lease.

5. CONDITION OF PREMISES

The Leased Premises are leased to and accepted by Tenant in their present condition and without representation or warranty of any kind by Landlord including, without limitation, any representations or warranty of fitness for a particular purpose. Tenant has made a physical inspection of the Leased Premises and has found the same satisfactory for all purposes of this Lease.

6. PAYMENT OF COST

Tenant shall, at its sole cost and expense, provide all such labor, materials, supplies, equipment, personnel, administrative support and professional services sufficient to perform the purposes of this Lease in accordance with the terms and conditions hereof. It is the intention of Landlord and Tenant that Tenant shall perform all activities and otherwise comply with this Lease in a manner satisfactory to Landlord and that all costs, expenses and obligations of every kind and nature whatsoever relating to or arising from Tenant's obligations under this Lease shall be paid by Tenant.

7. USE OF REVENUE

A. Except for payment of Rent, all Total Gross Revenue by Tenant from operation of the Leased Premises (including the fuel dock) shall be used by Tenant only for the improvement, operation, maintenance and administration (including staff salaries) of the Leased Premises to achieve the intent and purpose of this Lease.

B. Tenant may, with the prior written approval of Landlord, maintain funds or accounts of monies not spent to cover anticipated expenditures in the improvement, operation, maintenance and administration of the Leased Premises. Said fund or account shall not be commingled with other funds or assets of Tenant and shall not be used for any other purpose than as herein provided.

8. COMPLIANCE WITH LAWS, LICENSES, PERMITS, AND INSURANCE

A. Tenant shall, in accordance with all federal and State statutes and rules now or subsequently in effect, obtain and maintain all licenses, permits and approvals required by federal and State authorities for the improvement, maintenance and operation of the Leased Premises as a public marina. Landlord agrees to fully cooperate with Tenant in obtaining such licenses, permits and approvals. Tenant shall provide Landlord with satisfactory documentation that all such permits and approvals now required have been obtained prior to the Effective Date of this Lease and as subsequently required.

B. Tenant shall, at its sole cost and expense, comply and shall cause the Leased Premises to comply with all federal and State laws, rules and orders affecting the Leased Premises, any part thereof, or the use thereof, including those which require the making of any structural or extraordinary changes thereto whether or not any such laws, rules or orders may involve a change of policy on the part of the governmental body enacting the same.

C. Tenant shall comply with the requirements of all policies of insurance required by this Lease which at any time may be in force with respect to the Leased Premises.

D. If Tenant is issued:

(i) a notice of failure to comply with any policy of insurance required by this Lease;

(ii) a summons or any notice of violation of any license, permit, certification, authorization, approval or other similar instruments required by any governmental authority having jurisdiction necessary to improve, maintain and/or operate the Marina; or

(iii) a summons or any notice of violation of any applicable federal or State laws, rules, and orders affecting the Leased Premises or Tenant's improvement, maintenance and operation thereof,

Tenant shall immediately forward a copy of the notice or summons to Landlord and Tenant shall have such period of time to correct said violation as is prescribed in the summons or notice. If such violation is not cured within the prescribed period or any extension thereof, it shall be deemed a material breach of this Lease and Landlord, in addition to declaring a default hereunder by Tenant, may suspend Tenant's operation of all or the affected portion of the Leased Premises until said violation is corrected or resolved to the satisfaction of the agency that issued the summons or notice. Tenant shall indemnify, defend, protect and hold harmless Landlord against all liability,claim, loss or payment of any kind arising from Tenant's failure or omission to comply with any such insurance policy, license, permit, certification, authorization, approval or any applicable federal or State laws, rules or orders.

9. PUBLIC ACCESS

A. Tenant shall make the Leased Premises available for use by the public and shall not post or permit the posting of signs or use other means of restricting public access to and use of the Leased Premises without first obtaining the express written approval thereof by Landlord. Tenant may, subject to review and written approval by Landlord, adopt reasonable regulations including the posting of "No Trespassing" signs on the piers concerning access to and use of the Leased Premises by both berthholders and the public. Such regulations shall apply equally to both berthholders and the public.

B. Tenant shall assure that the public boat ramp located on the Leased Premises is available for public use at all times during the period from April 1 to October 31.

C. Tenant shall make all facilities and programs accessible to the disabled in compliance with the Architectural Barriers Act of 1968, 42 U.S.C.A. 4151 et seq., Title VI Civil Rights Act, Section 504, Americans With Disabilities Act, 42 U.S.C.A. 12101 et seq., and the New Jersey Barrier Free Subcode, N.J.A.C. 5:23-7 et seq. all as now in effect and subsequently amended.

10. RENOVATIONS AND IMPROVEMENTS - TITLE AND ACCEPTANCE

A. Tenant shall not commence or let any contract to construct, make or install any Future Improvement on the Leased Premises including all dredging performed by Tenant under paragraph 11B hereof to maintain a minimum depth below mean low water level for the safe accommodation of vessels unless Tenant shall first obtain Landlord's written approval of design plans and specifications describing the Future Improvement. The plan shall include but not be limited to: preliminary drawings and outline specifications in form to be submitted for the purpose of obtaining building permits and other approvals required by federal and State government authorities having jurisdiction; description of Tenant's intended use of the proposed Future Improvement; schedule for the commencement and completion of the Future Improvement; and such other information that Landlord may reasonably require to determine whether the proposed Future Improvement is consistent with the purposes of this Lease. Landlord reserves the right to require that Future Improvements located on the Leased Premises be constructed or installed in such manner that they may be removed with minimum damage to the Leased Premises upon any termination or expiration of this Lease. Landlord's approval shall be granted if Landlord determines that the proposed Future Improvement is consistent with this Lease and Tenant's obligations hereunder to improve, maintain, manage and operate the Leased Premises as a public marina. As approved, said plan shall become a part of this Lease and Tenant shall not materially modify or deviate therefrom without first obtaining Landlord's express written approval.

B. Tenant shall not let any contract for any Future Improvement without first submitting to Landlord a copy of the proposed contract together with a statement of the proposed

contractor's qualifications and obtaining Landlord's written approval of the contract and contractor.

C. All contracts, plans and specifications required to be submitted to Landlord by Tenant pursuant to this paragraph 11 are submitted for the purpose of assisting Landlord through the Division of Parks and Forestry in determining whether the proposed Future Improvement is consistent with the express purposes of this Lease. Landlord's approval of any such contract or plan through the Division of Parks and Forestry shall not be construed to relieve Tenant of its responsibility to obtain and maintain all necessary licenses, permits and approvals now or subsequently required by the appropriate federal and State authorities for the construction, operation and use of the Future Improvement. Tenant shall provide Landlord with satisfactory written evidence that all such licenses, permits and approvals have been obtained prior to the construction, operation and use of the Future Improvement as appropriate.

D. Upon the issuance of all required building and other permits and approvals, Tenant shall commence the Future Improvement project in accordance with the approved plan and diligently prosecute the project by one or more general contractors and/or subcontractors. All construction shall be done in a good and workmanlike manner in accordance with the approved plan and all requisite building permits, certificates, State Construction Code requirements, and, as provided in paragraph 9C hereof, the Americans with Disabilities Act, and the New Jersey Barrier Free Subcode.

E. Landlord's approval of drawings, designs, specifications and reports in accordance with this Lease shall not in any way relieve Tenant of responsibility for the technical adequacy thereof. Tenant shall, at its sole cost and expense, correct or revise any errors, omissions, or other deficiencies in Tenant's designs, drawings, specifications and reports. Landlord's review, approval or acceptance of any of the plans and/or work shall not be construed as a waiver of any rights under this Lease or any cause of action arising out of the performance of this Lease.

F. For any Future Improvement project undertaken as a single project and involving an estimated cost aggregating more than Twenty Thousand ($20,000.00) Dollars, Tenant shall:

(i) provide to Landlord, as security for the satisfactory completion of the construction of the project in form and substance reasonably satisfactory to Landlord, a corporate surety bond of a corporate surety company satisfactory to Landlord in the amount of 100% of the cost of construction of the project naming Landlord as obligee; and

(ii) provide to Landlord a labor and material payment bond of a corporate surety company satisfactory to Landlord and meeting the requirements of N.J.S.A. 2A:44-143 providing for the prompt payment for materials, supplies, labor, services and equipment, naming Landlord as obligee in form and substance reasonably satisfactory to Landlord.

G. Prior to the commencement of any Future Improvement project, Tenant shall deliver to Landlord policies of insurance or certificates thereof showing that Tenant and/or Tenant's contractor and subcontractors have obtained insurance coverage during the period of construction as follows:

(i) Completed Value Builders Risk Insurance with standard fire and extended coverage and to the extent that insurance against any additional risk is obtainable at standard rates, "all-risk" extended coverage endorsement; and

(ii) Contingent Liability and Comprehensive General Public Liability Insurance with a contractual liability endorsement (including insurance with respect to owned or operated motor vehicles) with aggregate limits of not less than $1,000,000.00 with respect to bodily injury, death or property damage for any one accident; and

(iii) Worker's Compensation and Employer's liability insurance providing the type of coverage and in the amounts required by the Laws of the State of New Jersey now or subsequently in effect.

Landlord reserves the right to increase the amount of insurance coverage and/or require types of insurance coverage in addition to

those amounts and types of coverage required above in light of the nature of the work involved in the Future Improvement and standard State contracting requirements at the time of the Future Improvement. All insurance coverage required under this subparagraph shall be obtained and maintained in compliance with the requirements of paragraph 24 of this Lease.

H. All Future Improvements made without Landlord's written consent shall, unless otherwise determined by Landlord in Landlord's sole discretion, be removed by Tenant on Landlord's demand. Tenant shall, at Tenant's sole cost and expense, repair any damage to the Leased Premises caused by Tenant's construction and removal of any unauthorized Future Improvement.

I. All Future Improvements constructed or installed on the Leased Premises by Tenant shall, upon completion in accordance with the approved plans therefor and the requirements of all government authorities having jurisdiction and Landlord's acceptance thereof as provided in paragraph 10B hereof, become the property of Landlord as part of the Leased Premises without compensation to Tenant free and clear of all liens and encumbrances.

J. Upon completion of the construction or installation of any Future Improvement, Tenant shall, as a condition precedent to acceptance thereof by Landlord and Tenant's use thereof as part of the Leased Premises, deliver to Landlord:

(i) a certificate signed by Tenant's architect to the effect that in the course of his observation of construction, nothing has come to his attention which would lead to the belief that such Future Improvement has not been completed in substantial conformance with the approved design plans and specifications and in accordance with the requirements of public authorities having jurisdiction;

(ii) copies of such permanent certificates of occupancy as shall be necessary for the use and occupancy of the Future Improvement;

(iii) copies of the final and complete waiver by Tenant's general contractor and its subcontractors of their rights

to file or assert a mechanic's lien against the work and/or any part of the Future Improvement; and

(iv) one (1) complete set of reproducible "as-built" or record drawings of the Future Improvement.

K. If Tenant cannot document that a Future Improvement was constructed in accordance with the requirements of all governmental authorities having jurisdiction, said Future Improvement shall, at Tenant's sole cost and expense, be removed by Tenant on Landlord's demand. Tenant shall, at Tenant's sole cost and expense, repair any damage to the Leased Premises caused by Tenant's construction and removal of said Future Improvement.

11. MAINTENANCE, REPAIRS, REPLACEMENTS AND UTILITIES

A. Tenant shall, at its sole cost and expense, be completely responsible for all maintenance, repairs and replacements on the Leased Premises. Tenant shall, as Additional Rent, pay the cost of all utility service to the Leased Premises. Tenant shall deliver up peaceable possession of the Leased Premises to Landlord upon expiration or termination of this Lease in at least as good a condition as it was delivered at the commencement of the Term. Landlord shall not be required to maintain the Leased Premises or Improvements or repair or replace any Improvement, utility system or equipment located on the Leased Premises.

B. Tenant shall, at all times during the Term of this Lease, keep and maintain the Leased Premises including all Improvements, utility systems and equipment thereon in good repair and condition. Tenant's responsibility to maintain the Leased Premises in good repair and condition requires Tenant to minimize, so far as is practicable, the affects from age, use and damage. Tenant shall promptly make all structural and nonstructural, and ordinary and extraordinary maintenance, replacements and repairs of every kind which may be required to be made upon or in connection with the Leased Premises or any part thereof including, without limitation, the installation, repair and replacement of all utility systems, and such dredging as may be necessary to maintain a minimum depth below mean low water level for the safe accommodation of vessels, the monitoring, repairing and replacement of any pier structures included in the Leased Premises from time to time, the repair and replacement of concrete aprons, perimeter walls, bulkheads and

fender systems and/or substructure of any such piers, the monitoring, repair and replacement of pilings and pile caps, and the repair and replacement of damaged piles around the perimeter of each such pier in order to keep and maintain the Leased Premises in good repair and condition. Landlord shall not be required to maintain the Leased Premises or maintain, alter, repair, rebuild or replace any Improvements comprising part of the Leased Premises and Tenant, except as otherwise expressly provided for in this Lease, expressly waives any right to make repairs to the Leased Premises at the expense of Landlord which may be provided for in any law now in effect or hereafter enacted.

C. Tenant shall keep the Leased Premises including all Improvements comprising a part thereof and all water areas within the Leased Premises clean, neat and well maintained, shall keep all walkways then in use within the Leased Premises reasonably free and clear of ice and snow, shall keep the Leased Premises reasonably neat, clean and free of trash, shall maintain adequate numbers of trash receptacles around the Leased Premises and empty the same on a periodic basis as required, shall be responsible for and pay the cost of collection and disposal of all garbage, trash and debris from the Leased Premises, and shall keep the grass mowed, all shrubbery trimmed and all gardens reasonably free of weeds. Any trash areas on the Leased Premises shall be separately fenced and screened and trash shall be kept in metal dumpsters with lids or other approved receptacles which are rodent proof and reduce odor. Tenant shall participate in and comply with all applicable State and local recycling programs.

D. Tenant's responsibility for the maintenance of that part of the Leased Premises designated as Garrison Avenue and Creek Road shall be limited to routine maintenance which shall consist of the implementation of procedures approved as part of the Management Plan to inspect the pavement and perform repairs commonly required and made to assure the normal useful life of the pavement. Upon the expiration of the normal useful life of the pavement and in the event that Landlord determines that such work is necessary, Landlord shall, subject to the availability of sufficient funds specifically appropriated therefor, be responsible for resurfacing Garrison Avenue and Creek Road and the performance of necessary work incident thereto.

E. As part of the Management Plan required under paragraph 13 hereof, Tenant shall submit a detailed replacement and maintenance schedule for the Leased Premises. The schedule shall include but not be limited to a description of the replacement and maintenance projects necessary to keep the Leased Premises in good repair and condition, the approximate schedule for the commencement and completion of each project, and cost estimates for each project.

F. Tenant shall appropriate sufficient funds in each annual budget to meet its annual and on-going replacement and maintenance obligations under this Lease.

G. In the event that the Leased Premises are not maintained in good condition, order or repair or not reasonably clean, neat and well maintained by Tenant to the reasonable satisfaction of Landlord, Landlord may, subject to the availability of sufficient funds specifically appropriated therefor, proceed to perform the necessary maintenance, repairs or replacements after notice to Tenant. Said notice shall describe the maintenance, repairs or replacements to be undertaken and shall give Tenant a period of thirty (30) days from receipt of the notice to commence the maintenance, repairs or replacements and such additional period of time as is reasonably necessary to complete the work. If Tenant does not commence and complete the maintenance, repairs or replacements within the period above provided, Landlord may proceed to complete the work, and in such event, Tenant shall pay to Landlord as Additional Rent, upon Landlord's demand, the full costs incurred by Landlord in performing such maintenance, repairs or replacements.

H. The agreements and covenants contained in this paragraph 11 shall inure to the benefit of Landlord and Tenant and be binding upon the respective parties hereto and their successors and assigns only. In no event shall the breach of any such agreement and/or covenant be enforceable by or in way deemed to inure to the benefit of or create a right for or on behalf of members of the public or any third party except Landlord and Tenant.

12. STAFF

Tenant shall, at all times during the Term of this Lease, engage a sufficient number of reliable, competent and qualified

personnel of legal age for operation and management of the Marina. The competence, qualifications, and salary for each position shall be established as part of the Management Plan required under paragraph 13 hereof.

13. MARINA MANAGEMENT

A. Prior to the Effective Date of this Lease, Tenant shall submit to Landlord a plan for the improvement, management, maintenance and operation of the Marina during the first five year period of the Term ("Management Plan") and obtain Landlord's written approval thereof. Prior to the expiration of the fourth year of the first five year period and the fourth year of each succeeding five year period during the Term of this Lease, Tenant shall submit to Landlord and obtain Landlord's written approval of a Management Plan for the immediately following five year period. The Management Plan shall include but not be limited to:

(i) an organizational plan for the operation of the Marina which shall include a description of the staff and the duties, qualifications and salary for each position;

(ii) total number of berths in the Marina, number and location of berths in each size category, and allocation of berths among seasonal, transient and other categories of usage;

(iii) description of marina-related services to be provided to the public and location at which such services will be provided;

(iv) hours of operation of the Marina including the hours that each marina-related service will be available;

(v) security plan and emergency procedures;

(vi) maintenance schedule;

(vii) form of berth permit to be issued to all berthholders; and

(xi) other general operating procedures.

In addition, the Management Plan shall include a capital improvement plan which shall include:

(i) annual schedules and description of maintenance;

(ii) annual estimate of labor and material costs;

(iii) annual schedule and description of replacements and replacement costs; and

(iv) Tenant's preventive maintenance policy including inspection frequency and procedures for carrying out repairs.

Each category of the capital improvement plan shall include the assumptions underlying Tenant's estimates of replacement and maintenance costs such as an estimate of the usable lifetimes of waterside and upland facilities, cost per square foot of dock replacement, and the cost of maintaining and replacing utilities and marine service equipment. The capital improvement portion of the Management Plan shall structure Tenant's planned level of on-going replacement and maintenance of the Marina.

B. Landlord shall approve the Management Plan provided that Landlord determines that it implements Landlord's requirements hereunder and is consistent with Tenant's obligation under this Lease to improve, maintain, manage and operate the Leased Premises as a public marina. Landlord reserves the right to approve the Management Plan with such conditions that Landlord reasonably determines are necessary to achieve the intent and purpose of this Lease. Such conditions of approval shall be incorporated in and made a part of the approved Management Plan. As approved by Landlord, the Management Plan shall be attached to and made a part of this Lease as Exhibit B. Tenant shall not amend, modify, change or deviate from an approved Management Plan without first obtaining the express written approval of Landlord. Landlord and Tenant shall meet at least every six (6) months to evaluate the Management Plan, Tenant's compliance with this Lease, and to discuss any proposed amendments of the Plan. In the event that a Management Plan is not approved within the period herein provided, Landlord may declare Tenant in default and proceed to terminate this Lease.

C. Prior to the Effective Date of this Lease, Tenant shall submit to Landlord an annual plan for implementation of the Management Plan ("Annual Plan") during the First Calendar Year and obtain Landlord's written approval thereof. On or before October 1 of the First Calendar Year and annually thereafter, Tenant shall submit to Landlord an Annual Plan for the immediately following Calendar Year and obtain Landlord's written approval thereof prior to commencement of said Calendar Year. The Annual Plan shall include:

(i) a description and estimated cost of Future Improvements, if any, and maintenance and replacements planned for the Calendar Year;

(ii) schedule for commencement and completion of each project described under (i) above;

(iii) description of marina related services to be provided and a schedule of fees to be charged for each service;

(iv) description of products to be offered for sale and a schedule of prices to be charged for the products;

(v) berth rental rate schedule as required under paragraph 15C hereof; and

(vi) an annual budget for operation of the Marina as required under paragraph 14 hereof.

The annual plan shall be approved by Landlord based on Landlord's determination that the submitted plan is consistent with the Management Plan and this Lease. The proposed schedule of prices to be charged for products shall be approved by Landlord based on Landlord's reasonable determination that the proposed schedule complies with paragraph 16B hereof. Landlord shall approve the proposed fee schedule for marina related services based on a reasonable determination that such fees are comparable to the fees charged for those services at similar marinas operating in the Delaware Bay area of New Jersey. Landlord shall approve the berth rental rate schedule based on a reasonable determination that the proposed schedule complies with paragraph 15C hereof. In the sole discretion of Landlord, Tenant's failure to submit an Annual Plan or obtain Landlord's approval thereof as herein provided may be

grounds for suspension of Tenant's operation of the Marina pending submission of an Annual Plan acceptable to Landlord or constitute a default by Tenant hereunder. As approved the Annual Plan shall become a part of this Lease by reference and Tenant shall not materially modify or deviate from said approved plan without first obtaining the express written approval thereof by Landlord. Landlord's approvals under this subparagraph 13C shall not be unreasonably withheld or delayed.

D. Tenant shall operate the Marina in accordance with this Lease and consistent with all statutes enacted by the State Legislature and department regulations and policies now or hereafter duly promulgated by Landlord with respect to the operation of State owned marinas including but not limited to: allocation of berths, retention of transient slips, public posting of berth application lists and berth permit issuance criteria. Landlord shall provide Tenant with such regulations and policies subsequently promulgated by Landlord.

E. Any proposed operational change affecting the public use of the Marina shall be subject to the review and written approval by Landlord prior to implementation. Said approval by Landlord shall not be unreasonably withheld or delayed.

14. ANNUAL BUDGET RECORDS AND ACCOUNTING

A. As part of the Annual Plan required under paragraph 13C hereof, Tenant shall submit an annual budget for the Calendar Year covered by the Plan. Said budget shall contain but not be limited to:

(i) projected income from berth rentals, fuel dock, transients, subleases and all other sources of income from operation of the Marina;

(ii) an itemized description and estimated costs including staff salaries to be incurred in the maintenance, operation and improvement of the Marina;

(iii) an itemized appropriation of funds for all anticipated maintenance, operation and improvement of the Marina.

Said budget shall demonstrate that Tenant has the financial capability and has made the appropriate commitment to meet its obligations under this Lease.

B. On or before April 15, July 15, October 15, and January 15 of each year during the Term of this Lease, Tenant shall submit to Landlord a written statement which shall, for the previous three (3) month period, itemize the Total Gross Revenue by Tenant from operation of the Marina, total net profit by Tenant from operation of the fuel dock, and itemize the costs incurred by Tenant in the maintenance, improvement and operation of the Marina in accordance with this Lease. Said Statement shall be certified by the Treasurer of the Fortescue Captains and Boat Owners Association.

C. Tenant shall maintain records that will allow Tenant to prepare financial statements in accordance with generally accepted accounting principles. Such records shall, at all times during the Term of this Lease and for a period of three (3) years after the expiration or termination hereof, be made available for audit by an authorized representative of Landlord, to determine the effectiveness of the financial management system and internal control procedures that have been established to meet the terms and conditions of this Lease and that the accounts and statements present fairly the results of Tenant's operations pursuant to this Lease. Tenant shall implement all financial management systems and internal control procedures required by Landlord based upon any such audit.

D. Tenant shall on or before March 31 after the end of each Calendar Year submit to Landlord a complete annual audit for said Calendar Year prepared by a certified public accountant which expresses an opinion of:

(i) the effectiveness of the financial management system and internal control procedures that have been established to meet the terms and conditions of this Lease;

(ii) whether Tenant's accounts and financial statements present fairly the results of Tenant's operations under this Lease;

(iii) the amount of Total Gross Revenue excluding State of New Jersey Sales Tax and fuel dock revenue by Tenant from operation of the Marina:

(iv) net profit by Tenant from operation of the fuel dock; and

(v) whether the amount of Rent paid is the total amount due under paragraph 3 hereof.

Tenant shall implement all financial management systems and internal control procedures required by Landlord based upon any such audit.

E. Tenant, its subtenants, contractors and subcontractors, shall provide Landlord through any authorized representative reasonable access to and the right to examine all records, books, papers or documents reasonably related to Tenant's possession, occupation and use of any part of the Leased Premises, and any project, services and work being performed pursuant to any contract or subcontract. Proper facilities shall be furnished for access and inspection.

15. BERTH APPLICATION, FEES AND USE

A. Tenant shall not discriminate against any applicant for a berth in the Marina on the basis of national origin, race, color, sex, sexual preference or handicap and shall not require that membership in the Fortescue Captains and Boat Owners Association, Inc. be a prerequisite for submission and acceptance of an application for a berth. Tenant may, subject to written approval of Landlord, charge an application fee. As approved, said application fee shall be uniformly charged and shall not be revised without the prior written approval of Landlord.

B. Tenant shall issue berth permits from publicly posted priority waiting lists developed from written applications in the chronological order received by Tenant. Waiting lists shall be maintained in two categories: New Jersey residents and non-residents with New Jersey residents having complete priority over non-residents in the issuance of berth permits. Tenant shall publicly post and update the applicant waiting lists monthly and shall submit updated lists of resident and non-resident applicants to Landlord quarterly during each Calendar Year.

C. Tenant shall annually establish its berth rental rates to be competitive with similar marinas in the Delaware Bay area of New Jersey and to provide sufficient funds for Tenant to manage, improve, maintain and operate the Marina in accordance with this Lease. As part of each Annual Plan required under paragraph 13C hereof, Tenant shall submit to Landlord a proposed berth rental schedule for the immediately following Calendar Year for review and written approval by Landlord. As part of the proposed schedule, Tenant shall provide documentation that the proposed rental rates are competitive with rates charged by comparable marinas operating in the Delaware Bay area of New Jersey. Landlord's approval of the proposed schedule shall be based upon its reasonable determination that the proposed berth rental rates are so competitive and provide sufficient funds for Tenant to manage, improve, maintain and operate the Marina in accordance with this Lease. Landlord may conduct a public hearing on the proposed berth rental rates prior to granting or denying approval.

D. The berth permit form and conditions shall be approved by Landlord in writing prior to issuance by Tenant. In the event that Tenant proposes to change the form or conditions of the berth permit, Tenant shall submit the proposed change to Landlord for approval as part of its annual submission of the proposed berth rental rates. As approved by Landlord, the changed permit form or condition shall be effective for the immediately following Calendar Year.

E. The issuance of berth holding permits for the following purposes is prohibited:

(i) long term (in excess of one (1) year) berth leasing;

(ii) berthing of domicile type units including but not limited to, powered and unpowered house type craft specifically designed for dockside living on other than a transient basis;

(iii) "condominium" type berth leasing;

(iv) leasing of berth sites for use as water sport activity centers such as but not limited to, waterskiing and parasailing unless specifically approved by Landlord; and

(v) berthing of vessels to be used in "time sharing" ventures.

F. On or before May 15 of each year, Tenant shall submit to Landlord a list of the berth holders of record for the summer season. On or before November 30 of each year, Tenant shall submit to Landlord a list of the berth holders of record for the winter season. Each list shall include the name of each berth holder of record, berth number, and boat name and registration number.

G. Tenant shall not evict any seasonal or annual berth holder from the berth holder's designated berth without first obtaining Landlord's written approval thereof which approval shall not be unreasonably withheld or delayed.

16. SALE OF PRODUCTS AND SERVICES

A. Tenant shall be permitted to sell or allow the sale of products and services on or from the Leased Premises that are consistent with the operation of a public marina under the terms and conditions of this Lease. Tenant shall submit to Landlord a written description of each product and service to be offered for sale and obtain Landlord's written approval before the product or service is offered. Tenant shall not substitute a materially different product or discontinue an approved service without first obtaining Landlord's written approval. Tenant shall sell only products and services of good quality and shall at all times be completely responsible for and shall obtain and maintain sufficient inventories to meet the needs of the public.

B. Tenant shall submit proposed prices to be charged for all products and services in writing to Landlord and obtain Landlord's written approval (which approval shall not be unreasonably withheld or delayed) thereof before the proposed price can be effective. Tenant shall submit all proposed price increases to Landlord and obtain Landlord's written approval thereof before the price increase can become effective. At no time shall the prices charged for any product or service offered for sale on or from the Leased Premises exceed the fair market value for similar products and services. All prices shall be prominently displayed and properly sized to be easily read by patrons at all times.

17. TAXES AND ASSESSMENTS

Tenant shall as Additional Rent promptly pay when due all taxes and assessments, together with interest and penalties thereon, which are levied upon or assessed with respect to the Leased Premises and/or the leasehold estate hereby created. Immediately upon receipt of any such tax bill or assessment, Tenant shall forward a copy of same to Landlord. If any assessment is made or any tax is levied against the Leased Premises or leasehold estate which may be legally paid in installments, Tenant shall have the option to pay such tax or assessment in installments, except that each installment thereof, and any interest thereon, shall be paid by the final date fixed for the payment thereof, and the whole amount thereof shall be paid prior to the expiration or termination of the Term of this Lease. Within thirty (30) days following the due date for payment of any such tax, assessment or installment thereof, Tenant shall submit to Landlord a receipt, canceled check or such other evidence required by Landlord documenting that such tax, assessment or installment has been paid in a timely manner as above provided. In the event that such tax or assessment is not paid in full prior to the expiration or termination of the Term of this Lease, the payment thereof shall remain a continuing obligation of Tenant after the expiration or termination of this Lease.

18. SUBLEASES FOR MARINA RELATED SERVICES

A. Tenant shall, subject to the written approval of Landlord, be permitted to enter into subleases, concession agreements or other agreements (hereinafter collectively referred to as "Subleases") for the purpose of providing the public with marina related services. Prior to any Sublease, Tenant shall notify the prospective sublessee in writing that the Sublease cannot be executed without first obtaining the express written approval thereof by Landlord. Notwithstanding any subletting, Tenant and any guarantor of Tenant's obligations under this Lease shall at all times remain fully responsible and liable for the payment of any Rent herein specified and for compliance with all of Tenant's other obligations under this Lease.

B. Any subletting under paragraph 18A hereof shall be made upon the following terms and conditions:

(i) Tenant shall give Landlord at least thirty (30) days prior written notice of any proposed Sublease together with a copy of the proposed Sublease representing the complete agreement between Tenant and the sublessee; the name and address of all officers of the sublessee; a description of the Marina facilities to be occupied; plans and specifications for any proposed renovation or improvement of said facilities; and the type of marina related services to be provided. Without limitation, Landlord's approval shall be conditioned upon the sublessee agreeing to: pay fair market rent to Tenant; indemnify, protect and save harmless Landlord; and obtain liability, product liability, contents and property damage insurance covering the facilities to be occupied and the services to be furnished in such minimum amount for each occurrence as shall be reasonably determined by Tenant and approved by Landlord with Tenant and Landlord being named as additional insureds thereunder.

(ii) There shall be no default by Tenant under any of the terms, covenants and conditions of this Lease at the time that Landlord's approval of any such subletting is requested and on the date of the commencement of any such Sublease.

(iii) Upon receiving Landlord's written approval, a duly executed copy of the Sublease together with a certificate of insurance documenting that the sublessee has obtained such insurance coverage as shall be prescribed shall be delivered to Landlord within ten (10) days after execution thereof. Any such Sublease shall provide that the sublessee shall comply with all applicable terms and conditions of this Lease to be performed by Tenant. Tenant shall be responsible for assuring sublessee's compliance with this Lease. Any violation of this Lease by sublessee shall, in the discretion of Landlord be deemed a material breach by Tenant.

(iv) In no event shall any permitted sublessee assign its Sublease or further sublet all or any portion of its sublet space without Landlord's prior written consent.

(v) Prior to the commencement of any improvement to and any use or occupancy of the sublet space, Tenant shall deliver to Landlord satisfactory written documentation that all licenses, permits and approvals have been obtained from all federal and State authorities having jurisdiction.

(vi) The term of any Sublease shall not exceed a period of one (1) year and shall not extend beyond the expiration or termination of this Lease.

C. Landlord's approval of any proposed Sublease shall be granted provided that Landlord, in its reasonable discretion, determines that:

(i) the business reputation, financial standing, operational experience and the type of business or style of operation of the proposed sublessee is satisfactory;

(ii) the proposed marina related service is consistent with this Lease and the operation of the Leased Premises as a public marine facility;

(iii) the proposed renovation or improvement of facilities within the Leased Premises is consistent with this Lease and the operation of the Marina as a public marine facility; and

(iv) the terms and conditions of the Sublease are consistent with this Lease.

The sublessee shall be required to occupy and use the facilities described in the Sublease subject to compliance with all applicable terms and conditions set forth in this Lease and Tenant shall require and use reasonable good faith efforts to ensure that the sublessee complies with the Sublease and all applicable terms and conditions of this Lease. Each Sublease shall provide that the failure of the sublessee to comply with all applicable terms and conditions of this Lease and/or any material term or condition of the Sublease shall constitute grounds for termination of the Sublease. In the event of such failure to comply or material violation, Landlord shall give Tenant written notice of Landlord's requirement and demand that Tenant use reasonable good faith

efforts within the period specified in said notice to correct said failure to comply or to terminate the applicable Sublease. If Tenant fails to use reasonable good faith efforts to correct said failure to comply or material violation within the notice period, the same shall constitute a default by Tenant under this Lease.

D. Any consent given by Landlord to a particular Sublease shall not constitute a waiver of the necessity for Tenant to obtain Landlord's approval of any subsequent Sublease.

E. The provisions of this paragraph 18 are intended to authorize Tenant to enter into agreements for the purpose of providing specific marina related services in specific defined areas of the Leased Premises. It does not authorize Tenant to and Tenant expressly agrees that Tenant shall not sublease all or any part of the Leased Premises or enter into any agreement with another party the effect of which is to attempt to cause any other party or entity to perform Tenant's primary obligations under this Lease to manage, improve, maintain and operate the Leased Premises in accordance with the terms and conditions of this Lease. In the event of any such unauthorized sublease, this Lease shall automatically become null and void as of the date of such sublease.

19. ASSIGNMENT

A. Tenant shall not assign or transfer this Lease or Tenant's responsibilities under this Lease or the operations authorized hereunder, nor sell, or otherwise assign or transfer a controlling interest in such operations or Tenant's ownership (hereinafter collectively referred to as an "Assignment") without first obtaining the express written approval thereof by Landlord which approval shall be given provided that Landlord, in its discretion and in addition to other considerations described below, determines that the business reputation, financial standing, operational experience and the type of business or style of operation of the proposed assignee is satisfactory. For the purposes of this Lease, the term "controlling interest" shall mean an interest beneficial or otherwise of sufficient outstanding voting securities or capital of Tenant so as to permit exercise of substantial managerial influence over the operations of Tenant. Landlord will determine whether or not an interest in Tenant constitutes a controlling interest. Prior to any Assignment, Tenant shall notify the prospective assignee in writing that the

Assignment cannot be executed without first obtaining the approval of Landlord. Tenant shall request in writing Landlord's approval of the proposed Assignment and shall include with said request all relevant documents related to the Assignment and the names and qualifications of the proposed assignee. Such Assignment shall be in writing and Tenant shall furnish Landlord with a copy of same and an agreement in writing wherein the assignee assumes and agrees to be jointly and severally, directly and primarily liable with Tenant to keep, observe and perform all of the covenants, conditions and obligations to be kept, performed and observed under this Lease on the part of Tenant. Tenant and any guarantor of Tenant's obligations under this Lease shall at all times remain fully responsible and liable for the payment of the Rent herein specified and for compliance with all of Tenant's other obligations under this Lease. There shall be no assignment if Tenant is in default under any of the terms and conditions of this Lease at the time that Landlord's approval of any such assignment is requested and on the effective date of such assignment. Any assignment executed without first obtaining the express written approval thereof by Landlord shall be null and void and shall constitute grounds for termination of this Lease.

B. Landlord, in exercising the discretionary authority set forth herein, shall, among other matters, take into consideration the management qualifications of the person(s) or entities which would thereby obtain an interest in the Leased Premises, the experience of such individuals or entities with marina operations, and the ability of such individuals or entities to operate the Leased Premises in the public interest. In the review of any proposed Assignment, Landlord reserves the right to require the proposed assignee to demonstrate compliance with or the ability to comply with the requirements of this Lease. No Assignment shall become effective without first obtaining the written approval of Landlord as to the terms and conditions thereof and the ability of the proposed assignee. In approving any Assignment, Landlord reserves the right to set conditions based upon a consideration of the qualifications and the financial ability of the proposed assignee to perform the obligations of tenant under this Lease. Without limitation, Landlord's discretionary approval shall be based upon Landlord's determination that the assignment does not alter the rights, obligations and liabilities of Landlord and Tenant under this Lease. In the event that Landlord consents to the assignment, Tenant shall pay to Landlord any profit or gain

realized by Tenant from the assignment. All sums payable hereunder by Tenant shall be paid to Landlord as Additional Rent upon receipt thereof by Tenant.

C. Any consent given by Landlord for a particular assignment shall not constitute a waiver of the necessity for such consent to any subsequent assignment. In each instance of a permitted Assignment, a duplicate original or a certified copy thereof in recordable form shall be delivered to Landlord within ten (10) days after execution, together with an agreement duly signed and acknowledged by the assignee assuming full, faithful, and due performance of all the terms, covenants, and conditions of this Lease and upon the delivery of such assignment and assumption agreement, all liabilities and obligations on the part of the Tenant accruing after such Assignment shall terminate and, upon the effective date of such Assignment and thereafter, all liabilities and obligations accruing thereafter shall be binding upon the assignee.

D. The assignment or divestiture by Tenant of its leasehold interest in this Lease shall not relieve Tenant of any obligations and liabilities, actual or contingent, accruing under this Lease on or prior to the date of such assignment or divestiture.

20. SECURITY

Tenant shall, at it sole cost and expense, be responsible for providing security at the Leased Premises against, including but not limited to, burglary, fire, theft, vandalism, malicious damage, and unauthorized entry. Landlord shall have no obligation to Tenant for the security of the Leased Premises, and shall not be responsible to Tenant, its agents, contractors, guests, employees, or invitees express or implied, or any other person on the Leased Premises for any loss, damage or injury to persons or loss, damage, injury or destruction of buildings, equipment or personal property on the Leased Premises.

21. SIGNS AND ADVERTISEMENTS

Tenant shall not post, paint, display or permit or otherwise allow any signs or advertisements to be painted, posted or displayed on or about the Leased Premises without first obtaining the express written approval thereof by Landlord.

22. PROMOTION OF MARINA

A. Tenant shall, in all signs, literature, promotion and advertisement of the Marina and any scheduled events at or pertaining thereto, provide that the Marina is a State-owned marina administered by the State of New Jersey, Department of Environmental Protection, Division of Parks and Forestry. Signs shall be posted on the Leased Premises identifying the Marina as being owned by the State of New Jersey and open to the public under the management of Tenant.

B. Tenant shall, prior to implementation, submit to and obtain Landlord's written approval of all plans for promotion and advertisement of the Marina and any scheduled events at or pertaining thereto.

23. INDEMNIFICATION

A. Tenant shall, for itself, its successors and assignees, assume all risks and liabilities arising out of the improvement, maintenance, operation, and use of the Leased Premises. Tenant covenants to defend, protect, indemnify and save harmless Landlord and hereby releases Landlord and each of its officers, agents, employees, successors and assignees from and against any and all such liabilities, losses, damages, costs, expenses (including reasonable attorney's fees and expenses), causes of actions, suits, claims, demands or judgments of every nature arising from or claimed to arise from in whole or in part:

(i) any injury to or death of any person in or on or any damage to property which occurs in, on or about the Leased Premises or upon any sidewalk, walkway, dock or pier within the Leased Premises or in any manner growing out of or connected with the use, non-use, condition or occupancy of the Leased Premises, or any part thereof, or construction or repair of any Improvements on the Leased Premises;

(ii) violation of any agreement or condition of this Lease by Tenant, it agents, employees, contractors, invitees express or implied, and anyone claiming by or through Tenant;

(iii) violation by Tenant of any contracts and agreements of record concerning the Leased Premises and restrictions of record and/or any law or regulation affecting the Leased Premises, the Marina, or any part thereof and/or any law or regulation affecting Tenant's corporate operations; and

(iv) any act, error or omission by Tenant, its agents, employees, contractors, invitees express or implied, and anyone claiming by or through Tenant in the performance of this Lease.

B. Landlord shall, as soon as practicable after a claim has been made against it, give written notice thereof to Tenant, along with full and complete particulars of the claim. If a suit is brought against Landlord or any of its agents, servants and/or employees, Landlord shall expeditiously forward or have forwarded to Tenant every demand, complaint, notice, summons, pleading, or other document received by or then in the possession of Landlord or its representatives.

C. It is expressly agreed and understood that any approval by Landlord of the work performed and/or reports, plans and specifications provided by Tenant shall not operate to limit the obligations of Tenant assumed pursuant to this Lease.

D. Tenant's liability pursuant to this paragraph shall continue after the termination or expiration of this Lease with respect to any liability, loss, expense or damage resulting from acts, errors or omissions occurring prior to such termination or expiration.

E. Tenant's indemnification obligations are not limited by, but are in addition to, the insurance obligations contained in this Lease.

F. Any injury which shall occur to Tenant, its employees, agents, contractors or invitees express or implied requiring medical intervention of which Tenant shall be aware, shall be reported to Landlord in writing within twenty-four (24) hours of the incident.

24. INSURANCE

A. Tenant shall, at its sole cost and expense, obtain and maintain at all times during the Term of this Lease and require all of its sublessees (including but not limited to any person providing any service and/or conducting any activity on the Leased Premises) to secure and maintain in force at all times during the provision of any service and/or conduct of any activity as part of Tenant's operation of the Marina, insurance on the Leased Premises of the types and in the amounts hereinafter provided:

(i) Comprehensive general liability insurance as broad as the standard coverage form currently in use in the State of New Jersey which shall not be circumscribed by any endorsements limiting the breadth of coverage (including coverage for product liability, protection and indemnity, pollution, Tenant owned or operated motor vehicles, broad form contractual liability, completed operations and broad form property damage endorsements) against claims for bodily injury, death or property damage occurring on, in or about the Leased Premises. Limits of liability shall be such amounts as Landlord may reasonably require, considering such amounts as are customarily at the time maintained by owners of commercial developments of a size and character similar to that of the Marina, but in any event not less than $2,000,000.00 with respect to bodily injury, death or property damage combined single limit per occurrence.

(ii) Property insurance to cover loss or damage on an "All Risk" of physical loss form of coverage including but not limited to collapse, loss or damage occasioned by fire, the perils included in the so-called extended coverage endorsement, flood, (as to the extent available), earthquake, vandalism and malicious mischief, and water damage and containing Replacement Cost, Agreed Value and Improvements and Betterments endorsements covering the Leased Premises and all Future Improvements now or hereafter located on the Leased Premises, including all buildings and similar structures and all replacements and additions thereto, and all fixtures, equipment and other property attached thereto and/or physically incorporated therein, the foregoing coverage to be provided in amounts

sufficient to provide one hundred (100%) percent of the full replacement cost of the Leased Premises and any Future Improvements subject to a deductible provision not in excess of $25,000.00 provided, however, that Tenant shall be responsible for any and all claims as though there was no deductible. Said policy shall be written so as to provide that the insurer waives all right to subrogation against either Landlord or Tenant in connection with any loss or damage covered by the policy. Said policies shall provide that losses thereunder shall be paid as provided in paragraph 25 hereof.

(iii) Marina Operator's liability insurance with limits of not less than $2,000,000.00 with respect to bodily injury, death or property damage for any one accident as a combined single limit.

(iv) Worker's compensation and employer's liability insurance of the type and in the amounts required by the Laws of the State of New Jersey now or subsequently in effect.

(v) Such other insurance, and in such amounts as may from time to time be reasonably required by Landlord against other insurable hazards which at the time are commonly insured against in the case of marinas similarly situated.

B. The insurance required under paragraph 24A above shall be issued by insurance companies authorized and approved to conduct business in the State of New Jersey and shall name the State of New Jersey, Department of Environmental Protection as an additional insured.

C. Prior to the Effective Date of this Lease, Tenant shall submit to Landlord Certificates of Insurance in form and substance satisfactory to Landlord as evidence that Tenant has obtained insurance coverage in accordance with this Lease. Said Certificates shall include a certification signed by Tenant's insurance agent or broker stating as follows: "I certify that I have reviewed the insurance specifications of the Lease for which this certificate is issued and that the insurance contracts identified herein meet all of said specifications."

D. The Certificates of Insurance shall provide for thirty (30) days notice in writing to Landlord prior to any cancellations, expiration, or non-renewal during the term the insurance is required to be maintained in accordance with this Lease. Tenant shall provide Landlord with valid Certificates of Renewal upon the expiration of the policies so that Landlord is in continuous possession of documentation that Tenant has at all times obtained and maintained all insurance coverage required under this Lease. Tenant shall, upon request, provide Landlord with copies of each policy required under this Lease certified by the agent or underwriter to be true copies of the policies provided to Tenant.

E. In the event that Tenant fails or refuses to renew any of its insurance policies to the extent required by this Lease, or any policy is canceled, terminated, or modified so that the insurance does not meet the requirements of this Lease, Landlord shall immediately suspend all of Tenants operations on the Leased Premises until Tenant obtains insurance coverage in satisfactory form in compliance with this Lease or proceed to default Tenant and terminate this Lease.

F. The limits of insurance coverage shall be increased from time to time to meet changed circumstances including but not limited to changes in the U. S. Consumer Price Index and changes indicated by the course of plaintiff's verdicts in personal injury actions.

G. Tenant expressly understands and agrees that any insurance protection required by this Lease shall in no way limit Tenant's obligations assumed in this Lease, and shall not be construed to relieve Tenant from liability in excess of such coverage, nor shall it preclude Landlord from taking such other actions as are available to it under any provision of this Lease or otherwise at law.

25. CASUALTY AND APPLICATION OF PROCEEDS OF PROPERTY INSURANCE

A. If the Leased Premises or any part thereof shall be damaged or destroyed by fire, the elements or other casualty, Tenant shall: (i) as promptly as possible after Tenant has knowledge of such damage or destruction, notify Landlord thereof, and (ii) with all due diligence, at Tenant's own cost and expense, repair, restore and rebuild the Leased Premises so that the

repaired, rebuilt or newly constructed Improvements shall be at least equal in appearance, stability, permanency of construction, usefulness and value to the Improvements immediately prior to the damage or destruction. All repairs, restoration and rebuilding shall be completed by Tenant in accordance with the requirements of paragraph 10 hereof to the same extent as though said work is a Future Improvement. This Lease shall remain in full force and effect during any period of such damage or destruction. If a partial destruction of the Leased Premises occurs, the Rent shall not abate unless the partial destruction renders the entire Leased Premises untenantable so as to preclude the operation of a public marina. If the Leased Premises are rendered untenantable, the Rent shall abate until the premises can again be operated as a public marina. If the Leased Premises shall be partially damaged or destroyed so as to effectively limit the use of a portion of the Leased Premises as a public marina, then the Rent shall abate for the portion of the Premises effectively limited until such time as effective use of the Premises is completely restored. In the event of the complete destruction of the Leased Premises rendering the entire Premises untenantable so as to preclude the operation of a public marina, Landlord and Tenant may, prior to the commencement of on-site restoration, mutually declare this Lease null and void as of the date of such declaration and all insurance proceeds shall then be payable to Landlord. The requirement of all due diligence of Tenant in restoring the Leased Premises shall be subject to a reasonable opportunity to adjust the loss with insurance companies and to Tenant's inability to obtain labor and material where such inability is not due to Tenant's own fault.

B. All property insurance shall provide that losses thereunder shall be payable in all cases to the trustee designated herein or any successor trustee, for the benefit of Landlord and Tenant as their interests may appear. Said insurance policies shall from time to time as written be delivered to such trustee to be held by it for Landlord and Tenant. Tenant shall forward to the trustee Certificates of renewal together with evidence of payment of premiums so that the trustee is at all times in possession of documentation that Tenant has obtained and is maintaining property insurance in compliance with the requirements of this Lease. The trustee of Landlord and Tenant for the purpose of holding such insurance policies and receiving payments of losses thereunder shall at all times be a bank or trust company in . Either Landlord or Tenant shall have the right at any time to dismiss the

insurance trustee, upon reasonable notice to the other party and to the then trustee. A new trustee shall be named by mutual written agreement of Landlord and Tenant. Landlord and Tenant shall each pay one-half of the charges and expenses of the insurance trustee upon written demand by the trustee.

C. All proceeds of any insurance in case of loss are to be paid to the insurance trustee to be held, paid and used solely for repairing, rebuilding and restoration of Improvements on account of the injury or destruction of which such insurance moneys have been paid. Tenant shall use such insurance moneys for the repair or reconstruction of such Improvements and shall provide any additional sums which may be required to complete the repair or reconstruction thereof so that repaired, rebuilt or newly constructed Improvements shall be at least equal in appearance, stability, permanency of construction, usefulness and value to the Improvements immediately prior to the damage or destruction. The repair, rebuilding, and restoration of the Leased Premises required under this paragraph 25 shall be subject to the provisions of paragraph 10 hereof to the same extent as though such repair or restoration was a Future Improvement. The insurance moneys shall be paid out by the trustee from time to time as the work of rebuilding, reconstruction or repair shall progress on bona fide certificates of the supervising architect at the rate of 90% of the amounts due for labor and materials as shown by such certificates, the remaining 10% to be paid to Tenant after such repairing or rebuilding shall have been completed and Tenant shall have furnished to the trustee satisfactory evidence that all claims and demands for labor or materials used or furnished in repairing or rebuilding have been paid in full or that no claim or lien can accrue or be enforced against any part of the Improvement on account thereof.

D. In the case of any damage to or destruction of any Improvement in which the costs of repairing or rebuilding the same, as estimated by the supervising architect or fixed by contract with a responsible contractor, shall exceed Twenty Thousand ($20,000.00) Dollars, Tenant shall, before commencing the repair or reconstruction of the Improvement, furnish to Landlord a performance bond and a labor and material payment bond in compliance with paragraph 10F hereof to the same extent as though said repair or reconstruction was a Future Improvement.

E. In case of any such damage to or destruction of the Leased Premises, Landlord and Tenant shall use every reasonable effort to settle and adjust as quickly as possible the amount of the loss payable by the insurers. Tenant agrees that it will commence the required repair or reconstruction promptly and within reasonable time after receipt of the proceeds of insurance paid on account of the damage or destruction and prosecute the work of repair or reconstruction to completion promptly and within reasonable speed and diligence and will also, immediately after any damage to or destruction of part of any Improvement, do all things necessary to protect the Improvement against further damage prior to commencement of the required repair or reconstruction. Pending completion of the repair and restoration of said damaged or destroyed Improvement, Tenant shall use good faith efforts to attempt, to the extent economically feasible, to provide and/or install temporary replacements that will not materially diminish the services formerly provided by the Improvements. If Tenant shall not complete such repair or reconstruction within the time stated, Landlord shall have the right to receive all insurance moneys then remaining in the hands of the insurance trustee, as Landlord's own property, the right to use such moneys in the repair or reconstruction of the Improvements upon the Leased Premises or to use the same for other purposes, and the right to cancel this Lease and Tenant's rights hereunder, all at the option of Landlord; provided, however, that no rights under this paragraph shall accrue to Landlord unless and until thirty (30) days written notice shall have been given by Landlord to Tenant and Tenant shall have failed within that period of time to proceed diligently with the repair or reconstruction of said Improvement as provided in this paragraph.

F. If the amount of the net insurance proceeds received by the Insurance Trustee exceeds the cost and expense of such restoration, the Insurance Trustee shall pay to Tenant any such excess. No payment of any such excess shall be made to Tenant if any monetary event of default of this Lease or any default which can be cured upon the payment of the excess insurance funds shall have happened and be continuing. In such event, any such funds shall be paid to Landlord to be applied to the complete or partial cure of such default. Any excess insurance proceeds paid to Tenant shall be applied by Tenant solely for the improvement of the Leased Premises for the benefit of the public.

26. DAMAGE CLAUSE

If the Leased Premises or any Improvements, utility systems or equipment thereon is damaged or lost by any cause arising out of or related to any act, error, or omission of Tenant, its agents, servants, employees, contractors or invitees express or implied, then Tenant shall with all due diligence, at Tenant's sole cost and expense, repair, restore and rebuild the Leased Premises so that the repaired, rebuilt or newly constructed Improvements shall be at least equal in appearance, stability, permanency of construction, usefulness and value to the Improvements immediately prior to the damage. All repairs shall be completed by Tenant in accordance with the requirements of paragraph 10 hereof to the same extent as though said repair is a Future Improvement. If Tenant fails to so repair after written demand, Landlord may make said repairs and the cost thereof incurred by Landlord shall be paid by Tenant to Landlord as Additional Rent within thirty (30) days after written demand therefor by Landlord. This paragraph shall not be construed to limit Tenant's obligation to maintain and repair the Leased Premises under this Lease.

27. MECHANIC'S AND MATERIALMEN'S LIENS

A. Tenant shall have no power to do any act or make any contract which may create or be the foundation for any lien or other encumbrance upon the reversion or other estate of Landlord, or of any interest of Landlord in the Leased Premises, or any Improvements thereon; it being agreed that should Tenant cause any alterations, rebuilding, replacements, changes, additions, improvements or repairs to be made to the Leased Premises, or labor performed or material furnished therein, thereon or thereto, neither Landlord nor the Leased Premises shall under any circumstances be liable for the payment of any expense incurred or for the value of any work done or material furnished, but all such alterations, rebuilding, replacements, changes, additions, improvements, repairs, labor and material shall be made, furnished and performed at Tenant's expense, and Tenant shall be solely and wholly responsible to the contractors, laborers and materialmen furnishing and performing such labor and material.

B. If, because of any act or omission (or alleged act or omission) of Tenant, any mechanic's or other lien, charge or order for the payment of money shall be filed against the Leased Premises

or any Improvements thereon, or against Landlord (whether or not such lien, charge or order is valid or enforceable as such), Tenant shall, at its own cost and expense, cause the same to be canceled and discharged of record or bonded within ten (10) days after notice to Tenant of the filing thereof, and Tenant shall indemnify and save harmless Landlord against and from all costs, expenses, liabilities, losses, damages, suits, fines, penalties, claims and demands, including reasonable counsel fees, resulting therefrom.

C. Tenant shall, upon completion of any repairs, replacements or Future Improvements, provide Landlord with a signed copy of any and all liens, said statement indicating that all contractors have been paid and all liens have been discharged.

28. LEASEHOLD MORTGAGE

From time to time during the Term of this Lease, Tenant may create one or more Leasehold Mortgages upon Tenant's leasehold interest with the prior written consent of Landlord provided that:

(i) no such Leasehold Mortgage shall extend to or affect the fee, the reversionary interest or the estate or interest of Landlord in the Leased Premises;

(ii) prior to Landlord's approval of any Leasehold Mortgage, Landlord and Tenant execute an amendment of this Lease setting forth all the terms and conditions under which such Leasehold Mortgage shall be binding on Landlord in the enforcement of its rights under this Lease against Tenant, leasehold mortgagee or a purchaser at foreclosure;

(iii) Landlord determines that the Leasehold Mortgage is solely for the purposes of this Lease; and

(iv) no such Leasehold Mortgage shall be effective unless said Leasehold Mortgage agreement is approved by Landlord in writing.

29. LANDLORD'S ACCESS TO LEASED PREMISES

A. Landlord, it agents or employees, shall have the right of ingress and egress on, over and across the Leased Premises for

access to, maintenance, development and operation of adjacent State-owned property.

B. Landlord, its employees or any authorized representative, shall have the right to enter upon and inspect the Leased Premises and Tenant's operation thereof and take such action as Landlord may deem necessary to assure compliance by Tenant with the terms and conditions of this Lease and/or to correct any condition resulting from Tenant's failure or omission to comply with the terms and conditions of this Lease.

C. Landlord shall exercise its right under A and B above in such a manner as not to damage Tenant's property or unreasonably interfere with Tenant's activities in light of the nature and extent of Landlord's activities necessary to assure Tenant's compliance with this Lease.

30. SUSPENSION OF OPERATIONS

Landlord may, in its sole discretion, order Tenant to suspend, delay or interrupt all or any part of its operation of the Leased Premises, including marina-related services and operations by sublessee, for such period of time as Landlord determines to be appropriate to protect State-owned property, to protect public health, safety and welfare, or when Landlord reasonably determines that Tenant's conduct of its operations and/or performance of its obligations under this Lease is not in compliance with this Lease. The primary reasons for issuance of such an order will be: (i) the occurrence of hazardous work conditions, emergency conditions, unusually violent weather conditions, or any other reason where continuance of operations may detrimentally impact State owned property and/or the health, safety and welfare of persons on site; and (ii) when Landlord reasonably determines that Tenant's conduct of its operations and/or performance of its obligations under this Lease is not in compliance with this Lease. Any suspension order under (i) above shall be effective immediately upon issuance by Landlord and shall continue in effect until the conditions that gave rise to the issuance of the order have abated to the satisfaction of Landlord. Any suspension order under (ii) above shall be in writing, shall describe the violation(s) and shall be effective ten (10) days after the order is received by Tenant unless within said period Tenant corrects said violation(s) to the reasonable satisfaction of Landlord. If the violation(s) described

in any suspension order issued under (ii) above cannot reasonably be cured within said ten (10) days the order shall be effective at the conclusion of said period if Landlord determines that Tenant has failed to initiate within said period such actions as reasonably can be taken toward curing the same and/or has failed to prosecute in good faith such action as diligently as reasonably possible after such action is initiated. Any suspension order issued under (ii) above shall remain in effect until the violation(s) that gave rise to issuance of the order have been cured to the satisfaction of Landlord. In order to assure continued operation of the Marina for the benefit of the public, in the event of any suspension under (ii) above, Landlord shall assume responsibility for supervision of the daily operation of the Marina (including Tenant's employees and sublessee) beginning on the effective date of the suspension and extending until the suspension period is over. Tenant shall pay the salary and cost of all of its employees during the period of any suspension. Tenant shall, during any suspension period, pay all costs, expenses, taxes and assessments on its part to be paid under this Lease. Tenant shall as Additional Rent pay all actual and reasonable costs incurred by Landlord in the supervision of the operation of the Marina during any suspension period under (ii) above. If a suspension order issued under (ii) above remains in effect for a period longer than thirty (30) days, Landlord, in its sole discretion, may elect to terminate this Lease. Any suspension hereunder shall be in addition to any other right or remedy available to Landlord under this Lease or any law or equity. Tenant hereby waives any claim for damages or compensation or abatement of Rent as a result of Landlord's actions under this paragraph.

31. TERMINATION

A. This Lease may be terminated by Landlord upon the occurrence of an event of default by Tenant, namely:

(i) Tenant's failure to:(a) provide Landlord with valid certificates of renewal of insurance upon expiration of the polices or to provide Landlord with certificates of insurance indicating that its sublessee have obtained and are maintaining insurance in accordance with this Lease; or (b) pay, when due, any Rent, Additional Rent or other sums required to be paid by Tenant hereunder and the continuation of such failure under (a) or (b) above for

ten (10) days after Tenant's receipt of written notice thereof from Landlord served by Certified Mail, Return Receipt Requested; or

(ii) Tenant's failure to perform any of the other covenants, agreements and conditions set forth in this Lease, and such failure shall continue for thirty (30) days after the date of receipt of notice from Landlord of such failure, or if such failure is of such character as cannot reasonably be cured within such thirty (30) days, Tenant fails to initiate within said thirty days such actions as reasonably can be taken toward curing the same and/or fails to prosecute in good faith such action as diligently as reasonably possible after such action is initiated.

B. If Landlord shall fail to cure any material default of Landlord of which it has been notified by Tenant in writing, within the time reasonably required to cure such default, Tenant shall have the right to terminate this Lease, upon thirty (30) days written notice of Tenant's intention to terminate hereunder, which right shall be in addition to any and all other remedies available to Tenant.

C. If termination for default is effected by Landlord, an equitable adjustment shall be made, but (i) no amount shall be allowed for anticipated profit from operation of the Leased Premises and (ii) any payment to Tenant resulting from such termination shall be adjusted to cover any additional costs to Landlord because of Tenant's default. The equitable adjustment shall provide payment to Tenant for termination settlement costs reasonably incurred by Tenant relating to commitments which had become firm prior to the termination.

D. Upon the expiration or any termination hereof, as provided in this Lease, Tenant shall (i) promptly discontinue all operation of the Leased Premises, take all commercially reasonable actions to mitigate damages, deliver up peaceable possession and use of the Leased Premises to Landlord in at least as good condition as it was delivered at the commencement of this Lease, and Landlord may at once re-enter, take possession of the Leased Premises and Improvements thereon, remove any and all persons occupying the Leased Premises, and assume complete responsibility

for management, maintenance and operation of the Leased Premises, and (ii) deliver or otherwise make available to Landlord all data, drawings, specifications, reports, estimates, summaries, records, accountings and such other information and materials as may have been made, kept or accumulated by Tenant in performing this Lease, whether completed or in process. If Tenant shall fail to remove any personal property lawfully belonging to and removable by Tenant within the time prescribed by any notice of termination, Landlord may appropriate the same to its own use without allowing any compensation therefor or may remove the same at the expense of Tenant. If Tenant removes any personal property, Tenant hereby covenants to pay any and all damages which may be caused to the Leased Premises by said removal.

E. Upon the termination of this Lease, Tenant shall pay to Landlord without demand or notice the sum of the following:

(i) all Rent, Additional Rent and other payments accrued to the date of such termination and a proportionate part of the Rent otherwise payable for the month in which termination occurs; and

(ii) the cost of making all restoration, renovation, improvement and repairs required to be made by Tenant hereunder including, but not limited to the removal of any unauthorized Future Improvements, and of performing all covenants of Tenant relating to the condition of the Leased Premises and any Improvements thereon during the Term and upon expiration or sooner termination of this Lease, such cost to be deemed prima facie to be the cost actually expended or incurred thereafter by Landlord.

32. CUMULATIVE REMEDIES; ADDITIONAL RIGHTS OF LANDLORD

The specific remedies to which Landlord may resort under the terms of this Lease are cumulative and are not intended to be exclusive of any other remedies or means of redress to which it may be lawfully entitled in case of any breach or threatened breach of any provisions of this Lease. The failure of Landlord to insist at any time upon the strict performance of any covenant or agreement, or to exercise any option, right, power or remedy contained in this Lease shall not be construed as a waiver or a relinquishment thereof for the future. A receipt by Landlord of any Rent,

Additional Rent or any other sum payable hereunder, with knowledge of the breach of any covenant or agreement contained in this Lease, shall not be deemed a waiver of such breach, and no waiver by Landlord of any provision of this Lease shall be deemed to have been made unless expressed in writing and signed by Landlord. In addition to the other remedies in this Lease provided, Landlord and Tenant shall be entitled to the restraint by injunction of the violation, or attempted or threatened violation of any of the covenants, conditions or provisions of this Lease.

33. BANKRUPTCY OR INSOLVENCY OF TENANT

The following shall apply in the event of the bankruptcy or insolvency of Tenant:

A. If a petition is filed by, or an order for relief is entered against, Tenant under Chapter 7 of the Bankruptcy Code, and the trustee of Tenant elects to assume this Lease for the purpose of assigning it, the election or assignment, or both, may be made only if all of the terms and conditions of this paragraph 33 are satisfied. If the trustee fails to elect to assume this Lease for the purpose of assigning it within sixty (60) days after the trustee's appointment, this Lease shall be deemed to have been rejected. Landlord shall then immediately be entitled to possession of the Leased Premises without further obligation to Tenant or the trustee, and this lease will be canceled. Landlord's right to be compensated for damages in the bankruptcy proceeding, shall, however, survive.

B. If Tenant files a petition for reorganization under Chapters 11 or 13 of the Bankruptcy Code, or if a proceeding is filed by or against Tenant under any other chapter of the Bankruptcy Code and is converted to a Chapter 11 or 13 proceeding and Tenant's trustee or Tenant as a debtor-in-possession fails to assume this Lease within sixty (60) days from the date of filing of the petition or conversion, the trustee or the debtor-in-possession will be deemed to have rejected this Lease. Landlord shall then immediately be entitled to possession of the Leased Premises without further obligation to Tenant or the trustee, and the Lease will be canceled. Landlord's right to be compensated for damages in the bankruptcy proceeding shall, however, survive. To be effective, an election to assume this Lease must be in writing and addressed to Landlord and, in Landlord's business judgment, all of the

following conditions, which Landlord and Tenant acknowledge to be commercially reasonable, must have been satisfied:

(i) The trustee or debtor-in-possession has cured or has provided to Landlord adequate assurance, as defined in this subparagraph B that: (a) the trustee will cure all monetary defaults under this Lease within then (10) days from the day of assumption; and (b) the trustee will cure all nonmonetary defaults under this Lease within thirty (30) days from the date of assumption.

(ii) The trustee of the debtor-in-possession has compensated Landlord, or has provided to Landlord adequate assurance as defined in this subparagraph B that within ten (10) days from the date of the assumption Landlord will be compensated for any pecuniary loss it incurred arising from the default of Tenant, the trustee, or the debtor-in-possession as recited in Landlord's written statement of pecuniary loss sent to the trustee or the debtor-in-possession.

(iii) The trustee or the debtor-in-possession has provided Landlord with adequate assurance of the further performance of each of Tenant's obligations under this Lease; provided, however, that (a) the trustee or debtor-in-possession will also deposit with Landlord, as security for the timely payment of Rent, an amount equal to one (1) Calendar Year's Rent and other monetary charges accruing under this Lease; and (b) if not otherwise required by the terms of this Lease, the trustee or debtor-in-possession will also pay in advance for one (1) Calendar Year an amount equal to Tenant's annual obligations under this Lease; (c) from and after the date of assumption of this Lease, the trustee or debtor-in-possession will pay the Rent in advance on each day that the Rent is payable; and (d) the obligations imposed on the trustee or the debtor-in-possession will continue for Tenant after the completion of the bankruptcy proceedings.

(iv) Landlord has determined that the assumption of this Lease will not breach any provision in any federal or State

law, rule or order by which Landlord is bound relating to the land comprising the Leased Premises.

(v) For the purpose of this subparagraph B, "adequate assurance" means that: (a) Landlord will determine that the trustee or debtor-in-possession has, and will continue to have, sufficient unencumbered assets after the payment of all secured obligations and administrative expenses to assure Landlord that the trustee or debtor-in-possession will have sufficient funds to fulfill Tenant's obligations under this Lease; and (b) an order will have been entered segregating sufficient cash payable to Landlord to secure to Landlord the obligation of the trustee or debtor-in-possession to cure the monetary or non-monetary defaults under this Lease within the time periods set forth above.

C. In the event that this Lease is assumed by a trustee appointed for Tenant or by Tenant as a debtor-in-possession under the provisions of subparagraph B above and if Tenant is then either adjudicated a bankrupt or files a subsequent petition for arrangement under Chapter 11 of the Bankruptcy Code, then Landlord may terminate this Lease and all Tenant's rights under it by giving written notice of Landlord's election to terminate.

D. For the purpose of this paragraph 33, "adequate assurance for future performance" means that Landlord has ascertained that each of the following conditions has been satisfied:

(i) The assignee has submitted a current financial statement, audited by a certified public accountant, that shows a net worth and working capital in amounts determined by Landlord to be sufficient to assure the future performance by the assignee of Tenant's obligations under this Lease; and

(ii) The assignee will obtain guarantees, in form and substance satisfactory to Landlord, from a surety company.

E. Neither Tenant's interest in this Lease nor any estate of Tenant created in this Lease will pass to any trustee, receiver, assignee for the benefit of creditors, or any other person or

entity, or otherwise by operation of law under the laws of any state having jurisdiction of the person or property of Tenant, unless Landlord consents in writing to the transfer. Landlord's acceptance of Rent or any other payments from any trustee, receiver, assignee, person, or other entity will not be deemed to have waived, or waive, the need to obtain Landlord's consent or Landlord's right to terminate this Lease for any transfer of Tenant's interest under this Lease without that consent.

34. FUEL DOCK

A. Tenant shall be responsible for the inspection, maintenance, repair and replacement of the fuel storage tanks in accordance with all pertinent federal and State laws and regulations now in effect or as subsequently amended.

B. Tenant shall inspect, maintain and repair all fuel pumps, pipes and other appurtenant equipment and keep same in good repair and condition.

35. ENVIRONMENTAL COMPLIANCE

A. The term "Hazardous Substances" as used in this paragraph shall include, without limitation, flammables, explosives, radioactive materials, asbestos, polychlorinated biphenyles (PCBs), chemicals known to cause cancer or reproductive toxicity, pollutants, contaminants, hazardous wastes, toxic substances or related materials, petroleum and petroleum products, and substances declared to be hazardous or toxic under any law or regulation now or subsequently enacted or promulgated by any federal or State authority.

B. Tenant shall not cause or permit to occur:

(i) any violation of any federal or State law or regulation now or subsequently enacted related to environmental conditions on, under, or about the Leased Premises, or arising from Tenant's use or occupancy of the Leased Premises under this Lease including but not limited to soil, ground water, and surface water quality conditions; and

(ii) the use, generation, release, production, storage, or disposal of any Hazardous Substance on, under or about the Leased Premises or the transportation to or from the Leased Premises of any Hazardous Substance except for such purposes and subject to such terms and conditions as shall first be established and expressly approved by the appropriate federal and State governmental authorities having jurisdiction.

C. Tenant shall, at Tenant's sole cost and expense, comply with all laws regulating the use, generation, storage, transportation, or disposal of Hazardous Substances relating to Tenant's operations on the Leased Premises ("Laws"). Tenant shall, at Tenant's sole cost and expense, make all submissions to, provide all information required by and comply with all requirements of all federal and State governmental authorities including but not limited to any agency of the Department of Environmental Protection ("Authorities") under the Laws. For the purposes of this paragraph, Landlord, acting through the Division of Parks and Forestry, shall not be deemed to be an Authority under the Laws. All plans prepared under this paragraph shall be submitted to Landlord for review and approval under paragraph 10 hereof to the same extent as though the implementation of the plan is a Future Improvement. Landlord's approval of any such plan through the Division of Parks and Forestry shall only be for the purposes set forth in paragraph 10 hereof. No approval by Landlord of any plan submitted by Tenant hereunder shall constitute a waiver of Tenant's obligations under this paragraph and the Laws.

D. If Landlord, any Authority, or any third party demands that a clean-up plan be prepared and that a clean-up be undertaken because of any deposit, spill, discharge or other release of Hazardous Substances that occurs during the Term, at or from the Leased Premises, or which occurred at any time during Tenant's use or occupancy of the Leased Premises, then Tenant shall, at Tenant's sole cost and expense, prepare and submit the required plans and all related bonds and other financial assurances; and Tenant shall, at Tenant's sole cost and expense, carry out all work in compliance with and in a timely manner as provided by such clean-up plans.

E. Tenant shall promptly provide all information regarding the use, generation, storage, transportation or discharge of Hazardous Substances that is requested by Landlord or any

Authority. If Tenant fails to fulfill any duty imposed under this paragraph within a reasonable time, Landlord may do so; and in such case, Tenant shall cooperate with Landlord in order to prepare all documents Landlord deems necessary or appropriate to determine the applicability of the Laws to the Leased Premises and Tenant's use of the Leased Premises, and for compliance with the Laws, and Tenant shall execute all documents promptly upon Landlord's request. No such action by Landlord and no attempt made by Landlord to mitigate damages under any Law shall constitute a waiver of any of Tenant's obligations under this paragraph.

F. Tenant's obligations and liabilities under this paragraph shall survive the expiration or termination of this Lease.

G. Tenant shall indemnify, defend, and hold harmless Landlord and its officials and employees from all fines, suits, procedures, claims, and actions of every kind and all associated costs (including attorney's and consultant's fees) arising out of or in any way connected with any deposit, spill, discharge, or other release of Hazardous Substances that occurs during the Term at or from the Leased Premises, or which arises at any time, during Tenant's use or occupancy of the Leased Premises, or from Tenant's failure to provide all information, make all submissions, and take all actions required by all Authorities under the Laws. Tenant's obligations and liabilities under this subparagraph shall survive the expiration or termination of this Lease.

36. LAW GOVERNING LEASE

This Lease shall be governed and construed, and the rights and obligations of the parties hereto shall be determined in accordance with the Laws of the State of New Jersey.

37. COVENANT AGAINST CONTINGENT FEES

Tenant assures that no person or selling agency has been employed to solicit or secure this Lease upon an agreement or understanding for a commission, percentage, brokerage or contingent fee.

38. ANTI-COLLUSION CLAUSE

Tenant does hereby warrant and represent that this Lease has not been solicited or secured, directly or indirectly, in a manner contrary to the Laws of the State of New Jersey and that said Laws have not been violated and shall not be violated as they relate to the procurement or the performance of this Lease by any conduct, including the paying or giving of consideration of any kind, directly or indirectly, to any State employee, officer or official.

39. GRATUITIES

If Landlord finds after a notice and hearing that Tenant or any of Tenant's agents or representatives offered or gave gratuities in the form of entertainment, gifts or otherwise to any official, employee or agent of Landlord in an attempt to secure this Lease or favorable treatment in awarding, amending or making any determinations related to the performance of this Lease, Landlord may also pursue such other rights and remedies that the law or this Lease provides.

40. NO DISCRIMINATION

A. Tenant, its contractors, subcontractors and sublessee shall not discriminate against any employees who are employed in the operations covered by this Lease or against any application for such employment because of sex, race, religion, color, national origin, sexual preference or handicap. This provision shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. Tenant shall insert a similar provision in all subleases and contracts for the services covered by this Lease. Tenant shall also comply with the appropriate and applicable subagreement provisions found in 40 CFR 33, Subpart F-333.10005 and N.J.S.A. 10:21 through 10:24 through 10:5-38 and all rules promulgated thereunder.

B. Tenant and its sublessee shall not discriminate on the basis of sex, race, religion, color, national origin, sexual preference or handicap in providing access to, use and enjoyment of the Leased Premises by the public.

41. MERGER

This Lease, including all exhibits attached hereto, constitutes the entire agreement between the parties, and all prior understandings, agreements, and representations have been merged herein. Upon the Effective Date hereof, this Lease supersedes and cancels all previous leases and agreements covering the lease of the Leased Premises.

42. SEVERABILITY

If any term or provision of this Lease or the application thereof to any person or circumstance shall, to any extent, be determined by a court of competent jurisdiction to be invalid or unenforceable, the remainder of this Lease, or the application of such term or provision to persons or circumstances, other than to those to which it is held invalid or unenforceable, shall not be affected and each term and provision of this Lease shall be valid and be enforced to the fullest extent permitted by law.

43. SUCCESSION AND BINDING EFFECT

Except as otherwise set forth herein, all of the terms and provisions of this Lease shall be binding upon and shall inure to the benefit of the successors and assigns of the respective parties hereto.

44. AMENDMENT

The parties hereto agree that this Lease shall not be amended, supplemented, changed, modified or altered except upon mutual agreement of the parties hereto in writing.

45. QUIET POSSESSION

Landlord agrees that Tenant, on satisfactorily performing the agreements contained herein, shall peaceably and quietly have, hold and enjoy the Leased Premises for the above stated Term.

46. HOLD OVER TENANCY

If Landlord permits Tenant to remain in possession of the Leased Premises after expiration of this Lease without having

executed a new written lease with Landlord, then Tenant shall occupy the Leased Premises subject to all the terms, covenants and conditions contained in this Lease. Such holding over by Tenant shall not constitute a renewal or extension of this Lease. Landlord may, at its option, elect to treat Tenant as one who has not removed at the end of its term and thereupon be entitled to all the remedies against Tenant provided by Law.

47. WAIVER

Failure of either party to complain of any act or omission on the part of the other party, no matter how long same may continue, shall not be deemed a waiver by said party of any of its rights hereunder. No waiver by either party at any time express or implied, of breach of any provision of this Lease shall be deemed a waiver of breach of any other provision or a consent to any subsequent breach of the same or any other provision. The consent to or approval of any action on any one occasion by either party hereto shall not be deemed a consent to or approval of any other action on the same or any subsequent occasion. Any and all rights and remedies which either party may have under this Lease or by operation of law, either at law or in equity, by reason of a breach by the other party shall be distinct, separate, and cumulative and shall not be deemed inconsistent with any other right or remedy and any two or more or all of such rights and remedies may be exercised at the same time. Acceptance by either party of any of the benefits of this Lease with knowledge of any breach thereof by the other party shall not be deemed a waiver by the party receiving the benefit of any rights or remedies to which it is entitled hereunder or by law.

48. NOTIFICATION

The parties hereto agree that all submissions, approvals, notices and correspondence which may be required under this Lease shall be forwarded by certified mail, return receipt requested, and addressed as follows:

TO LANDLORD: Office of the Director
Division of Parks and Forestry
P. O. Box 404
Trenton, New Jersey 08625

TO TENANT: Fortescue Captains and Boat Owners Association, Inc.
Garrison Avenue
Fortescue, New Jersey 08321

Either Landlord or Tenant may at any time change such address by mailing to the address above a notice of the change at least ten (10) days prior to such change.

49. TENANT AS INDEPENDENT PRINCIPAL

A. Tenant acknowledges and accepts that it is an independent principal and is not undertaking the improvement, maintenance, management, and operation of the Leased Premises on behalf of Landlord and that it has no relationship with Landlord in connection with this Lease as Landlord's agent, servant, employee, contractor or otherwise. Tenant agrees not to enter into any agreement or commitment on Landlord's behalf.

B. Tenant shall have direct supervision of all its employees, agents, contractors and subcontractors, and sublessee performing any activity under this Lease. Tenant shall assure compliance by its employees, agents, contractors and subcontractors and sublessee with the terms and conditions of this Lease.

50. CORPORATION - CERTIFICATE OF INCORPORATION, BY-LAWS, OFFICERS, AND COMPLIANCE WITH LAWS

A. Prior to the Effective Date hereof, Tenant shall submit to Landlord a certified copy of Tenant's current Certificate of Incorporation. Tenant shall not amend, modify or otherwise change the Certificate of Incorporation without first submitting the proposed amendment, modification or change to Landlord for comment. Landlord shall have a period of thirty (30) days to review any proposed amendment, modification or change before same can become effective.

B. Tenant shall, prior to the Effective Date of this Lease and annually on the anniversary thereof, submit to Landlord a certificate of standing issued by the Secretary of State.

C. Tenant shall, prior to the Effective Date of this Lease, provide Landlord with a current copy of the by-laws of the

Fortescue Captains and Boat Owners Association, Inc. Tenant shall not make any changes in the by-laws without first obtaining the written approval of Landlord for any such change. Within one (1) year after the Effective Date of this Lease and at all times thereafter during the Term of this Lease, Tenant shall maintain and revise its by-laws to be consistent with the obligations and responsibilities of Tenant under this Lease.

D. Tenant shall provide Landlord with a list of the name, address, and telephone number of each officer of the Fortescue Captains and Boat Owners Association, Inc. and shall promptly notify Landlord in writing of any changes.

E. Tenant, its officers and employees, shall at all times during the Term of this Lease, conduct the corporate operations of Tenant in accordance with Tenant's certificate of incorporation and by-laws, and all federal and State laws, statutes, rules, orders and directives applicable to Tenant. If Landlord determines based upon verified information or upon independent investigation or audit that Tenant has not so complied, Landlord may in addition to any other right or remedy available at law, equity or under this Lease, suspend Tenant's operation of all or part of the Leased Premises until the non-compliance is resolved to the reasonable satisfaction of Landlord.

51. HEADINGS

The paragraph headings throughout this Lease are for convenience and reference only, and the words contained therein shall in no way be held to explain, modify, amplify, or aid in the interpretation, construction or meaning of the provisions of this Lease.

52. RESOLUTION

The Board of Directors of the Fortescue Captains and Boat Owners Association, Inc. shall adopt a resolution authorizing the execution of this Lease on behalf of the Association for the purposes and subject to the terms and conditions herein provided. Tenant shall submit a copy of said resolution to Landlord in form and substance satisfactory to Landlord prior to execution of this Lease by Landlord.

IN WITNESS WHEREOF, the said parties hereto have duly executed this Agreement on the day and year first above written.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION

By: _____
Robert C. Shinn
Commissioner

ATTEST:

By: _____
Peter F. DelRossi
Secretary

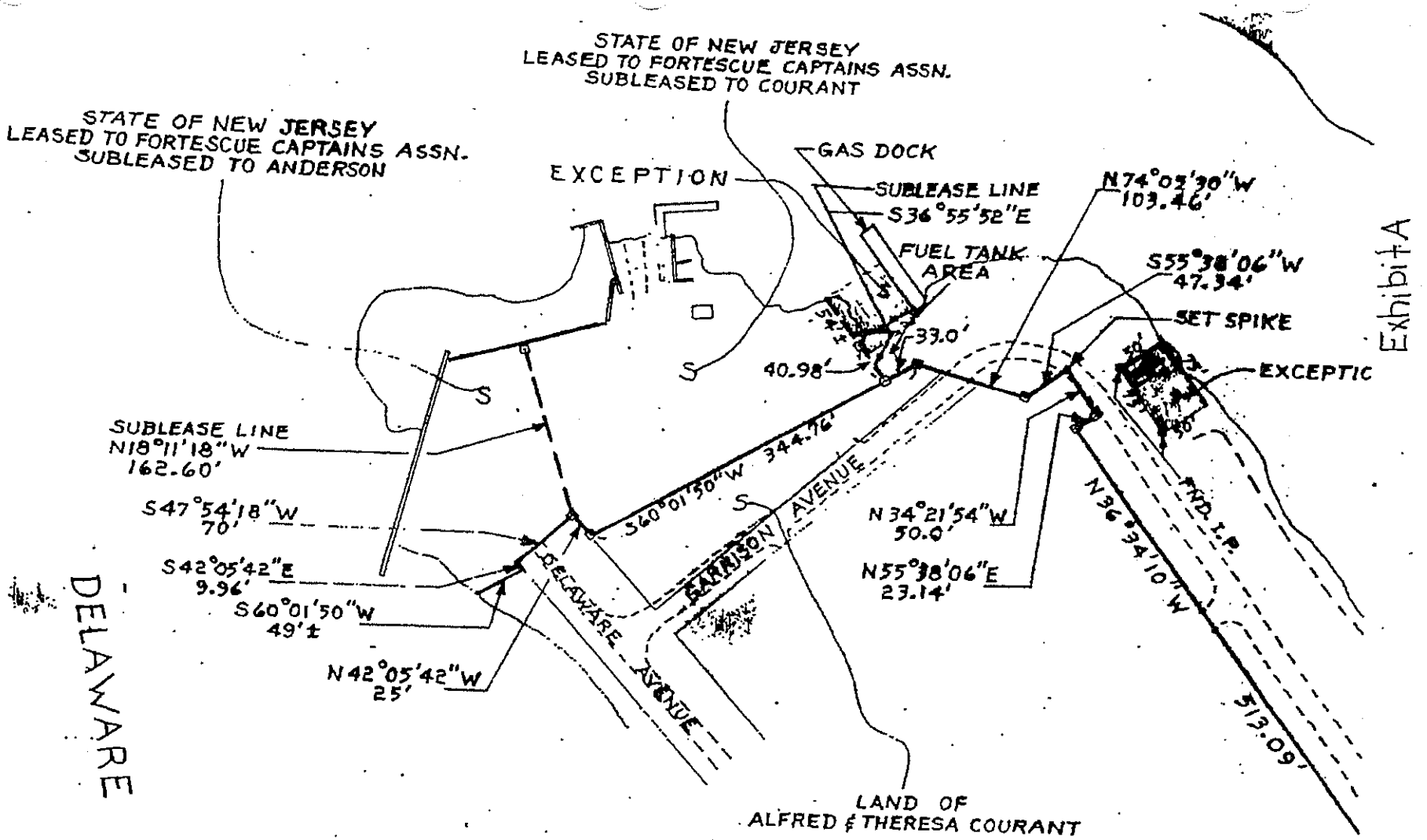
April 2, 1998

FORTESCUE CAPTAINS
AND BOAT OWNERS ASSOCIATION, INC.

By: _____
LAWRENCE J. PHARO
President

This Lease has been reviewed
and approved as to form by:
PETER VERNIERO
Attorney General
State of New Jersey

By: _____
Deputy Attorney General


STATE OF NEW JERSEY
LEASED TO FORTESCUE CAPTAINS ASSN.
SUBLEASED TO COURANT
STATE OF NEW JERSEY
LEASED TO FORTESCUE CAPTAINS ASSN.
SUBLEASED TO ANDERSON
EXCEPTION
GAS DOCK
SUBLEASE LINE
S36°55'52"E
FUEL TANK AREA
N74°05'30"W
103.46'
S55°38'06"W
47.34'
SET SPIKE
EXCEPTIC
33.0'
40.98'
SUBLEASE LINE
N18°11'18"W
162.60'
S47°54'18"W
70'
S42°05'42"E
9.96'
S60°01'50"W
49'±
N42°05'42"W
25'
S60°01'50"W 344.76'
HARRISON AVENUE
DELAWARE AVENUE
N34°21'54"W
50.0'
N55°38'06"E
23.14'
N36°34'10"W
513.09'
FND. I.P.
DELAWARE
LAND OF
ALFRED & THERESA COURANT
Exhibit A

State of New Jersey
Hazard Mitigation Grant Program
Municipality Letter of Intent

Project Summary	
1. Applicant:	DOWNE TWP., LYNN WATERMAN, BEAVER DAM BOAT RNTL.
2. County:	CUMBERLAND
3. a. Project Eligibility: Did the municipality participate in the Multi-Hazard Mitigation Planning Process?	☒ Yes ☐ No. If no, does the municipality have its own multi-Hazard mitigation plan? ☒ Yes ☒ No
b. Is the mitigation strategy identified in your MHMP?	☒ Yes ☐ No
4. a. Project Type: PUBLIC TIDAL WATERWAY #	☒ Flood Control ☐ Acquisition ☐ Elevation ☐ Planning ☐ Other** DREDGING SILT/SAND DEBRIS FROM TIDAL CRK.
b. Describe Other:	COMMERCIAL MARINA CHANNEL OBSTRUCTION/SANDY
5. a. Primary Point of Contact:	ROBERT CAMPBELL
b. Title:	MAYOR
c. Address:	288 MAIN ST., NEWPORT, N.J. 08345
d. Phone:	856-305-6213
e. Fax:	856-447-3533
f. Email:	vgc4.downe@comcast.net
6. Is the community a small and impoverished community as defined by the State Hazard Mitigation Plan (reference)?	☒ Yes ☐ No

7. a. Does your jurisdiction participate in the NFIP?	☒ Yes	☐ No
b. If so, does your jurisdiction participate in the Community Rating System (CRS)?	☐ Yes	☒ No
8. a. Do you have Flood Insurance? N/A	☐ Yes	☐ No
b. If so, is this a repetitive loss property? N/A	☐ Yes	☐ No

9. Cost Estimates*	Total Grant Request:	# 450,000

*Cost estimates are rough estimates that are subject to change. Cost estimate sources can include but are not limited to RS Means, contractor estimates, historical data, etc.

10. Endorsement: I understand that the local share of project funding will be 25% of the total project cost and that we will contribute ☒ all or ☒ seek funding elsewhere for the matching share of the mitigation project.

Signed: _____ Date: 3-14-13

Title: MAYOR, DOWNE TWP.

State of New Jersey
Hazard Mitigation Grant Program
Municipality Letter of Intent

Municipality Letter of Intent Instructions
1. **Applicant** - The applicant is a Municipalities, Borough, City, Township and Private Non-Profit.
2. **County** - The name of the County the project is located in.
3. **Project Eligibility** – a. You are an eligible applicant If you, participated in a Multi-Hazard Mitigation Plan (MHMP). b. Please state if the project is identified as a mitigation action in the MHMP
4. **Project Type** – (Please provide a brief description of the project, attach form if needed) a. Identify mitigation project type b. See page one for examples of other eligible mitigation projects
5. **List contact information for the primary point of contact.**
6. **Check yes or no if this community is identified as impoverished.**
7. a. Identify whether or not your community participate in the National Flood Insurance Program NFIP. http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book b. To verify if you community participate in CRS use the link below. http://www.fema.gov/sites/default/files/orig/fema_pdfs/pdf/nfip/manual201105/content/19_crs.pdf
8. a. If the sub-applicant have flood insurance please check the box b. Check box if the property is a repetitive loss property
9. Give an estimate of the project cost
10. Endorsement – The cost share is 75% FEMA and 25% Applicant. The cost share can be in the form of In-kind or cash. Check if you will contribute all or seek funding elsewhere and sign.

BEAVER DAM BOAT RENTALS, Inc.

PO Box 352
Rt. 553 514 Old Beaver Dam Road
Newport, New Jersey 08345

Ph: 856-447-3633

www.crabulousnj.com

To All of Whom it May Concern:

- Beaver Dam Boat Rentals is a unique eco-tourism business in Downe Township, located in the Southern New Jersey region along the Delaware Bay coast estuary. We rent non-powered boats and tow them into the Oranoakin Creek for recreational crabbing. We also perform educational field trips for various schools in the Cumberland County region as well as work with the 4-H Clubs, Boy Scouts, Cub Scouts, Audubon Society and other private groups teaching about this particular estuary system.

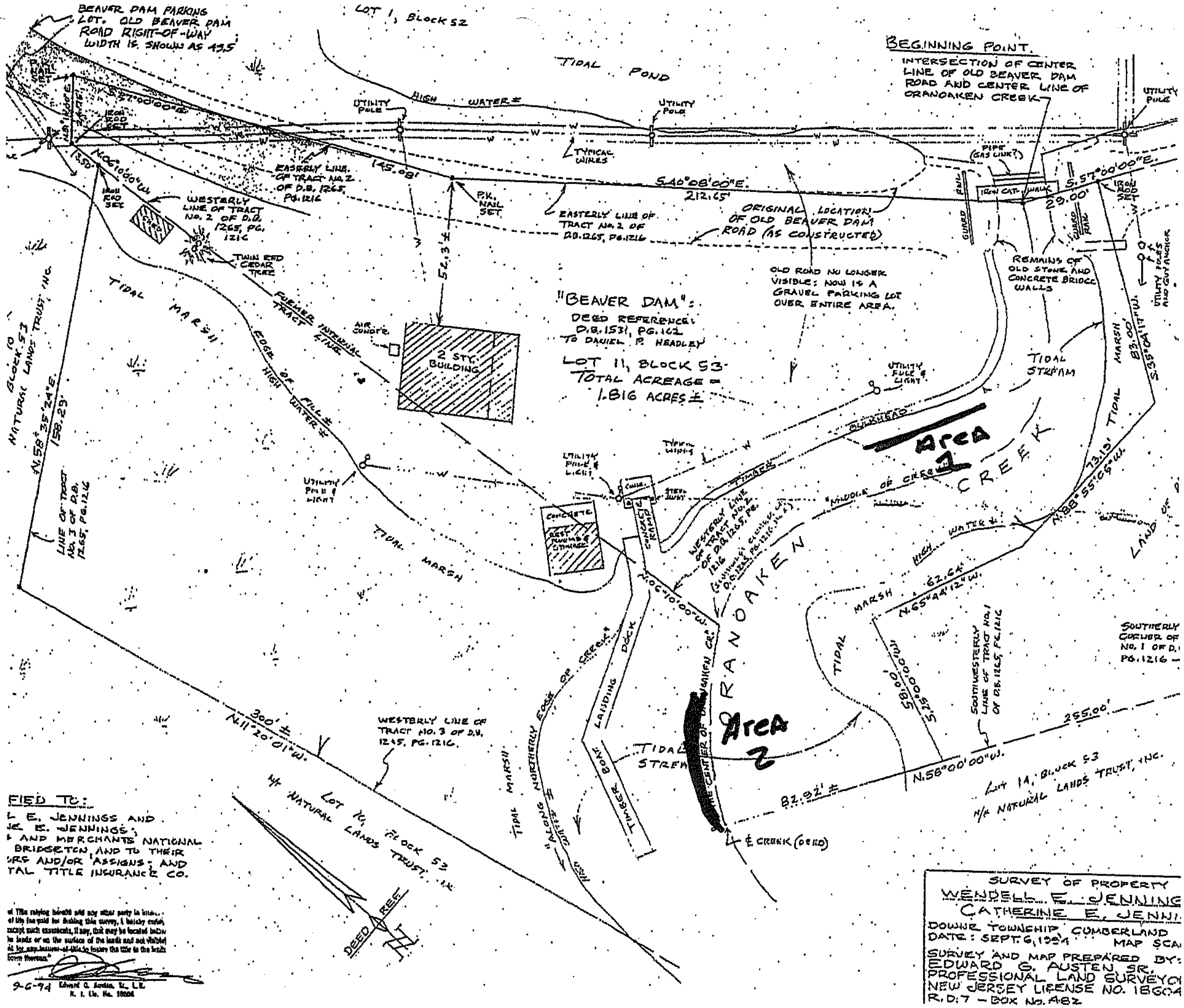
- The Oranoakin Creek is a tidal, brackish waterway that feeds into the Delaware Bay. We are somewhere in the area of 7-11 miles to the bay depending on which channel is taken. We have been advised by NJ Fish and Wildlife we are one of the top producing creeks for crabbing in the state; we have an enormous variety of wildlife as well as the closest nesting eagles to humans they are aware of.

- Beaver Dam Boat Rentals has been in existence for over 100 years. We are one of the last of the crabbing operations left in the state of New Jersey. We attract crabbers from all of the country and the world each year. We employ at least 5-7 people during our season. Our normal season is from Memorial Day to the first or second week in October. We also have varying hours for field trips, kayaking and other educational programs prior to or past this time range.

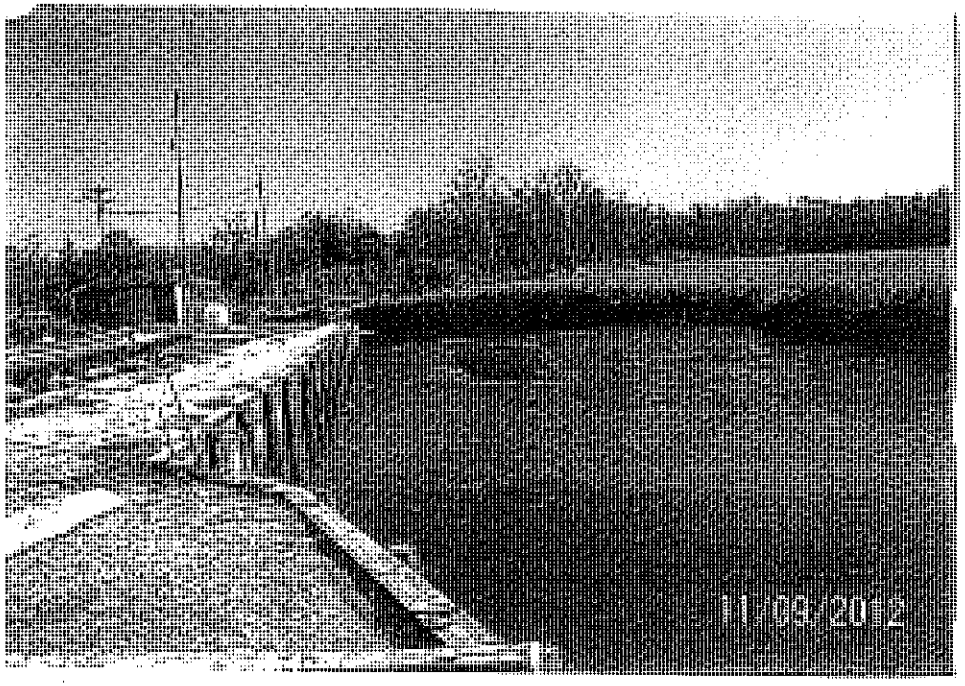
- Super storm Sandy has devastated this waterway. There is a tremendous amount of debris that was washed in by the storm. We are currently suffering a huge loss of navigable waterway due to the large amount of sand that has filled in the landing area of our boats. As of this time, we are extremely concerned that we cannot operate this business in a safe and secure manner due to the loss of navigable waters. (see photos)

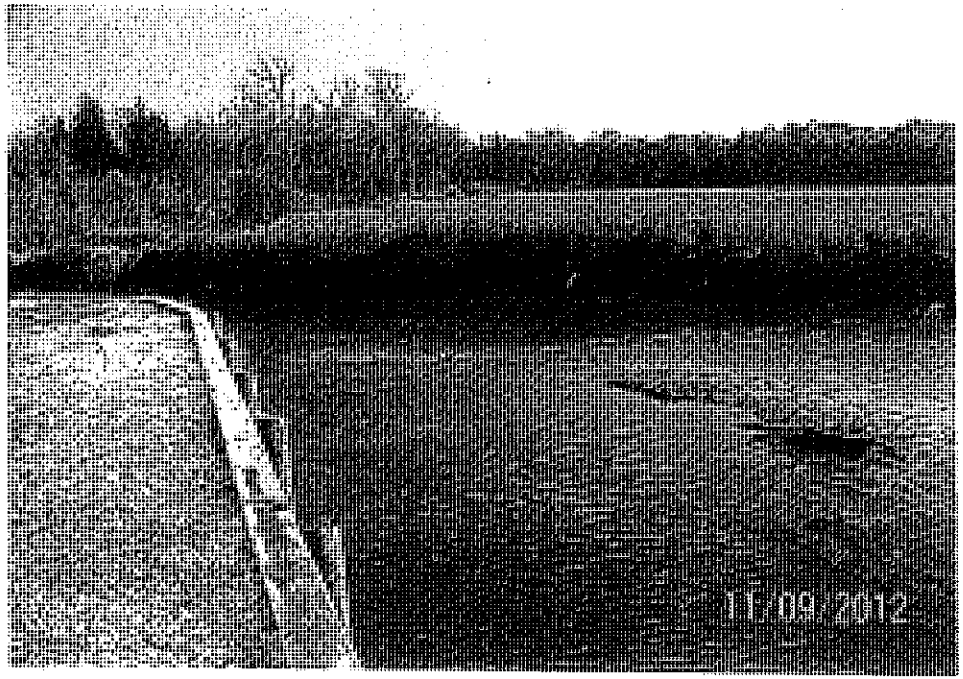
- During our season, we attract well over 5000 people to this area. They eat at local restaurants, buy gas, and shop in the general region. Many stay in Millville or Vineland at local hotels because of the far distance they are traveling. We regularly direct customers to as many regional and local destinations as they have time for such as the NJ Motorsports Park, the Discovery Bay Project, and of course, the NJ shore.

- We are requesting emergency intervention to repair the waterway that our customers use. The landing area around our dock is so severely filled in that we will not be able to operate at full capacity if at all. We would be unable to land boats in an emergency weather situation which occurs frequently due to pop-up thunder storms. It is imperative that the docking and landing area of the creek be opened up ASAP for us to be able to open our business on time and maintain the steady employment of our crew.

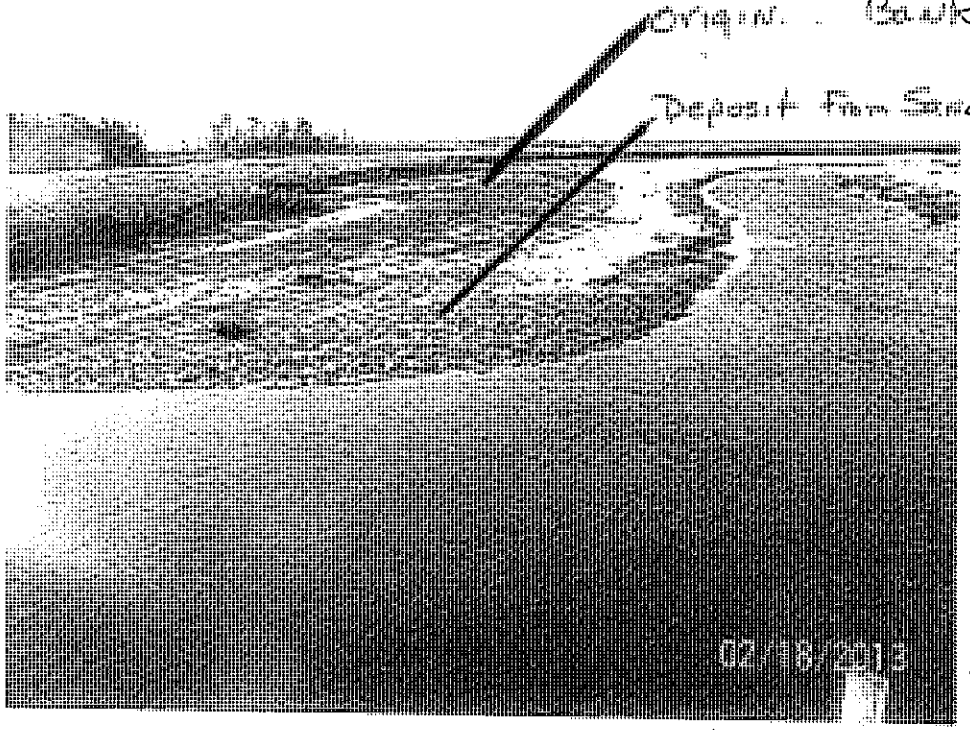

BEAVER DAM PARKING LOT. OLD BEAVER DAM ROAD RIGHT-OF-WAY WIDTH IS SHOWN AS 49.5'
LOT 1, BLOCK 52
TIDAL POND
HIGH WATER ±
BEGINNING POINT.
INTERSECTION OF CENTER LINE OF OLD BEAVER DAM ROAD AND CENTER LINE OF ORANOAKEN CREEK
UTILITY POLE
TYPICAL WIRES
P.K. NAIL SET
IRON ROD SET
EASTERLY LINE OF TRACT NO. 2 OF D.B. 1265, PG. 1216
145.08'
S.40°08'00"E. 212.65'
S.57°00'00"E. 29.00'
PIPE (GAS LINE?)
IRON CAT. WALK
GUARD RAIL
ORIGINAL LOCATION OF OLD BEAVER DAM ROAD (AS CONSTRUCTED)
WESTERLY LINE OF TRACT NO. 2 OF D.B. 1265, PG. 1216
N.06°10'00"W.
TWIN RED CEDAR TREE
52.3' ±
REMAINS OF OLD STONE AND CONCRETE BRIDGE WALLS
OLD ROAD NO LONGER VISIBLE: NOW IS A GRAVEL PARKING LOT OVER ENTIRE AREA.
"BEAVER DAM":
DEED REFERENCE: D.B. 1531, PG. 162 TO DANIEL P. HEADLEY
LOT 11, BLOCK 53
TOTAL ACREAGE = 1.816 ACRES ±
2 STY. BUILDING
AIR COND'R.
FORMER INTERNAL TRACT LINE
EDGE OF FILL ±
HIGH WATER ±
TIDAL MARSH
TIDAL STREAM
UTILITY POLE & LIGHT
BULKHEAD
Area 1
Area 2
CREEK
ORANOAKEN
"MIDDLE OF CREEK"
TIMBER
CONCRETE RAMP
CONCRETE REST ROOMS & STORAGE
WESTERLY LINE OF TRACT NO. 2 OF D.B. 1265, PG. 1216
BLOCK 10 NATURAL LANDS TRUST, INC.
N.58°35'24"E. 158.29'
LINE OF TRACT NO. 3 OF D.B. 1265, PG. 1216
S.35°04'17"W. 83.00'
N.88°55'06"W. 73.15'
N.65°44'12"W. 62.64'
S.25°00'00"W. 58.00'
SOUTHWESTERLY LINE OF TRACT NO. 1 OF D.B. 1265, PG. 1216
SOUTHERLY CORNER OF NO. 1 OF D. PG. 1216
255.00'
N.58°00'00"W.
82.92' ±
LOT 14, BLOCK 53
N/F NATURAL LANDS TRUST, INC.
CENTER OF ORANOAKEN CR.
℄ CREEK (DEED)
TIMBER BOAT LANDING DOCK
"ALONG NORTHERLY EDGE OF CREEK"
TIDAL MARSH
300' ±
N.11°20'01"W.
WESTERLY LINE OF TRACT NO. 3 OF D.B. 1265, PG. 1216.
LOT 10, BLOCK 53
N/F NATURAL LANDS TRUST, INC.
DEED REF.
FIED TO:
L E. JENNINGS AND
JE E. JENNINGS;
& AND MERCHANTS NATIONAL
BRIDGETON, AND TO THEIR
ORS AND/OR ASSIGNS AND
TAL TITLE INSURANCE CO.
9-6-94 Edward G. Austen, Sr., L.S.
SURVEY OF PROPERTY
WENDELL E. JENNING
CATHERINE E. JENNI
DOWNE TOWNSHIP, CUMBERLAND
DATE: SEPT. 6, 1994
MAP SCA
SURVEY AND MAP PREPARED BY:
EDWARD G. AUSTEN, SR.
PROFESSIONAL LAND SURVEYO
NEW JERSEY LICENSE NO. 18604
R.D. 7 - BOX NO. 482

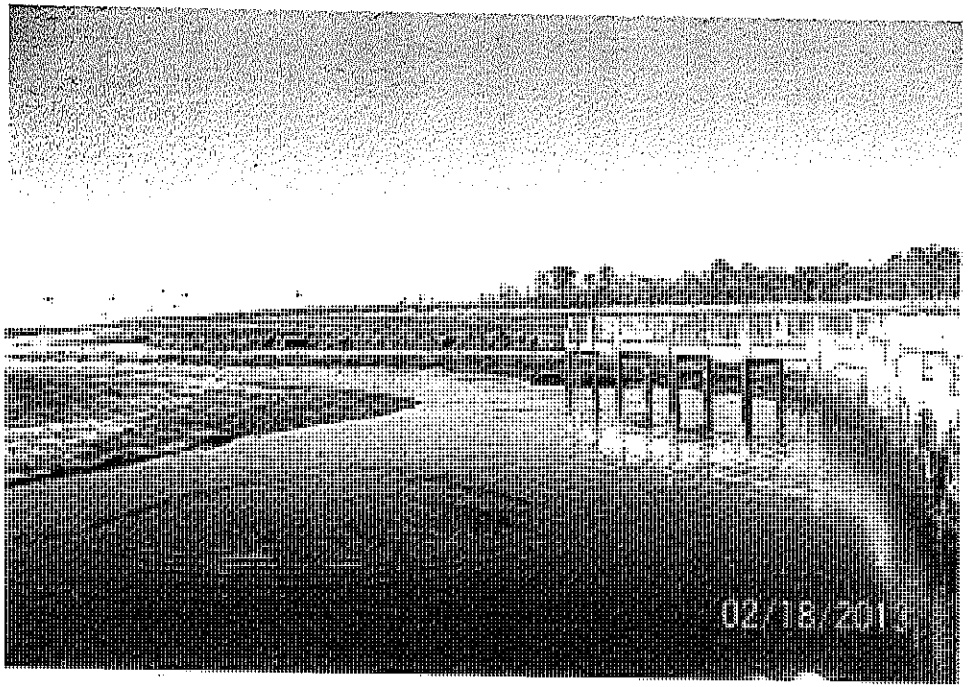
Area

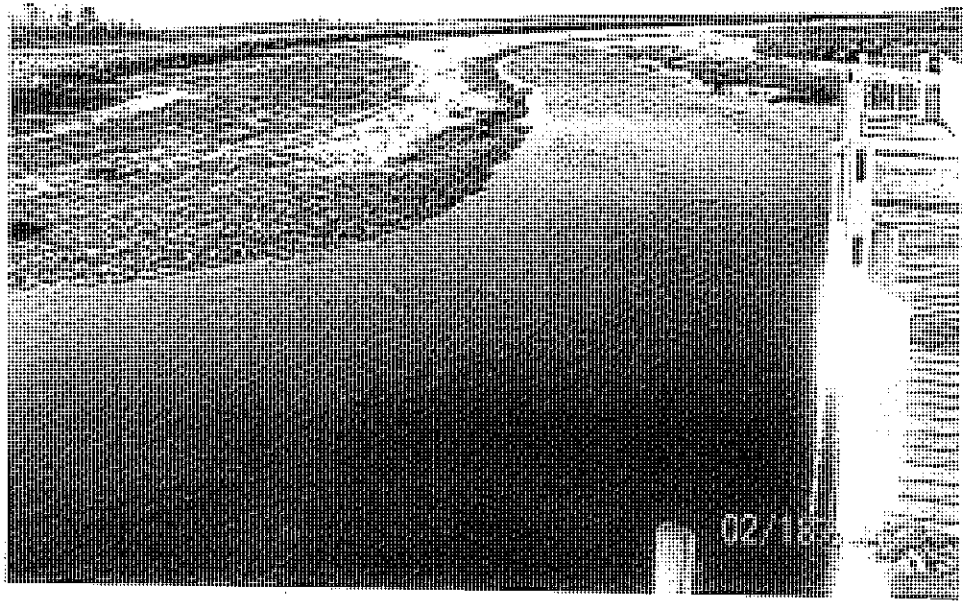




Area 2







ATTACHMENT B

USACE State Problems, Needs, and Opportunities Correspondence with Individual State Responses

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF THE COMMISSIONER
Mail Code 401-07
P.O. BOX 402
Trenton, NJ 08625-0402
TEL (609) 292-2885
FAX (609) 292-7695

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

July 17, 2014

Lieutenant General Thomas P. Bostick
Commander
United States Army Corps of Engineers
441 G Street NW
Washington, DC 20314-1000

Re: North Atlantic Coast Comprehensive Study and New Jersey's Needs

Dear Lieutenant General Bostick:

As you know, on April 14, 2014, the New Jersey Department of Environmental Protection submitted comments to the U.S. Army Corps of Engineers' (Army Corps) draft North Atlantic Coast Comprehensive Study (Comprehensive Study). We now seek to build upon the great collaboration between the State and Army Corps to study the flood risks of vulnerable populations within New Jersey, and obtain necessary authorization to proceed with feasibility studies of the New York-New Jersey Harbor and Tributaries and New Jersey's back bay regions.

To assist New Jersey in rebuilding and enhancing long term resiliency post-Sandy, the State partnered with six universities to devise flood mitigation strategies for particularly flood-prone communities located near the Hudson River, Hackensack River, Arthur Kill, Barnegat Bay and Delaware Bay. Summaries of these studies have already been provided to the Army Corps for consideration in the Comprehensive Study, and we will share copies of all nine reports once finalized. We believe the university studies demonstrate a strong federal interest in mitigating risk in these regions, and thus justify the need for further feasibility studies. The Army Corps technical and financial resources are critical to effectively implementing these strategies.

The title and focus areas for the nine university studies are:

Hudson River (Hoboken, Jersey City, Weehawken, Bayonne)

1. Flood Adaptation Strategies for the NJ Hudson River Waterfront "Hoboken, Jersey City, Weehawken and Bayonne"

2. Urban Storm Drainage System: Identification, Modeling, and Green Practices for Developing Flood Risk Reduction Strategies for Vulnerable Coastal Populations along Hudson River at Hoboken and Jersey City

Hackensack River (Moonachie, Little Ferry)

3. Flood Mitigation Engineering Resource Center
4. Strategies for Flood Risk Reduction for Vulnerable Coastal Populations along Hackensack River at Moonachie and Little Ferry

Arthur Kill (Elizabeth, Linden, Rahway, Woodbridge)

5. Strategies for Flooding Risk Reduction for Vulnerable Coastal Populations at Elizabeth, Linden, Rahway and Woodbridge

Barnegat Bay

6. Storm Surge Reduction Alternatives for Barnegat Bay
7. Analysis of Potential Wetlands Enhancement in Barnegat Bay Estuary
8. Strategies for Flood Risk Reduction for Vulnerable Coastal Populations along Barnegat Bay

Delaware Bay, Salem/Cumberland Counties

9. Strategies for Flood Risk Reduction for Vulnerable Coastal Populations along Delaware Bay

The U.S. Department of Housing and Urban Development's (HUD) Rebuild by Design initiative examined the need for comprehensive, regional flood mitigation strategies for the New York-New Jersey Harbor and Tributaries – a region that was particularly impacted during Superstorm Sandy and does not have any authorized or constructed Army Corps projects. As a result of these vulnerabilities, and the identification of innovative regional solutions, HUD has allocated funding to the State for two Rebuild by Design projects: (1) the "New Meadowlands," which primarily focuses on Moonachie and Little Ferry on the Hackensack River; and (2) "RESIST-DELAY-STORE-DISCHARE," which focuses on Hoboken, Jersey City, and Weehawken.

The State will incorporate the university studies into the Rebuild by Design process. HUD's selection of these projects and the award of significant funding to New Jersey for detailed design, engineering, and construction provide the opportunity for major steps forward in regional flood resiliency. Unfortunately, the State did not receive sufficient HUD funding to fully implement these projects. Therefore, we submit that these projects should be incorporated into the final Comprehensive Study for the Army Corps consideration with the intention that the unfunded project components be placed in contention for future USACE funding and construction. The State recognizes the importance of a regional and cooperative approach with New York in order to achieve effective coastal storm risk management and resilience in this region.

In addition to the New York-New Jersey Harbor and Tributaries, there are other areas throughout the State that lack the benefit of an authorized or constructed Army Corps project. Areas like New Jersey's back bays face significant risk to future storm surge events. The State requests that the Army Corps incorporate into the Comprehensive Study the extensive research of these regions by our university teams.

Many areas that include an Army Corps constructed project also experienced extensive damage as a result of the sheer magnitude and force of Superstorm Sandy. In light of the increasing frequency and intensity of extreme weather events, the State also requests that, consistent with the Disaster Relief Appropriations Act of 2013, the Army Corps undertake a comprehensive reevaluation of all constructed projects, as well as projects currently under study in New Jersey, in order to address this increased risk and improve coastal storm risk management and preparedness by incorporating current science and engineering standards. This reevaluation should include the Atlantic coastal projects of Sandy Hook to Barnegat, Great Egg Harbor Inlet to Peck Beach, and Cold Spring Inlet to Lower Township, and should determine, among other things, if dunes should be included in their designs to improve their coastal storm damage reduction capabilities.

New Jersey respectfully requests that, in order to prepare for future coastal storms, the Army Corps leverage the extensive research of the State's focus areas documented in the Comprehensive Study and the university studies, and advance them to the feasibility phase. Recognizing the significant cost of this endeavor, we are hopeful this will be achieved at full federal expense.

We are excited to continue the strong collaboration with the Army Corps and other regional partners to ensure the Comprehensive Study's findings and opportunities are fully implemented.

Sincerely,

Terrence S. Brody
Executive Director, GORR

Bob Martin
Commissioner, NJDEP

cc: New Jersey Congressional Delegation