



**US Army Corps  
of Engineers®**  
New York District

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# **NEW YORK AND NEW JERSEY HARBOR AND TRIBUTARIES STUDY**

## **COASTAL STORM RISK MANAGEMENT STUDY**

### **DRAFT INTEGRATED FEASIBILITY REPORT & TIER 1 ENVIRONMENTAL IMPACT STATEMENT**

#### **APPENDIX A8: Tier 1 Cultural Resources Appendix**



Contract No. W912DS-15-D-0002

**U.S. Army Corps  
of Engineers**  
New York District

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**CULTURAL RESOURCES ASSESSMENT: NEW YORK –  
NEW JERSEY HARBOR and TRIBUTARIES STUDY**

**DRAFT TIER I ENVIRONMENTAL IMPACT STATEMENT**

**DRAFT REPORT**

**AUGUST 2022**

**COMMONWEALTH HERITAGE GROUP, INC**  
NY Regional Office—Buffalo  
2390 Clinton Street  
Buffalo, New York 14227

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**PREPARED FOR:**

**DMA-Mabbett Joint Venture LLC**  
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**UNDER CONTRACT TO:**

**U.S. ARMY CORPS OF ENGINEERS**  
New York District  
26 Federal Plaza  
New York, New York 10278-0090

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# Abstract

## PROJECT DESCRIPTION

Commonwealth Heritage Group, Inc. (Commonwealth) completed this cultural resources investigation for the New York-New Jersey Harbor and Tributaries (NYNJHAT) Study under contract to DMA-Mabbett Joint Venture, LLC of Vienna, Virginia, for the New York District, U.S. Army Corps of Engineers (USACE / District). The study is a planning component in the design of a series of measures aimed at managing the risk of future coastal storm damage in the New York-New Jersey Harbor areas of New York and New Jersey, respectively. In recent years, storms have severely impacted this region and, in response, the USACE is investigating measures to manage future flood risk in ways that support the long-term resilience and sustainability of the coastal ecosystem and surrounding communities, and reduce the economic costs and risks associated with flood and storm events. As of this writing, the USACE is considering five undertaking build alternatives (project Alternatives 2, 3A, 3B, 4, and 5 [Alternative 1 is the no-build alternative]), each of which will help the region manage flood risk that is expected to be exacerbated by relative sea level rise through construction of flood control measures. The NYNJHAT Study will contribute information to distinguish among the alternatives and inform recommendations for alternative selection (USACE 2021).

The USACE has defined a study area for the NYNJHAT Study that is employed herein as the broad setting within which the project's measures will ultimately be constructed. It circumscribes all five undertaking build alternatives. It encompasses the New York Metropolitan Area, including the most populous and densely populated city in the United States, and the six largest cities in New Jersey. In total, the study area covers more than 2,150 square miles and comprises parts of 25 counties in New Jersey and New York, including: Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth Counties in New Jersey; and Rensselaer, Albany, Columbia, Greene, Dutchess, Ulster, Putnam, Orange, Westchester, Rockland, Bronx, New York, Queens, Kings, Richmond, and Nassau Counties in New York. Of the total study area, 1,829.6 square miles are on land and 320.4 square miles are on water; 1,219.5 square miles are in New York and 930.5 are in New Jersey. The study area also includes over 900 miles of tidally influenced shoreline. USACE has organized the NYNJHAT study area into nine regions: Upper Bay/Arthur Kill Region; Lower Bay Region; Jamaica Bay Region; Hackensack/Passaic Region; Raritan Region; Long Island Sound Region; Lower Hudson/East River Region; Mid-Hudson Region; and Capital District Region.

The purpose of this investigation is to provide information about cultural resources that will contribute to the USACE's decision-making process in selecting a build alternative for the New York-New Jersey Harbor and Tributaries flood risk management system. To do so, the investigation includes two parts: an historical review of the study area to provide contextual information for the cultural resources it contains; and preliminary assessments of the potential direct and indirect (i.e., visual) effects of each of the build alternatives on cultural resources. The historic context covers the USACE-defined study area, while the effects assessments are limited to areas near the planned build alternatives. The document will form a component of the undertaking's NYNJHAT Draft Tier 1 Environmental Impact Statement (EIS).

Documentation of historic properties (i.e., cultural resources) is important for the NYNJHAT Study and the selection of a project design. The New York City Metropolitan area, Northeast New Jersey, and the Hudson River Valley are nationally significant for their roles in the development of the United States. This interconnected history is visually represented by the dense concentration of architecturally significant structures and historic sites characterizing the New York City Metropolitan area, northeastern New Jersey, and the Hudson River Valley. The regions around and including the Hudson River, New York / New Jersey Harbor, and the surrounding tributaries and estuaries were also important areas for Native American settlement and land use both before and after the arrival of Europeans.

In addition to properties listed or eligible for inclusion in the S/NRHP, the study area also includes other nationally, state, and locally defined classes or types of resources of historical and / or cultural



importance. Among these are World Heritage Sites, National Historic Landmarks, National Park Service Sites (which include National Monuments), National Heritage Areas, New York State Heritage Areas, and New York City Landmarks. Some properties are designated as more than one resource type.

The study area also overlaps the traditional homelands of several Native American Nations, members of which have continued to reside in the region since the arrival of Europeans in the sixteenth century. Some of these communities are federally recognized tribes with interests in undertakings in the study area. They include the Mohawk, Mohican, Delaware Nation, Delaware Tribe, and the Shinnecock. Additionally, the Unkechaug Nation is recognized by New York State and the Ramapough Lenape are recognized by New Jersey. Continual cooperation and consultation with these nations through their Tribal Historic Preservation Offices (THPOs) will be an important element in the alternative selection process.

This study provides a baseline of cultural and historic information that will inform alternative selection. Commonwealth completed the cultural resources assessment for the NYNJHAT Draft Tier 1 EIS with the most recent Project details and GIS data available from the USACE as of July 22, 2022. Any subsequent changes to the NYNJHAT project alternatives that has potential to affect cultural resources will be assessed in the next phase of the study, Draft Tier 2 EIS. Information on historic properties and cultural resources within the New York portion of the study area is derived from spatial data and information shared with the USACE by the New York SHPO and other data (e.g., survey reports, NRHP nominations, building and site forms, etc.) available online in the office's Cultural Resources Information System (CRIS). For the New Jersey section of the study area, some information on historic properties and cultural resources for this study was obtained from the New Jersey Historic Preservation Office (NJHPO) online shape file data available in the LUCY, an online GIS viewer for New Jersey's cultural resources inventory. Spatial data for New Jersey cultural resources was not available as of this writing, although it is anticipated the data will be accessible for the next phase of the NYNJHAT study (Tier 2 EIS). This, coupled with the large geographic extent of the project, somewhat limit the conclusions that can be drawn at this preliminary level concerning the relative indirect (visual) effects of the project alternatives on cultural resources in New Jersey.

## RESULTS

Adverse effects are anticipated for historic and cultural resources within the NYNJHAT study area. Depending on the final project features, ground disturbing activities have the potential to adversely affect the integrity of archaeological sites and installation of above-ground features has the potential to diminish the characteristics of historic structures that make them eligible for inclusion in the S/NRHP.

### Project Direct Effects on Cultural Resources in New York

**Archaeological sites.** All of the project alternatives have the potential to affect archaeological resources in New York. The no-action alternative (Alternative 1) potentially will have the greatest effect on archaeological sites; there are 160 known sites in the area that would likely be flooded within the next century should the project not be built. The build alternatives will potentially affect roughly similar numbers of sites, relative to each other; of those alternatives, Alternative 3B is within 100 meters of the most sites (N = 19), and Alternative 5 is within 100 meters of the fewest (N = 10).

**Aboveground resources.** All the project alternatives have the potential to directly affect aboveground cultural resources in New York. As was the case with archaeological sites, the no-action alternative (Alternative 1) potentially will have the greatest effect on aboveground resources; there are over 2,500 known aboveground resources in the area that would likely be flooded within the next century should the project not be built. The build alternatives will potentially affect roughly similar numbers of sites, relative to each other; of those alternatives, Alternative 4 is within 100 meters of the most aboveground resources (N = 340), and Alternative 5 is within 100 meters of the fewest (N = 167). Portions of the Jamaica Bay Unit of the Gateway National Recreational Area (NRA) will be affected by Alternatives 2, 3A, 3B, and 4.

**Submerged resources.** NY SHPO CRIS data records no submerged archaeological sites not related to shipwrecks within the Direct APE for any of the build alternatives in New York. NOAA ENC data indicates the build alternative Direct APEs overlap with the locations of between two and 43 shipwrecks in New York. The Direct APE for Alternative 2 overlaps with the most shipwrecks (N = 43) and Alternative 5 overlaps with the fewest (N = 2).

### **Project Direct Effects on Cultural Resources in New Jersey**

**Archaeological sites.** All of the project alternatives have the potential to affect archaeological resources in New Jersey. Assessment of the precise number of sites that will be affected by the no-build alternative is beyond the scope of this investigation. The build alternatives will potentially affect roughly similar numbers of sites; of those alternatives, Alternative 4 is within 100 meters of the most archaeological grids with identified, NR-listed, or NR-eligible sites (N = 43), and Alternative 5 is within 100 meters of the fewest (N = 13). For Alternatives 2 to 4 in New Jersey, the total number of grids that are within 100 meters of measures are roughly double the corresponding totals for alternatives in New York. This perhaps reflects differences in the amounts of post ca. AD1800 urban development that have occurred near the undertaking APEs in the respective states.

**Aboveground resources.** All the project alternatives have the potential to directly affect aboveground cultural resources in New Jersey. The number of historic properties within the build alternative Direct APEs varies significantly: Alternative 4 will potentially affect 79 properties, while the Alternative 5 Direct APE intersects only 20 properties. Portions of the Sandy Hook Unit of the Gateway National Recreational Area (NRA) will be affected by Alternatives 2 and 3A. Parts of three National Historic Landmarks are also within the Direct APEs for the build alternatives: the Fort Hancock Sandy Hook Proving Ground Historic District National Historic Landmark is within 100 meters of Alternative 2; the Clark Thread Company Historic District is in the Direct APE for Alternatives 3A and 3B; and the Holland Tunnel is within 100 meters of Alternatives 3B, 4, and 5.

**Submerged resources.** The NJ LUCY data does not have a dedicated layer for submerged archaeological resources, although offshore sites may be indicated by the system's archaeological grids. In this case, some of the archaeological sites noted above could be submerged resources. NOAA ENC data indicates the build alternative Direct APEs overlap with the locations of up to eight shipwrecks in New Jersey. The Direct APE for Alternative 4 overlaps with the most shipwrecks (N = 8) and Alternative 5 overlaps with the fewest (none).

### **Project Indirect / Visual Effects on Cultural Resources in New York**

All the project alternatives have the potential to affect the setting of aboveground cultural resources in New York. Based solely on topography, the areas within which alternative measures will be visible within a mile of the project vary between 75.5 and 85.6 percent of that terrain. Alternative 4 would be visible from the largest proportion of its surroundings (85.6 percent), and Alternative 5 from the smallest relative area (75.5 percent). There are a large number of aboveground properties in the viewsheds of all the build alternatives: Alternative 3B would be visible from the most historic properties (N = 15,716), while Alternative 5 would be visible from the fewest (N = 10,532). Undoubtedly, these numbers will be somewhat attenuated when vegetation and the built environment are factored into the viewshed calculations. However, they will likely remain somewhat high, given the density of historic properties in New York City.

Another (and perhaps more effective) way to express the alternatives' potential overall effects on aboveground resources is to explore the number of historic properties from which project alternatives would be visible as a ratio of the number of properties in the viewsheds to the total viewshed area: i.e., the number of properties in the viewsheds per viewshed square mile. The values of the ratio vary significantly among the alternatives: Alternative 3A has the lowest ratio – it would be visible from 76 historic properties per viewshed square mile; Alternative 5 has, by far, the highest ratio – it would be visible from 630.7 historic properties per viewshed square mile.

### **Project Indirect / Visual Effects on Cultural Resources in New Jersey**

All the project alternatives have the potential to affect the setting of aboveground cultural resources in New Jersey. Based solely on topography, the areas within which alternative measures will be visible within a mile of the project vary between 47.8 and 69.1 percent of that terrain. Alternative 4 would be visible from the largest proportion of its surroundings, and Alternative 3B from the smallest relative area.

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## List of Abbreviations

APE	Area of Potential Effect
c./ca.	circa
CSRM	Coastal Storm Risk Management
ft	feet / linear feet
FR/EIS	Feasibility Report and Environmental Impact Statement
GNRA	Gateway National Recreation Area, NY, NJ
ha	hectare
IFF	Induced Flooding Feature
km	kilometer
mi	mile
NACCS	North Atlantic Coast Comprehensive Study
NAVD	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act
NHLD	National Historic Landmark District
NHPA	National Historic Preservation Act
NNBF	Natural & Nature Based Feature
NPS	National Park Service
NRHP	National Register of Historic Places
NYCDCP	New York City Department of City Planning
NYC LPC	New York City Landmarks Preservation Commission
NYNJHAT	New York-New Jersey Harbor and Tributaries
NYSHPO	New York State Historic Preservation Office
NYS OPRHP	New York State Office of Parks, Recreation, and Historic Preservation
PED	Preconstruction Engineering and Design
RRF	Residual Risk Feature
RSLC	Relative Sea Level Rise
SBM	Shoreline Based Measure
SH-BP	Sandy Hook-Breezy Point
S/NRHP	State and National Registers of Historic Places
SNWA	Special Natural Waterfront Area
sq mi	square miles
SSB	Storm Surge Barrier
TSP	Tentatively Selected Plan
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey

## **Cultural Resources Glossary** (after NPS Bulletin 28)

**CULTURAL RESOURCES** A broad term applied to places, sites, buildings, structures, objects, cultural practices, or collections of these physical and nonphysical manifestations that have significance to humans. A cultural resource is an aspect of a cultural system that is valued by or significantly representative of a culture or that contains significant information about a culture. A cultural resource may be a tangible entity or a cultural practice. Tangible cultural resources are categorized as districts, sites, buildings, structures, and objects for the National Register of Historic Places and as archeological resources.

**ADVERSE EFFECT** An adverse effect occurs when an undertaking diminishes the integrity of a historic property's location, design setting, materials, workmanship, feeling, or association. Characteristics of the property that may qualify it for inclusion on the NRHP have been negatively impacted.

**ADVISORY COUNCIL ON HISTORIC PRESERVATION (ACHP)** The independent agency set up under the National Historic Preservation Act (Title II) to advise the President and the Congress on cultural resources preservation; to advise on the dissemination of information on such activities; and to encourage public interest in cultural resources preservation. Under Section 106 of the NHPA, the Advisory Council on Historic Preservation will be afforded an opportunity to comment on Federal, federally assisted, or federally licensed undertakings that may have an effect on cultural resources properties.

**ARCHAEOLOGICAL RESOURCE** "[A]ny material remains of past human life or activities which are of archaeological interest, as determined under uniform regulations promulgated pursuant to ARPA. Such regulations shall include but not be limited to: pottery, basketry, bottles, weapons, weapon projectiles, tools, structures, pithouses, rock paintings, rock carving, intaglios, graves, human skeletal materials, or any portion or piece of any of the foregoing items. No item shall be treated as an archaeological resource under ARPA regulations unless such item is at least 100 years of age" [ARPA 16 U.S.C. § 470bb].

**AREA OF POTENTIAL EFFECT (APE)** "[T]he geographic area or areas within which an undertaking may cause changes in the character of or use of historic properties, if any such properties exist" [36 CFR § 800.2(c)]. The determination is based not on knowledge of specific properties, but on what effects might be created if historic properties do exist in the undertaking's APE. The APE is influenced by the scale and nature of an undertaking

**ASSOCIATION** The relationship between a historic event, activity, or person and a cultural resource.

**BUILDING** An enclosed structure with walls and a roof, consciously created to serve some residential, industrial, commercial, agricultural, or other human use.

**CHARACTER-DEFINING FEATURE** A prominent or distinctive aspect, quality, or characteristic of a historic property that contributes significantly to its physical character. Structures, objects, vegetation, spatial relationships, views, furnishings, decorative details, and materials may be such features.

**CONSULTATION** The act of seeking and considering the opinions and recommendations of those parties that have consultative roles in the Section 106 process. These parties include the SHPO, the ACHP, Native American Indian, traditional tribal leaders, representatives of local governments, applicants for Federal assistance, other agencies (Federal or State), institutions, foundations, professional organizations, preservation groups, and specific individuals from the public with a demonstrable interest in the outcome of the process.

**CONTEXT** (including ARCHAEOLOGICAL and HISTORIC) The physical setting, location, and cultural association from which archaeological or historic materials are discovered. Usually the meaning of such materials cannot be discerned without information about their setting. One example is determining how

old an object is, given that the age of objects excavated from a site varies with their depth in the ground. Unless the depth of an object is carefully recorded against a fixed point of reference, it may be impossible to relate objects to the dimension of time.

**CULTURAL LANDSCAPE** A geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general kinds of cultural landscape, not mutually exclusive:

Historic site: a landscape significant for its association with a historic event, activity, or person.

Historic designed landscape: a landscape significant as a design or work of art; was consciously designed and laid out either by a master gardener, landscape architect, architect, or horticulturist to a design principle, or by an owner or other amateur according to a recognized style or tradition; has a historical association with a significant person, trend or movement in landscape gardening or architecture, or a significant relationship to the theory or practice of landscape architecture.

Historic vernacular landscape: a landscape whose use, construction, or physical layout reflects endemic traditions, customs, beliefs, or values; in which the expression of cultural values, social behavior, and individual actions over time is manifested in physical features and materials and their interrelationships, including patterns of spatial organization, land use, circulation, vegetation, structures, and objects; in which the physical, biological, and cultural features reflect the customs and everyday lives of people.

Ethnographic landscape: areas containing a variety of natural and cultural resources that associated people define as heritage resources, including plant and animal communities,

**CULTURE** A system of behaviors, values, ideologies, and social arrangements. These features, in addition to tools and elements such as graphic arts, help in the interpretation of the human universe as well as dealing with features of the natural and social environments. Culture is learned, transmitted in a social context, and modifiable. Synonyms for culture include "lifeways," "customs," "traditions," "social practices," and "folkways."

**DESIGN** The combination of elements that create the form, plan, space, structure, and style of a historic property.

**DISCOVERY** To find cultural resources in an unexpected location or circumstance, or of a class not covered by previous review under the National Historic Preservation Act, as amended through 1992, Section 106.

**EFFECT** The word "effect" is broadly defined. Effects can be direct or indirect and the word covers any foreseeable change when "the undertaking may alter characteristics of the property for inclusion in the National Register." For the purpose of determining effect, alterations to features of the property's location, setting, or use may be relevant depending on a property's significant characteristics and should be considered [36 CFR § 800.9(a)].

**ETHNOGRAPHIC RESOURCE** A site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.

**FEATURE or ARCHAEOLOGICAL FEATURE** Many archaeological elements are portable, such as fragments of bone, pottery, and stone tools. Archaeological sites, however, frequently contain features: manmade constructions that are not portable and are part of the earth itself. Examples of such features are hearths, bedrock mortars, fireplaces, foundations of buildings, storage pits, grave pits, and canals.

**GEOGRAPHIC INFORMATION SYSTEM (GIS)** A geographic information system is a data base system that is designed to manage data referenced by spatial or geographic coordinates. Using GIS spatial data can be viewed, queried, and analyzed for greater understanding of the spatially significant relationships. Common GIS data features include transportation, water resources, utility resources, geo-political boundaries, aerial photography/imagery, and the attributes for all of the above.

**HISTORIC CHARACTER** The sum of all visual aspects, features, materials, and spaces associated with a property's history.

**HISTORICAL CONTEXT** An organizing structure created for planning purposes that groups information about historic properties based on common themes, time periods, and geographical areas.

**HISTORIC DISTRICT** Ageographically definable area, urban or rural, possessing a significant concentration, linkage, or continuity of sites, landscapes, structures, or objects, united by past events or aesthetically by plan or physical developments. A district may also be composed of individual elements separated geographically but linked by association or history. (See National Register Bulletin 15.)

**HISTORIC PROPERTY** "Any prehistoric or historic building, district, site, structure, or object included in or eligible for inclusion in the National Register. The term includes artifacts, records, and remains that are related to and located within such properties" [36 CFR § 800.2(e)].

- a. **DISTRICT.** A geographically definable area, urban or rural, with a concentration, linkage, or continuity of cultural resources properties that are united by past events, or aesthetically by plan or physical development. A district may also be composed of areas that are separated by space but are linked by history or style.
- b. **SITE.** The location of a precontact-period or historic event, occupation, or activity; or structure, whether represented by standing ruins or by other surface or subsurface evidence, when the location, regardless of the value of existing structures, contains the historical or archaeological value.
- c. **BUILDING.** A structure created to shelter any form of activity, such as a house, stable, church, barracks, hospital, or similar structure. Buildings may refer to a functionally related complex, such as a courthouse and jail, a house and barn, or a barracks, a mess hall, and a chapel.
- d. **STRUCTURE.** An edifice, often an engineering project, designed to aid human activities, such as bridges, canals, or aqueducts.
- e. **OBJECT.** An artifact of functional, aesthetic, cultural, historical, or scientific value that may be, by nature or design, movable yet related to a specific historical activity, event, district, site, setting, or environment.

**HISTORIC LANDSCAPE** A cultural landscape associated with events, persons, design styles, or ways of life that are significant in American history, landscape architecture, archeology, engineering, and culture; a landscape listed in or eligible for the National Register of Historic Places.

**HISTORIC PROPERTY:** A district, site, structure, or landscape significant in American history, architecture, engineering, archeology, or culture; an umbrella term for all entries in the National Register of Historic Places.

**HISTORICAL SIGNIFICANCE** The meaning or value ascribed to a structure, landscape, object, or site based on the National Register criteria for evaluation. It normally stems from a combination of association and integrity.

**INDIAN TRIBE** The governing body of any Indian tribe, band, nation, or other group that is recognized as an Indian tribe by the Secretary of the Interior and for which the United States holds land in trust or restricted status for that entity or its members. Such term also includes any native village corporation, regional corporation, and native group established pursuant to the Alaska Native Claims Settlement Act [43 U.S.C. § 1701 et seq.].

**INTEGRITY** The authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during its historic or prehistoric period; the extent to which a property retains its historic appearance.

**LOCATION** The place where the historic property was constructed or the place where the historic event(s) occurred.

**MATERIAL** The physical elements that were combined or deposited to form a property. Historic material or historic fabric is that from a historically significant period, as opposed to material used to maintain or restore a property following its historic period(s).

**MATERIAL REMAINS/ARTIFACTS** Material remains (or artifacts) consist of “physical evidence of human habitation, occupation, use, or activity” [43 CFR § 7.3 (a)(2)]. These remains consist of any object or site that shows evidence of manufacture, use, or modification by humans. Examples of artifacts/material remains may include but are not limited to tools, implements, weapons, ornaments, clothing, and containers created variously from bone, ivory, shell, wood, metal, hide, feathers, pigments, chipped/pecked/ground stone, pottery/ceramics, and cordage/basketry /weaving; as well as organic debris or by-products/waste products such as burned animal bones or vegetal remains resulting from food preparation activities; works of artistic or symbolic representation such as rock paintings and carvings; and human remains.

**NATIONAL HISTORIC LANDMARK** Properties named by the Secretary of the Interior, per the Historic Sites Act of 1935, as having exceptional significance in the Nation's history [36 CFR Part 65]. National Historic Landmarks are listed in the National Register of Historic Places. They are reviewed per the National Historic Preservation Act, as amended through 1992, Section 110(f). The National Historic Preservation Act, as amended through 1992 [54 U.S.C. 300101 et seq.], sets national historic preservation policy and requires each Federal agency to develop a program to locate, inventory, and nominate to the Secretary of the Interior all cultural resources under the agency's control that may meet the criteria of the National Register of Historic Places. In addition, every Federal agency having any undertaking that may have an effect on a historic property (i.e., meeting the criteria of the National Register of Historic Places) will afford the Advisory Council on Historic Preservation an opportunity to comment on the undertaking. Federal agencies are directed to assume responsibility for preservation of historic properties they own or control.

**NATIONAL REGISTER OF HISTORIC PLACES (NRHP)** A listing of districts, sites, buildings, structures, and objects significant on the national, regional, or local level in U.S. history, architecture, archaeology, engineering, and culture. It is maintained by the Secretary of the Interior per the Historic Sites Act and the National Historic Preservation Act, as amended through 1992. The term “eligible for inclusion on the National Register” includes both properties formally determined as such and all other properties that meet the National Register of Historic Places criteria as defined by 36 CFR § 60.4.

**SETTING** The physical environment of a historic property; the character of the place in which the property played its historical role.

**STATE HISTORIC PRESERVATION OFFICER (SHPO)** The official within each state who has been designated and appointed by the state governor to administer the state historic preservation program, pursuant to Section 101(b)(1) of the NHPA.

**STRUCTURE** a constructed work, usually immovable by nature or design, consciously created to serve

some human activity. Examples are buildings of various kinds, monuments, dams, roads, railroad tracks, canals, millraces, bridges, tunnels, locomotives, nautical vessels, stockades, forts and associated earthworks, Indian mounds, ruins, fences, and outdoor sculpture. In the National Register program "structure" is limited to functional constructions other than buildings.

**SUBMERGED CULTURAL RESOURCE** Underwater Euro American or Native American remains.

**TRADITIONAL CULTURAL PROPERTY** A property "that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Guidelines for Evaluating and Documenting Traditional Cultural Properties. Examples include:

1. "a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;
2. a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;
3. an urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;
4. a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
5. a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity" (Guidelines for Evaluating and Documenting Traditional Cultural Properties).

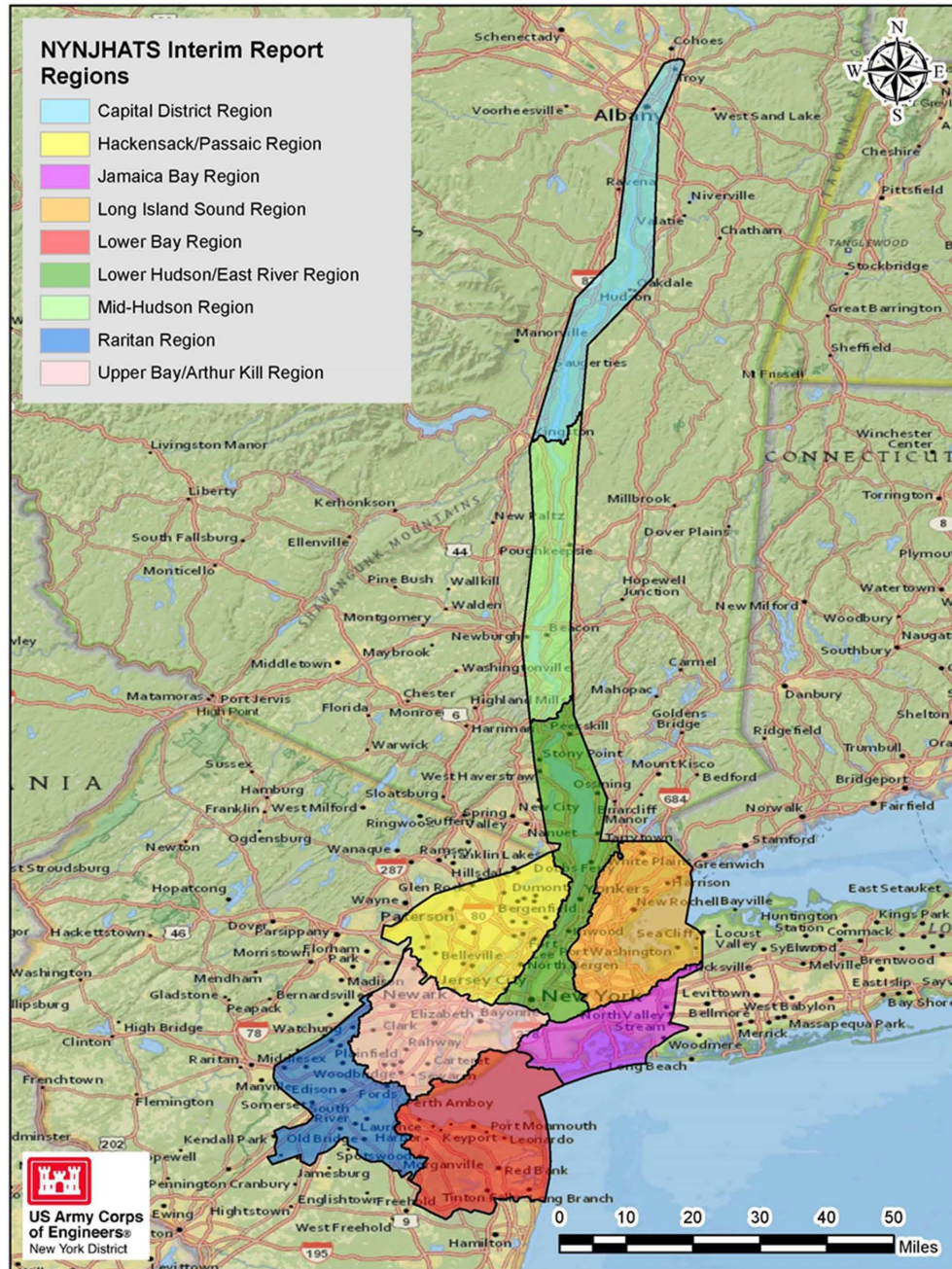
## 1.0 Introduction

Commonwealth Heritage Group, Inc. (Commonwealth) completed this cultural resources investigation for the New York-New Jersey Harbor and Tributaries (NYNJHAT) Study under contract to DMA-Mabbett Joint Venture, LLC of Vienna, Virginia, for the New York District, U.S. Army Corps of Engineers (USACE / District). The study is a planning component in the design of a series of measures aimed at managing the risk of future coastal storm damage in the New York-New Jersey Harbor areas of New York and New Jersey, respectively. In recent years, storms have severely impacted this region and, in response, the USACE is investigating measures to manage future flood risk in ways that support the long-term resilience and sustainability of the coastal ecosystem and surrounding communities, and reduce the economic costs and risks associated with flood and storm events. As of this writing, the USACE is considering five undertaking build alternatives (project Alternatives 2, 3A, 3B, 4, and 5 [Alternative 1 is the no-build alternative]), each of which will help the region manage flood risk that is expected to be exacerbated by relative sea level rise through construction of flood control measures. The NYNJHAT Study will contribute information to distinguish among the alternatives and inform recommendations for alternative selection (USACE 2021).

The USACE has defined a study area for the NYNJHAT Study that is employed herein as the broad setting within which the project's measures will ultimately be constructed. It circumscribes all five undertaking build alternatives. It encompasses the New York Metropolitan Area, including the most populous and densely populated city in the United States, and the six largest cities in New Jersey. In total, the study area covers more than 2,150 square miles and comprises parts of 25 counties in New Jersey and New York, including: Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth Counties in New Jersey; and Rensselaer, Albany, Columbia, Greene, Dutchess, Ulster, Putnam, Orange, Westchester, Rockland, Bronx, New York, Queens, Kings, Richmond, and Nassau Counties in New York (Figure 1.1; Table 1.1). Of the total study area, 1,829.6 square miles are on land and 320.4 square miles are on water; 1,219.5 square miles are in New York and 930.5 are in New Jersey. The study area also includes over 900 miles of tidally-influenced shoreline. USACE has organized the NYNJHAT study area into nine regions: Upper Bay/Arthur Kill Region; Lower Bay Region; Jamaica Bay Region; Hackensack/Passaic Region; Raritan Region; Long Island Sound Region; Lower Hudson/East River Region; Mid-Hudson Region; and Capital District Region.

The purpose of this investigation is to provide information about cultural resources that will contribute to the USACE's decision-making process in selecting a build alternative for the New York-New Jersey Harbor and Tributaries flood risk management system. To do so, the investigation includes two parts: an historical review of the study area to provide contextual information for the cultural resources it contains; and preliminary assessments of the potential direct and indirect (i.e., visual) effects of each of the build alternatives on cultural resources. The historic context covers the USACE-defined study area (see Figure 1.1), while the effects assessments are limited to areas near the planned build alternatives. The document will form a component of the undertaking's NYNJHAT Draft Tier 1 Environmental Impact Statement (EIS).

Documentation of historic properties (i.e., cultural resources) is important for the NYNJHAT Study and the selection of a project design. The New York City Metropolitan area, Northeast New Jersey, and the Hudson River Valley are nationally significant for their roles in the development of the United States. This interconnected history is visually represented by the dense concentration of architecturally significant structures and historic sites characterizing the New York City Metropolitan area, northeastern New Jersey, and the Hudson River Valley. The regions around and including the Hudson River, New York / New Jersey Harbor, and the surrounding tributaries



**Figure 1.1. NYNJHAT Study regions defined by the USACE.**

and estuaries were also important areas for Native American settlement and land use both before and after the arrival of Europeans.



**Table 1.1 NYNJHAT Study Region summary characteristics.**

<b>Study Region</b>	<b>Area (Sq. Miles)*</b>	<b>New York Counties</b>	<b>New York Area (Sq. Miles)</b>	<b>New Jersey Counties</b>	<b>New Jersey Area (Sq. Miles)</b>
Capital District Region	222.7	Albany, Columbia, Dutchess, Greene, Rensselaer, Ulster	222.7	None	0
Hackensack / Passaic Region	260.7	Rockland	0.6	Bergen, Essex, Hudson, Morris, Passaic	257.7
Jamaica Bay Region	155.3	Kings, Nassau, Queens	121.1	None	0
Long Island Sound Region	260.6	Bronx, Nassau, Queens, Westchester	199.1	None	0
Lower Bay Region	326.2	Richmond	18.3	Middlesex, Monmouth	176
Lower Hudson / East River Region	259.2	Bronx, Kings, New York, Orange, Putnam, Queens, Rockland, Westchester	172.1	Bergen, Hudson	19.9
Mid-Hudson Region	211.2	Dutchess, Orange, Putnam, Ulster	210.9	None	0
Raritan Region	216.9	None	0	Middlesex, Monmouth, Somerset, Union	214
Upper Bay / Arthur Kill Region	245.4	Kings, New York, Richmond	48.1	Essex, Hudson, Middlesex, Union	168.9

\*Area total includes water bodies; area totals for each state do not include offshore waters and the Hudson.

Although this report includes a glossary, it employs several cultural resources-specific phrases and concepts throughout that require brief introduction here. In the parlances of the National Park Service (NPS) – the federal agency responsible for stewardship of cultural resources – and the New York and New Jersey State Historic Preservation Offices (SHPOs), an ‘historic property,’ (sometimes just a ‘property’) is a “district, site, building, structure or object significant in American history, architecture, engineering, archeology or culture at the national, State, or local level” (NPS 2020). In cultural resources literature, the term is sometimes employed synonymously with ‘cultural resource’ or ‘historic resource.’ Two important subclasses of the property types in the NPS definition are shipwrecks and traditional cultural properties, the latter of which are places associated “with cultural practices or beliefs of a living community that (a) are rooted in that community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1998:1). One expression of the importance of an historic property is its listing in the State and/or National Registers of Historic Places (S/NRHP); eligibility of a property for inclusion in the registers is determined by whether the property meets criteria defined by the National Park Service and is frequently determined by SHPOs.

In addition to properties listed or eligible for inclusion in the S/NRHP, the study area also includes other nationally, state, and locally-defined classes or types of resources of historical and / or cultural importance. Among these are World Heritage Sites, National Historic Landmarks, National Park Service Sites (which include National Monuments), National Heritage Areas, New York State Heritage Areas, and New York City Landmarks. Some properties are designated as more than one resource type.

The study area also overlaps the traditional homelands of several Native American Nations, members of which have continued to reside in the region since the arrival of Europeans in the sixteenth century. Some of these communities are federally-recognized tribes with interests in undertakings in the study area. They include the Mohawk, Mohican, Delaware Nation, Delaware Tribe, and the Shinnecock. Additionally, the Unkechaug Nation is recognized by New York State and the Ramapough Lenape are recognized by New Jersey. Continual cooperation and consultation with these nations through their Tribal Historic Preservation Offices (THPOs) will be an important element in the alternative selection process.

This study was prepared by cultural resources professionals meeting the Secretary of the Interior's professional qualifications standards for their respective disciplines (36 CFR 61). Dr. Donald Smith, RPA, served as Principal Investigator, Senior Archaeologist, and GIS Coordinator Manager. Ms. Christine M. Longiaru, M.A., was Principal Investigator and Senior Architectural Historian. Mr. Mark A. Steinback, M.A., was Project Historian and Project Director.

## **1.1 Cultural Resources Study: Description and Scope**

This study provides a baseline of cultural and historic information that will inform alternative selection. Commonwealth completed the cultural resources assessment for the NYNJHAT Draft Tier 1 EIS with the most recent Project details and GIS data available from the USACE as of July 22, 2022. Any subsequent changes to the NYNJHAT project alternatives that has potential to affect cultural resources will be assessed in the next phase of the study, Draft Tier 2 EIS. Potential direct and indirect effects to historic properties based on the areas of potential effect (APEs) of the proposed measures in each alternative APE are discussed in Sections 4 to 9. Information on historic properties and cultural resources within the New York portion of the study area is derived from spatial data and information shared with the USACE by the New York SHPO and other data (e.g., survey reports, NRHP nominations, building and site forms, etc.) available online in the office's Cultural Resources Information System (CRIS). For the New Jersey section of the study area, some information on historic properties and cultural resources for this study was obtained from the New Jersey Historic Preservation Office (NJHPO) online shape file data available in the LUCY, an online GIS viewer for New Jersey's cultural resources inventory. Spatial data for New Jersey cultural resources was not available as of this writing, although it is anticipated the data will be accessible for the next phase of the NYNJHAT study (Tier 2 EIS). This, coupled with the large geographic extent of the project, somewhat limit the conclusions that can be drawn at this preliminary level concerning the relative indirect (visual) effects of the project alternatives on cultural resources in New Jersey.

The remainder of this introduction includes: summaries of relevant federal and state cultural resources compliance laws and regulations (Section 1.2); a project alternatives overview (Section 1.3); measure construction details (Section 1.4); and anticipated potential impacts to cultural resources (Section 1.5). Section 2 of this report explains the study methodology for establishing the Direct Area of Potential of Effects and Indirect Area of Potential Effect and includes an outline of sources of background information and a cultural resources summary. Section 3 provides a general overview of Native American and Euro-American history in the NYNJHAT study area, and gives an overview of the types of cultural resources in the study area. Sections 4 to 9 include Affected Environment analyses for cultural resources for each alternative. Section 4 considers potential impacts to cultural resources under the no action or no-build alternative (Alternative 1). Report sections for each of the other five alternatives (Nos 2, 3A, 3B, 4, and 5) include an overview of measures, cultural resources within construction effects (Direct APE) in New York and New Jersey, and cultural resources within non-structural effects / visual impact area (Indirect effects)

for locations in the New York study area (see Sections 5 through 9). Section 10 provides a summary of results of this initial cultural resources assessment. Section 11 contains a list of references cited in the report.

## **1.2 Federal and State Cultural Resources Compliance**

Federal and state laws require the USACE to consider effects on cultural resources. The Council on Environmental Quality's regulations implementing the National Environmental Policy Act (NEPA), as amended, require that Federal agencies consider the "[u]nique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas" and "[t]he degree to which the [proposed] action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources" (40 CFR §1508.27(b)(3), (8)).

The USACE must also consider the effects of its undertaking on historic properties as defined in 54 U.S.C. §300308 of the National Historic Preservation Act (NHPA). The NHPA (54 U.S.C. §300101 et. seq.) distinguishes historic properties as any prehistoric or historic district, sites, building, structure, artifacts, or object included on, or eligible for inclusion on, the National Register of Historic Places (NRHP). Other Federal laws and regulations also protecting these resources include the Archaeological and Historic Preservation Act of 1974 (54 U.S.C. §§312501- 312508), and the Archaeological Resources Protection Act of 1979 (16 U.S.C. §§470aa-470mm). These Federal laws, specifically Section 106 and Section 110 of the NHPA, require Federal agencies to consider the effects of their actions on cultural resources and historic properties, including districts, sites, buildings, structures, and objects included or eligible for inclusion in the NRHP.

Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108) and its implementing regulations (36 CFR Part 800) requires an assessment of the potential impact of an undertaking on historic properties that are within the proposed project's area of potential effects (APE). The NHPA defines the APE defined as the geographic area or areas "within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16(d)). Additionally, Section 110(f) of the NHPA (54 U.S.C. § 306107) requires USACE to minimize harm to all National Historic Landmarks (NHL) within the APE to the maximum extent possible.

For the NYNJHAT study, the APE for cultural resources extends beyond the study area to encompass the following: 1) areas where structural measures are implemented (to include construction, demolition, vibration, and auditory effects); 2) where non-structural measures are applied to historic properties, and 3) where structural or non-structural measures has the potential to affect the viewshed of historic properties. An effect is an alteration to the characteristics of a historic property qualifying it for inclusion in or eligibility for the NRHP (36 CFR 800.16(i)). Examples of effects include visual intrusions, alterations of setting, noise, vibrations, viewsheds, and physical impacts. Indirect effects to historic properties are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Applicable state laws include the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Section 14.09 of the New York State Historic Preservation Act and the New Jersey Register of Historic Places Act, (Laws of 1970, Chapter 268) and New Jersey Public Law 2004, Chapter 1.

Federal agencies are required under Section 106 of the National Historic Preservation Act to “consider the effects of their undertakings on historic properties” and consider alternatives “to avoid, minimize or mitigate the undertaking’s adverse effects on historic properties” [(36 CFR 800.1(a-c)] in consultation with the State Historic Preservation Officer (SHPO) and appropriate federally recognized Indian Tribes (Tribal Historic Preservation Officers - THPO) [(36 CFR 800.2(c))].

### 1.3 Alternatives Overview

This cultural resources assessment addresses the five alternatives as presented in the NYNJHAT TIER 1 EIS:

- **Alternative 1: No Action**
- **Alternative 2: Harbor-Wide Storm Surge Barrier + Shoreline-Based Measures**
- **Alternative 3A: Multi-Basin Storm Surge Barriers + Shoreline-Based Measures**
- **Alternative 3B: Multi-Basin Storm Surge Barriers + Shoreline-Based Measures**
- **Alternative 4: Single Basin Storm Surge Barriers + Shoreline-Based Measures**
- **Alternative 5: Shoreline-Based Measures Only**

### 1.4 Preliminary Summary of Measures

Alternatives 2 to 5 include a combination of intended to mitigate increased flood risk. They can be either structural or non-structural and can also make use of natural (i.e., not man-made) barriers to flooding.

**1.4.1 Structural Measures.** Structural measures refer to those that would divert floodwaters from damaging property. These measures have the potential to cause both direct and indirect effects to aboveground resources, archaeological sites, and submerged resources. Some measures have the potential to change the landscape and setting. The types of structural measures under consideration in the NYNJHAT alternatives include the following.

- |                         |                                   |                                 |
|-------------------------|-----------------------------------|---------------------------------|
| • Seawalls / revetments | • Groins                          | • Detached breakwaters          |
| • Berms/levees          | • Multipurpose berms / levees     | • Floodwalls /bulkheads         |
| • Tide gates            | • Deployable floodwalls           | • Deployable berms / cofferdams |
| • Surge barriers        | • Road or rail raisings           | • Beaches and dune restorations |
| • Bridge trash racks*   | • Stormwater system improvements* |                                 |

(\*Measures that are a non-federal responsibility.)

***There are two major types of structural measures:***

**Storm surge barriers (SSBs):** include navigational and/or auxiliary gate(s), associated tie-ins (floodwalls, levees, buried seawalls/dunes, etc.), residual risk features (RRFs), and induced flooding features (IFFs); and

**Shoreline-based Measures (SBMs):** land-based measures consisting of floodwalls, levees or berms, beachfill, etc.

**1.4.2 Non-structural Measures.** All alternative plans will include nonstructural measures for areas with unaddressed coastal storm risk. Nonstructural measures are actions taken to reduce or eliminate the long-term risk to human life and property from natural hazards. These types of measures are permanent or contingent measures applied to a structure and/or its contents that prevent or provide resistance to damage from flooding. Non-structural measures have the potential to cause both direct and indirect effects to aboveground cultural resources, archaeological sites, and submerged resources. The types of non-structural measures under initial consideration in the NYNJHAT study alternatives include the following.

- |  |                                    |  |
|--|------------------------------------|--|
| • Acquisition/buyouts                              | • Early warning systems*           | • Elevating structures                                   |
| • Floodproofing                                    | • Increase storage                 | • Public engagement                                      |
| • Preservation                                     | • Resilience standards*            | • Emergency response systems*                            |
| • Stormwater management*                           | • Building codes/zoning*           | • Strategic Acquisition                                  |
| • Hazard mitigation plans*                         | • Retreat                          | • Wetland migration                                      |
| • Relocating utilities and critical infrastructure | • Modify/remove channel structures | • Design/redesign and location of services and utilities |
| • Coastal zone management*                         | • Regional sediment management *   |  |

(\*Measures that are a non-federal responsibility.)

**1.4.3 Natural and Nature-based Features (NNBF).** All alternative plans will include natural and nature-based features where applicable and feasible. Natural or nature-based coastal flood risk management measures work with or restore natural processes with the aim of wave attenuation and storm surge reduction. These measures include elevating existing shoreline marsh to absorb and reduce the inland extent of coastal storm floodwaters by keeping pace with rising sea levels and living shorelines to stabilize the shoreline marsh. These features have the potential to cause effects to archaeological resources and changes to the landscape. The visual effects would likely not be considered adverse to historic properties. The types of NNBF measures under initial consideration in the NYNJHAT study alternatives include the following.

- |                           |                               |                              |
|---------------------------|-------------------------------|------------------------------|
| • Freshwater wetlands     | • Vegetated dunes/beaches     | • Salt marshes               |
| • Maritime forests/shrubs | • Oyster reefs                | • Barrier island restoration |
| • Submerged aquatic veg.  | • Green stormwater management |                              |

## 1.5 Potential Impacts to Cultural Resources

Structural measures, non-structural measures, and natural and nature-based features can all have effects on cultural resources. The effects can be either direct or indirect: direct effects occur where measures and features are implemented, and can include construction, demolition, vibration, and auditory effects; indirect effects occur where measures and features have the potential to affect the viewshed of historic properties.

In general, the NYNJHAT flood risk reduction systems can be broken up into two components: storm surge barriers and shore-based measures. There is potential for new construction and / or improvements to existing structures to cause effects on archeological sites, historic properties, and submerged resources. The numbers of properties that may be affected are extensive in several locations.

***Proposed Actions which have potential to impact Archaeological Resources:***

- Ground disturbance is any disturbance to an area not previously excavated and includes new excavation deeper and/or wider than previous excavations on the same site.
- Above-ground construction including construction of temporary roads, and access facilities, grading, or landscaping
- Modification to topography

***Proposed Actions which have potential to impact Architectural Resources:***

- Direct physical damage from new construction and demolition activities
- Vibration and movement from new construction (pile driving, blasting, foundation work, increased truck traffic, etc.)
- Construction debris (construction site runoff)
- Alteration of a resource's integrity of setting
- Indirect Visual Impacts from construction of project features

***Proposed Actions which have potential to impact Submerged Cultural Resources:***

- Dredging
- Onshore and underwater construction (excavation for deep foundations, driven piles,
- Temporary barriers erected for construction of Project measures (caissons, cofferdams)
- Onshore ground disturbance is any disturbance to an area not previously excavated and includes new excavation deeper and/or wider than previous excavations on the same site.

## 2.0 Methodology

The focus of this Draft Tier I EIS study is to present a preliminary assessment of Direct Areas of Potential Effects (APEs) and the Indirect Areas of Potential Effects/ Visual Impact Areas for the project's alternatives. The APE includes the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking", 36 CFR 800.16(d). For the NYNJHAT Project, the District shall consider potential direct, indirect, and cumulative effects to historic properties and all aspects of integrity, including their associated settings as applicable.

This study uses the broad term 'cultural resources' to apply to places, archaeological sites, buildings, structures, objects, cultural practices, or collections of these physical and nonphysical manifestations that have significance to humans. Definitions of cultural resources and other terms are summarized in a glossary.

### DIRECT AREA OF POTENTIAL EFFECTS

This study preliminarily identifies known cultural resources that could be directly affected by the NYNJHAT Project. The activities associated with the proposed undertaking include all new construction, improvements, and maintenance activities related to the proposed NYNJHAT Project. For this study, the direct APE for cultural resources is defined as the area within 100 m (328 ft) of each proposed project component and any temporary construction actions (e.g., access roads, staging areas, etc.). Temporary construction actions are typically developed relatively late in the planning process, and have not been designed as of this writing. The 100-meter APE around planned measures used herein to define the direct APE will circumscribe most, if not all, future planned temporary construction actions. The direct APE is the area in which an undertaking is most likely to have impacts on cultural resources. The direct APE includes the area that may be affected by direct physical impacts, such as demolition, alteration, or disturbance of a resource.

In general, an undertaking has an effect on an historic property when the undertaking may alter characteristics of the property. Section 106 of the National Historic Preservation Act and 36 CFR 800.5 provide a useful definition of adverse effects, as well as helpful examples:

- (1) *Criteria of adverse effect.* An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.
- (2) *Examples of adverse effects.* Adverse effects on historic properties include, but are not limited to:
  - (i) Physical destruction of or damage to all or part of the property;
  - (ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation and provision of handicapped access,

- that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;
- (iii) Removal of the property from its historic location;
  - (iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
  - (v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;
  - (vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and
  - (vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term reservation of the property's historic significance [36 CFR 800.5].

## INDIRECT AREA OF POTENTIAL EFFECTS/ VISUAL IMPACT AREA

This study provides preliminary identification of known cultural resources that could be visually affected by the NYNJHAT Project. Visual analysis is part of the NEPA and Section 106 analyses and includes a broad look at the potential impacts to historic properties. By definition, a visual effect occurs whenever a proposed undertaking will be visible from an historic property. The mere existence of a visual effect does not automatically imply that the effect is adverse. An *adverse* visual effect occurs only when the addition of a new element to a landscape is found to diminish those aspects of a property's significance and integrity, such as its historic setting, which make it eligible for the State and National Registers of Historic Places (S/NRHPs).

Adverse visual effects are generally of two types, aesthetic or obstructive. An adverse aesthetic effect transpires when an undertaking's visual effect has a negative impact upon the perceived beauty or artistic values of an historic structure or landscape, thereby diminishing the appreciation, experience, or understanding of the resource. Common examples of adverse aesthetic impacts include the diminution or elimination of open space, or the introduction of a visual element that is incompatible, out of scale, in great contrast, or out of character with the historic resource or its associated setting. An adverse obstructive effect occurs when the proposed undertaking blocks any part of an historic property or eliminates scenic views historically visible from the property.

In keeping with USACE guidance, the APE for visual impacts on historic properties for the NYNJHAT cultural resource study is defined as those areas within one mile of proposed facilities which are within the potential viewshed (based on topography) of each Alternative. The New York State Department of Environmental Conservation (NYSDEC) defines *Visual Impact* as:

when the mitigating effects of perspective do not reduce the visibility of an object to insignificant levels. Beauty plays no role in this concept. A visual impact may also be considered in the context of contrast. For instance, all other things being equal, a blue object seen against an orange background has greater visual impact than a blue object seen against the same colored blue background. Again, beauty plays no role in this concept [NYSDEC 2000:10-11].

The analysis takes into consideration the resource's geographical distance and the effect of topography on whether the Project is visible from historic resources. A visibility analysis that takes the built environment and vegetation into account are beyond the scope of this study.



## RESEARCH METHODS

This study is intended to provide a baseline of cultural and historic information that will inform preliminary planning decisions regarding cultural resources.

In addition to guidance from the USACE, the technical approach for the cultural resources survey was conducted in accordance with the:

- New Jersey Historic Preservation Office's (2004) Guidelines for the Preparation of Cultural Resource Management Archaeological Reports;
- New York Archeological Council's (NYAC) *Standards for Cultural Resources Investigations and the Curation of Archeological Collections in New York State*;
- New York State Office of Parks, Recreation, and Historic Preservation's (2005) *State Historic Preservation Office Phase I Archaeological Report Format Requirements*; and
- Secretary of the Interior's Standards and Guidelines for Archaeological Documentation (48FR44734-37)

Background research for the project included a review of existing cultural resource reports, management plans, archaeological site files, historic maps, and nominations to the National Register of Historic Places (NRHP). All work was performed by and under the direct supervision of individuals meeting the Secretary of the Interior's professional qualifications standards (36 CFR 61). The background research and an assessment of the archeological sensitivity and State and National Registers of Historic Places sensitivity of the study area were conducted in during the period of January through June 2022. Table 1 outlines the sources of background cultural resources Information.

The New York State Office of Parks, Recreation and Historic Preservation (OPRHP) provided cultural resources data for the visual impact area in New York State. Data from the New Jersey Historic Preservation Office (NJHPO) was not available at the time of this writing. The results of the indirect area of potential effects will only include the proposed project locations in New York State. It is anticipated that architectural resources data will be supplied by NJHPO for the visual impact area and presented in the Tier 2 DEIS. Potential visual impacts to architectural resources in New York—topographic viewshed only—are presented for each of the build alternatives, in Sections 5 to 9 of this report.

**Table 2.1. Sources of Background Cultural Resources Information.**

New York State Office of Parks, Recreation and Historic Preservation (OPRHP)	For this project, ORPHP supplied the District with archaeological site and historic resources spatial data available in the OPRHP's Cultural Resources Information System (CRIS), a GIS (Geographic Information System)–based web application that provides access to the cultural resources information maintained by the SHPO. Besides spatial data, CRIS includes digital images, National Register documents, building and archaeological inventory forms, survey reports, and a wide variety of additional legacy data. This data is provided on an "as is" basis and makes no representation that the information is current as of the date of the CRIS shapefile data was provided to the District. <a href="https://www.nys.gov/cris">Cultural Resource Information System (CRIS) (ny.gov)</a> One important caveat involving the CRIS data used for this study
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	is that this investigation may have double counted some resources, most notably in cases where data has been recorded for individual properties within historic districts.
New York City Landmarks Preservation Commission (LPC)  <a href="http://nyc.gov/landmarks-preservation-commission">Landmarks Preservation Commission (nyc.gov)</a>	The official map of the LPC displays Individual, Interior, and Scenic Landmarks, as well as Historic Districts in all five boroughs. Available online information for buildings and archaeological sites includes designation reports, photos, and additional information such as construction data, architect, and style.
New York State Museum (NYSM)	The NYSM was the original repository of archaeological site locations and information. Its primary sources for site locations have been transferred to ORRHP's CRIS inventory.
New Jersey Historic Preservation Office (NJHPO)	The NJHPO maintains LUCY (Look Up Cultural resources for Yourself), which provides precise location information for aboveground resources approximate locations for archaeological resources (archaeological resources are stored as ½-mile square "archaeological grids," within which resources are present. The geographic data visible in the LUCY interface was not available for this project, which somewhat limited the viewshed analyses (indirect APE) for the alternatives' effects in New Jersey. It is anticipated the data will be accessible for the next phase of the study. <a href="#">LUCY</a>
New Jersey State Museum (NJSM)	The NJSM maintains the state's official archeological site files and site locations. The information was not reviewed for this study.
National Oceanic and Atmospheric Administration (NOAA)	NOAA's The Office of Coast Survey maintains the online Automated Wreck and Obstruction Information System (AWOIS) database. This database includes wrecks and obstructions, and other significant charted features in coastal waters of the United States. AWOIS is not a comprehensive record of wrecks or obstructions in any particular area. <a href="http://www.noaa.gov/office-of-coast-survey/automated-wreck-and-obstruction-information-system-inport">Office of Coast Survey's Automated Wreck and Obstruction Information System   InPort (noaa.gov)</a> . This study employs data in NOAA's Electronic Navigational Charts for determining the presence and location of shipwrecks. Although the ENC does not have all the substantive information in AWOIS, it is more complete and accurate.
State of New Jersey Department of Environmental Protection (NJDEP)	The NJDEP's online reports portal, DEP Dataminer, provides planning and compliance survey report listings. Electronic copies of cultural resources survey and historic preservation reports are available through DEP Dataminer. <a href="https://www13.state.nj.us/DataMiner">https://www13.state.nj.us/DataMiner</a>
United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites	Information on UNESCO World Heritage Sites includes an interactive map, list of nominations, and documents prepared for each site's nomination <a href="https://whc.unesco.org/en/globalstrategy/">https://whc.unesco.org/en/globalstrategy/</a>

Geographically, New York is a city with 5 boroughs, 59 community districts and hundreds of neighborhoods. The locations and names of neighborhoods and communities in HATS regions in New York City were identified by reviewing the *New York City A City of Neighborhoods* map (City of New York Department of Planning 2014).

### **Post-Hurricane Sandy Investigations and Cultural Resources**

After Hurricane Sandy in 2012, the NYS OPRHP initiated the Historic Resources Survey of Selected Waterfront Communities on Long Island and New York City project that concluded in 2020. This large-scale survey project was realized through the support of the NPS for Hurricane Sandy Disaster Relief. The goal of the project was to update and expand the NY SHPO's historic resources inventory in selected coastal communities which are considered vulnerable areas on the north and south shores of Long Island and in Brooklyn, Queens, Staten Island, and the Bronx. The intensive study allows for the NY SHPO and communities to be better prepared for future weather and climate-change-related events. The focus of the survey was on above-ground historic resources, including buildings, historic districts, landscape features, structures, and objects. Underground and maritime archaeological sites were not included in the study (NYS ORPHP 2021:13).

The New Jersey Historic Preservation Office (HPO) has been actively engaged in variety of recovery, hazard mitigation, and resiliency initiatives since Hurricane Sandy (NJHPO 2020). In conjunction with FEMA, NJHPO staff conducted field survey and assessment of above ground resources in primarily flooded areas of the state (Figure 2.1; New Jersey Department of Environmental Protection [NJDEP] 2013:4-5). Information about impacts to archaeological resources was obtained through FEMA's Wet Debris Removal program where there have been extensive efforts to identify and avoid marine/maritime archaeological resource (NJDEP 2013:4-5). NJHPO received an Emergency Supplemental Historic Preservation Fund Disaster Recovery Grant (HPF-DR grant) through the National Park Service to implement a program of rehabilitation, documentation, and guidance. Technical assistance was developed to update information about vulnerable cultural resources and provide guidance in planning for future storms. NJHPO developed an Action Plan and an Action Plan Addendum plan which provide information on programs implemented with HPF-DR Funding (NJDEP 2013, 2014). In 2019, NJHPO released *Flood Mitigation Guide for Historic Properties* and *Elevation Design Guidelines for Historic Properties*. One study relevant to the NYNJHAT study area includes an *Intensive-Level Architectural Survey of the Hoboken Historic District* (NJ HPO 2020).



**Figure 2.1 Superstorm Sandy surge extent near the NYNJHAT study area in New Jersey (NJDEP 2013:23).**

## **3.0 Cultural Background**

### **3.1 INTRODUCTION**

During the occupation of the region prior to the arrival of European explorers and settlers, the three major cultural traditions manifested in southeastern New York State and northeastern New Jersey during the precontact era were the Paleo-Indian, Archaic, and Woodland. Cultural change in the area can be summarized as a gradual increase in social complexity, punctuated by several important cultural and/or technological innovations (Ritchie 1980; Engelbrecht 2003; Tuck 1978a; Tooker 1978a). These periods are described in more detail in section 3.2.

The historic cultural background narrative for the NYNJHAT Study includes broad trends in regional developments for historic time periods, specific to each of the nine planning regions: Upper Bay/Arthur Kill Region; Lower Bay Region; Jamaica Bay Region; Hackensack/Passaic Region; Raritan Region; Long Island Sound Region; Lower Hudson/East River Region; Mid-Hudson Region; and Capital District Region (see Figure 1.1). The historic background identifies information on specific topics of New York and New Jersey history and is presented in section 3.2.

A 2014 report for Hudson-Raritan Estuary Comprehensive Plan (Harris et al. 2014) compiled cultural resources background information to serve as an appendix to the Feasibility Study and Programmatic Environmental Impact Statement for the Hudson-Raritan Estuary Ecosystem Restoration Program. The report provided a detailed cultural/historical overview for eight regions in northeastern New Jersey, New York City, and the lower Hudson River Valley. These areas are very similar geographically to planning regions presented in this study. The present study includes the Mid-Hudson and Upper Hudson Regions, which were not included in 2014, and combines the Arthur Kill and Lower Bay regions, which were separate in 2014. Please refer to that study for additional detailed information on the regions.

Each planning region's historic background is presented as its own project area and covers the period between initial European contact with Native American inhabitants of New Jersey and New York to the present time. There is some overlap in the historic contexts of the planning regions due to the proximity of the regions. This cultural background includes broad trends in regional developments for historic time periods, including early explorers (1500-1625); colonial settlement (1625-1775), developments and changes in industrialization, urbanization, and agricultural activities; immigration and economic and urban expansion; suburban development; metropolitan development; and modern activities.

### **3.2 PRECONTACT-PERIOD NATIVE AMERICAN HISTORY**

The Native American history of northeastern North America spans at least 13,000 years (e.g., Lepper and Funk 2006; Lothrop and Bradley 2012:9, 17; also see, e.g., Archambault 2006 for a discussion of Native American views concerning their origins). Archaeologists who study this history in northeastern North America (the Northeast) typically divide it into three time periods: the Paleoindian; Preceramic (also frequently called the Archaic); and Woodland / Ceramic

Periods. The earliest of these periods is the Paleoindian which lasted from about (at least) 13,000 to 10,000 years before present (BP). Living in seasonal camps near freshwater sources and lithic workshops, the earliest people were nomadic big-game hunter-gatherers. Changing environmental conditions at the end of the last ice age required an adaptation of the economy, resulting in a shift to the exploitation of temperate forest resources by Preceramic hunter-gatherers. In some areas of eastern North America, the Preceramic (10,000 to 3,500 [BP]), which was characterized by seasonally occupied campsites and later by larger seasonal settlements, is followed by a Transitional period (4,000 to 3,000 BP) which bridges the Preceramic and the subsequent Woodland period.

The adoption of clay vessel technology is the defining characteristic of the Woodland / Ceramic period (ca. 3,000 to 450 BP). The time period also witnessed the adoption of agriculture and the appearance of burial mounds in some parts of the Northeast, developments that were accompanied by many new and different social and economic adaptations developed (Ritchie 1980). Eventually, Lenape or Delaware (Proto-Munsee)-speaking people came to inhabit eastern New Jersey, southeastern mainland New York State, and western Long Island. Other nearby groups in the Woodland period included the Algonquian populations of the upper Delaware Valley, the Iroquoian-speaking Susquehannock of southeastern Pennsylvania and the Haudenosaunee of upstate New York. These periods are described in more detail below.

**Paleoindian Period.** The precise date of humans' arrival in North America is unknown (see discussion in, e.g., Stanford 2006). However, the last glacial retreat occurred in New York approximately 15,000 years ago, followed by a series of changing environmental conditions. The earliest dated Paleoindian site in New York is the Dutchess Quarry Cave in southwestern Orange County (12,580 BP). The black earth region near Florida, New York (in Orange County) was a major wetland/glacial lake.

Paleoindian cultures were adapted to a late Pleistocene tundra or park tundra environment. Paleoindians were highly mobile people who needed to travel over long distances to obtain food. About 12,000 years ago, the coastal New York environment was a mosaic of tundra and forests that were predominantly arctic willows, pine, spruce, and fir which eventually gave way to birch and oak (Funk 1972; Lepper and Funk 2006; Lothrop and Bradley 2012:13-14; Marshall 1982:17; Salwen 1975). The emergence of oak stands and subsequent increase in resource availability allowed greater human population density toward the end of the period.

Pleistocene megafauna, including mastodon, Colombian mammoth, great beaver, fossil bear, and northern species like fox, seal, moose, and caribou roamed the Northeast. A variety of other species like fossil peccary, white-tailed deer, elk, bison, and horse were also adapted to the Northeast (Funk 1972:11; Lothrop and Bradley 2012:14, 16; Ritchie 1980:10-11). Mastodons preferred wooded spruce areas located at lower elevations in the valleys (Marshall 1982:18; Funk 1972:11). Dent suggests that mastodons were extinct 1,000 years before humans arrived in the Upper Delaware Valley of New Jersey and that the tundra environment had also succumbed (Dent 1991:136). This hypothesis may be true for coastal New York as well. However, according to Marshall, megafauna was still present when the Paleoindians arrived in the northern New Jersey and southern New York areas (Marshall 1982:18; see Lothrop and Bradley:14). Two mastodons from Orange County along with two others found in New Jersey yielded dates ranging from 10,995

$\pm 750$  to  $9,860 \pm 225$  BP (Salwen 1975:44). Caribou herds probably extended into the Middle Atlantic region beyond the time of the megafauna extinction.

During the late glacial/early postglacial period, caribou were probably hunted by the Paleoindians as evidenced by caribou bone found at the Dutchess Quarry Cave No. 1 site in Orange County in association with a fluted point (an important and usually easily recognizable diagnostic artifact of the Paleoindian period). The bone was radiocarbon dated to  $12,580 \pm 370$  BP. Additional fluted points were found at Dutchess Quarry Cave No. 8. With deglaciation, the megafauna began to decline and were replaced by more temperate species that migrated into the area. Throughout the Paleoindian period and the early parts of subsequent preceramic times, human subsistence shifted from large Pleistocene game, like caribou, to more modern, mid-latitude species, such as white-tailed deer (Eisenberg 1978; see Lothrop and Bradley 2012:35-36).

In addition to mammal meat, fish and plant foods were available to Paleoindian groups. Pollen analysis of samples from the Shawnee-Minisink site near the Delaware Water Gap has revealed the presence of many edible plants. Carbonized seeds were recovered by flotation. Some of the plants identified by these means included goosefoot (*Chenopodium* sp.), ground cherry, blackberry, hawthorn plum, pokeweed, pigweed (*Amaranthus* sp.), smart weed (*Polygonum* sp.), wild lettuce, grape, hackberry, and meadow grass (Kraft 1986:41).

Paleoindians probably utilized nomadic settlement systems in which their movements were directed by the migration of game animals. During the seasonal peaks of resources, larger populations occupied strategically located large camps; and during periods of low resource potential, the population dispersed, temporarily occupying small camp sites and rockshelters. A band-level social organization is attributed to Paleoindian groups, with each band consisting of 25 or 30 people (Snow 1980; Jones 1999). As climatic conditions allowed more permanent occupation of an area, this wandering became more restricted, and bands settled into loose territories.

Ritchie and Funk (1973:333) have classified Paleoindian sites into two main categories: quarry / tool workshops and camps. These categories are further subdivided into large, recurrently occupied camps, small special-purpose camps, and caves or rockshelter sites. Chert quarrying and the preliminary stages of tool production were carried out at the tool workshops (Funk 1978; Gramly and Funk 1990:13). More recent syntheses and data compiled in the last 25 years suggest Paleoindian settlement systems were somewhat more diverse than the Ritchie and Funk model. They likely changed throughout the time period, and at least also included some sites on dunes (Lothrop and Bradley 2012:24). Located near the margin of extinct glacial lakes, many Paleoindian sites in the Northeast are on elevated areas “where good drainage, meaning a dry living floor, was an important consideration” (Funk 1978:18). These hills or rises also served as loci for monitoring the migratory patterns of game species. At least eleven Paleoindian sites have been found in the Hudson drainage (Salwen 1975; Lothrop and Bradley 2012:18-20), including Port Mobil in Charlestown on Staten Island. The Hudson Valley was likely an important route used by Paleoindian people in the early post-glacial migrations into the Northeast (Lothrop and Bradley 2012).



The low number of Paleoindian sites in coastal New York is possibly due to the fact that, as in later periods, most of the sites were located along the coast, which would have provided a great amount and variety of subsistence resources. Sites in what is now Queens County would have represented inland environments during the Paleoindian period, when relative sea levels were lower (e.g., Hill 2006). As with sites dating to later periods, information from known Paleoindian sites in the Northeast reveals that preferred locations would have been well-drained higher ground near streams or wetlands, in addition to rockshelters, quarry sites, and locations near the lower river terraces.

Early Paleoindian chipped-stone artifacts include fluted points—thin, lanceolate-shaped bifacial implements fluted down the center for hafting—as well as unifacial end and sidescrapers, utilized flakes, and waste flakes (Marshall 1982:13; Lothrop and Bradley 2012:15). Cryptocrystalline stones like jasper and chert were the preferred raw materials of Paleoindian tool makers. Fluted points and other Paleoindian artifacts made from Pennsylvania jasper and various cherts were found at the Port Mobil site on Staten Island (Kraft 1977, 1986:34; Ritchie 1980:3). Fluted points gradually decreased in size as larger game animals moved north or became extinct (Kraft 1986:47). They were eventually replaced in the late Paleo-Indian/Early Preceramic transition (10,000-8,000 BP) with other forms, including unfluted triangular points, stemmed points, and Plano points (Lothrop and Bradley 2012:15). The last are lanceolate-shaped points without flutes. In Monmouth County, New Jersey, late Paleoindian artifacts including unfluted triangular points and Hardaway Dalton points were found at the Turkey Swamp site which dated to between 9,041 and 7,939 BP (Marshall 1982:33). The transition from Paleoindian to Early Archaic is gradual throughout the Northeast.

***Preceramic Period.*** The beginning of the Preceramic period was marked by the improved climate and more diverse forest-based biome that appeared after the recession of glaciers. Changes visible in the archaeological record include stylistic shifts in lithic (stone tool) assemblages, an apparent increase in population, changes in the subsistence strategy, and a less nomadic settlement system (Funk 1978; Tuck 1978). Three subdivisions are generally recognized for the Preceramic period: Early, Middle, and Late.

Following the Pleistocene, environmental conditions ameliorated leading to reforestation of the Northeast and the gradual appearance of relatively modern types of forest. The emergence of oak stands and resultant increase in resource availability allowed greater human population density toward the beginning of the period. Between 10,000 and 8,000 BP the hills and mountains were overgrown with pine, hemlock and oak while forests in the coastal areas were chestnut and oak (Kraft and Mounier 1982:59; Salwen 1975). The retreating glacier caused a continuing rise in sea levels forcing people to move away from the former coast.

People lived in small territorial bands that hunted, fished, and gathered plant foods. With the exception of the dog, they had no domestic animals (Kraft 1986:51). Preceramic people subsisted on anadromous fish, shellfish, berries, roots, tubers, eggs, nuts, and deer (Kraft 1986:51). They probably moved when food supplies dwindled but lived less nomadic lives than did people in earlier times. Small encampments close to rivers, swampy areas or ponds reflect their strategies for settlement (Banks 1999; Kraft and Mounier 1982:76; Nicholas 1988).



Early Preceramic period tools included projectile point forms related to those of the Carolina Piedmont (Brennan 1979; Ritchie and Funk 1971). Among them were styles known as Hardaway Dalton, Palmer corner-notched, Kirk corner-notched, Kirk stemmed, and bifurcate base points similar to Amos corner-notched and LeCroy, both of which frequently had serrated edges in the Southeast. Serrated edges occurred much less frequently in the Northeast. People also used endscrapers, sidescrapers, spokeshaves, drills, gravers, choppers, hammers, and anvil stones. There was a trend towards making tools from locally available raw materials, such as non-cryptocrystalline stones like argillite (Banks 1999).

Early Preceramic period sites were typically small encampments clustered along major rivers, marshy, swampy areas, and lowlands (Nicholas 1988). Several sites have been found on Staten Island and had projectile points like those mentioned above. The earliest of these sites are Richmond Hill, near the center of Staten Island where a hearth was dated to  $9,410 \pm 120$  BP (I-4929), and Ward's Point, near Tottenville, dating to  $8,300 \pm 140$  BP (I-5331). These are among the earliest post-Paleoindian dates in the Northeast (Ritchie and Funk 1971).

The Middle Preceramic period lasted from 8,000 to 6,000 BP. During this time, people subsisted on chestnuts, acorns, and anadromous fish, as well as the abundant forest animals. Oak, chestnut, and hemlock dominated the landscape causing animal populations to increase in the forests as a result of the abundance of mast foods produced by the trees. Heavy woodworking tools, along with netsinkers, and fish remains found on archaeological sites suggest some degree of focus on riverine or estuarine systems of settlement. Between 8,000 and 7,000 BP, the seashore was located about 50 miles (80.5 kilometers) east of Staten Island, and western Brooklyn was not on the coast (Kraft 1986:56; Hill 2006; Pagoulatos 2002). People living in that area then would not have been adapted to a coastal lifestyle as later populations did. In general, people probably lived in small, somewhat mobile (possibly family-based) groups, that would disperse into smaller, task-focused groups when necessary (Pagoulatos 2002). The climate was warm and moist by 7,000 BP, and water levels continued to rise forcing groups to move further inland.

People began to develop woodworking tools during Middle Preceramic times, using coarse-grained stones and river cobbles for their raw materials. Large stones were commonly available, which allowed tool makers to reserve high quality lithic materials for finely flaked tools. New shaping techniques were developed in order to work these coarse-grained rocks. The primary technique was pecking and grinding, which was used for shaping axes, adzes, gouges, choppers, and other woodworking or rough stone tools. These heavy woodworking tools may have been used for canoe building. Tools also included anvil stones, choppers, netsinkers, and an array of projectile points. Among the most commonly used raw materials were chert, jasper, argillite, shale, quartzite, and rhyolite (e.g., Banks 1999:26). Stemmed, Neville-style points, are found on sites as well as Stanley Stemmed, which are similar to Early Archaic Bifurcate Base points (Kraft 1986: 58). Since qualitative changes cannot be seen between the Early and Middle Preceramic periods, some archaeologists do not distinguish them as separate periods, instead viewing them as a single transitional period between the Paleo-Indian and the Late Preceramic (Mason 1981).

The environment during the Late Preceramic times (6,000-4,000 BP) was largely similar to that of today. Hunting, fishing, and gathering were still the principal daily activities although greater

emphasis was placed on small game, shellfish, nuts, and wild cereal grains like *Chenopodium* (goosefoot). This shift in subsistence strategies made higher population densities possible, although the larger population may have made it necessary to exploit these different resources. Whatever the reason, as population increased, camps became larger and more numerous. While principal settlements were located near major rivers, people still lived in bands with well-defined territories. Moving seasonally or when resources dwindled, they probably congregated occasionally for exchange and socialization (Pagoulatos 2006). Houses of this period may have been circular and oval measuring 36 to 66 feet (11 to 20 meters) in diameter with overlapping entranceways. One such house pattern was found at the Wapanucket No. 6 site in Massachusetts (Robbins 1960). The Lamoka Lake site in western New York contained rectangular house patterns 14 to 16 ft (4.3 to 4.9 m) long and 7 to 13 ft (2.1 to 4 m) wide (Ritchie and Funk 1973). A Late Preceramic period house pattern was found near Long Island Sound in a "gently-rising, wooded ground on the east side of a northward-flowing stream emptying into an estuary and thence into Long Island Sound" (Gwynne 1984:1). The post molds from the structure suggest a round or oval shape but size could not be determined (Gwynne 1984:6).

Heavy grinding implements like mullers, mortars, and pestles provided new means of preparing food from seeds, nuts, dried berries, and meat and were made of sedimentary and metamorphic rock like sandstone and argillite. Late Preceramic-period people also used bifacial, chipped-stone knives, semilunar knives that were often made of slate, the atlatl or spear thrower, bolas, and plummets. Traces of the Laurentian tradition, a Late Archaic culture, which is characterized by ground slate ulus, plummets, and gouges, are found on some coastal New York sites including the Stony Brook site. Long, narrow-stemmed or narrow, weakly-notched projectile points styles known as Lamoka, Poplar Island, Bare Island, Wading River, and Lackawaxen stemmed, were characteristic of the Piedmont or Small Stemmed Tradition, which originated in the Southeast (Brennan 1977; Kraft 1986:73). These projectile points were not often reworked into scrapers, drills, and graters because of their size and shape. Narrow-stemmed projectile points were found at the Bowmans Brook site on Staten Island (although these may also be from later times – see below).

A major component of the Piedmont Tradition, the Sylvan Lake complex, was found at the Wading River Site on Long Island. Sylvan Stemmed points were a part of the Sylvan Lake artifact complex (ca. 4,500 BP), which included the use of small-stemmed points and atlatls for hunting. Flint working, butchering, and woodworking were other common activities of people who left the Sylvan Lake archaeological materials. The River phase followed the Sylvan Lake complex stratigraphically at the Sylvan Lake Rockshelter (Dutchess County), and was characterized by Normanskill-style projectile points, animal effigy pestles, pitted anvil or nutting stones, abrading stones, bannerstones, netsinkers, plano-convex adzes, and shallow-lipped gouges.

The Transitional period or Terminal Preceramic (ca. 4,000-3,000 BP) is largely defined as a time when people began making soapstone / steatite containers and started participating in belief systems that included elaborate human burials. Also, large, broad-bladed spear points of the Susquehanna broadspear tradition began to appear on archaeological sites along the Atlantic coast from Georgia to Maine. According to Kraft (1986:84), this tradition probably originated in the southern Piedmont and was related to the Savannah River culture. Snow has characterized this period as Terminal Archaic, viewed as "technologically transitional from the preceramic Late

Archaic to the ceramic Early Woodland via an episode of soapstone vessel manufacture" (1980:235). However, Hoffman (1998) has noted that, at least in some parts of the Northeast, the earliest pottery pre-dates soapstone vessels, underscoring the complexity of the events and social interactions during which clay vessel technology was adopted.

Nut-bearing trees like oak, hickory, chestnut, and beech dominated the eastern forests during the Terminal Preceramic. Sea levels continued to rise causing increased salinity in estuaries, including the lower Hudson River (Kraft 1986; Snow 1980). People of this period subsisted on deer, black bears, small mammals, wild turkeys, pigeons, shellfish, fruits, roots, nuts, and anadromous fish.

The large, broad-bladed, skillfully made spearpoints of the Susquehanna broadspear tradition began to appear on archaeological sites from this period and were spread along the Atlantic coast from Georgia to Maine. According to Kraft, this tradition probably originated in the southern Piedmont and was related to the Koens-Crispin culture (Kraft 1986:84), represented by broad-stemmed points, scrapers, atlatl weights, celts, and adzes. Koens-Crispin points are similar to Savannah River, Lehigh Broad, and Snook Kill points which indicate widespread travel and trade among people during terminal Preceramic times. According to Mounier, "The [Koens-Crispin] complex is associated with an elaborate pattern of mortuary ceremonialism which emphasized the practice of cremation, the ritual use of red ocher, and the often-lavish inclusion of grave goods" (Kraft and Mounier 1982:82). The Koens-Crispin site in Medford, New Jersey, and the Savich Farm Site in Marlton, New Jersey, both revealed such practices. The Savich Farm Site dates between 4,300 and 3,900 BP (Kraft 1986: 80). The Snook Kill phase is an early part of the Susquehanna tradition and is characterized by broad-bladed, contracting stemmed Snook Kill points. The Old Place site on Staten Island contained a Snook Kill component consisting of points and scrapers.

***Ceramic / Woodland Period.*** The Woodland period in the Northeast (spanning ca. 3,000 BP to the time of contacts with Europeans) can be characterized as one of innovation; two of its important defining characteristics are: the adoption of clay vessel technology, an innovation related to increasing sedentism and a gradual growth in reliance on agriculture throughout the period; and at least for roughly the first half of the time period, involvement with regional systems of interaction that included trade and shared spiritual ideas, the expressions of which sometimes involved elaborate human burials (e.g., Stewart 1995:185). While the previous hunting and gathering economy continued as a means of subsistence during Woodland times, indigenous groups became more and more dependent on domesticated plants for food. Agriculture brought with it a score of new problems that required new adaptations. With agriculture came more sedentary lifeways, a general increase in population, technological changes, and a litany of social and political changes. The degrees to which people adopted sedentary lifeways, and the timing of that change, varied significantly through the lower Hudson and along the coastal areas of New York and central New Jersey (Pagoulatos 2004). Investigations of Early and Middle Woodland sites also identified numerous exotic items in human burials, which suggest the existence of widespread exchange and trade networks (Ritchie 1980).

The introduction of pottery, which "improved the efficiency of food preparation" (Curtin 1996:6; see Braun 1983), marks the beginning of the Woodland period (e.g., Stewart 1995:182). The Early

Woodland period (3,000 to 2,000 BP) saw the appearance of several different spatiotemporally distinct groups of artifact types and styles (archaeological 'phases'), including those known as the Orient, Meadowood, Middlesex, and Bushkill phases (Kraft 1986; Snow 1980). Orient Fishtail projectile points replaced the broadspears of earlier times during the Orient phase. These points were used as knives and spears and were sometimes reworked into drills, scrapers, strike-a-lights, and gravers (Kraft 1986:91-92). People still used soapstone pots but also began to make made clay vessels tempered with crushed steatite. These pots, called Marcey Creek Plain, were shaped like steatite pots. Another early type of ceramic was Vinette-1 which was cone-shaped with cord-marked impressions on the inside and outside. Vinette-1 pottery has been found at Grouse Bluff in Dutchess County in apparent association with Orient Fishtail points (Lavin 1999; Lindner 1992). A Vinette 1 pot, now restored, was found at the Bear Mountain Railroad Station Rockshelter (Funk 1976:175). In some areas, people may have continued to use tools, such as narrow-stemmed projectile points, they had developed during the Late Preceramic, but added ceramic vessels to their suite of implements (e.g., Juli and McBride 1984:91).

The Orient culture, named for the Orient sites on northeastern Long Island, were complex burial sites with large communal pits on hilltops and some individual burials. Many of the burials were accompanied by Orient Fishtail points, soapstone fragments or "killed" soapstone pots, and red ochre: "The typical grave lot therefore provided for hunting game, kindling fire, and cooking food, with a cosmetic kit thrown in" (Ritchie 1980:177). According to Smith, the Orient culture was "the burial complex of the people responsible for the North Beach focus" on Long Island (Smith 1950:150). Orient sites have been found all over Long Island, in upper New York City, on Staten Island, and in the Hudson Valley (Ritchie 1980:165).

Lavin (1999:42) notes that stable marsh formation along Long Island Sound began during the Early Woodland. The abundance of floral and faunal resources in marshes may also be an important variable in the suite of developments that occurred near the beginning of the Ceramic period.

Adena-Middlesex (ca. 2,800-2,300 BP) is another Early Woodland culture. The people who left the Adena suite of artifacts and features subsisted on smartweed, marsh elder, canary grass, nuts, roots, mammals, fish, and fowl (Kraft 1986). Evidence of early domesticated cucurbits appears at this time in the Midwest, while domesticated tobacco is inferred from the appearance of smoking pipes. Material culture of these people included smoking pipes, pendants, Cresap points, Adena Beavertail points and copper beads. Adena-Middlesex people likely harbored beliefs relating exotic items with increased importance (Kraft 1986). The archaeological record indicates the people who expressed their beliefs with the elaborate parts of Adena-Middlesex material culture where not a group of new arrivals, but rather extant populations that adopted a new subset of beliefs; i.e., the ideas of Adena-Middlesex migrated, but the people did not (e.g., Stewart 1995:188-189)

The Rosenkrans site is an important Adena-Middlesex site that overlooks the Delaware River. It has reburied human interments consisting of eight adults, two adolescents, three children, and three infants who were disinterred from their original graves and brought to the site for reburial. One burial was a middle-aged man whose upper front teeth had been removed; a practice possibly indicative of a shaman. His bones were stained green suggesting that he was adorned

with copper when buried originally. For cultures found in the Midwest, evidence exists for similar practices where the teeth have been removed so that the upper jaw of a wolf that had been carved to fit in the space may be worn and manipulated by a "wolf shaman" (Kraft 1986:102). Middlesex burials have been found at the Van Orden and Barton sites in the Hudson Valley (Funk 1976; Ritchie 1958).

The Middle Woodland Period (2,000 to 1,000 BP) in the Northeast was a time of increasing populations, continued diversification of material culture forms and embellishments (evident, for example, in an increase in the variability of decorative motifs applied to ceramic vessels), and the probable beginnings of maize agriculture (e.g., Cassedy, et al. 1993; Cassedy and Webb 1999; Hart 2011). Groups west of the Hudson valley also participated in a large 'interaction sphere' centered in the Ohio area (the Hopewell 'phenomenon').<sup>1</sup> It is possible that people living in some coastal areas did not start to plant maize until very late in the time before the arrival of Europeans (i.e., the terminal Late Woodland) (Ceci 1979-1980).

Throughout the Hudson Valley and nearby parts of New Jersey, the earlier part of the Middle Woodland (2,000 to 1,500 BP) is the Fox Creek phase. Fox Creek sites are often located near streams and are associated with fishing. Diagnostics of this period include net-marked pottery and Fox Creek lanceolate and stemmed projectile points (Funk 1976). Bolas, celts, pitted stones, hammer stones, anvil stones and pestles are frequently found on Fox Creek sites (Kraft 1986). An innovation of the period was the Petalas blade, found at the Petalas workshop site in the middle Hudson valley as well as in numerous riverside middens, refuse pits, and caches such as the Joy site (Funk 1976). Petalas blades, made from high quality local chert, are thought to be fish-butcher knives due to their frequent association with sturgeon remains. A total of 127 Petalas blades and a long copper needle were found on the Abbott Farm site overlooking the Delaware River in New Jersey in a prime fishing location. In this instance, the needle was likely used by fishermen to string their catch on to a cord for drying (Kraft 1986:107). The Piedmont region of New Jersey is one possible source for this native copper (Williams and Thomas 1982:115). Interregional exchange during the Fox Creek phase is indicated by high frequencies of New Jersey argillite in the Hudson Valley and New York cherts found well south of their sources.

After 1,500 BP, sites in the northern parts of the Hudson Valley have artifacts from the Point Peninsula tradition, including the Burnt Hill and Four Mile phases. In the lower Hudson Valley, sites are of the coastal Clearview phase (Funk 1976; Lavin 1998:8). Characteristics of the Point Peninsula tradition include Jack's Reef corner-notched and pentagonal projectile points, and dentate-stamped pottery. According to Kraft (1986:114), Jack's Reef points were probably arrow heads, suggesting the advent of the bow and arrow. Platform smoking pipes, antler harpoons and beaver tooth incising tools were found at the Faucett and Minisink sites in the upper Delaware River valley, along with decorative stone pendants, sharks tooth beads, and bone combs (Kraft

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<sup>1</sup> The original definition of the Middle Woodland concept (herein used only to refer to the period between 2,000 and 1,000 bp) primarily related it to a large social and trade interaction sphere centered in the Ohio area – the 'Hopewell Interaction Sphere.' Coastal New York and New Jersey were on the periphery of that interaction, if not completely outside it. In New York, the end of the Middle Woodland was also formerly perceived to coincide with a series of socio-technological developments that recent research has demonstrated neither occurred together nor at the end of the time period Hart 2011; Hart and Brumbach 2003). Thus, the Middle Woodland is a fairly arbitrary construct for the coastal New York-New Jersey area, and is employed here solely as a time period.

1986:114), similar to Point Peninsula finds in upstate New York (Ritchie 1980). Point Peninsula pottery or projectile points have been found at sites in the Bear Mountain-West Point region, including Fishermans Rockhouse, the Dunderberg site, Twin Rockshelter, and the Nicoll farm site (Funk 1976). Coastal influences in the ceramic tradition may include East River Corded pottery from the Riverbank Rockshelter and the Navy Rockshelter, although the East River Corded type of pottery, which may date to after the Middle Woodland.

Pagoulatos (2004) has summarized the Middle Woodland settlement system for New Jersey as one that, although semi-sedentary, relied on seasonal moves by people among ecological regions to maximize yields from the ever-changing available resources. Groups coalesced in the spring at riverine and tidal areas to harvest anadromous fish, and, after the spawning period, they dispersed into smaller groupings focused on acquiring a wider variety of aquatic, mammal, and plant resources. In coastal areas, shellfish undoubtedly formed an important part of diets.

The Late Woodland (1,000 BP to the time of contact with Europeans, ca 450 BP) was a period of significant cultural change. Subsistence systems shifted from towards more reliance on growing domesticated plants. People living in the Hudson Valley area may have practiced a form of settlement in which they dispersed and lived in relatively small camps in low-lying settings along river floodplains (such as at the Goldkrest site on the Hudson just south of Albany) during warm months, and inhabited larger upland settlements during cold times (Lavin 2004). Although Haudenosaunee groups living west of the Hudson came to live in palisaded villages in later parts of the Late Woodland – a development that implies an intensification of warfare – no Late Woodland palisaded settlement sites are known along the Hudson south of Albany (Curtain 2004; Lavin 2004).

Other Late Woodland developments in eastern New York and north-coastal New Jersey include population growth and changes in religious and ceremonial life (Bender and Curtin 1990; Cronon 1984; Handsman 1980; Kraft 1986). Some mortuary practices began to occur during the Late Woodland involving dog ceremonialism. According to Strong (1985:36), two themes are evident. One theme, which dates back to Preceramic times, involves the dog's relationship to "home and hearth" as reflected by dog burials found in villages near hearths. Strong speculates that dogs may have been sacrificed to protect the household. The second theme, which is more prevalent in the Late Woodland, is the burial of dogs in association with humans. It is possible that age, sex, and cause of death of humans were factors in dog sacrifice. Dog burials have been found on sites occupied during the Bowmans Brook phase of the East River Tradition in the early Late Woodland.

In the coastal area, the Middle Woodland Windsor-tradition<sup>2</sup> Clearview phase was followed by the Windsor Sebonac phase in the Late Woodland. The Sebonac phase is characterized by relatively large settlements of possibly one hundred inhabitants, located in shellfish rich areas (Ritchie 1980:266; Lavin 1998:8). In addition to shellfish gathering, Sebonac people hunted, fished, and

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<sup>2</sup> The Windsor Tradition is a sequence of Middle and Late Woodland pottery styles from coastal areas of Connecticut and New York. Vessels in the tradition have fairly wide-ranging characteristics (e.g., Lavin 1984:19-23; 1998; described in Rouse 1947 and Smith 1947). The phases within Windsor are of shorter length and are largely defined by specific styles of pottery within the Windsor tradition (e.g., Lavin 1998). The Late Woodland East River Tradition is a similar taxon that was focused west of Windsor in coastal New York and northeast coastal New Jersey.

engaged in some degree of horticulture, as evidenced by carbonized corn found at the Sebonac site on Long Island by Harrington (1924: 249-253). Homes of these people were circular and 10 to 20 ft (3 to 6 m) in diameter.

Utilitarian artifacts of the Sebonac phase include broad, thin, triangular Levanna points often made of white quartz. Bone harpoons and fish hooks along with netsinkers were used for fishing. Woodworking tools like grooved and notched axes, celts, and plano convex adzes were used (Ritchie 1980:267-268). Ritchie described the commonly shell-tempered Sebonac pots as elongated and cone-shaped at the base with a straight or inward-slanting collarless rim. The exterior surface was decorated with impressions from scallop shell or fabric but was sometimes cord-marked or plain. Vessel interiors were smoothed, possibly with a scallop shell to create striations. Scallop shells were also used to decorate the area from the shoulder to the lip with linear, criss-crossed or rectangular designs that were combed or stamped. Occasionally, triangular or circular punctations occur with raised interior rim bosses (Ritchie 1980:268).

Non-utilitarian artifacts include stone pendants with holes drilled through the center or side, and sometimes with incised designs. Although bone and shell beads are found only rarely, stone and ceramic pipes are found, and the latter are decorated with stamped or incised designs. Sebonac people buried their dead flexed or folded without grave goods in pits already in use for other purposes, such as cooking.

The East River tradition includes Late Woodland sites in coastal New York and northeast coastal New Jersey (Lavin 1984:22-23). It co-existed with the Windsor Tradition and the interface between the two may have overlapped and fluctuated temporally. The earliest phase in the tradition, Bowmans Brook, has sites that are along "tidal streams or coves" (Ritchie 1980:269) and often contain pits filled with shell. Shellfish gathering was an important activity along with fishing, horticulture, and hunting. Utilitarian artifacts include broad triangular Levanna points made of quartz or other stone, antler and bone-flaking tools, netsinkers, bone awls, hammerstones, anvils, grooved axes, abrading stones, tools made of beaver incisors, and ceramics.

Bowmans Brook incised pottery was found at the Abbott Farm Site on the Delaware River in New Jersey. Bowmans Brook Stamped pots are tempered with grit and have an elongated body, cone-shaped base, a "straight or flaring rim, and cord-malleated exterior and smooth interior surfaces, and cord-wrapped stick decorations in simple linear, chiefly horizontal, patterns" (Smith 1950: 191-192). Bowmans Brook Incised pots are sometimes shell-tempered with an in-sloping rim and a mostly smooth exterior surface. The rim is decorated with triangular or rectangular incising. "The herringbone motif is common and a few vessels of this type have stylized human faces formed by three punctates placed on raised nodes about the rim" (Ritchie 1980:270). East River Cord-Marked pottery is a third type common to this culture. It is elongated with a cone-shaped base like the other two types, but the exterior surface is cord-marked and sometimes smoothed. Non-utilitarian artifacts include "a bone pin with a carved head, a fragmentary rectangular pendant, and a hematite paintstone" (Ritchie 1980:269). Cut and drilled deer bones may have been ornaments worn on clothing, while plain or stamped ceramic pipes have been found on a few sites.

Bowmans Brook people buried their dead flexed or folded without grave goods in pits already in use for other purposes, such as cooking, or in a cemetery near the village. Bundle burials and dog burials have also been found as noted above.

The Bowmans Brook phase was succeeded by the Clasons Point phase of the East River Tradition. Dating to about 650 BP, Clasons Point sites are usually on terraces above tidal inlets and often contain numerous pits used for cooking, storage, trash disposal, and graves. Clasons Point people buried their dead flexed in storage pits or in a shallow grave. Shellfish remains are frequently found on these sites while the remains of other animals are found much less often. People of this culture also engaged in gathering and horticulture as evidenced by the presence of corn, hickory nuts, walnuts, and sweet-flag roots (Ritchie 1980:271).

Clasons Point people continued to use Levanna points but began using antler and bone projectile points as well. Ritchie (1980:271) reported "a long-bone dagger with serrated edges" at one of the sites. Netsinkers were used in fishing as well as bone hooks. Stone hoes, mortars and pestles, mullers, and turtle shell dishes have been found. Wood-processing tools in the form of three-quarter grooved axes, celts, antler-tine wedges, beaver incisor scrapers, gravers and chisels, and flake scrapers were used (Ritchie 1980:271). Toolkits also included triangular, stemmed, and lanceolate stone knives, along with drills, nutting stones, hammerstones, anvilstones, sinewstones, bone awls, perforated mat needles, and antler tool handles (Ritchie 1980:271).

Ceramics of this period were characteristically one-to-two-gallon vessels with the same shape as the types mentioned above, and mostly shell-tempered with straight or flaring rims and exterior cord-impressed decoration. Vessels from the latter part of the period became more globular with rounded bases and collared rims that have been turned out. Their bodies are smooth or cord-roughened and the rim and collar are incised. One such type, Van Cortland Stamped, is similar to the those found to the north. Eastern Incised, which has an incised collar, is similar to Chance Incised and Deowongo Incised types made by Iroquoian groups.

Non-utilitarian artifacts include stamped or incised elbow-shaped clay pipes, bone beads, shell beads, and wampum beads, which, according to Ritchie, were "a European-trade-inspired commodity" (Ritchie 1980:271). However, Ceci (1990:23) suggested that wampum or proto-wampum played an important role in the development of sedentary or semi-sedentary villages and in trade between villages and large centers in the Midwest before European contact. "The decline of midwestern centers led to a breakdown of exchange systems in the Northeast ca. AD 1400" (Ceci 1990:23). According to Ceci, the exchange system was then reactivated around 400-350 BP when the first Europeans arrived. Moreover, "native cultural development continued for over a half century after the arrival of Europeans and the same factors that drew the American Indian to the mouth of the Hudson also attracted the Dutch" (Schuyler 1977:1).

Between 600 and 300 BP, possibly as early as 650 BP, people in the lower Hudson Valley were making ceramics with well-defined collars and incised linear geometric designs – characteristics that correlate with the Minisink phase of the Proto-Munsee people (Kraft 1986:120). Changes in material culture such as this have been cited as a possible movement of Munsee populations into the eastern New York and western Connecticut (Funk 1976:300; Ritchie 1958:102; Snow 1980). Curtain has postulated that Mohican people may have lived along the Hudson to the north as



early as 1,500 BP. The Late Woodland period brought increasing sociopolitical complexity and diversification of resource exploitation. These trends were greatly accelerated by contact with European explorers beginning in the latter decades of the sixteenth century. Two distinct cultural groups emerged in the lower Hudson Valley during the Late Woodland Period: Lenape/Delaware (Proto-Munsee)-speaking people west of the Hudson River in Orange and Ulster counties, and the ancestors of the Wappinger along the eastern side of the Hudson from Dutchess County to Westchester County. Mohican people lived along the river further to the north.

In New Jersey, Proto-Munsee speaking people generally lived in the northern part of the state, north of the Raritan River, and Proto-Unami speakers generally lived south of the Raritan River. These groups are discerned by differences in ceramics and burial style in addition to their linguistic differences (Kraft 1986:120).

**Contact.** The Contact period (ca. AD 1550 - 1750 [400-200 BP]) refers to the first large-scale interactions between Native Americans and Europeans. At this time, Long Island Native Americans were part of the Algonquian cultural and linguistic groups which occupied large portions of the Northeast. Those on Long Island included subgroups of the Lenape or Delaware culture. They consisted of autonomous, loosely related bands or lineages living in small family groups. The Munsee linguistic/cultural subgroup occupied the western portion of Long Island, including Queens County. The Munsee was apparently a large, loosely related group of Lenape who shared the wolf as a totemic symbol. Their population at the time of the arrival of Europeans was approximately 4,500 (Goddard 1978:214). The larger Munsee settlements were located at river mouths with camps along major rivers, estuaries, coves, inlets and bays. Contact-period Native Americans on Long Island were politically divided into approximately 13 groups, with the Matinecock, Canarsee, and Rockaway occupying Queens County. The Matinecock were in the northern portion of Queens from Newtown eastward, continuing to the Nissequogue River in Suffolk County. Contact period archaeological materials have been reported from several Queens County sites.

At the beginning of the Contact period, the Matinecock were estimated to number some 1,200 persons, with the general Native American population of Long Island totaling approximately 7,500 individuals. By 1650 the Matinecock population had been reduced to only some 200 persons; only 1,000 Native Americans were estimated to inhabit all of Long Island. By the time of the American Revolution, the latter number had been reduced to only some 100 to 200 persons.

### **3.3 HISTORIC BACKGROUND OF THE NYNJHAT STUDY AREA**

The historic cultural background narrative for the NYNJHAT Study area includes broad trends in regional developments for historic time periods, specific to each of the nine planning regions: Upper Bay/Arthur Kill Region; Lower Bay Region; Jamaica Bay Region; Hackensack/Passaic Region; Raritan Region; Long Island Sound Region; Lower Hudson/East River Region; Mid-Hudson Region; and Capital District Region (see Figure 1.1). The historic background identifies information on specific topics of New York and New Jersey history. A 2014 report for Hudson-Raritan Estuary Comprehensive Plan (Harris et al. 2014) compiled cultural resources background information to serve as an appendix to the Feasibility Study and Programmatic Environmental Impact Statement for that plan. The report provided a detailed cultural/historical overview for eight

regions in northeastern New Jersey, New York City, and the lower Hudson River Valley. Those regions are very similar geographically to planning regions presented in this study. The present study includes the Mid-Hudson and Upper Hudson Regions, which were not included in 2014, and combines the Arthur Kill and Lower Bay regions, which were separate in 2014. Please refer to that study for additional detailed information on the regions.

By the time of European contact, Native people occupied the region along the Atlantic Coast extending from Saco Bay, Maine, to Connecticut's Housatonic River area and from Long Island across Manhattan and into New Jersey, including areas inland. For the most part, these people shared similar cultural patterns, and spoke closely related Algonquian languages, practiced maize, bean, and squash horticulture in combination with hunting, fishing, and wild plant collecting, and lived by similar religious, social, and political practices with villages as basic social units (Salwen 1978). Resources were utilized within a limited territory though in some instances areas such hunting territories, fishing stations or marshes were shared with other villages.

Long before the arrival of European explorers in the sixteenth century, Native American groups in southern New York, Long Island, and New Jersey participated in trade networks that extended to other Native groups inland. Early European explorers noted the presence of European trade goods, which is likely an indication of the extent to which trading networks linked different localities. The addition of European trade goods would profoundly impact Native lives, as the ever-increasing political, military, religious and economic interactions with Europeans undermined traditional Native American cultural patterns.

Native American groups in eastern New York and New Jersey were profoundly affected by the introduction of the fur trade, years before European began to settle the area. Beginning in the last decades of the sixteenth century, the increasingly regular encounters between Europeans and Native Americans incubated a pandemic of European diseases among unexposed Native populations, which decimated many Native groups. The presence of typhus, smallpox, measles, and others ravaged Native communities. "According to a 1640 statement by Hudson River Indians, their numbers had decreased by disease to less than one-tenth of the original population since the arrival of the Dutch" (Brasser 1978a:83).

In addition to the tensions and population loss engendered through simple contact with Europeans, trade has been recognized as having a major impact upon traditional aboriginal cultural patterns. Once the fur trade was established, ensuring a stable supply of European material culture, the manufacture of Native goods rapidly declined until they were entirely replaced by European manufactured implements. Finally, changes occurred in sociopolitical relationships after 1640 as the fur trade intensified and the supply of furs declined. The most important of these changes was the formation of confederations such as the Five Nations Confederacy of New York State. Despite Haudenosaunee ascendancy in northern and central New York, the Mohican still played a dominant role in southeastern New York, serving as intermediaries between the Haudenosaunee and the Delaware/Munsee in the Lower Hudson Valley (Snow 1994; Goddard 1978; Brasser 1978b).

The earliest account of what would become New York Harbor, the lower Hudson, and western Long Island comes from Florentine mariner Giovanni da Verrazzano. Sponsored by King Francis

I of France, Verrazzano explored the southern or lower portion of the present Hudson River and New York Bay in 1524. His narrative depicts "a very agreeable site located within two small prominent hills (the Narrows), in the midst of which flowed to the sea a very big river, which was deep within the mouth" (Rieth et al. 1995:14). Further, the warmth of the reception he received from local Native Americans, who offered to barter goods, suggested that they may have had previous contacts with European visitors. This period dates the beginning of the end of traditional Native American cultural patterns due to ever-increasing political, military, religious and economic interactions with Europeans (Brasser 1978a:79-82; Goddard 1978:220).

Despite the explorations of the lower Hudson River by Verrazzano, and possibly Esteban Gómez (or Estêvão Gomes, Portuguese captain who sailed for Spain ca. 1525), the historic period in New York State generally begins in 1609, with the first significant European record of exploration and settlement of the region by the French in the St. Lawrence Valley and the Dutch in the Hudson Valley. In 1609, the English navigator Henry Hudson, in the service of the East India Company (*Vereenigde Oostindische Compagnie* [VOC]), reconnoitered the coast of what would become New Jersey and sailed up New York Bay and the river that Hudson named "Mauritius" and Dutch cartographers labeled "*Noort-Rivier*" (i.e., North River) (Brasser 1978a:79-82, 1978b: 200-203; Ellis et al. 1967:18-25; Gehring and Starna 1988:xiii-xxiv). While sources differ over whether Hudson anchored in Sandy Hook Bay, south of Staten Island, or Gravesend Bay, they agree he allowed Native Americans onto his ship, the *Halve Maen*, to exchange goods, especially tobacco and maize. Members of Hudson's crew are reputed to have gone ashore near the present town of Gravesend to trade and mingle among the local Native Americans, who provided food and entertainment to the mariners. Hudson and his crew's interchange with local Native Americans was not without incident—one sailor was killed and two others were wounded when Native Americans attacked Hudson's ship near Sandy Hook (Brasser 1978a; Bergen 1884; Spooner 1884; Jacobs 2009:21-22).

Seeking a shorter route to the Spice Islands and India, Hudson sailed as far north as what is now Albany. Mohicans living in a village along the river provided food and entertainment to Hudson and his crew. Subsequent voyages by Dutch captains established outposts in the region to advance the commercial interests of the United Provinces of the Netherlands. As Dutch knowledge of the region grew, so did their interest in developing the commercial prospects of the fur trade. Captain Adriaen Block became the first European to sail through Hell's Gate (*Hellegat*), a narrow tidal strait in the East River through to Long Island Sound. He was also the first to land at Montauk Point where he encountered local Native Americans. As early as 1614, a fortified trading post and several houses had been constructed on Manhattan to attest to the Dutch presence. About that time Block also discovered the Connecticut River (and named it the *Versche*, or Fresh, *Rivier*) and reconnoitered Narraganset Bay (Brasser 1978a:82, 1978b:200-203; Jacobs 2009; Spooner 1884:20-22). New Amsterdam was established in 1624.

### **3.3.1 Upper Bay/Arthur Kill Region**

The Dutch were the first Europeans to penetrate the streams and forests of what would become New York and New Jersey. The Dutch claim to the region rested on the 1609 voyage of Henry Hudson, an English mariner in the service of the Dutch East India Company. Subsequent voyages by Dutch captains served to establish outposts in this portion of North America to advance the

commercial interests of the United Provinces of the Netherlands. These voyages included the expeditions of Cornelis Jacobsz Mey, who sailed around the southern tip of present-day New Jersey (Cape May) and explored Delaware Bay in 1614 (Gehring and Starna 1988:xiii-xxiv; Burke 1991:1-18).



**Figure 3.1. Upper Bay/Arthur Kill Region, NYNJHAT Study**  
(USACE, New York District 2021).

In 1621, the *Staten Generaal* of the United Provinces organized the Dutch West India Company (*Westindische Compagnie* [WIC]) and granted the company a monopoly to trade along the shores of the Americas for 24 years. The center of Dutch operations in North America was New Netherland, a thin band of sparsely settled territory stretched along the North River which connected New Amsterdam at the lower tip of Manhattan Island with the frontier outpost of Fort Orange, the present City of Albany, New York, and its satellite at Schenectady. From their base in New Netherland, the Dutch prosecuted the prized beaver pelt trade, competing with the English

in the Connecticut River valley and the Swedes in the Delaware River valley. While the Dutch claimed both regions, only the Delaware valley would actively feel their influence (Brasser 1978:79-82; Goddard 1978:220; Ellis et al. 1967:18-23; Burke 1991:1-18).

The WIC established footholds on the islands in Upper Bay Region, including Ellis Island, Nutt Island (Governors Island), and Bedloe's Island (Liberty Island), which were used for timber, fishing, and collecting shellfish. In addition, the Dutch established several small, short-lived communities in the 1620s and 1630s, including Hoboken, Pavonia (on Staten Island), and on Burlington Island in the Delaware River, as well as more permanent settlements in the 1640s in the Hudson valley and in what is Kings County on Long Island (New Utrecht and Breuckelen) (Harris et al. 2014:46; Burke 1991). However, the Dutch population of New Netherland remained small, numbering to a meager 1,200 by 1647 (Burke 1991:2).

Unlike most American colonies, the relationship between the first Europeans in New Jersey and the local Native Americans was relatively peaceful. In the area of western Long Island around what is now Kings County, Dutch traders patronized Native Americans closely related to or allied with Munsee-speaking Algonquian Delaware groups, comprising Nayack, Canarsee, and Rockaway (although these groups are sometimes grouped under the rubric "Canarsee") (Spooner 1884:20; Goddard 1978:214). Within the boundaries of present-day Fort Hamilton, a seventeenth-century Native American village called Nayack is reputed to have existed and was described as "cornfields surrounding a single longhouse sheltering approximately 20 to 22 people" in 1679 (Klein et al. 1986:1-9).

The issuance of land patents in what would become Kings County began 1636 when Native Americans sold a tract of land to Jacob Van Corlaer and a tract to Andries Hudde and Wolfert Gerritson Van Couwenhoven. These tracts together would become known as New Amersfort or Flatlands (Brasser 1978b:204; Goddard 1978:220-222; Stiles 1884:43-44; Ross 1902:64). With the choicest areas of settlement being the "flat untimbered lands along the shore of the bay and river" reminiscent of land in Holland, additional purchases in western Long Island followed Governor William Kieft's acquisition of title for nearly all of the remaining property in what would become Kings and Queens counties to settle newcomers (Stiles 1884:43-44). Called Nassau Island by the early Dutch inhabitants, Long Island became dotted with villages during the middle decades of the seventeenth century, and included the settlements of Wallabout, Amersfort (Flatlands), Midwout or vlachte bos (Flatbush), Breuckelen, Boswyck (Bushwick), and Vlissingen (Flushing) (Stiles 1884:25; Bergen 1884:256; Ross 1902:329).

Tensions between the Dutch and the Delaware increased during the 1630s and 1640s under the Directorship of Willem Kieft (1638-1647) as the Dutch population grew and as competition for European trade goods exacerbated rivalries among the different Delaware groups (Goddard 1978:213-216, 221). Nevertheless, since both colonial settlers and the Delaware utilized similar subsistence strategies—farming the flats along rivers and fishing in those rivers—both groups tended to regard similar areas highly for the establishment of their settlements. Therefore, as the population of European settlers increased and spread throughout the colony, especially after the English conquest of New Netherland in 1664, the Delaware were forced to move west, ultimately out of New Jersey entirely. By 1758, the Delaware relinquished their claims to all lands in New Jersey. Eventually, remaining Delaware left the area, resettling in either Pennsylvania, Wisconsin

or Indiana (Goddard 1978:222; Williams and Kardas 1982:186, 189-190; Kraft and Mounier 1982b:139-141).

Colonial neighbors troubled New Netherland Directors (colonial governors) Wouter van Twiller (1633-1638), Willem Kieft (1638-1647), and Pieter Stuyvesant (1647-1664). This included the presence of a few hundred Swedish settlers along the Delaware River and the successful establishment of trading posts and settlements on eastern Long Island and the Connecticut River valley by the English. Stuyvesant feared the Swedes would replicate this success in the Delaware valley. However, Dutch governors failed to move against the Swedes' Delaware River settlement until 1651 when the Dutch invaded the region and erected Fort Casimir. Three years later the Swedes demolished the fort, and Stuyvesant responded by sending an armada of seven ships and 650 soldiers up the Delaware, whereupon the Swedish governor surrendered. The English would not be so easily dispatched (Ellis et al. 1967:20-28; Fitch and Glover 1990:B-141-143).

Notwithstanding the founding of their first permanent settlement in what would become New Jersey at Bergen (later, Jersey City) in 1660, Dutch proprietorship over New Netherland was abruptly terminated four years later, when forces loyal to James, Duke of York and Albany (later, king), captured the colony during the Second Anglo-Dutch War. New Netherland was renamed New York, and the duke was given control over all land west of the Connecticut River and east of the Delaware River. Later, as a gift to two courtiers who had served King Charles II (his brother) during the English Civil War and his subsequent exile in France, James awarded the land lying between the Hudson and the Delaware Rivers to John, Lord Berkeley, and Sir George Carteret. In the 1665 patent to the new proprietors, the colony was named Nova Caesaria in honor of Carteret's birthplace, the Isle of Jersey in the English Channel (Wacker 1982:199; Kim 1978:8-9; Halsey 1882:8-9; Ellis et al. 1967:25-28; Pomfret 1964:8).

By 1660, New Utrecht, in what is now the Borough of Brooklyn, had eleven substantial homes as well as a block house defended by palisades. In 1679, two travelers, Jasper Dankers and Peter Sluyter, stayed at the newly constructed stone house of Jacques Cortelyou, the colony's surveyor, and their account is suggestive of the extent and type of farming conducted on the Cortelyou property.

'After supper,' they say, 'we went to sleep in the barn upon some straw spread with sheepskins in the midst of the continuous grunting of hogs, squealing of pigs, bleating and coughing of sheep, barking of dogs, crowing of cocks, cackling of hens, and especially a goodly quantity of fleas and vermin, of no small portion of which we were participants, and all with an open barn door, through which a fresh north wind was blowing. . . . We could not complain, since we had the same quarters and kind of bed that their own son usually had, who now, on our arrival, crept in the straw behind us' [Stiles 1884:47].

Sometime later, Cortelyou's sons, Pieter and Jacques, Jr., inherited property and an associated right to run a ferry across the Narrows. In 1719, they operated a ferry from their property on Long Island to Staten Island. The Cortelyou Wharf is believed to have been located east of present-day Fort Hamilton.

Prior to the English takeover of New Netherland, the areas nominally under Dutch control were practically undisturbed by European occupation. When Philip Carteret arrived in 1665 to become

the first governor of New Jersey, he found "a cluster of four cabins waiting for him" at the site of what would become the capital, Perth Amboy (Kim 1978:5). Six years later the region's primitive state of settlement had only slightly improved.

An observer of the New Jersey scene commented in 1671 that there were several villages on the ocean side near the entrance of the Raritan River, but that there was not even one for about a sixty-mile stretch between the entrance to the Raritan and the Delaware Bay [Kim 1978:5].

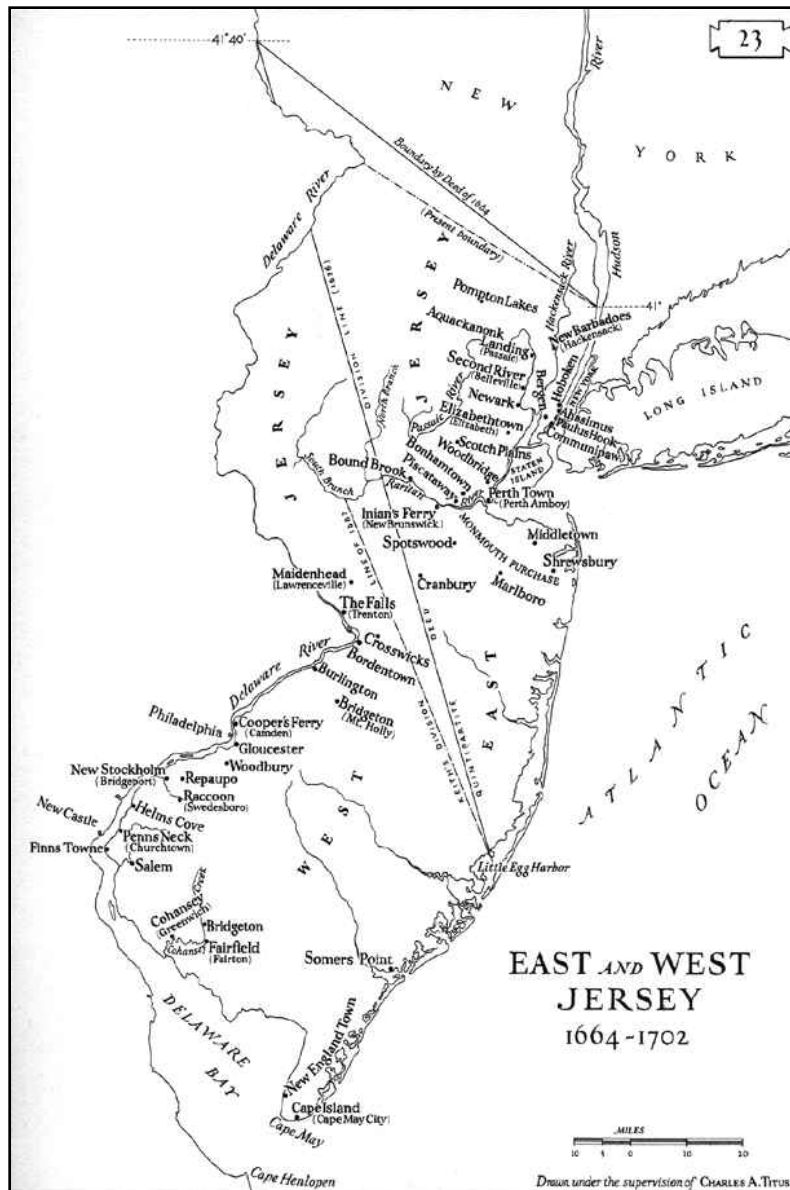
Before the arrival of Carteret, English Military Governor Richard Nicolls had allowed migrants from New England to take up farms west of the Hudson River, in what would become Essex, Union, and Middlesex Counties. In exchange for the privileges of establishing an assembly and a headright system, the migrants had agreed to pay a small annual quitrent to the Duke of York. The proprietors, Berkeley and Carteret, recruited colonists on similar terms, except they assumed they would be receiving the rent money. The duke's impulsive gift had caused so much confusion that it was not clear who owned what in New Jersey (Wacker 1982:199; Kim 1978:8; Pomfret 1964:8-10; Halsey 1882:8-9).

Settlement in the Upper Bay area began in the late 1660s when large tracts of land were purchased by English speculators. In December 1664, Nicolls issued a patent to John Baker, John Ogden, John Bayly and Luke Watson for a substantial tract of land lying between the Raritan and Passaic Rivers. The Elizabethtown Patent extended from the mouth of the Raritan to the mouth of the Passaic (17 miles) and 34 miles into the back country, encompassing over 500,000 acres, including all of present Union County and parts of present Morris and Somerset Counties. Settlers from Long Island were encouraged to immigrate to the colony and erect farmsteads (Pomfret 1964:9-10).

Berkeley, short on cash, grew tired of the proprietary venture and, in 1674, sold his share for £1,000 to what would become a group of surprisingly quarrelsome Quakers that included William Penn. Carteret retained his half. This sale necessitated the division of the colony into two separate governments, known as East Jersey and West Jersey (Figure 3.2). Carteret died in 1680, and East Jersey was sold at auction two years later to twelve men, one of whom was William Penn. Each of the twelve men sold half his interest to another man, resulting in East Jersey having 24 proprietors.

Carteret and, later, the 24 proprietors tried unsuccessfully to turn a profit in East Jersey, and the West Jersey Quakers went bankrupt. Despite an inability to turn a profit, by the end of the seventeenth century more than 3,300 Quakers were living in West Jersey. The Crown reunited the two Jerseys into a single royal colony in 1702, and recognized New Jersey as an independent colony separate from New York, although the two colonies would share the same governor for more than three decades. In 1700, the population of New Jersey stood at approximately 14,000. Its residents lived on scattered, often isolated farmsteads clustered at the far ends of the colony along the Delaware River and the Hudson River-Atlantic coast; villages of more than a few hundred people were rare. The New Jersey Legislature considered the northwestern portion of the colony uninhabited in 1707 (Pomfret 1964:21; Wacker 1982:200-209; Stansfield 1998:75-77; Manning 1984:43-46, 49-53; Halsey 1882:17-18).





**Figure 3.2. East and West Jersey and prominent settlements during the period 1664-1702 (West Jersey History Project).**

During the late seventeenth century and early eighteenth century, subdivision of the large speculative tracts began as smaller lots were sold to incoming settlers. With the advent of active English development of colonial New Jersey, European homesteaders with a variety of backgrounds cleared the land and erected farmsteads in increasing numbers. New Englanders via Long Island began filtering into eastern New Jersey; Dutch immigrants with their enslaved Africans also left Long Island in the 1680s, establishing settlements in the Raritan valley and what would become Somerset County. However, since the earliest English immigrants came from the Piscataqua River valley in New Hampshire and Newbury, Massachusetts, the area acquired the name Piscataway when townships were being created (Wacker 1982:199; Snell 1881; Wacker 1982:199). At first, West Jersey attracted Irish and English Quakers in large numbers. But after



William Penn redirected Quaker settlement to his colony of Pennsylvania after 1682, New England and Long Island Puritans and Baptists from England and Virginia entered the area. The first agglomerated settlements grew up around road junctions and river fords. Social, economic, and climatologic conditions favored the development of small subsistence farmsteads rather than large agricultural plantations, but these conditions did not preclude the continued existence of slavery. Within a local and regional exchange system, farms grew grain and raised livestock for themselves and their neighbors and only later exported their surplus to merchants in either Philadelphia or New York City (Manning 1984:44-45; Wacker 1982:199-205; Hawley 1964:3-4; Kardas et al. 1977:11, 18).

Administrative necessities resulted in the division of East Jersey into municipalities and counties. During initial county division in 1682-1683, East Jersey was divided into Middlesex, Monmouth, Essex, and Bergen Counties. The boundaries of the counties and municipalities in this area shifted often during the colonial era. In 1857, Union County was formed from the southern portion of Essex County (Kardas et al. 1977:11-12).

To compensate for a general lack of laborers in the New World, both the Dutch and the English utilized slave labor for agricultural and maritime activities. At the outset of settlement of Dutch Brooklyn, documentary evidence suggests that the number of enslaved people in the town were few. By 1698, however, more than 18 percent of the population was held in bondage-48 enslaved people out of a total population of 259. In 1738, the town's population was 282 of whom 119 were enslaved Africans (or slightly more than 42 percent enslaved) (Bergen 1884:261-263; Miller et al. 1979:13-14). As expected, the wealthiest people in the town were the main users of enslaved labor, and they included Jacques Cortelyou, Jr., Pieter Cortelyou, Denyse Denyse, Caspar Cropsey, Gerrit Kouwenhoven, and several members of the van Brunt family (Bergen 1884:262; Ross 1902:124). By the beginning of the American Revolution, more than one-third of the population of Kings County was African American, almost all of whom were enslaved. These numbers suggest that the county "probably had the highest proportion of slaves to total population of any county north of the Mason-Dixon line" in 1775 (Miller et al. 1979:14). There were 204 enslaved people in the Town of New Utrecht in 1790 (Stiles 1884:169).

Grist and saw mills were the most significant industrial operations during the Colonial and Early National periods in the area in New Jersey. Around these mill sites and at the intersections of roadways developed small villages, such as Watchung, Plainfield, Quibbletown, and Samptown (Hawley 1964:3-4; Kardas et al. 1977:11, 14, 18).

The area around the present Fort Hamilton played a notable role during the early part of the American Revolution. Rebel strategists recognized the importance of the Narrows for the defense of New York Harbor and constructed a redoubt and a battery of several twelve-pound cannon near Denyse's Wharf on the bluffs that are now within Fort Hamilton. Although its exact location is not known, Denyse's Wharf is believed to have been located either near the site of the original casemate of Fort Hamilton or under one of the approaches to the Verrazano-Narrows Bridge. Garrisoned by Colonel Edward Hand with men of the 1st Pennsylvania Riflemen and an undetermined number of guns, the battery fired preemptive rounds on the frigate H.M.S. *Asia*, which headed Admiral Sir Richard Howe's fleet, as it arrived at Staten Island in early August 1776 (Bergen 1884:262; Harney 1986:8-9).

The attempt to capture New York was part of a larger strategic initiative by the British to divide the New England colonies from the Middle Atlantic and Southern colonies. British planners believed that once the colonies were successfully split, each region could be returned more easily into the empire. During early July 1776, British forces from Boston under Admiral Howe, brother of General William Howe, landed on Staten Island in preparation for a larger undertaking (Carrington 1877:199-205).

On the morning of August 22, the British, under the command of General Howe, crossed the Narrows and began landing what would become a force of between 15,000 and 16,000 men and 40 pieces of artillery (other estimates of troop strength are higher) on Long Island near Denyse's Wharf. At that time, western Long Island was a low, level plain covered with a dense growth of woods and thickets. Stretching north and east from the coast, the plain was divided by a ridge of hills, extending from New York Bay midway through the island (Stiles 1884:52). This staging area near Denyse's Ferry Landing would be the launching point for the multi-prong assault on the Colonials' defensive position near Brooklyn, under the command of George Washington (Carrington 1877:199-215; Harpuz 1996:B-28).

Fought on August 27, 1776, the Battle of Brooklyn (sometimes referred to as the Battle of Long Island) resulted in the decisive defeat of the outnumbered Americans, who deftly escaped into Manhattan on the night of August 29 under cover of thick fog. The deadliest single encounter of the Revolution for the Americans, the Battle of Brooklyn cost the rebels 3,000 soldiers, who were either killed or captured or went missing. After the evacuation of Washington's troops, Kings County was occupied for seven years by the British and their Hessian allies, who utilized and encamped on colonial fortifications throughout the county. During the occupation, according to Bergen, "the British, Hessians, Tories and refugees had unlimited range over Long Island, and were quickly joined by 'neutrals' and 'fence gentry'" (Harpuz 1996:B-28; Bergen 1884:262; Stiles 1884:13, 32-33, 52; Carrington 1877:199-215). New York remained under British-Hessian occupation until November 25, 1783, when the British fired the final cannon shot of the war as a parting salute at crowds on Staten Island who were jeering their departure (Harney 1986:12).

In New Jersey, The plains below the Watchung Mountains and near the Raritan River received considerable attention from American and British forces during the Revolutionary War. During the winter of 1776-1777, British troops were stationed in Perth Amboy and New Brunswick, while the American troops wintered in Morristown. During subsequent foraging and raiding activities conducted by British soldiers in the region, American forces harried the raiders. Some of these American soldiers were encamped on "plantation" property owned by Cornelius Vermeule. Located at the confluence of the Green and Stony Brooks, the Blue Hills Post (or Vermeule's) covered land on both sides of Green Brook and perhaps Stony Brook as well. Despite scholarly disagreement over the size and layout of the cantonment, sources allege that Vermeule's plantation buildings "housed all the officers of one of Washington's regiments in 1776-77" (Kardas et al. 1977:12-13; Vermeule 1923). Including troops from Essex, Somerset, Morris, Sussex, and Middlesex Counties (totaling between 1,000 and 2,000 men), the cantonment consisted of a fort and earthenworks whose mission was to defend Quibbletown-Scotch Plains Road and local farmers from enemy raids.

During the spring and summer of 1777, American and British forces engaged in numerous skirmishes. During June 1777, Generals Sir William Howe and John Burgoyne, attempting to flush George Washington out of his mountain refuge, maneuvered through the Green Brook valley near Quibbletown (now New Market), Plainfield, and Westfield. A skirmish fought at the gorge near the confluence of Green and Blue Brooks on June 26, 1777, called "the Battle of Bloody Gap," resulted in a British rout of American forces fleeing Burgoyne's assault (Carrington 1877:300-301). Another skirmish to the south, "the Battle of Short Hills," occurred during a general campaign of skirmishing and maneuvering within central New Jersey (Kardas et al. 1977:12-13).

International tensions engendered by the French Revolution and its aftermath, ultimately including the War of 1812, led to the development of comprehensive plans to defend New York City from invasion. In 1800, the City of New York ceded to the United States its fortified islands in New York Harbor—Governors Island, Bedloe's Island, and Ellis Island. Military officials determined that defending New York Harbor was of prime importance and masonry fortifications were erected by New York State at several locations around the harbor, including Staten Island, Governors Island, and Manhattan between 1807 and 1812 (Harney 1986:13). Based on the 1807 recommendations of Colonel Jonathan Williams, Chief Engineer of the Army and first Superintendent of the U.S. Military Academy at West Point, both masonry and non-masonry fortifications would be constructed as part of overall harbor defense. While the federal government was slow to implement Williams's recommendations, the New York State government erected the first defenses on the east side of the Narrows, building a log battery on Hendrick's Reef on the shoals west of Denyse's Ferry in 1812 and an earthen redoubt on the heights overlooking the narrows. Shortly thereafter, the state ceded portions of the area that would become Fort Hamilton to the federal government, which subsequently constructed a stone battery on the reef. Called Fort Diamond due to the shape of the island on which it was erected, the installation became known as Fort Lafayette and was later demolished during the construction of the Verrazano-Narrows Bridge in the 1960s. This fort covered two-and-one-half acres and had walls 30 feet high and 8½ feet thick with 96 gun emplacements upon completion (Gilmore and Artes ca. 1980:4; Papurt ca. 1942:5-6; Harbor Defense Museum 1894: 2-4; Harney 1986:19-22). An earthen and timber redoubt, called Fort Lewis, was constructed in the area now known as Fort Hamilton, across the Narrows from Fort Wadsworth on Staten Island.

At the conclusion of the War of 1812, the War Department convened a board of engineers to plan for the permanent defenses of the New York's coastal areas and harbors. This endeavor resulted in the completing and strengthening of Fort Diamond. General Rene E. DeRussy of the Corps of Engineers was assigned as Assistant Engineer to the Fort Diamond project and was later promoted to Superintending Engineer of Fort Hamilton's construction. During 1819 and 1820, a joint Army-Navy commission prepared plans for the new installation which would be known as Fort Hamilton (Harbor Defense Museum 1894:7, 12; Harney 1986:21-30).

The resulting defensive arrangement regarding Fort Hamilton is termed the "Third" or "Totten System" of American seacoast fortifications. The first two systems reflected initial and incomplete attempts to defend New York City prior to the conclusion of the War of 1812. Created in 1824 by Joseph Gilbert Totten, John L. Sullivan, and Simon Bernard, "this system in its fullest conception integrated the navy, state militia, interior communications, and coastal fortifications into a comprehensive program" (Klein et al. 1986:7-19; Facility Engineers Office 1991:7-9). The system

relied on architecture as a key component of defense: massive masonry fortifications would protect a large concentration of weapons and soldiers from attack. These structures would be built to withstand bombardment from the sea and designed as self-contained units buffered by vacant tracts of land to maintain sight lines. The plan reflected both the fear of invasion from the sea and the national policy of deterrence. The nation's capital and the White House were damaged by a British sea-borne assault during the War of 1812, setting an indelible precedent for contemporary strategists (Klein et al. 1986: 7-19, 28; 2-33-35).

During the years prior to the outbreak of the Revolutionary War through the first half of the nineteenth century, agriculture remained the principal activity of the settlers in New Jersey. Local farmsteads were supplemented by such early rural industries as numerous water-powered mills, both saw and grist, located along area streams (Vermeule 1923:10-12; Kardas et al. 1977:14). After the Revolutionary War, mills served the gradually developing local communities. While New Jersey was overwhelmingly rural during the early years of the nineteenth century, socioeconomic changes were beginning to occur in the areas of transportation, industrialization, and urbanization.

Transportation improvements set the stage for more rapid growth after the Civil War. Shortly after 1766, "Old York Road (NJ Route 28 and portions of various county and local routes in Somerset and Hunterdon counties) by way of Paulus Hook, Newark, Elizabethtown, Plainfield, Somerville, and Lambertville on the Delaware River became an increasingly popular stage road servicing interior counties" (A.G. Lichtenstein & Associates, Inc. 1994:20; Wacker 1982:209-210; Larrabee 1982:221-231).

In general, the years 1800 to 1820 were known as the Turnpike Era in New Jersey transportation as toll roads, operated and developed by stock companies, facilitated the shipment of freight, especially farm products and minerals, from rural to urban areas (A.G. Lichtenstein & Associates, Inc. 1994:20-22). The Morris Turnpike (1801), connecting Newark to Morristown, and the Union Turnpike (1804), connecting Morristown to Milford, Pennsylvania, were the leading roads constructed at this time. Further, the New Jersey Turnpike was completed in 1809 and passed through Bound Brook along the course of the old Raritan Road. This turnpike remained in operation until 1869. New Jersey's location between two of the most important cities of the Early National period—New York City and Philadelphia—played an important role in the internal development of the state. Important routes emerged within the Philadelphia-New York corridor to ensure the transfer of goods, people, and the mail. These routes included the Trenton and New Brunswick Straight Turnpike Company (1804-1806), developing the route along the present US 1, and the Swift-Sure Stage Road. Traversing Plainfield and Scotch Plains along Old York Road, the Swift-Sure Stage Road connected Trenton/Philadelphia and New York City (Wacker 1982:209-210; A.G. Lichtenstein & Associates, Inc. 1994:21, UNI-2; Larrabee 1982:221-231; Hawley 1964:10). The change in the level of commercial activity along these toll roads was remarked upon by an observer of the day: "In the early 19th century, in one day, the keeper of a tollgate near Bound Brook, Somerset County, counted 600 vehicles 'laden with produce and drawn by one to six horses on the way to New Brunswick and to nearby boat landings'" (Manning 1984:47).

Independent of the establishment and subsequent expansion of the military presence at Fort Hamilton during the second half of the nineteenth century, the nature of the community around

the facility began to change. During the mid-nineteenth century, rural land use patterns shifted as agricultural endeavors were replaced by manufacturing and raw material processing in the vicinity of the expanding City of Brooklyn to the north. Simultaneously, suburban residences, hotels, and seaside "get-aways" began to coexist with farming areas along the shore south of Brooklyn. Tidal marshes once exploited for animal feed and left as grassland, were slowly being filled and used for dumpsites, road construction, and residential or recreational purposes. With few roads, the Town of New Utrecht began a process of slow but steady growth in population, from 907 in 1810 to 2,129 in 1850 (Ross 1902:335; Bergen 1884:263). Overlooking Gravesend Bay and the Narrows with a series of scenic bluffs and beautiful beaches, New Utrecht "remained a serene Dutch settlement, showing no expansion until after the Civil War, when it became a small resort center" (Murphy 1979:92). Near the fort, active farms were slowly converted into hotels and seaside resorts, for those New Yorkers and Brooklynites with the leisure time and the money to escape the increasingly congested and dirty cities. Beginning in the 1850s, the Coney Island area, south of the Fort Hamilton, became an attractive location for summer resorts and hotels sprang up to meet this new demand. In the 1850s, the Coney Island plank road connected Coney Island beaches with the City of Brooklyn, facilitating the influx of leisure-seekers. As the traffic of vacationers increased in the 1860s, especially after the Civil War, restaurants, saloons, and bathing establishments mushroomed to service the booming resort industry. "By the 1870s, 396,099 people lived in the City of Brooklyn, and only 23,822 people lived in the original boundaries of the four still rural towns, an area twice as large as the city. The rural areas [which included New Utrecht] remained largely unaffected by the nineteenth-century industrial-commercial growth of Brooklyn" (Miller et al. 1979:20).

Canals were the next stage of internal improvements during the antebellum era and served to lower costs and increase the amount of goods shipped between points west and the eastern seaboard. The Morris Canal (1825-1831) and the Delaware and Raritan Canal (1830-1834) were successfully utilized to improve inadequate interregional transportation systems in New Jersey and increase the amount of Pennsylvania coal shipped to industrializing eastern cities. These goals would be fully realized during developments of the next stage of transportation improvements: the Railroad Era (A.G. Lichtenstein & Associates, Inc. 1994:24-29).

Beginning as an array of non-unified short lines to serve local needs in the 1830s, the New Jersey railroads, by the end of the nineteenth century, would become integrated into a successful network of lines and routes connecting Pennsylvania producers and New Jersey commuters with New York City. The development of the Central Railroad of New Jersey, the Lehigh Valley Railroad, and the Delaware, Lackawanna & Western Railroad would propel the modernization of the economies of the big northeastern cities, create the suburbanization of northern New Jersey and make New York City into a leading world economic center (A.G. Lichtenstein & Associates, Inc. 1994:24-29).

The rural character of northeastern New Jersey began to fade in the post-Civil War years as farming and quarrying began to be replaced by residential developments, which sent commuters to New York City, Newark, Elizabeth, and Jersey City. Places like North Plainfield, Green Brook, Dunellen, and Berkeley Heights became suburban communities, emerging around train stations along the New Jersey Central rail line or a related spur. The Central Railroad of New Jersey (commonly referred to as the "Jersey Central") played an important role in encouraging

suburbanization by advertising housing developments along its route. "Realizing that railroad prosperity would be stimulated by population growth, the Central's President, John Taylor Johnston, encouraged new towns along the right-of-way. In 1866, the Jersey Central began assembling land for just such a new town. Its location: the village of New Market, several miles west of North Plainfield. By 1868 the railroad had acquired 300 acres and the success of the new town of 'Dunellen' was assured" (Guter and Foster 1985:np; A.G. Lichtenstein & Associates, Inc. 1994:MID-8; SOM-5).

The expansion of the railroad encouraged the movement of people between the city and the countryside, and, as one might expect, towns located along the path of the line—including Dunellen, North Plainfield, and Plainfield—prospered from the association (Guter and Foster 1985:np). Prior to 1870, land in Green Brook valley "was all open farm" (Guter and Foster 1985:np, quoting an 1873 "Jersey Central" publication). Moreover, in 1881 local historian James P. Snell, describing Washington Park, a new railroad-inspired suburban development, wrote:

The place has been laid out on the lands of the farmers, and has been largely settled by people from New York, or those who do business in that city . . . . In this respect it may be regarded as one of those suburban places where people of moderate means seek quiet and inexpensive homes in the pure air and ample spaces of the country. The houses are, many of them, new, and constructed with more or less architectural elegance, the grounds being ornamented with shrubbery, and everything presenting a neat and tasty appearance [Guter and Foster 1985:np].

Other developments during the period typified the planned, single-family, suburban housing development initiated by the railroad before the turn-of-the-century. Excluding commercial "nuisances," such as slaughterhouses, tanneries, glue factories, etc., the developments represented "the growing importance of the suburbs as a home for the middle class," as an escape from the noise, smells, and foreign immigrants characteristic of late nineteenth-century American cities (Guter and Foster 1985:np; Rosenzweig 1985:27-32). As a result, a community of middle-class property owners—what we would call white-collar executives, entrepreneurs, and professionals—who worked largely out of the area developed in these areas. Blue collar and lower-middle-class white-collar workers (small-scale tradesmen and laborers) were usually concentrated outside of these developments in a different part of town (Guter and Foster 1985:np).

Not confined to areas near railroad depots, suburban communities spread throughout New Jersey. For example, established in 1868 by the Jersey Central, the community of Dunellen consisted of approximately 200 dwellings and several stores by the 1880s. Moreover, the concentration of railroads led to development of Bound Brook (near the Raritan River) as an industrial center, with the concomitant spread of suburban housing areas along railroad routes between Dunellen and Bound Brook (Burrow and Hunter 1990:5-22). In addition, "[f]rom the late 1870s through the 1910s northern Middlesex County was at the outer ring of northern New Jersey suburban development" (A.G. Lichtenstein & Associates, Inc. 1994:MID-6). This trend toward increasing suburbanization would be reinforced by the construction of the New Jersey highway system and the rapid expansion of automobile commuter traffic after World War I (A.G. Lichtenstein & Associates, Inc. 1994:MID-8, SOM-5; Burrow and Hunter 1990:5-14, 5-22).

In Brooklyn, ship building was established along Brooklyn's western shores with the concomitant development of maritime commerce and associated warehouses, coal yards, offices, and services to support area workers. During the middle of the century, the Atlantic Docks were constructed along the Brooklyn shoreline and a canal was proposed for Gowanus Creek which would drain and fill the surrounding area.

As designed, the canal was intended to not only drain the surrounding meadowland but also to receive waste and storm water runoff from the adjacent developed property. In 1853 Richards plan started to take effect, private landowners undertook construction of the Gowanus Canal and began filling and dredging of adjacent meadowland for development [Harris et al. 2014:54-55].

The one-story shanties and tenement houses sprang up in areas near the canal.

Arthur Kill is a tidal strait that connects to Upper Bay via the Kill Van Kull (another tidal strait) and mixes waters with Newark Bay. It also connects Newark Bay with Raritan Bay. Important tributaries to Arthur Kill include the Rahway and Elizabeth Rivers, Woodbridge Creek, and Fresh Kills Creek. These waterways exist within a heavily industrialized and developed corridor. The New Jersey side of the Arthur Kill is industrialized; large areas of wetlands are intermingled with industrial facilities on the New York side. Arthur Kill and Kill Van Kull have deepwater navigation channels that allow transport of cargo into and out of the Ports of New York and New Jersey. While the Arthur Kill is highly industrialized, approximately 55 percent of the shoreline is natural mudflats and marshes.

After the Civil War, the New Jersey side of the Arthur Kill became heavily industrialized, and the Staten Island side remained largely open space outside of the small settlements. At the beginning of the twentieth century, west side became the site of "large copper refineries, agricultural chemical works, new or expanded clay products plants, building materials manufactories, metallurgical industries, the beginning of today's extensive petroleum handling facilities, and vessel construction yards emerging on dry land as well as filled marsh (Harris et al. 2014:131). Facilities on the Staten Island side included "the Kreischer brick works, the American Linoleum Manufacturing Company, the Atlantic Terra Cotta Company, and Tottenville Copper" (Harris et al. 2014:131).

During the last quarter of the nineteenth century, a variety of railroads, including the Perth Amboy & Elizabethtown Railroad and New York & Long Branch Railroad, established passenger and freight stations and terminals serving the New York area. The Port Reading Railroad docks on the Arthur Kill was constructed by 1892 (Harris et al. 2014:131-132).

The islands in New York Harbor were not immune from development. After the conclusion of the Civil War, hundreds of thousands of immigrants arrived at the Port of New York every year, overwhelming the state-run facility in Manhattan. In 1892, Ellis Island opened as the primary point of entry for immigrants arriving in the United States. It closed in 1954. Castle Garden in Battery Park served as the nation's principal immigration station from 1855 to 1890. Prior to it becoming an immigration station, Ellis Island was used by the U.S. War Department as a military fortification and ammunition storage facility beginning during the War of 1812. The island was used as a

munitions arsenal for the Union army during the Civil War. Unfortunately, the fire destroyed nearly the entire facility in June 1897. A new brick facility and a hospital were subsequently constructed. The massive immigration station, located in the Upper New York Bay just south of Manhattan, included facilities for docking, registration, inspection, medical checks, and quarantine. The period from its opening until the beginning of World War I “marked a transition in the demographics of immigration to the city, as Italians and Eastern European Jews became the dominant groups, in place of English, Irish, and Germans, who had represented the bulk of new arrivals previously” (Seyfried 2004). “Immigration during the early twentieth century soared; with more than one million people passing through Ellis Island in the years immediately preceding World War I” (Harris et al. 2014:57-58).

In 1877, Bedloe’s Island was selected as the site for Frederic-Auguste Bartholdi’s Statue of Liberty. Since 1811, the island was the location of Fort Wood, and it had served as a quarantine station at various times in its history. Completed in 1886, the pedestal for the statue was designed by Richard Morris Hunt, and the landscape around the pedestal and the remaining fort structures was designed by Frederick Law Olmstead. The Statue of Liberty was formally dedicated in October 1886. The torch of the statue was subsequently electrified for illumination. (Harris et al. 2014:59-60). In 1933, the Statue of Liberty came under the jurisdiction of the National Park Service.

In the twentieth century, changing technology, the development of the automobile, and the related state highway system encouraged traveling and allowed workers to live farther from their places of employment. As a result, bridges and tunnels were constructed to facilitate travel within and between New York and New Jersey. For example, the Holland Tunnel under the Hudson River at Jersey City was completed in 1927; the George Washington Bridge at Fort Lee was opened in 1931; the Goethals Bridge over the Arthur Kill between Elizabeth, New Jersey, and Staten Island opened in 1931; and the Lincoln Tunnel at Weehawken was opened in 1937. The Verrazano-Narrows Bridge between Staten Island and Brooklyn opened in 1964. Its name was changed Verrazzano-Narrows Bridge in 2018 (Harris et al. 2014:138)

### **3.3.2 Lower Bay Region**

At the time of European invasion, the Raritan Delaware occupied sites in New Jersey along the lower Raritan River near the Kill Van Kull, as well as the southern part of Staten Island. Robert Juet, chronicler of Henry Hudson (1609), stated that the Raritan, a branch of the Delaware or Leni-Lenape, occupied sites near the Kill Van Kull shoreline (Clute 1877). The expedition found evidence of burial sites near shore and noted the presence of lithic hatchets and projectile points. The Hackensack also occupied the area.

Unlike early colonial enterprises founded on political or religious principles, New York’s development was prompted by trade. Early maritime commerce in the New York Harbor area began in the early 1600s, centering on the trade and barter of fur, probably beaver (Bank of Manhattan Company 1915). After the area was discovered by the Italian explorer Giovanni da Verrazzano in 1524, the Dutch began initial colonization of Manhattan Island, with the Dutch West India Company establishing a trading post of eight men in 1625 to help develop



the fur trade (Shumway 1975). By 1650, New Amsterdam featured peoples speaking some 18 languages.



**Figure 3.3. Lower Bay Region, NYNJHAT Study (USACE, New York District 2021).**

The fledgling colony was replaced by English rule when a naval squadron appeared in 1664 off New Amsterdam and demanded its surrender. Renamed "New York," the colony was taken back in 1673 but was returned to England by terms of a treaty in 1674. Despite this change, New York's economy grew. In 1683, there were 3 ships, 3 barks, 23 sloops, and 41 small boats noted as being at New York. In 1696, there were 62 sloops, 40 square-rigged vessels, and 60 small boats. The single-masted sloop was the most extensively employed vessel type during the early years of the colony. Thought to have developed from the old Dutch yacht, the sloops had the broad beams and round, full bottoms that characterized seventeenth-century Dutch vessels. The universal boat for traveling and freighting on the river, the sloop's light draught was

well suited to floating over the shallows of the Hudson River. By 1771, the Hudson River sloop was a large and powerful boat (Hall 1884:115).

The rise of New York commercial activity was slow, and while merchants traded to the West Indies, they neglected trade to Europe until after the Revolutionary War. Prior to the war, privateering and the trade in enslaved people were practiced. The port was especially known for its privateering, and between the French and Indian War until the advent of the Revolutionary War, 48 privateers, 695 guns, and 5,660 men were sent out from the port. Fast-sailing brigs and schooners had sharp floors and sat low in the water; these vessels were seldom captured. A few of this same class of vessel also participated in the slave trade (Hall 1884:115).

Part of the British strategy during the Revolutionary War was to control New York Harbor, and they first landed on Staten Island in 1776. Although the many major battles of the war were fought outside the state, the British continued to hold New York as a main naval base. The end of the war brought restrictions against trade with the West Indies; however, the trade was revived in 1793 when France and England went to war. Becoming the leading seaport in 1797, the port was idled for over a year with the passage of the Embargo Act of 1807. Just four months prior to the embargo, Robert Fulton successfully tested the steam-propelled *Clermont*, an event that signaled a revolution in marine transportation and waterborne commerce. Built in an East River yard and powered by an imported British steam engine, the vessel ran between New York City and Albany in 1807. Although earlier steamboats had operated both in the United States and abroad, it was Fulton and his partner Robert Livingston whose success with the *Clermont* "marked the beginning of the unbroken development of steam navigation in America" (Ringwald 1965:1). In 1812, Fulton built the first "double-ended" ferryboat *Jersey*, which operated between Jersey City and Manhattan. In 1814, he established the first steam ferry between Brooklyn and Manhattan (Brouwer 1990:20-26).

The development of the steamboat was impeded by the monopoly awarded to Fulton (actually awarded to Livingston, a state political power broker) for steamboat operation in the state of New York. Struck down in 1824 by the Supreme Court of the United States, the removal of the monopoly brought significant changes to the local waters both in vessel types employing steam propulsion and the engines themselves, as well as waterborne commerce affected by the introduction of these vessel types. A general type evolved that would come to typify the larger Hudson River steamboats (Ringwald 1965:2), as well as the Long Island Sound and Chesapeake Bay steamboats.

After the War of 1812, the Port of New York increased its role in the sailing packet industry, both in the construction and in the commercial aspects of the vessels. Like the *Clermont*, the packets were built in East River yards. Packets bound for Liverpool, London, and Le Havre would make their eastbound crossing with cotton or grain and return with immigrants and European luxury goods. By 1850, New York was a center of clipper ship construction with between 50 and 100 vessels being built yearly. Mostly built for New York owners, the packets and clippers were launched for the packet, China tea, or California trades (Hall 1884:116).

After the Civil War, the American shipbuilding industry saw not only the final development of the American square-rigged ship, but in New York, where builders specialized in expensive

packets and clippers, a dramatic decrease in production. Production of New York-built boats dropped from 40 in 1855 to zero in 1862, averaging only four per year over the next decade (Hutchins 1948). The completion of the trans-continental railroad and the opening of the Suez Canal spelled doom for the fast sailing vessels by the 1870s (Brouwer 1990:46).

The industry also witnessed a change in the way it conducted business. Before the Civil War, shipbuilding usually consisted of a small group of shipwrights headed by a master shipwright. Shippers, on the other hand, had little to do with shipbuilding. After the war, however, capitalists sought out the industry on a large scale. The master shipwright became an employee, this was the result of declining activity in the ship market and the increased cost of ship construction (decreased timber supply) (Hutchins 1948). By 1880, the economies associated with the free market system dramatically modified, if not replaced, the old apprenticeship.

The opening of the Erie Canal in the fall of 1825 was perhaps the greatest stimulus to the growth and success of the Port of New York in the early nineteenth century. Extending from Buffalo on Lake Erie to Albany on the Hudson River, the canal runs 365 miles. Reducing shipping times and costs of inland produce and commodities to the Port, the Erie Canal caused interior towns to thrive due to increased commerce and ensured New York's leadership among eastern ports because of its access to markets and goods of the interior of the continent (Brouwer 1990:29-34; Hall 1884:224; Morrison 1958:539).

Soon other canals were constructed throughout New York, with canals also constructed in Pennsylvania, Maryland, New Jersey, and Delaware. Navigation improvements in connecting inland waterways by canals in the 1820s and 1830s resulted in new commerce opportunities and increased maritime traffic. The Delaware & Raritan Canal, the company by the same name receiving its charter in 1830, was the conduit for Pennsylvania coal to New Brunswick, New Jersey, on the Raritan River, and the Morris Canal carried coal across New Jersey to Newark from the mouth of the Lehigh River (Albion 1939:134-137; Morrison 1958:172; Raber et al. 1995b:25). A crucial corridor for waterborne commerce between Upper New York Bay to Raritan Bay around Staten Island in the early nineteenth century traveling, the Kill Van Kull and the Arthur Kill increased in importance throughout the nineteenth century with the construction of the Delaware & Raritan Canal and the attendant expansion of the coal trade. With later direct railroad connections from Elizabethport to Phillipsburg, New Jersey, on the Delaware River, and a new coal terminal at Port Johnson, Bayonne on the Kill (constructed in 1865), shipments of coal on the kills increased dramatically in the 1850s and 1860s (Albion 1939:134-137; Morrison 1958:167-189; Raber et al. 1995b:25).

The construction of canals brought about an attendant boom in the construction and use of canal boats or barges, as well as a reduction in the number of schooners involved in the same trade. The importance of the canal use in the waters of New York Harbor is indicated by the frequency with which they appear in historic photographs of the area (see Johnson and Lightfoot 1980). Either decked or open, the canal barges were towed through the Erie and Champlain canals by horse and mule walking along towpaths. Arriving at the Hudson River, they would require other means of propulsion. Coinciding with the construction of the canals and the canal barge, the

advent of steam power produced the towing vessel, the predecessor of the modern day tugboat. The first vessel built for this general service appears to have been the *Hercules*, constructed in 1832 in New York by a company that ran a line of coastal packets (Morrison 1958:540).

At the same time steam propulsion was making inroads into maritime construction and commerce, it was also having a profound effect on land in the form of railroads. By the 1870s, the railroads would shape the way the Port area handled goods by effectively creating the lighterage system. Of the dozen major lines that serviced the port, only two directly serviced Manhattan Island. With the exception of the Baltimore & Ohio, which entered Staten Island, most railroads ended at the New Jersey shore of the Hudson River. These lines were forced to transport their cargoes of passengers and products over the last remaining leg of the journey by water. However, there remained a far greater tonnage of waterborne freight requiring discharge along piers and waterfront slips than land-conveyed freight (Harding 1912). Some freight cars crossed the waterways on long barges called car floats, while the contents of other cars were offloaded or transferred onto lighter barges in the form of sailing craft, deck scows, and hold and covered barges; steam lighters carried priority cargo such as mail.

Servicing the geographic and commercial needs of the harbor required a "railroad navy." Some 1,500 tugboats, car floats, covered lighters, express lighters, floating grain elevators, and other craft loaded and unloaded freight at specially designed rail-to-water transfer piers. This transportation network offered (1) access to the water (slip) side of steamships and (2) access to parts of the harbor not accessible by rail.

Historically, New York's leadership position in general cargo portage depended on its ability to move or "lighter" goods from ship to pier or ship to ship. The term "lighter" describes a small boat utilized as an intraport cargo carrier. These lighters, sail or steam propelled, handled all types of agricultural and commercial goods, including mail. The usual lighter transported between 500 and 800 tons of freight (Harding 1912).

In New York Harbor, the term also applies to cargo ferrying via scow, barge, derrick, carfloat, or grain elevator *vis-a-vis* waterfront terminals or anchored ocean vessels. The breadth of New York's lighterage activity "reflected America's full-scale entry into the industrial age, with its ever-increasing demand for imports of raw materials and foreign markets" (Brouwer 1987:30).

The harbor's vast waterways and dense population initially hindered centralized railroad service. "In response to these challenges, many major railroads established intermodal networks designed to meet and beat their competitors" (Dibner 1994:6). Of the dozen or so railroad lines built during the mid-1800s, only one line, the New York Central, provided direct rail freight service to Manhattan (Brouwer 1987). From 1835 to 1865, tracks progressively penetrated the harbor, terminating at the nearest navigable waterway. Most came no closer to Manhattan than Jersey City.

In the 1870s, railroads adopted the carfloat interchange system. Cars from southern areas reached New England-bound railroads by flotation barge. In Manhattan, around 1900, and

later in Brooklyn and the Bronx, float bridge stations (inland freight stations) provided mechanisms for freight marine/terrestrial interchange. Beginning around 1860, railroads delivered (at no charge) a carload or more of incoming freight to waterfront locations within a designated harbor boundary (free lighterage limits).

Waterfront destinations received the same rate "as though it were physically on the line of the railroad" (Flagg 1994:7). Railroad owners had no choice but to provide free lighterage since the free service directly competed with canal boat carriers who delivered goods directly to ships or terminals and charging for the service would drive shippers to other East Coast ports. When later investments included port facilities, railroad owners "did not want New York to be placed at economic disadvantage in competition with East Coast ports where goods did not have to be lightered" (Brouwer 1987:31). By the 1920s, railroads owned outright large lighterage fleets.

By 1885, New York Central Railroad maintained 92 lightering boats, and the Pennsylvania Railroad maintained 104 vessels. In 1908, the Lehigh Valley Railroad had 250 craft, and the Baltimore & Ohio had 142 (Harding 1912). Three other railroads had fleets numbering more than 200 (Brouwer 1987). In 1907, the New York Central fleet moved 304,372 cars on float, or about 1,000/day, in addition to 1,402,358 lightered tons of bulk freight, or some 5,000 tons/day (Harding 1912). In 1917, all railroad freight shipped to or from Manhattan Island (apart from New York Central's track) arrived by lighter or carfloat (French 1917; Table 3.1).

**Table 3.1. Railroad Tonnage in 1914 by Commodity, Percentage, & Local Movement\***

Commodity	Carfloat		Lighter		Total	
	Tons	%	Tons	%	Tons	%
Grain and mill stuffs	593,000	14.0	3,232,000	76.1	4,244,000	100
Foodstuffs	2,714,000	42.1	1,195,000	18.6	6,442,000	100
Fuel and ores	568,000	1.6	31,903,000	90.9	35,101,000	100
Building materials	829,000	17.0	2,323,000	47.8	4,865,000	100
Miscellaneous	6,100,000	49.0	2,607,000	20.9	12,463,000	100

\*adapted from New York, New Jersey Port and Harbor Development Commission 1920

Expansion of the free lighterage system allowed waterfront industries to develop floating sidings. Terminal companies took advantage of the situation by developing ports within ports, providing steamship piers, loft buildings, and freight stations, all served by private rail networks connected by carfloat. Companies set up special terminals for bananas, coal, grain, and perishables. A Merchant's Association of New York representative described the waters of Manhattan as "an interior *belt line* employed in switching cars between the terminals on the New Jersey shore and the industries . . . in various parts of the harbor" (Squires 1918:3).

The water belt line or lighterage and carfloat system came under attack around 1910. Independent cost analysis suggested that the system suffered from cost overruns, particularly delay and damage to freight. These allegations, however, often originated from rival ports. Objections also came from urban planners, who complained about the disproportionate amount of waterfront occupied by railroad marine operations. Supporters recognized that if operations moved elsewhere in Manhattan, companies would occupy space even more valuable.

The New York Port Authority (established 1923) tried to carry out a comprehensive plan of replacing marine operations with land-based belt lines. Railroad executives refused to cooperate with one another; despite studies showing increased revenue by unifying terminals and belt lines, rail companies preferred the traditional lighterage/carfloat system (Flagg n.d.). The Port Authority modernized pier and vehicular crossings, eventually substituting motor trucks for lighterage.

Modern containerization and trucking diminished the importance of the lighterage system by 1960. The demise of the lighterage system came about with the advent of the modern standardized freight container that is adapted for quick transference from and onto train, truck, and specially adapted ships (Brouwer 1990:54). By 1976, railroads no longer provided lighterage service. Hundreds of abandoned wooden vessels associated with this industry now litter the port's shoreline. Flagg et al. (1992) accurately noted that steel barges contain valuable scrap and are less likely abandoned. Some derelicts served as storage units for a time, but eventually lost any useful function.

The lack of railroad initiative aided Manhattan's port decline. Marine business slowed to the point that railroads found it cheaper to transfer freight in New Jersey by truck rather than by lighter. By the early 1970s, most free railroad lighterage in New York's port ended. The last carfloat operation in Manhattan ended in 1976.

## **STATEN ISLAND**

Relative to the New York-New Jersey metropolitan area, Staten Island is both water-bound and isolated. Historically, the island's western border, the Arthur Kill channel, and its northwestern border, the Kill Van Kull, played vital roles connecting New York with New Jersey, Philadelphia, and Long Island Sound. Staten Island rests between New York Bay and New Jersey's northeastern shoreline, the Arthur Kill channel separating the island from the latter. The island's geographical center is situated 11 miles southwest of New York City. The Kill Van Kull extends from Newark Bay to New York Bay and separates Staten Island's northwestern shoreline from New Jersey at Bergen Point. Bayles (1887) states that the island's name is an English rendering of the Dutch form *Staaten Eylandt*, meaning "Islands of the States."

The name "Kill Van Kull" (channel), historically known as the Kills, is apparently Dutch for the "Kill of the Cul" (*Het Kill van het Cul*) (Bayles 1887). *Kill* is a Dutch word for "creek," while *Cul* is possibly French for "bay," thus "the creek of the bay." *Achther Cul*, the Dutch rendering for Newark Bay, meant "Back Bay," the Dutch word *achter* meaning "after" or "behind" (Clute 1877).

De Vries (1655), as cited in Wacker (1975), comments on the immense numbers of water fowl on the Achter Cul, stating:

There are great numbers . . . of geese, which stay here through the winter, by the thousands, and which afford fine sport with a gun. . . . Land birds are also very numerous, such as wild turkeys . . . taken by the savages with their hands, who also shoot them with bows and arrows . . . There are different kinds of fine fish . . . haddock,

plaice, flounders, herring, sole, and many more kinds . . . There are fine oysters, large and small, in great abundance. In the summer time crabs come on the flat shores, of very good taste [Wacker 1975:23-24].

The description offered by De Vries is a far cry from the fouled and polluted waters of the modern Arthur Kill and Kill Van Kull channels.

Initially, Native American conflict hampered European development of Staten Island. As part of the Province of New Netherland, the island fell under the jurisdiction of the Dutch WIC (Black 1982). In 1661, French Waldenses and Huguenots established a modest village near South Beach, apparently the island's first permanent European settlement (Steinmeyer 1950).

The Dutch surrendered its island claim, as well as the rest of New Netherland, to England in 1664. Native American conflict culminated in the "Peach War" of 1655, which depopulated the island where "settlement had to be recommenced" (Bayles 1887; Black 1982). Staten Island became part of the shire of Yorkshire. Francis Lovelace, who purchased Native American land rights to the island in 1670, laid out lots on the island's north, south, and west sides. In 1675, the island obtained separate jurisdiction, and in 1683, a separate county, Richmond.

Demographically, seventeenth-century Staten Island mirrored early Dutch and subsequent English settlements. Under English domain, the island witnessed the arrival of fugitive French Huguenots in significant numbers. By the mid-1700s, Staten Island included Dutch, French, Belgian, and English populations (Bayles 1887).

Between 1790 and 1810, the island featured a rural population subsisting on farming, fishing, and maritime commerce. The population (5,347) increased more than 39 percent by 1810 (Sachs and Waters 1988). Agriculture (beef, pork, wheat, rye, apples) and seafood (fish, clams, oysters) sustained the island's population (Cotz et al. 1985). The community also harvested salt hay from the extensive salt meadows in Northfield, Southfield, and Westfield townships.

Commercial oystering dates from the earliest Dutch settlements. The industry even advertised in early Dutch journals (Powell 1976). Considered a staple in the eighteenth century, oysters were shipped locally and abroad. Beds thrived in the Arthur Kill's deeper waters, Prince's Bay, the mouth of the Raritan River, and the Kill Van Kull (Hine and Davis 1925; Sachs and Waters 1988).

Extensive marshes north of later Rossville, coupled with the island's remoteness (relative to the New York City and Philadelphia markets), slowed coastal development. Furthermore, large land grants encompassing the island's southern end restricted settlement. Mark Dusachoy, described in a seventeenth-century deed transaction as a "planter," held some 823 acres in the Smoking Point area (Schneider 1977). Christopher Billopp received about 1,600 acres on the island's southwest corner. Begun circa 1709-1716 and running between Perth Amboy and the end of Amboy Road, the earliest ferry across the Arthur Kill was included in Billopp's grant. Besides local ferry service, given opportunity, the Billopp ferry probably served as a link between New York City and Philadelphia. The ferry operated intermittently from the Amboy Road site until the beginning of the Civil War, when the landing moved a half mile north (Raber et al. 1995a:24).

By the end of the colonial period, subdivided Billopp grants, together with other smaller grants, led to increased farming near the Arthur Kill south of Fresh Kills. Eventually smaller communities emerged north of the Billopp grant boundaries as New York/Philadelphia markets expanded. The initial franchise, Old Blazing Star (now Rossville), is located in an area north along the south side of what is now Arthur Kill Road (prehistoric Smoking Point). The name "Blazing Star" apparently originated from taverns at each ferry site. Old Blazing Star remained the project area's principal settlement until after the American Revolution. The New Blazing Star Ferry at Tompkinsville (Linoleumville) opened around 1757 and by 1764 featured a stagecoach connection.

One of the earliest ferries to cross the Kill Van Kull, the Port Richmond-Bergen Point ferry, dates to the 1690s. Jacob Carsen petitioned the New York Governor's Council in 1750 for a patent stating that he had operated a ferry between Staten Island and Bergen Point for some 60 years. His request, to "erect" his vessel into a public ferry, grew out of fear of competition as a result of increased population. Corsen received the patent, operating the ferry until 1764. New owners took over the operation the same year (Reed 1959).

The New Blazing Star route began in New York City, crossed the North River by ferry to Powle's Hook (Jersey City), to Bergen Neck (Jersey City and Bayonne), to Bergen Point, where the ferry carried passengers and freight across the Kill Van Kull (Reed 1961). The New Blazing Star differed from the Blazing Star Ferry, which ran from modern Rossville, Staten Island to the opposing New Jersey shoreline. The New Blazing Star did not operate during the Revolutionary War.

British forces occupied the island during the Revolutionary War. Up to 40,000 garrisoned British and Hessian troops occupied the island, many stationed near the western shore (Sachs and Waters 1988). This was perhaps due to the location of the Old Blazing Star ferry and its subsequent access to Philadelphia and New Jersey (Schneider 1977). After the war, local officials confiscated and subdivided the grant's remaining acres. Development of the island's hamlets, villages, and industry depended, in part, on transportation networks, i.e., ferries, landings, and roads.

Ferry service provided early links with the mainland. By 1816, Daniel Tompkins' Richmond Turnpike Company opened a road connecting the northeast shore (Tompkinsville) with the New Blazing Star Ferry west in Linoleumville. Tompkins then offered steamboat service between Tompkinsville and Manhattan, establishing a direct route between New York and Philadelphia (Cotz et al. 1985). The ferry at Tottenville linked Staten Island with Perth Amboy, and the one at Holland or Howland Hook with Elizabeth, New Jersey. Another ferry ran across the narrows to Brooklyn. Kill Van Kull service ran between Bergen Point and Port Richmond (Leng and Davis 1930). In the 1830s, a horseboat ferry operated across the Kill Van Kull. The vessel, known as Coyles horseboat, ran during the late 1830s and early 1840s. The project lasted only a few years, the service replaced by rowboats or scows (Reed 1959).

Despite New York Harbor expansion, the Arthur Kill's marshy shoreline prevented large-scale commercial development. In 1810, the island's primary industries included two textile carding



machines, two tanneries, three distilleries, and 59 looms producing some 23,100 yards of flaxen fabric, 12,000 yards of woolen fabric, and 7,000 yards of blended cloth (Sachs and Waters 1988). Even as the channel itself became an increasingly important commercial route, communities along the Arthur Kill remained largely agrarian.

In the early nineteenth century, Manhattan's new middle class sought refuge on the island's underdeveloped southern shore. The earliest resorts appeared in Tompkinsville (1821) and later north in New Brighton (1837). The grand shoreline became a favorite local retreat. In the 1880s South Beach, later Midland, had 100,000 tourists during peak season (Staten Island 1979). Several large institutions, public and private, medical and non-medical, established expansive residences along the northern shoreline. Settlements gradually developed around these institutions. The wealthy, meanwhile, established their own Island estates.

Early industrial development began on the north shore at Factoryville, now West New Brighton. In 1819 Barrett, Tileston, and Company established a dyeing and printing house there (Leng and Delavan 1924). Port Richmond served as the location for the Staten Island Whaling Company and later the Jewett White Lead Works (1842).

The island's rich clay and kaolin deposits on the southwest shore along the Fresh Kills and lesser deposits on the north shore led to an emerging brick-manufacturing industry (Sachs and Waters 1988). German immigrant Balthazar Kreischer, knowledgeable in the construction trades, built a Manhattan brickworks in 1845, and in 1852 he built the International Ultramarine Works on the Arthur Kill south of Smoking Point.

In 1854, Kreischer established a clay and firebrick works on the island that operated in several locations, the earliest and largest located along the Arthur Kill south of Rossville (Sachs and Waters 1988). In 1873-1874, he moved the entire manufacturing operation to a three-acre site just north of the Outerbridge Crossing. In the 1880s, the family-owned plant produced an estimated 3.5 million bricks annually. Kreischerville became an industrial community. The plant shipped all products by water, building a steam lighter in 1880 (Raber et al. 1995a).

Transportation improvements during the last half of the nineteenth century accelerated Staten Island's industrial growth. The first railroad linked Clifton with Tottenville in 1869 (Leng and Delavan 1924). Small communities developed around the rail stations. Immediately after the Civil War, heavy industry expanded, especially after the 1880s. The emerging transportation industries and the subsequent communities built near their local hubs brought new occupations and services, providing opportunities for blacksmiths, coopers, wheelwrights, grocers, bakers, and printers (Sachs and Waters 1988).

The Staten Island Rapid Transit Railway Company opened a train bridge over the Arthur Kill in 1889. Coaches and horse cars linked north and east shores with Richmond and Linoleumville to the west (Leng and Delavan 1924). By 1880 Staten Island's population totaled approximately 40,000, 90 percent clustering in villages along the northern and eastern shorelines. The rest of the island remained rural farmland, swamp, saltmeadow, or beach. The island featured 100 manufacturing plants employing some 1,550 people, mostly young men, though the plants employed 88 females over 15, and 30 children (Sachs and Waters 1988).

By the mid-1900s, agricultural chemical production facilities, metallurgic industry plants, clay and brick production facilities, building material factories, copper refineries, shipyards, and emerging petroleum industries lined the Arthur Kill's western shoreline. At Staten Island, only a few small industries appeared: the American Linoleum Manufacturing Company, Atlantic Terra Cotta Company, Kreisher Brick Works, and Tottenville Copper.

During the early part of the twentieth century, New York's port handled 40 percent of all U.S. foreign trade. The average annual value of imports and exports for the port during 1911-1913 totaled \$1,809,358,239, or 46.2 percent of that for the United States (Squires 1918). In 1920, nearly half of all foreign commerce for the United States entered through the Port of New York. Some eight million people lived within a 25-mile radius of the Statue of Liberty (New York, New Jersey Port and Harbor Development Commission [PHDC] 1920). Yet Staten Island's Arthur Kill waterfront remained underdeveloped.

Local economic fallout following World War I, limited access, and pollution governed the island's future. When the Department of Health traced typhoid fever to Staten Island oysters, the department condemned the industry (Bureau of Curriculum Research ca. 1980s). Water pollution destroyed oyster beds, and by the early twentieth century, the local fishing business little resembled its admirable past.

Chemical and copper refineries along the Jersey shoreline released gaseous contaminants into the atmosphere. Prevailing westerly winds, in turn, pushed contaminants across the island, ruining agricultural production. Industrial waste eventually made Staten Island's real estate less than desirable. New York City started dumping garbage on the island in 1916. Initial operations failed in 1918, but in 1946 dumping resumed. Following a series of land transfers, the present Fresh Kills Landfill on Staten Island is considered the largest landfill in the world.

The disposal of garbage, particularly during the nineteenth century, created special problems for residents. Until 1934, ocean dumping was commonplace. Shoreline residents from Long Island to New Jersey complained of nasty beaches and shorelines. Dead cats, dogs, and chickens, and putrid fruits and vegetables lined the area shoreline. The problem, recognized by local officials, proved difficult to correct (Corey 1991).

The garbage scow, a barge filled with garbage, became commonplace on the rivers and channels. An article in the *New York Times* (NYT, 1880) noted that the amount of garbage dumped in the harbor actually filled certain channels (as presented in Corey 1991). In 1871, the New York legislature enacted laws prohibiting the dumping of garbage into the waters of the North (Hudson) and East Rivers, Upper New York Bay, and parts of Raritan Bay (Corey 1991). As a result, legal dumping moved to southeastern Staten Island.

**Staten Island Shipyards.** The scarcity of timber following the American Revolution somewhat diminished the Staten Island shipbuilding trade. After the war, the American shipbuilding industry thrived because of low-cost construction made possible by cheap timber (Hutchins 1948). The growth of the fishing and oystering industries following the War of 1812,

and later the expansion of recreational boating industries, brought a revival in wooden boat/ship construction and repair.

By 1855, shipwrights in Tottenville (particularly in an area called Unionville), many of Scandinavian descent, produced sloops, schooners, propeller yachts, and coal barges. At one time stores stocked Norwegian newspapers because Staten Island had so many Scandinavian ship carpenters (John Noble Collection 1973). The William H. and James M. Rutan Shipyard built nearly 100 sloops and schooners (manuscript on file, Staten Island Institute of Arts and Sciences). Jacob Ellis operated a shipyard near the foot of Tottenville's Main Street. At the south side of the Ellis yard stood a blacksmith shop (A.E. Rolles) where Ellis's vessel fittings were probably wrought. Before mid-century, sailing lofts, which later manufactured building awnings, established services on the north shore. Rope walks appeared in Rossville and Richmond in the late 1850s (Sachs and Waters 1988).

One of Ellis's shipwrights, Chris Brown, eventually opened a business at the foot of Amboy Road, later building the oceangoing tug *Cyclops*, renowned for towing huge rafts of lumber from Nova Scotia to New York (*Advance* 24 March 1968). By 1880, Staten Island had seventeen shipbuilding firms, eight in Tottenville. These latter eight yards included eight marine railways. Described by Henry Hall in 1880, "this is a fishing locality, with coal depots in New Jersey, and the work is largely for smacks (fishing), tugs, and coal barges" (Hall 1884:119).

From the middle to late nineteenth century, shipbuilding industries played a major role in Staten Island's maritime economy. Staten Island shipbuilding dramatically increased during World War I. Stephen Cossey operated a 20-acre plant that during its 22-year history constructed 1,149 boats. The \$30,000,000 industry produced lighters, tugs, dredges, coastwise vessels, and dry docks. More than anything else Tottenville celebrated its shipyards and the quality and quantity of work done in them. The yards planned and built tugs, schooners, oyster boats, sloops, yachts, and all conceivable craft of ordinary tonnage, besides the work of overhauling, rebuilding, refitting, altering, etc. that is always ongoing. Competent mechanical work gave Tottenville shipyards an excellent reputation all along the coast.

Staten Island's shipbuilding tradition continued into the twentieth century. The Staten Island Shipbuilding Company (established 1895) is historically known for its steel hulls and diverse designs. The early hulls built by the yard included tugs, carfloats, scows, barges (oil and coal), yachts, schooners, ferryboats, steam and derrick lighters, dredges, drill boats, and in recent years, mine sweepers, cargo freighters, and tankers (Allen 1922). There is a distinct probability that some of the derelict sites associated with the project area are vessels built by the Staten Island Shipbuilding Company.

## **NEW JERSEY**

Early Dutch agricultural settlements met with some success in northeastern New Jersey because of their proximity to Dutch settlements in Manhattan and Long Island (Wacker 1975). Despite their purchase of a large tract of land between the Raritan and Passaic Rivers in

1651, the Dutch WIC did not settle in New Jersey west of the Arthur Kill. The area's geography, similar to that of Staten Island, limited coastal development.

Lacking commerce, manufacturers, or noted cultural achievements, the region remained an isolated salt marsh during the colonial period (Pomfret 1973). A few farms appeared inland. The largest dry-land section north of Perth Amboy, Blazing Star, stretched about a mile north of Tufts Point. Woodbridge and Elizabethtown farmers harvested marsh grass hay and produced other farm products for shipment and sale in Manhattan. Shipping by boat, farmers loaded their products at several small landings along the Arthur Kill. Industrial development eventually engulfed several early landing sites near Woodbridge Creek (Raber et al. 1995b).

The Blazing Star Ferry to Staten Island initially opened around 1725. The New Blazing Star Ferry opened ca. 1757 at the foot of present-day Roosevelt Avenue in Carteret. The pier, built several times over the years, survived until World War I. The service ran in different capacities until 1929 (Raber et al. 1995b).

Perth Amboy, named after Perth in Scotland and after the Leni-Lenape (Delaware) word for "point," *ambo* (Wacker 1975), occupies the rounded point of land between the Arthur Kill and the Raritan River, at the head of Raritan Bay. It received a charter in 1718 making it New Jersey's oldest incorporated city, yet in 1880 it had only 4,808 inhabitants. The site itself was originally part of a tract purchased from Native Americans in 1651 by Augustine Herman, a Staten Island Dutchman. The area was later described in 1682 as "a sweet, wholesome, and delightful place" (Writer's Project Administration [WPA] 1946:362).

Perth Amboy could not overcome its locational disadvantage to New York, and at first the community was unable to support much commercial activity along the Arthur Kill waterfront. The town's Manhattan packet service (1684) became a link in the New York-Philadelphia route by 1750, but competition from a stagecoach and ferry service across the Raritan at New Brunswick and the Arthur Kill (ca. 1764) at the New Blazing Star Ferry ruined the business.

Ferry service between Tottenville, Staten Island, and Perth Amboy dates to the colonial era. Documentation of ferrying dates to 1650, when Raritan Indians transported Dutch travelers across the Arthur Kill, probably in dugouts. Unskilled European boatbuilders had little problem constructing the dugout canoe. Long and narrow, some to 40 feet and made of local timber, the dugout evolved into the New England boat canoe of the eighteenth century (Chapelle 1951).

Christopher Billopp later established ferry service from a point believed to be where Amboy Road meets the Arthur Kill to a point opposite on the Perth Amboy shore (Reed 1955). The service remained in the Billopp family until 1781. Initial service probably featured skiffs, sloops, periaguas, or other small boats. Periaguas, large canoes fitted to sail in eighteenth-century accounts, are also identified as such for New York shallop-type boats. The boat had a foremast "in the eyes of the hull," severely raked forward, carried a short-gaff foresail, the main mast raked aft (Chapelle 1951). Morrison gives dimensions of three periaguas enrolled at New York as ferries running to Staten Island in the name of Cornelius Vanderbilt, their lengths either 50 or 49 feet, beams 13 or 14 feet, and their depths 4 feet (1958:169).

Colonial/Loyalist conflict after the Revolution spilled over into the Arthur Kill vicinity, with the Tories very active in Perth Amboy (Burrow and Hunter 1990). Many Loyalists subsequently moved to Elizabethtown, the oldest English settlement in New Jersey (WPA 1946). Renowned for its tanning and leather trade, ships of 40 and 50 tons sailed up the Elizabeth River as far as Broad Street (WPA 1946). Elizabethtown's economic fortunes rose in the early nineteenth century, a result of small-scale artisans and brass foundries, many associated with carriage and carriage accessory manufacturing (Raber et al. 1995b).

Perth Amboy, on the other hand, witnessed continual economic decline some 20 years after the Revolution (WPA 1946). A small commercial waterfront emerged near Smith Street, the waterfront reflecting the harvest and sale of marsh grass, but the steamboat monopoly held by Fulton and Livingston effectively retarded growth of this area by controlling all steam transportation from adjoining states into the waters of New York State. The waterfront, however, saw intermittent service as a landing by the 124-foot steamer *Raritan*, owned by John and Robert Livingston. Beginning her service in June 1809, the vessel ran from New York to Amboy in four hours, stopping at Elizabeth, Amboy, and then on to New Brunswick up the Raritan River. Running this route until 1818, the route was also served by the larger *Olive Branch* until 1822. In confrontation to the monopoly, Cornelius Vanderbilt ran the *Bellona* of the Old Union Line in 1818 on the New Brunswick route. After the 1824 demise of the steamboat monopoly, regular steamboat service along the Arthur Kill and lower Raritan River was initiated and served as an impetus to growth along the Kill. However, prior to 1830, Amboy was not employed as a permanent terminal by any of the lines (Morrison 1958:167-171).

New York City's emergence as the world's leading port provided substantial economic and industrial growth for New Jersey. New York's canal systems and rail networks directly linked the harbor with northern markets. Port expansion in Manhattan, Brooklyn, and New Jersey's Hudson River shoreline made New York the national European trade center. Some of the first American railroads were built north and south of this area (WPA 1946). The Lehigh Valley Railroad (LVRR), which located in Perth Amboy in 1859, foretold the region's industrial future. The LVRR became one of the world's largest coal shippers on the eastern seaboard at the turn of the twentieth century (manuscript on file, Perth Amboy Public Library 1954).

Industrial development followed these rail links, especially in Elizabethtown. However, no rail lines ran along the Arthur Kill or lower north bank of the Raritan River. By 1860, ferry traffic diminished to an extent that only a few rowboats owned by A.M. Dawson crossed the Arthur Kill, at a fare of 12.5 cents one way (Reed 1955). The opening of the Staten Island Railroad the same year established a direct route between Tottenville and the ferry to New York City at Clifton.

South of Woodbridge Creek, clay mining and the manufacture of clay products bolstered the local economy, as did barge and boat construction. These industries probably accounted for most of the town's population increase. Revival of the ferry service from Smith Street to Tottenville, Staten Island (1860), coupled with its still rural flavor, enhanced Perth Amboy's status as a local resort (WPA 1946). Railroad expansion along the Arthur Kill in the 1870s, followed by navigation improvements between Staten Island and New Brunswick, provided new opportunity for industry.

By the 1880s, the scarcity of large-scale rail sites with suitable deepwater connections made the project area attractive to industry (Raber et al. 1995a). Between ca. 1880 and 1905, growth in the clay industries augmented the development of chemical and copper processing industries along the Arthur Kill shoreline. Known as the Chemical Coast, industrial expansion brought two coal (rail) terminals on the Arthur Kill, shoreline routes, and a third terminal in South Amboy. The increased rail traffic witnessed growth in barge construction and repair.

During the last quarter of the nineteenth century, waterborne traffic along the Arthur Kill increased from six million tons between ca. 1873-1875 to nine million tons by 1900 (Raber et al. 1995b). Putting this figure into perspective, some 55,000 reported vessels used the Elizabethport facilities in ca. 1873. By 1885, freight volume on the Arthur Kill exceeded foreign commerce tonnage from New York.

From 1880 to 1910, Perth Amboy's population doubled. By 1920, the population totaled over 40,000 (PHDC 1920). Heavy industry developed along the Kill's New Jersey shoreline by virtue of the deeper channel and access to New Jersey's Central Railroad freight terminal. One industry significant to the project area is directly related to Meyer Guggenheim, the first industrialist to build a copper refinery in Perth Amboy.

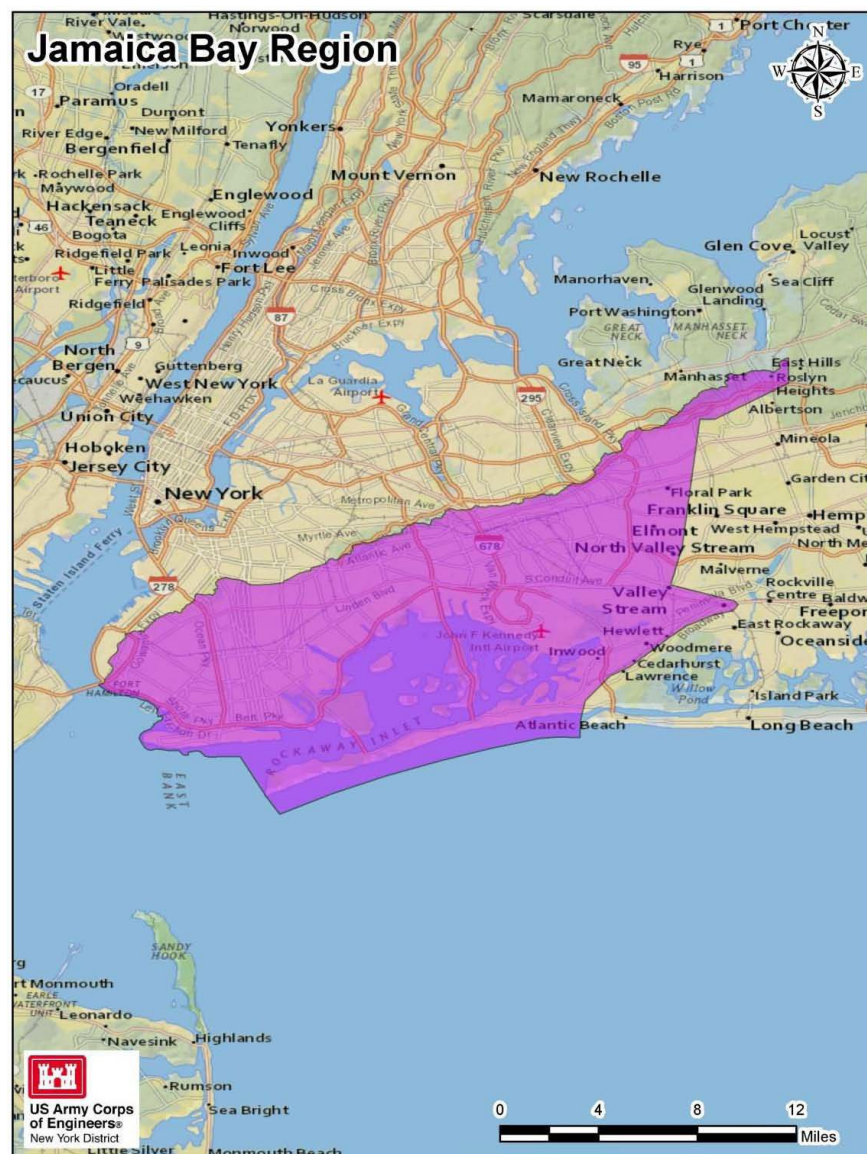
**NEW JERSEY SHIPYARDS.** Ship construction in the area was predominantly associated with coal barge construction and repair at Perth Amboy. These yards did not appear until 1860, even though the route of canal barges hauling Pennsylvania coal through the Delaware & Raritan Canal took them by Perth Amboy. The stimulus for these yards most likely was a result of "the completion of the Central Railroad of New Jersey (CNJ) line from Elizabethport to Phillipsburg, New Jersey on the Delaware River in 1852, and CNJ's entry into the coal hauling business from Pennsylvania in 1855 under an agreement with the Lehigh Valley Railroad" (Raber et al. 1995a:29). Coal barges had been constructed at the area yards since 1860, the barges being employed to transport coal to New York City. By 1880 there were three yards and two marine railways, the Lehigh Valley Railroad ordering six barges in that year. Hall states that the earlier models built here were constructed for capacity, but the newer barges, 125 feet long, 28 feet broad, and 11 feet deep, were designed as well for small resistance (1984:121).

### 3.3.3 Jamaica Bay Region

Jamaica Bay is a tidal wetland sheltered from the Atlantic Ocean by the Rockaway Peninsula. It is one of three of New York City's Special Natural Waterfront Areas (SNWA). The bay consists of a network of marshland, shifting channels, and changing island configurations. Islands within Jamaica Bay that have changed over the centuries are Mill Island, Bergen Island, Barren Island, Ruffle Bar, and Broad Channel Island. The Gateway National Recreation Area, NY, NJ (GNRA), under the direction of the National Park Service, and several New York City parks also are located within the bounds of Jamaica Bay (USACE 2019). John F. Kennedy International Airport occupies the northeastern shoreline of the bay.

The Jamaica Bay Unit of the GNRA includes several areas surrounding Jamaica Bay in New York Harbor in the Jamaica Bay Region study area. These include wildlife refuge areas, wetlands,

former military installations, beaches and playgrounds (designed originally as New York City parks), and the first municipal airport in the city (Floyd Bennett Field in Brooklyn).



**Figure 3.4. Jamaica Bay Region, NYNJHAT Study (USACE, New York District 2021).**

**Kings County.** Various groups of Algonquian-speaking Native Americans occupied the Jamaica Bay area when the Dutch arrived in the seventeenth century. The northern portion of Jamaica Bay area was occupied by the Canarsie group. The Rockaway, who mainly occupied Nassau County and the eastern portion of Queens County, would have controlled at least the eastern portion of the Rockaway Peninsula (Trelease 1960). Thompson (1962 [1918]) stated that the Rockaway had a large settlement on Hog Island in Rockaway Bay (present-day Hempstead Bay), immediately north of Long Beach. Bellot (1918:9) asserted that the main Rockaway village was located on Hog Island, also known as Barnum's Island. This location should not be confused with

the outer beach at Rockaway, which was also known as Hog Island in the late-nineteenth and early-twentieth centuries.

Based on references in early colonial documents, it has been inferred that a major Canarsie settlement located at Flatlands (Bolton 1922; Van Wyck 1924), however the presence of Native American occupation refuse at this location had not been noted (Pickman 1994). Bolton (1920) declared that the principal Canarsie village sites were at Ryder's Pond and Canarsie.

The Canarsie sachems sold the land bordering the present-day Brooklyn portion of Jamaica Bay to European settlers in three separate 1636 transactions. The land was described in the deeds as comprising three "flats," collectively called "Casteteuw" (other spellings are given in the literature). Tooker (1911:36) translated this term as "where grass is cut or mowed." This suggests that the sale included the marshes bordering Jamaica Bay. It is likely that the sale also included the areas of drier ground bordering the marshes as reflected by the phrase in the deed that the tracts extended "into the woods."

Called Nassau Island by the early Dutch inhabitants, Long Island became dotted with villages during the middle decades of the seventeenth century and included the settlements of Wallabout, Amersfort (Flatlands), Midwout or *vlachte bos* (Flatbush), Breuckelen, Boswyck (Bushwick), and Vlissingen (Flushing). "Among the woods of this region, and overlooking the broad expanse of 'the Beautiful Bay,' the wigwams of the Nyack tribe stood, undisturbed by the white man for a generation after he had built his first house on Nassau Island" (Bergen 1884:256). In 1665, local Native Americans deeded a tract of land at "Canarrissen" to the Town of Flatlands (then named New Amersfort). The conveyance referred to the Native Americans' use of the land for cultivation and provided that the purchasers should provide a fence for the protection for this cultivated tract (Tooker 1911; Minsky 1963). This led to Bolton's characterization of the Canarsie site as including "planting lands."

**Queens County.** In 1644, thirty to forty English Presbyterians from Stamford, Connecticut, crossed Long Island Sound and migrated to the west-central portion of what is Long Island, calling their settlement Hempstead (Heemstede, to the Dutch). After obtaining the right to settle the area from the local Native Americans, the English colonists petitioned the New Amsterdam officials for their permission. Willem Kieft, the governor, granted approval the following year after the colonists submitted to several conditions. In 1650, Peter Stuyvesant, the Director General of Dutch New Netherlands, granted a charter to 15 of these English families for a town to be erected on fertile land west of Hempstead, and in the same year the first settlement was called Rustdorp (restful village; now Jamaica). In 1656 a deed to the land was obtained from the Rockaway group of Native Americans. The land, which included the north shore of Jamaica Bay within Queens County, was purchased in 1655 and 1662. The latter transaction was entered into by Waumitumpack, the "Sachem of Rockaway" (W.W. Munsell & Co. 1882:193-195).

The first town meeting was held on November 25, 1656. Seventeen settlers apportioned the town land among themselves, and each received ten acres of plantation land and twenty acres of meadow land (the latter apparently refers to the marsh land near Jamaica Bay). Governor Stuyvesant granted a charter to the town, then known as Rustdorp, in 1660 (Gritman 1921; Hazelton 1925:II).



The portion of Jamaica bordering the bay came to be known as “Jamaica South.” In the early days of the town the marsh lands were apparently held in common. The three communal meadows bordering the bay were known as East Neck, Long Neck, and Haw Tree Neck. The Jamaica settlers were organized into teams and assigned the task of “mowing” marsh grasses from one of these meadows (Black 1981:20).

In 1685, the Rockaway deeded a large tract of land that included all of the Rockaway peninsula extending westward from the present Wave Crest area to European speculators. This tract was subsequently granted by English Governor Thomas Dongan to John Palmer, who sold this land in 1687 to Richard Cornell (also named in the records as “Cornwell” or “Cornwall”). “[A]n ironmaster of Flushing,” Richard Cornell is generally considered the first settler in the Rockaway area. His house was erected at Far Rockaway. Upon Cornell’s death in 1693, his land was divided among his heirs (Bellot 1918:9-21).

Despite acquisition by Europeans in the seventeenth century, most of the area bordering Jamaica Bay remained marshland that was unoccupied through the early nineteenth century. Nevertheless, the European settlers utilized the land much as it had been by the Native American occupants. One valuable resource was the marsh vegetation. A 1679 journal entry describing Flatlands noted that

there is toward the sea (the bay), a large piece of low flat which is overflowed at every tide...which produces a species of hard salt grass or reed grass. Such a place they call *valey* [sic] and mow it for hay, which cattle would rather eat than fresh hay or grass [Dankers and Sluyter 1867:124-26, quoted by Black 1981:13].



**Figure 3.5. Jamaica Bay, Kings and Queens Counties in 1775 (Montessoro 1775)**

Like the Native Americans before them, settlers in the vicinity of the bay also made use of its fish, shellfish, and wildlife resources for food. These food-procurement activities were carried out as recreational and/or subsistence endeavors rather than as commercial ventures until the mid-nineteenth century (Black 1981:24-26).

Agriculture was the major economic activity of settlers of the villages surrounding Jamaica Bay. Thus, there was a need for mills to process the agricultural products. The tidal creeks adjacent to the bay were utilized for this purpose. The mills were constructed on upland areas where the uplands penetrated the surrounding marshes and adjoined the creeks.

Grist mills stood along three tidal creeks in Kings County: Gerritsen Creek, Fresh Creek, and Spring Creek. These mills were shown on the 1781 Taylor and Skinner map, which is the earliest to detail structures adjacent to the Jamaica Bay shoreline. The mills were apparently tide mills utilizing water power created by construction of a dam across the tidal creeks. After the rising tide filled the pond behind the dam the gates were shut and the water was trapped in the pond. When the tide fell sufficiently, the gates were opened and the water was released through a millrace to turn the mill wheel. Approximately five hours milling time would have been available for each of the two daily tides (Hampshire County Council 1999).

Barren Island was originally known by the Dutch name of "*t Beeren Eylant*," which translates into English as Bears Island. The name Barren Island is a corruption of the original Dutch name. It was also referenced as "Bearn Island" in seventeenth-century documents (Van Wyck 1924:13). William Moore, in a 1762 petition to the British Governor Moncton asking for a patent for Barren Island, described the island as vacant and "containing about thirty acres of upland and by computation about seventy acres of marsh or salt meadow land which at spring tides is overflowed by the sea" (quoted in Van Wyck 1924:207).

There is no indication that the early settlers utilized the Jamaica Bay islands. In fact, as noted, Revolutionary War-era maps suggest that most of the present islands may have formed after this period.

**American Revolution.** The area north and west of the bay played a notable role during the early part of the American Revolution. Colonial strategists recognized the importance of the Narrows for the defense of New York Harbor and constructed a redoubt and a battery of several twelve-pound cannon near Denyse's Wharf near what is now Fort Hamilton in Brooklyn. The attempt to capture New York was part of a larger strategic initiative by the British to divide the New England colonies from the Middle Atlantic and Southern colonies. British planners believed that once the colonies were successfully split, each region could be brought back more easily into the empire. During early July 1776, British forces from Boston under Admiral Sir Richard Howe, brother of General William Howe, landed on Staten Island in preparation for a larger undertaking (Carrington 1877:199-205).

Fought on August 27, 1776, the Battle of Brooklyn (sometimes referred to as the Battle of Long Island) resulted in the decisive defeat of the outnumbered Americans, who deftly escaped into Manhattan on the night of August 29 under cover of thick fog. After the evacuation of Washington's

troops, the British occupied Long Island throughout the duration of the war until November 25, 1783 (Harpuz 1996:B-28; Carrington 1877:199-215).

International tensions engendered by the French Revolution and its aftermath, ultimately including the War of 1812, led to the development of comprehensive plans to defend New York City from invasion. Military officials determined that defending New York Harbor was of prime importance and masonry fortifications were erected by New York State at several locations around the harbor, including Staten Island, Governors Island and Manhattan between 1807 and 1812 (Klein et al. 1986:7-19; Harney 1986:13).

The New York State government erected the first defenses on the east side of the Narrows, building a log battery on Hendrick's Reef on the shoals west of Denyse's Ferry in 1812 and an earthen redoubt on the heights overlooking the narrows. Shortly thereafter, the state ceded portions of the area that would become Fort Hamilton to the federal government, which subsequently constructed a stone battery on the reef. Called Fort Diamond due to the shape of the island on which it was erected, the installation became known as Fort Lafayette and was later demolished during the construction of the Verrazanno-Narrows Bridge in the 1960s (Brouwer 2000:1; Gilmore and Artes ca. 1980:4; Harbor Defense Museum 1894: 2-4; Harney 1986:19-22).

The earthen and timber redoubt, called Fort Lewis, was constructed in the area now known as Fort Hamilton, across the Narrows from Fort Wadsworth on Staten Island. At the conclusion of the War of 1812, the War Department convened a board of engineers to plan for the permanent defenses of the New York's coastal areas and harbors. During 1819 and 1820, a joint Army-Navy commission prepared plans for the new installation which would be known as Fort Hamilton. On this site, the federal government would build the casemate and redoubt portion of the Fort Hamilton reservation between 1825 and 1831.

In 1809, because of a petition by descendants of the original Cornell heirs, the Rockaway peninsula was divided into two portions, with the eastern section of the beach within the second division and subdivided into 15 separate plots (Bellot 1918:9-21). In 1832, the Brooklyn & Jamaica Railroad was chartered and was completed to Jamaica in 1834, providing a direct connection to the New York metropolitan area and its port facilities. The South Side Railroad Company was subsequently incorporated in 1860 to provide reliable railroad service to communities along the south shore of Long Island. Construction began in 1866, and in 1867 the railroad crossed Locust Avenue (now Baisley Boulevard) and reached Rockville (now Rockville Center) (Hazelton 1925:Vol I). By 1873, the New York & Rockaway Railroad (later the Montauk Division of the Long Island Railroad) was constructed.

In Kings County during the mid-nineteenth century, rural land use patterns shifted as agricultural endeavors were replaced by manufacturing and raw material processing in the vicinity of the expanding City of Brooklyn. Simultaneously, suburban residences, hotels, and seaside "get-aways" began to coexist with farming areas along the shore south of Brooklyn. Tidal marshes once exploited for animal feed and left as grassland, were slowly being filled and used for dumpsites, road construction, and residential or recreational purposes (Ross 1902:335; Bergen 1884:263). Transportation changes after the Civil War served to modernize and enlarge Brooklyn.

Overlooking Gravesend Bay and the Narrows with a series of scenic bluffs and beautiful beaches, New Utrecht "remained a serene Dutch settlement, showing no expansion until after the Civil War, when it became a small resort center" (Murphy 1979:92). Active farms were slowly converted into hotels and seaside resorts, for those New Yorkers and Brooklynites with the leisure time and the money to escape the increasingly congested and dirty cities. Beginning in the 1850s, the Coney Island area became an attractive location for summer resorts and hotels sprang up to meet this new demand. In the 1850s, the Coney Island Plank Road connected Coney Island beaches with the City of Brooklyn, facilitating the influx of leisure-seekers. As the traffic of vacationers increased in the 1860s, especially after the Civil War, restaurants, saloons, and bathing establishments mushroomed to service the booming resort industry. By the 1870s, 396,099 people lived in the City of Brooklyn, and only 23,822 people lived in the original boundaries of the other five still rural towns (Flatbush, Flatlands, Gravesend, New Lots, and New Utrecht, which remained largely unaffected by the nineteenth-century industrial-commercial growth of Brooklyn (Miller et al. 1979:20). By the 1880s these seaside hotels and residences predominantly replaced the working farms of the area (Bergen 1884:263).

The change in the generally rural nature of Kings County would accelerate in little more than a decade after the opening of the Brooklyn Bridge between Brooklyn and Manhattan in May 1883. "Five years before its annexation [by the City of Brooklyn in 1894], New Utrecht had been little more than a farming town. But the arrival of the Second Avenue trolley quickly revolutionized the neighborhood. Thousands of houses were constructed. Streets opened up; and the real estate developers descended upon the unsuspecting community" (Harold Coffin Syrett quoted in Miller et al. 1979:23).

By January 1896, the City of Brooklyn and Kings County were coterminous, and Brooklyn became the fourth largest city in the United States (Miller et al. 1979). Roadway construction and changes in transportation helped to facilitate the consolidation of the towns of Kings County into the City of Brooklyn and modernize the region. Early roads developed first from trails used by local Native Americans and early Dutch traders. By the time of the American Revolution, the "highway of travel from New York [City went] through Brooklyn to Fort Hamilton, and across the Narrows to Staten Island" (Stiles 1884:266). One of the earliest important roadways from what is now Bay Ridge to the present Fort Hamilton was the Shore Road which traveled along the bluffs and overlooked the bay (Stiles 1884:266). This road has been expanded and extended in the twentieth century and is now known as the Shore or Belt Parkway.

The Brooklyn Railroad Company operated a line from Fort Hamilton to Third Avenue and had finally switched to locomotives from horses by 1880. With the prominence of Coney Island as a resort community in the years after the Civil War, railroad service connecting Manhattan and Brooklyn to the seashore provided an outlet for further settlement. In the 1870s and 1880s, two railroad companies were established from Bay Ridge to Coney Island: the New York & Manhattan Railroad and the New York & Sea Beach Railroad (Stiles 1884:267).

In 1832 the Brooklyn & Jamaica Railroad was chartered and was completed to Jamaica in 1834, providing a direct connection from Queens County to the New York and its port facilities. The South Side Railroad Company was subsequently incorporated in 1860 to provide reliable railroad service to communities along the south shore of Long Island. Construction began in 1866, and in

1867 the railroad crossed Locust Avenue (now Baisley Boulevard) and reached Rockville (now Rockville Center) (Hazelton 1925:vol 1). By 1873, the New York & Rockaway Railroad (later the Montauk Division of the Long Island Railroad) was constructed, passing through what later became St. Albans (St. Albans Civic Improvement Association 1941).

Maps drawn from the late seventeenth century through the early nineteenth century illustrated Rockaway peninsula as a barren stretch of land with no structures depicted along the beach west of Far Rockaway. The Rockaways became a resort destination in 1833 after the establishment of the Marine Pavilion in the Far Rockaway area. At that time, the Rockaway peninsula was part of Hempstead, Nassau County. By 1852, a small beachside community had emerged around the area known as Pavilion with an influx of summer visitors. The rest of the peninsula to the west remained undeveloped. The extent of the peninsula's shoreline in the mid-nineteenth century terminated roughly in the area eastern boundary of future Jacob Riis Park. In 1855, a U.S. Life-Saving Service (No.33) boathouse was established at Rockaway Point at the western end of the peninsula. It was one of several U.S. Life-Saving Stations of the period built along the coastlines of New Jersey, New York, and Rhode Island (Koski-Karell et al. 2013:G-4). In the mid-1850s, James S. Remson and a partner acquired large tracts undeveloped land near current Beach 102nd Street, which later became "Seaside." After they opened the Seaside Hotel, additional hotels and amusement ventures opened in the years prior to 1880.

Far Rockaway had over 2,000 year-round residents by 1860. Other communities were established on the peninsula after the Civil War. During this period, steamships and other vessels transported visitors from the New York City area to the piers on the Jamaica Bay side of the peninsula. A second U.S. Life-Saving Service Station (No. 32, an integral station) was established on the peninsula at Far Rockaway in 1871 (Koski-Karell et al. 2013:G-5). In 1872, the railroad was extended along a track running along the ocean from Far Rockaway to Rockaway Beach on a track. At that time, the entire beach was covered with cedar trees which provided both shade for visitors and construction material (Bellot 1918:104). The Rockaways became a fully developed seaside resort destination in the late nineteenth century. By the turn of the twentieth century, the Rockaway peninsula was reached by steam and elevated railway routes. Coney Island and Rockaway Beach became the most popular and visited seaside resorts on the Long Island Shore in the early twentieth century.

On January 1, 1898, Brooklyn became part of Greater New York, which subsumed New York (Manhattan), Brooklyn, the Bronx, Queens, and Staten Island into a single metropolis by an act of the New York State Legislature, thus becoming a borough of the City of New York. A part of the changing pattern of nineteenth century life, which included industrialization and urbanization, immigration brought new groups into Kings County that found work in the factories, mills, and shops of Brooklyn. Relevant immigrant groups include: English (1664-ca. 1950), Irish (1820s-ca. 1950), German (1840s-ca. 1950), Italians (1860s-ca. 1950), Jews (1870s-ca. 1950), and Eastern Europeans (1890s-ca. 1950). After the 1950s, immigrant groups arrived from Central America, the Caribbean, Africa, and Asia.

**Late Nineteenth-Century and Twentieth-Century Land Use.** Human utilization of Jamaica Bay during the first half of the nineteenth century remained essentially unchanged (Black 1981). Beginning in the latter half of the nineteenth century and continuing with an accelerated pace

during the twentieth century, a number of technological, demographic and economic trends led to substantial changes in the bay.

The first large-scale commercial exploitation of Jamaica Bay occurred during the second half of the nineteenth century with the development of a shellfish harvesting industry. This industry lasted until the 1920s when pollution led to the demise of the shellfish beds. Other nineteenth-century commercial uses of the bay shores were focused on the Barren Island fertilizer and fish oil industries.

Between 1897 and 1936, the bay came under the jurisdiction of the New York City Department of Docks. During this period schemes for large-scale dredging and development of port and industrial facilities around Jamaica Bay were developed, but never fully implemented. During the twentieth century, the bay became a dumping ground for refuse from the growing City of New York, leading to the filling-in of large portions of the shoreline. Paradoxically, the same period saw development of parkland around the bay shores, largely through the efforts of Robert Moses (Black 1981). After the Department of Docks and Ferries assumed administration of the bay and its islands, the city took over the existing leases to the islands and granted new ones.

With the increase of leisure time among the working and middle classes of the city, the Rockaways, the bay islands, Canarsie, and other areas around Jamaica Bay became attractive as destinations for sport fishing, bathing, and other leisure-time activities. The construction of a railroad trestle across Jamaica Bay to the Rockaways in 1880 and the subsequent opening of Cross Bay Boulevard facilitated these pursuits. Prior to 1889, much of the travel to the Rockaways was conducted by ferries that ran from various points on the north shore of the bay. Ferry service continued through the 1930s. Access to the Jamaica Bay shore was aided further by the opening of the Belt Parkway. Construction of the portion of this roadway east of Fort Hamilton took place between 1936 and 1940, and the parkway was formally opened on June 21, 1940. The road was widened from four to six lanes after World War II (Black 1981:76). During the twentieth century the increasing population of New York City also led to the development of permanent housing on filled-in marshland adjacent to the shores of Jamaica Bay.

Apparently, no substantial occupation of the Jamaica Bay islands occurred until the latter portion of the nineteenth century, although Black (1981:63) notes a temporary occupancy of Ruffle Bar prior to the Civil War. Unlike most of the islands, Ruffle Bar included a substantial area of upland along its southern shore.

The opening of the railroad in 1880 stimulated more intensive occupation of the islands, and a village was established on Big Egg Marsh (now the location of Broad Channel) during this period (WPA 1939:590). Subsequently, small communities of fishing huts and vacation cottages were located at other points along the trestle, including Beach Channel, north of the Rockaways, and Swift Creek (Black (1981:62).

During this period a substantial community developed on Ruffle Bar, eventually comprising some 40 buildings (Black 1981:63; Seitz and Miller 1996:42). A hotel, possibly built in the nineteenth century was reportedly located on this island, and the remains of a wooden pier were noted here in the 1970s (John Milner and Associates 1978:133).

Barren Island was the location of numerous factories during the nineteenth and early twentieth centuries. The first factory established on the island was a bone boiling establishment constructed on the north side in either 1845 or 1855 by Wm. B. Reynolds. Lefferts R. Cornell operated a fertilizer factory in 1855 (Dubois 1884:78; Brockett 1884:756-757). At this facility, as well as others which were subsequently established on the island, dead animals from New York and Brooklyn were processed into fertilizer and other products. The Swift factory was destroyed by a windstorm and replaced in 1866 by R. Recknagle (Dubois 1884:78). Another factory, “the great Rendering and Fertilizer Factory of P. White & Sons” was built in 1868 and destroyed by fire in 1878. It was replaced by five new buildings which were standing in 1884 (Dubois 1884:78). The dead animals processed at the Barren Island fertilizer plants were delivered from New York City by boat to docking facilities at the factories (Wurm 1985:6).

By the 1880s the fertilizer factories had been joined by five fish-oil factories. The first was constructed circa 1860 by Smith & Co. “on the north side of the island” (Dubois 1884:78). Another such factory was built by V. Coon and subsequently operated by C. De Homage, M.D., who built a new building near the original site. A second fish-oil factory, the Barren Island Menhaden Company, located near the Coon/Homage facility, was established in 1868 by the Goodking Brothers. Both factories used steam engines and each also apparently utilized its own “steamers” to catch the menhaden. Two other factories, a fish-rendering plant operated by Jones & Co. and the Hawkins Brothers Fish Oil and Fish Guano factory were built “at the west end” (Dubois 1884:78).

By the late nineteenth century, the menhaden processed by the fish oil factories had become scarce. The fish-oil factories were succeeded by a plant which burned garbage delivered from the city daily by scow (Wurm 1985:6). In 1904, the “horse factories” as well as the garbage disposal plant continued to operate on Barren Island. A community of some 1,400 persons had also developed on the island by this time, most of whom worked in the factories (Queens Borough Public Library 1904). The garbage disposal plant was operated by the New York Sanitary Utilization Company.

The odors emanating from the Barren Island factories were so powerful that they could be smelled even in the Rockaways. In the latter years of the nineteenth century and during the early twentieth century, residents of various communities bordering the bay formed an “Anti-Barren Island League” and after numerous efforts the plants were eventually closed. The last facility to remain in operation on Barren Island was the garbage processing plant. In 1933, this plant, then operated by the Products Manufacturing Company, was taken over by the City of New York, which operated it until 1935, when it closed (Brooklyn *Daily Eagle* 1899; Young 1956b; Black 1981:36).

During the late nineteenth century, shacks were built by fishing clubs and squatters at various locations on the islands in Jamaica Bay. After the Department of Docks assumed administration of the bay in 1897, the city took over leases to previous occupants and granted new ones (Black 1981:60).

In February 1917, the U.S. Army commissioned the Rockaway Point Military Reservation on a 309-acre tract of land at the western end of the peninsula to defend the eastern channel entrance

to New York Harbor, located six miles to the east. The initial World War I layout of Fort Tilden included the fortification area along the Atlantic beach front and the post area including a wharf on Rockaway Inlet. The U.S. government installed a timber groin system along the fort's beach front ca.1917 to protect the installation from beach erosion. Battery Harris, an array of massive sixteen-inch guns, was installed at the site during the 1920s and remodeled during World War II. Nike Ajax and later Nike-Hercules missiles were installed in underground silos at the site during the 1950s and 1960s (Torres 1980).

In the late 1920s, an airport, which eventually became Floyd Bennett Field, was established on Barren Island (Wurm 1985:60). This airfield, on the east side of Flatbush, was significant in aviation history. It operated commercially between 1931 and 1941, making it New York City's first municipal airport. The U.S. Navy acquired the 387-acre airfield in 1941 and kept it in operation until 1872, when it was incorporated into the Gateway National Recreation Area (SRI International 1998).

With the expansion of rapid transit in the early twentieth century, new residential communities were developed in Queens such as Forest Hills, South Ozone Park, Howard Beach, and Kew Gardens. The opening of the Queensboro Bridge in 1909 provided further connection with Manhattan. Queensboro Boulevard was constructed as the main arterial highway across the borough.

Beginning 1915, the much of northern and southern parts of Queens had access to the New York City Subway system. Continued expansion of the subway system into Queens resulted in accelerated development and, during the 1920s, the growth rate of Queens had swelled to 130 percent (Seyfried 2004). A new street system and single family houses quickly replaced the borough's farms and open areas.

Major improvements to the transportation infrastructure in the 1930s resulted in more growth in the Rockaways. Two new bridges, Marine Parkway Bridge (1937) and Cross Bay Bridge (1939), connected Rockaway to Queens and Brooklyn. The introduction of the subway sparked the peninsula's transition from seaside recreational communities to neighborhoods with permanent residents. Works Progress Administration (WPA) projects were carried out on the Rockaway Peninsula as well as at Coney Island and Brighton Beach. Shore Road was expanded into the six-lane Belt parkway beginning in the 1930s. New York City's second municipal airport (LaGuardia Airport) opened on the northern shoreline of Queens in 1939.

By 1939, the islands in Jamaica Bay were home to some four thousand people, nearly all of whom lived on Broad Channel. Approximately 80 people lived on the other islands, mostly in shacks or fishing huts. Ruffle Bar, an island east of Barren Island, buildings were erected during the second half of the nineteenth century, and as many as 40 buildings were present in 1926 (Black 1981:62-63).

Construction of Idlewild Airport began ca. 1942, and the airport opened in 1948. It was subsequently expanded to 4,930 acres (Kearns et al. 1991), and its name was changed to JFK after 1963. A new major highway opened in 1960, the Long Island Expressway which extended



across the northern portion of Queens. The Verrazanno-Narrows Bridge was completed between Staten Island and Brooklyn in 1964.

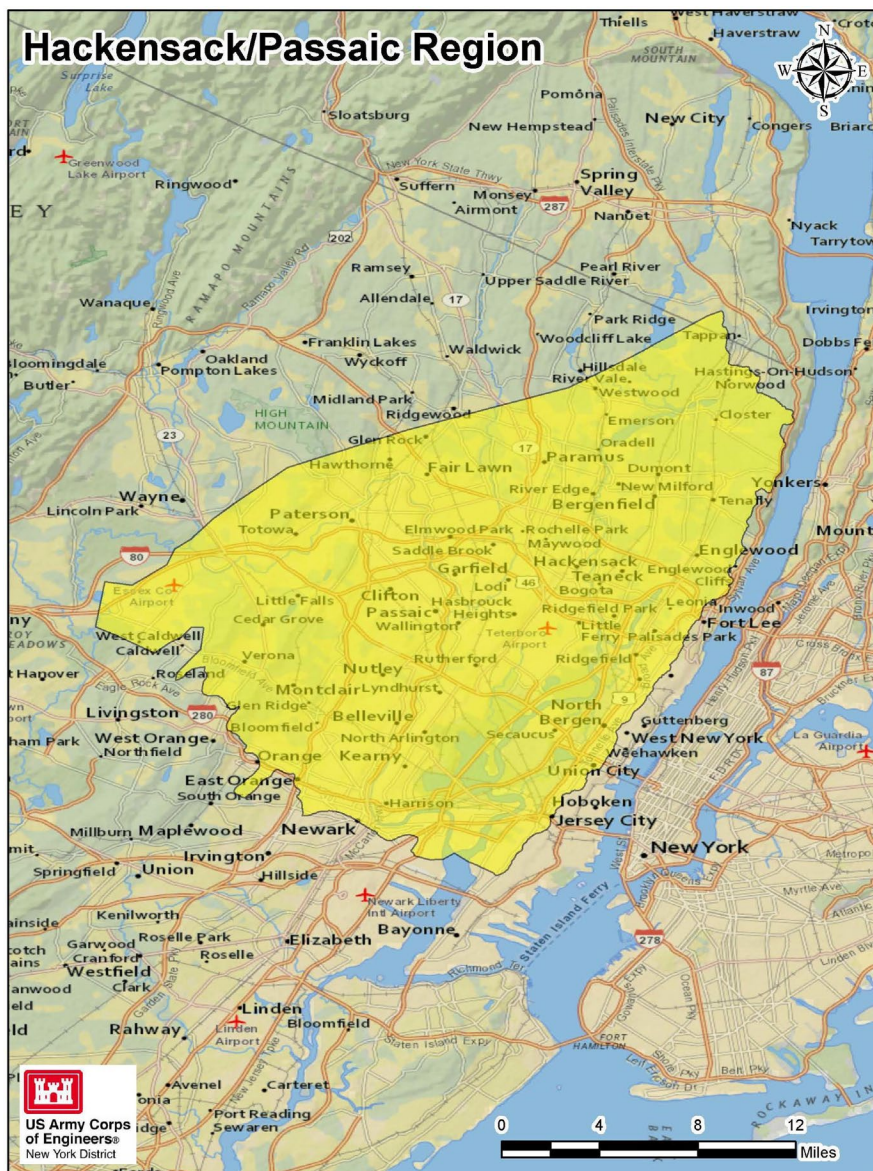
### **3.3.4 Hackensack/Passaic Region**

Jersey City, a historically significant New Jersey port of entry and manufacturing center, is situated on a peninsula formed by the Hudson and Hackensack Rivers and Upper New York Bay. Located just across the Hudson River from the island of Manhattan, Jersey City is considered the first permanent European settlement in the state (Jersey City Online n.d.). Prior to the arrival of Europeans, this area of fertile land and abundant water was home to a branch of the Lenni Lenape nation (better known as the Delaware). Following Henry Hudson's voyage for the Dutch East India Company, the area became part of the Dutch province of New Netherland. The trading company introduced the patroon system into the region, selling large tracts of land to wealthy "patroons," who in turn pledged to attract at least fifty permanent settlers to the colony (Stansfield 1998). In 1629, a patroon named Michael Pauw received a grant to plant a Dutch colony on the west side of the Hudson River. Pauw's grant, which eventually became the district of Pavonia, is the earliest known conveyance for what would later become Jersey City (Grundy and Caroselli 1970; Kardas and Larrabee 1978).

The patroon system, which essentially relegated settlers to the role of serfs, attracted few emigrants from the mother country and proved an ineffective colonization strategy for the Dutch, although it was more successful in the Mid-Hudson and Upper Hudson Regions (Stansfield 1998; Kim 1978). By the mid-seventeenth century, New Netherland could boast only a handful of settlers whose small numbers left them vulnerable to attacks from Native Americans as well as the land grabs and territorial counterclaims of other colonial powers. This held true for the district of Pavonia, which ran along the west bank of the Hudson River approximately between Harsimus Cove on the north and Caven Point on the south. By the late 1630s, Pavonia contained three tiny Dutch settlements within the boundaries of present-day Jersey City. These included the settlements of Harsimus, a lowland area near the present Harsimus Cove, Paulus Hook, a "noticeable promontory of high land" where Jersey City was later founded, and Communipaw, an area of relatively high land on the north side of New York Bay (Kardas and Larrabee 1978). These settlements consisted largely of scattered farms known as "bouwerries" that extended along the length of the Hudson shoreline (Rutsch et al. 1977).

Despite more than a decade of relatively peaceful relations with the local Native groups, unrest broke out in the early 1640s and escalated into the Dutch-Indian War of 1643-1645. Due in large measure to the poor leadership of Director-General Willem Kieft, the conflict quickly resulted in the destruction of most of the early Dutch farms within Pavonia (Kardas and Larrabee 1978). In the late 1640s, the Dutch made another attempt to settle the west side of the Hudson under the leadership of a new director-general, Pieter Stuyvesant. After negotiating peace with local Native Americans, Stuyvesant established a community known as Bergen in the interior portion of the peninsula, to the west of the original settlements. Observing his predecessor's difficulty in defending the widely scattered farmsteads of the earlier settlements, Stuyvesant ordered the village to be enclosed and fortified against attack. As an added protection, the director-general

purchased most of what is now Hudson County from the Hackensacks in 1658 (Grundy and Caroselli 1970; Kardas and Larrabee 1978).



**Figure 3.6. Hackensack/Passaic River, NYNJHAT Study (USACE, New York District 2021).**

The palisaded village of Bergen, which was laid out around Bergen Square on top of a high ridge, ran north from present-day Vroom Street with a central roadway following the current Bergen Avenue right-of-way. This settlement fared better than the previous colony, boasting a municipal court, legislature, school, and church by the early 1660s (Jersey City Online n.d.). Around the same time, Bergen was joined on the west bank by a second new Dutch settlement known as Communipaw. The site of the new village fronted on New York Bay and ran south from the present Communipaw Avenue (Kelly et al. 1960). It was separated from the bay on the east by an area of marshland known as Communipaw Cove. Together, the villages of Bergen and Communipaw were intended to replace the original European settlements destroyed in the Dutch-Indian War,

although many of the shoreline bouwerries were eventually reestablished (Kardas and Larrabee 1978).

All in all, Dutch colonial ambitions in the New World proved short-lived. In 1664, the Dutch lost their American colonies altogether when, the colony was bloodlessly seized by the English. New Netherland became the English proprietary colony of New Jersey, divided into the provinces of East and West Jersey under the governance of Sir George Carteret and John Lord Berkeley, respectively (Pennington & Fraser 1997). In 1683, New Jersey was divided into four counties, and the Dutch villages of Bergen and Communipaw became part of a larger township called Bergen, one of three townships located in the East Jersey county of the same name (Grundy and Caroselli 1970).

Following the establishment of English rule, life on the west bank of the Hudson remained relatively unchanged for almost two centuries (Kardas and Larrabee 1978). Carteret granted a new charter to the township of Bergen, guaranteeing its inhabitants the continuation of all rights and privileges previously enjoyed under Dutch rule (Grundy and Caroselli 1970). Now removed from the “front line of European expansion,” descendants of the original Dutch settlers continued to farm the fertile highlands and collect oysters from the mud flats in the quiet, rural communities of Bergen County. The only sign of coming change was the area’s gradual emergence as a transportation hub and transshipment point between a growing Manhattan community and new settlements to the west (Kardas and Larrabee 1978). Several important roads were already established by the late seventeenth century, including a road running northwest from Communipaw to Bergen along the route of modern Communipaw Avenue. Another road ran from Paulus Hook to Bergen. More importantly, the settlers began supplying ferry service to Manhattan from several points on the peninsula, including Communipaw Cove (Kardas and Larrabee 1978).

During the late seventeenth century and early eighteenth century, subdivision of the large speculative tracts began as smaller lots were sold to incoming settlers, who occupied scattered farmsteads. With the advent of active English development of colonial New Jersey, European homesteaders from a variety of backgrounds cleared the land and erected farmsteads in increasing numbers. New Englanders via Long Island began filtering into eastern New Jersey; Dutch immigrants with their African slaves also left Long Island in the 1680s, establishing settlements in the Raritan valley (Snell 1881; Wacker 1982:199). At first, West Jersey attracted Irish and English Quakers in large numbers. But after William Penn redirected Quaker settlement to his colony of Pennsylvania after 1682, New England and Long Island Puritans and Baptists from England and Virginia entered the area. The first agglomerated settlements grew up around road junctions and river fords. Social, economic, and climatologic conditions favored the development of small subsistence farmsteads rather than large agricultural plantations, but these conditions did not preclude the continued existence of slavery. Within a local and regional exchange system, farms grew grain and raised livestock for themselves and their neighbors and only later exported their surplus to merchants in either Philadelphia or New York City (Manning 1984:44-45; Wacker 1982:199-205).

The first community to bear the name Jersey City emerged in the location of the original west shore settlement of Paulus Hook, located between Harsimus Cove on the north and Communipaw on the south. Abraham Isaacsen Planck initially purchased this waterfront acreage in 1638 for

550 guilders from the Dutch West India Company. Planck established a small settlement on this land, using a portion of it as a tobacco plantation and the remainder for farming and dairy purposes (Rutsch et al. 1977; Marrin 2002). Following Planck's proprietorship, title to the land passed through the hands of several owners until 1804, when a group of investors led by three New York lawyers purchased the parcel and formed The Associates of the Jersey Company, which oversaw the affairs of the community for the next fifteen years. Jersey City took its initial step toward becoming an independent municipality in 1820, when the New Jersey state legislature granted the community a municipal charter, and it was incorporated for the first time (Grundy and Caroselli 1970).

From the beginning, Jersey City's waterfront played a vital role in its commercial and industrial development. Oystering and shad fishing, both conducted in the mud flats of Communipaw Cove, represented one of the area's earliest and most important industries, until the arrival of the railroads and manufacturing in the nineteenth century polluted and destroyed both the cove and its adjacent waterways (Rutsch et al. 1977). The establishment of an extensive ferry service between Communipaw Cove and the island of Manhattan was another hallmark of Jersey City's early commercial growth. The first ferry service was established by William Jansen around 1661, operating from a landing at the foot of present-day Communipaw Avenue on what was the original south cove shoreline (Rutsch et al. 1977; Kardas and Larrabee 1978). By 1764, Jansen's Ferry had significant competition from the newly established Paulus Hook Ferry, which operated from the foot of Grand Street as part of a stage route between New York and Philadelphia. Both enterprises provided service via rowboats and small, decked sail-boats known as periaugers. In 1812, investor and entrepreneur Robert Fulton established a drydock in Paulus Hook and soon began providing ferry service to and from Manhattan Island via steamboat. Over time the ferry industry and the hostelry business that accompanied it contributed greatly to Jersey City's role as the focal point of transportation between major industrial cities in the northeast (Rutsch et al. 1977).

The simultaneous arrival of the railroads and the Morris Canal in the 1830s solidified the city's vital role in the regional economy for the next one hundred years (Jersey City Online n.d.). The Morris Canal and Banking Company, initially authorized by the state legislature to build a waterway from Phillipsburg to Newark, broke ground for the Morris Canal in 1824. Just four years later, the company had already received permission to extend the canal to Jersey City to create a tidewater outlet immediately adjacent to New York City. By 1838, the completed canal provided the city's iron industry with direct access to the coal mines of eastern Pennsylvania as well as important iron markets in the northeast (Rutsch et al. 1977). Meanwhile, numerous railroad lines jockeyed for position along the Hudson's west bank, competing for access to the increasingly important New York Harbor and shipping facilities of Manhattan. By the mid-nineteenth century, the area was known for its network of rail terminals, which included the Erie, Pennsylvania, Lehigh Valley, and Jersey Central Railroads.

The city's extensive waterfront, effective transportation network, and easy access to fuel from Pennsylvania coal mines led logically to the rapid growth of the city's industrial and commercial prowess. Important early enterprises included Dummer's Glasshouse, a waterfront industry established in 1824 just south of the present-day Morris Canal Basin, and the Jersey City Pottery Works, opened on Warren Street in 1825 (Rutsch et al. 1977). The year 1845 marked the

beginning of Jersey City's steel industry with the establishment of the Atlas Foundry, followed by the North Point Foundry and Machine Works in 1848 and the Adirondack Steel Works in 1849 (Rutsch et al. 1977). Other well-known companies eventually made their home in Jersey City, including American Can, Emerson Radio, Colgate, and Dixon Ticonderoga (Jersey City Online n.d.).

In 1838, Jersey City separated completely from the township of Bergen and formed an independent municipal government (Grundy and Caroselli 1970; Rutsch et al. 1977). Having achieved a greater measure of independence, city officials made a concerted effort to correct some of the city's problems and to undertake several public improvement projects. Streets were graded and filled, and sunken lots filled with stagnant water were eliminated (Rutsch et al. 1977). Over the next two years, Jersey City attracted another one thousand new residents to become the fastest growing municipality in the newly formed Hudson County. Within thirty years the city had outpaced the growth of neighboring communities such as Bergen and Hudson City, who voted in 1870 to consolidate with the city into one large urban area. Nearby Greenville joined the merger three years later (Grundy and Caroselli 1970).

The Abraham Lincoln Memorial Park, originally known as West Side Park, was one of several significant municipal improvements that a prospering Jersey City undertook in the late nineteenth and early twentieth centuries. Begun in 1904, the park followed closely on the heels of projects such as the construction of the Hudson (now Kennedy) Boulevard in 1894, the completion of a new city hall in 1896, and the erection of the Main Library building in 1901 (Jersey City n.d.). It was the first undertaking of the newly created Hudson County Park Commission, formed in 1903 following the passage of a state law enabling counties to fund public parks through bonds. Located between Kennedy Boulevard and the Hudson River, Lincoln Park remains the oldest and largest park in the Hudson County park system (Dierickx 1985).

West Side Park was created on a parcel of land originally known to Jersey City residents as Glendale Woods. A partially forested area with an ideal combination of mature shade trees and open space, the property had long been acknowledged as the natural, albeit unofficial, park of Jersey City. The Jersey City Golf Club had for some time occupied a portion of the property and owned a clubhouse on what would become the northeast corner of the park. The remainder of the area, composed mainly of vacant parcels owned by nearby homeowners, was a favorite local picnic spot (Muirhead 1910; Dierickx 1985).

The commission assigned the job of designing the new park to two prominent early twentieth-century landscape architects, Daniel W. Langton and Charles N. Lowrie, a founding member of the American Society of Landscape Architects (Grundy 1982; Simo 1999). Approved in September 1905, Langton and Lowrie's plan for the 282-acre park was predominantly Picturesque in style and called for distinct sections of formal and informal landscape design. Overall, the park was roughly cruciform in shape. By 1908, the eastern portion of the park, located between West Side and Marcy Avenues, was laid out and planted (Dierickx 1985). The western portion of the park, known as the Meadow, remained undeveloped for approximately a decade after the park was established.

Following World War II, the rapid growth of the suburbs around Jersey City delivered a blow to the urban area, which experienced the collapse of its railroads, the death of its manufacturing centers, and the general decline of its public infrastructure (Jersey City Online 2002). The condition of Lincoln Park, along with the whole of Jersey City, fell into a pattern of deterioration and neglect. The plight of Lincoln Park was also compounded by the construction of State Highway 1 in the 1920s. Running from north to south through the center of the park, the increasingly busy highway divided the park in two, cutting off the west side field almost completely from the eastern half of the park. By the mid-twentieth century, the area was no longer used in accordance with its intended design, and by the late 1960s it was serving as a city landfill and dump. Since the early 1970s, the former west side field has been allowed to return to its natural wetlands state and remains in this condition to the present (Dierickx 1985).

### **3.3.5 Raritan Region**

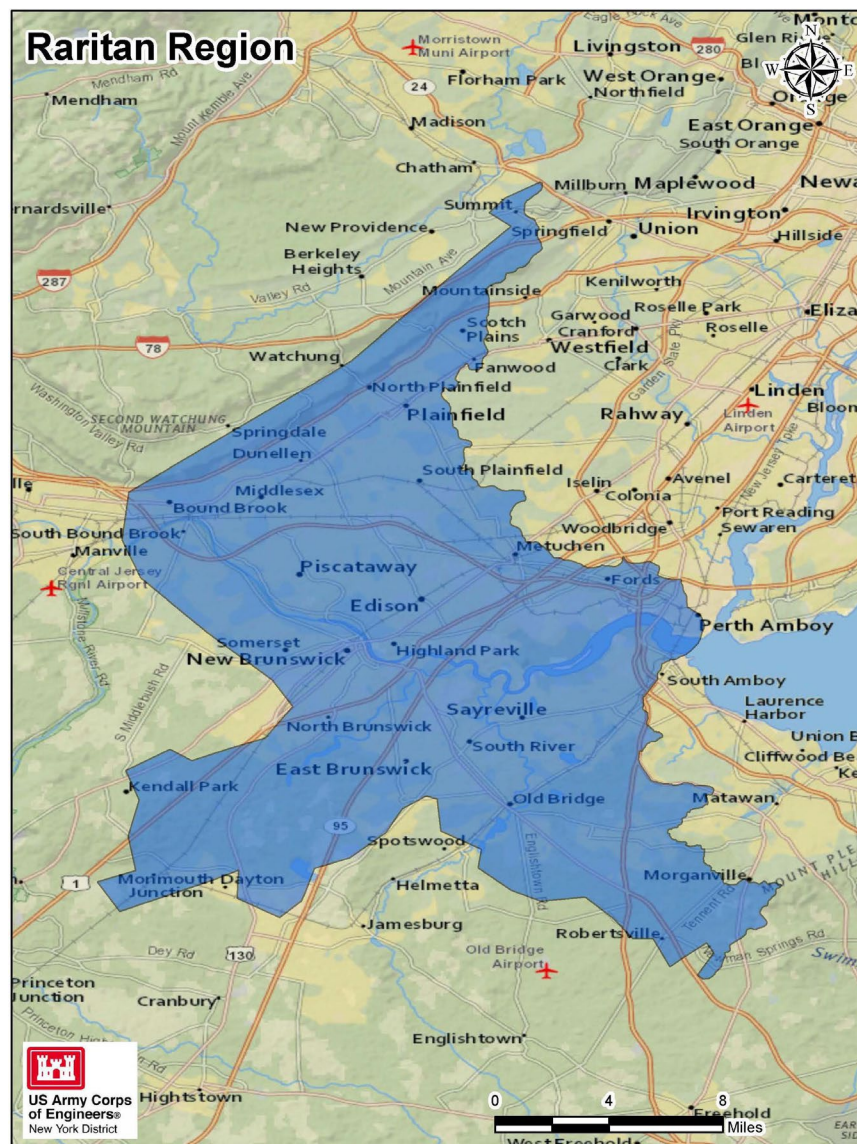
When Philip Carteret, a cousin of the proprietor, arrived in 1665 to become the first governor of New Jersey, he found "a cluster of four cabins waiting for him" at the site of what would become the capital, Perth Amboy (Kim 1978:5). "An observer of the New Jersey scene commented in 1671 that there were several villages on the ocean side near the entrance of the Raritan River, but that there was not even one for about a sixty-mile stretch between the entrance to the Raritan and the Delaware Bay (Kim 1978:5-8).

Before the arrival of Carteret, English military governor Richard Nicolls had allowed migrants from New England and Long Island to take up farms west of the Hudson River, in two grants: one in what would become Essex and Middlesex counties and one in what would become Monmouth and Ocean counties. Moreover, English, Scots, Dutch, and German settlers were attracted to the Raritan Valley. In exchange for the privileges of establishing an assembly and a headright system, the migrants had agreed to pay a small annual quitrent to the Duke of York (Fleming 1984; Wacker 1982:199; Pomfret 1964:8-10).

Settlement in the study area began in the late 1660s when large tracts of land were purchased by English speculators. In December 1664, Nicolls issued a patent to John Baker, John Ogden, John Bayly, and Luke Watson for a substantial tract of land lying between the Raritan and Passaic Rivers. The Elizabethtown Patent extended from the mouth of the Raritan River to the mouth of the Passaic River 17 miles and 34 miles into the back country, encompassing over 500,000 acres, including all of present Union County and parts of present Morris and Somerset Counties. Settlers from Long Island were encouraged to immigrate to the colony and erect farmsteads (Pomfret 1964:9-10). During the late seventeenth century and early eighteenth century, subdivision of the large speculative tracts began as smaller lots were sold to incoming settlers, who occupied scattered farmsteads. As expected, pioneers established settlements along watercourses and Indian trails. With the advent of active English development of colonial New Jersey, European homesteaders from a variety of backgrounds cleared the land and erected farmsteads in increasing numbers. New Englanders via Long Island began filtering into eastern New Jersey; Dutch immigrants with their African slaves also left Long Island in the 1680s, establishing settlements in the Raritan valley (Snell 1881; Wacker 1982:199). The first settlements grew up around road junctions and river fords. By the close of the seventeenth century, the Raritan River



valley had become "an area of cultural heterogeneity," which included Dutch, New Englanders, Africans, Quakers, French Huguenots and, later, Scots, all of whom were attracted by the area's rich farmland (Manning 1984:44). Social, economic, and climatological conditions favored the development of small subsistence farmsteads rather than large agricultural plantations, but these conditions did not preclude the continued existence of slavery. Within a local and regional exchange system, these farms grew grain and raised livestock for themselves and their neighbors and only later exported their surplus to merchants in either Philadelphia or New York City (Manning 1984:44-45; Wacker 1982:199-205; Kardas et al. 1977:11, 18).



**Figure 3.7. Raritan Region, NYNJHAT Study (USACE, New York District 2021).**

Administrative necessities resulted in the division of East Jersey into municipalities and counties. Counties were formed in 1681 in West Jersey (Burlington and Salem were the original two) and

in 1683 in East Jersey (Bergen, Essex, Middlesex, and Monmouth were the original four). Somerset County was created in 1688.

In 1685, John Campbell received a license from the governor to “settle upon the South Branch of the Raritan River... if he can peaceably agree with the Indians and there to make settlement as well as for himself as Capt. Andrew Hamilton and Mr. John Doby, till the same can be purchased or that the division line between this province and the Province of West Jersey be run” (The Lore Office nd; Reid 1685; Young et al. 2003:7-8).

Central New Jersey was a key battleground during the Revolutionary War as numerous engagements, both small and large, were fought in the area. Continentals and their patriot supporters, British soldiers and their loyalist supporters, and Hessians roamed the countryside, foraging for food and materiel (Owen 1975; Boatner 1992; Fleming 1984). The plains below the Watchung Mountains and near the Raritan River, received considerable attention from American and British forces during the Revolutionary War. During the winter of 1776-1777, British troops were stationed in Perth Amboy and New Brunswick, while the American troops wintered in Morristown. During subsequent foraging and raiding activities conducted by British soldiers in the region, American forces harried the raiders. Some of these American soldiers were encamped on “plantation”-property owned by Cornelius Vermeule. Located at the confluence of the Green and Stony brooks, the Blue Hills Post (or Vermeule’s) covered land on both sides of Green Brook and perhaps Stony Brook as well. During 1776-1777, the post included troops from Essex, Somerset, Morris, Sussex, and Middlesex Counties (totaling between 1,000 and 2,000 men). The cantonment consisted of a fort and earthenworks whose mission was to defend Quibbletown-Scotch Plains Road and local farmers from enemy raids. American forces utilized the high ground just northwest of the project area to monitor the Scotch Plains during their stay (the area became known as “Washington’s Rock,” and is now a state park) (Kardas et al. 1977:13; Pagoulatos 1992:7).

At approximately the same time, American troops under the command of General Benjamin Lincoln were stationed at Bound Brook. In April 1777, the British twice attacked American positions in the Raritan River valley, but each time the defeated rebels escaped north into the Watchung Mountains. During June 1777, British Generals Sir William Howe and John Burgoyne, attempting to flush George Washington out of his mountain refuge, maneuvered through Green Brook valley near Quibbletown (now New Market), Plainfield, and Westfield. A skirmish fought at the gorge near the confluence of Green and Blue Brooks on June 26, 1777, called “the Battle of Bloody Gap,” resulted in a British rout of American forces fleeing Burgoyne’s assault (Carrington 1877:300-301). While some sources have confused this skirmish with another skirmish to the south, “the Battle of Short Hills,” these were different battles that occurred during a general campaign of skirmishing and maneuvering within central New Jersey. Throughout the winter of 1778-1779, American troops were again encamped at Middle Brook and Bound Brook. However, no engagement with the British occurred during that occupation (Kardas et al. 1977:12-13; Burrow and Hunter 1990:5-13).

While New Jersey was overwhelmingly rural during the early years of the nineteenth century, and agriculture was the primary economic activity well into the twentieth century (Kardas and Larrabee 1981:25; McCabe 1975), socioeconomic changes were beginning to occur in the areas of



transportation, industrialization, and urbanization. A number of transportation improvements occurred which set the stage for more rapid growth after the Civil War. Shortly after 1766, "Old York Road (NJ Route 28 and portions of various county and local routes in Somerset and Hunterdon counties) by way of Paulus Hook, Newark, Elizabethtown, Plainfield, Somerville, and Lambertville on the Delaware River became an increasingly popular stage road servicing interior counties" (A.G. Lichtenstein & Associates, Inc. 1994:20; Wacker 1982: 209-210; Larrabee 1982:221-231).

In general, the years 1800 to 1820 were known as the Turnpike Era in New Jersey transportation as toll roads, operated and developed by stock companies, facilitated the shipment of freight, especially farm products and minerals, from rural to urban areas (A.G. Lichtenstein & Associates, Inc. 1994:20-22). The Morris Turnpike (1801), connecting Newark to Morristown, and the Union Turnpike (1804), connecting Morristown to Milford, Pennsylvania, were the leading roads constructed at this time. Further, the New Jersey Turnpike was completed in 1809 and passed through the southern portion of the project area near Bound Brook, along the course of the old Raritan Road. This turnpike remained in operation until 1869 (Wacker 1982:209-210; A.G. Lichtenstein & Associates, Inc. 1994:21, UNI-2; Burrow and Hunter 1990:5-13-14; Larrabee 1982:221-231; Hawley 1964:10)

Canals served as the next stage of internal improvements during the antebellum era. The Canal Era (1820-1840) served to lower costs and increase the amount of goods shipped between points west and the eastern seaboard. The Morris Canal (1825-1831) and the Delaware & Raritan Canal (1830-1834) were successfully utilized to improve inadequate interregional transportation systems in New Jersey and increase the amount of Pennsylvania coal shipped to industrializing eastern cities. A.G. Lichtenstein & Associates, Inc. 1994:24-29; Burrow and Hunter 1990:5-14).

By 1864, the establishment of railroad stations at what is now Flaggtown and Neshanic Station by the South Branch Railroad resulted in the creation of new roads to connect the surrounding farm areas to the rail line (Young et al. 2003:7/8, 12). By the early 1870s, the area in the vicinity of the river was still sparsely settled (Beers 1873). While the Branchburg and Hillsborough areas remained largely rural, the railroads brought in manufactured goods in exchange for the agricultural output. "Depot towns, such as Flaggtown [sic], Neshanic Station, and North Branch Station grew prosperous as a result of the railroads" (A.G. Lichtenstein & Associates, Inc. 1994:Som-3). The region and Somerset County in general "developed within an agrarian-based economic framework, with dispersed farmsteads surrounding local support centers" (Young et al. 2003:8-3). Agriculture was an important, if not primary, pursuit of the area until the twentieth century; hence the state's nickname as "The Garden State."

Two railroads serviced this area in the 1870s, the South Branch Railroad (later incorporated into the Central Railroad of New Jersey) and the Easton & Amboy Railroad (later incorporated into the Lehigh Valley Railroad). These lines transported local farm produce to regional markets, such as New Brunswick, Perth Amboy, and New York City (McCabe 1977). Incorporated in 1855, the Lehigh Valley Railroad wanted to connect the anthracite coalfields of Pennsylvania to Jersey City and Perth Amboy. During the early 1870s, the Easton & Amboy Railroad was constructed as the New Jersey division of the Lehigh Valley and opened along its entire length by 1875, with stops at Flaggtown and Neshanic. In 1888, the Lehigh Valley route was connected to the Central

Railroad of New Jersey. The original mainline ROW of the Lehigh Valley duplicated portions of the South Branch railroad route and, later, was considered redundant. (A.G. Lichtenstein 1994:Mid-4; Young et al. 2003:7-7; Guzzo 2002).

After 1900, local farmers shifted their efforts away from grain production toward dairy, poultry, and garden crops (Snell 1881; Young et al. 2003:7-7). Since World War II, the area has seen dramatic residential and commercial development.

Created in 1683, Middlesex County was one of the four original counties of East Jersey. Areas west of what is now Route 9 were identified as “the Barrens of Wickatunk.” The earliest settlement of what is now Sayreville occurred ca. 1770 when Elijah Disbrow (sometimes Disbrough) located near the South River bridge. This was near the Raritan River (Reid 1685; Wall and Pickersgill 1921:469).

In 1684, South Amboy Township was formed and included what are now the boroughs of South Amboy and Sayreville and the townships of Monroe and Old Bridge. Named for James R. Sayre, Jr., who, along with Peter Fisher, started a large brickmaking operation along the Raritan, Sayreville Township was created in 1876. In 1920, the Township of Sayreville was reorganized as the Borough of Sayreville (Karcher 1953:140; Clayton 1882:861).

The Camden & Amboy Railroad opened from Bordentown in Burlington County to South Amboy in 1833 and became an economic stimulus to the region from the beginning. A total of 110,000 passengers rode the line the first year. Securing its success, it had a state-chartered monopoly through Middlesex County along the New York City to Philadelphia corridor, which provided the financial foundation for it to avoid the fluctuations in financing that undermined other roads. The Camden & Amboy Railroad stimulated agriculture and industry along the length of its lines. Most startling was the growth of commercial agriculture in southern Middlesex where farmers shipped thousands of tons of produce to the New York and Philadelphia markets (A.G. Lichtenstein 1994:Mid-4-5). The Pennsylvania Railroad purchased the Camden & Amboy in 1871.

James Rufus Morgan was proprietor of the Old Spye Inn around the time of the Civil War and reputedly manufactured gunpowder and munitions on his estate for the Confederates. He is reputed to have smuggled them to Confederate ships via a tunnel from the inn to the bay. The Old Spye Inn was formerly located along Old Spye Road (Everts and Stewart 1876). By the 1880s, the Applegate brothers owned the Old Spye Inn and had transformed it into a hunting and fishing club, which attracted many wealthy patrons during the summer. By 1876, the New York & Long Branch Railroad was shown running east of the area and crossing Cheesequake Creek (NJHM ca. 2000).

Eastern central New Jersey had an extensive brick-manufacturing industry with significant brickyards emerging in the mid-nineteenth century. Sayreville and South River, as well as surrounding communities, utilized the indigenous beds of ‘tough’ dark clay. In 1851, James Wood established the first brickyard in what is now Sayreville, near the Raritan River. In the 1850s, Peter Fisher and James Sayre, Jr., opened a brickyard west of the Wood beds. By the end of the nineteenth century, Sayre and Fisher were “among the most extensive brick manufacturers of the United States, having five yards containing twenty-one kilns, their operations covering many

acres, involving the erection of several large sheds and the employment of about two hundred men” (Clayton 1882:860). The Sayre and Fisher Company incorporated in 1886, and by the 1920s employed 1,700 men and owned 5.5 miles of frontage on the Raritan and South Rivers and on the Washington Canal (Wall and Pickersgill 1921:470). The Sayre and Fisher brick company ceased operations in the early 1970s, and most of the buildings were demolished.

During the last decades of the nineteenth century, rail lines and regular passenger service, especially on the Central Railroad of New Jersey permitted development and suburbanization of northern Middlesex County. Moreover, construction of rail routes to Monmouth and Ocean counties opened the New Jersey shore to tourists and vacationers. “[T]he most significant rail line from northern New Jersey was the New York and Long Branch Railroad [, which] opened in 1875 from Perth Amboy to Long Branch (Monmouth County). At Perth Amboy, it made connections to branch lines of both the Pennsylvania Railroad and the Central New Jersey, and after 1883 the New York & Long Branch shared its tracks with trains of both railroads. The railroad offered superior service to the shore, and built the first bridge across the mouth of the Raritan River between the Amboys” (A.G. Lichtenstein 1994:Mid-6).

While the Raritan area and South Amboy saw increased industrial development, Madison Township (present-day Old Bridge Township), remained predominantly agricultural and was marked by slow growth. Cheesequake Creek was a busy navigation route with inns, taverns, and a small village located in its vicinity, and local potteries made use of the clays around the creek. In the 1850s mills near Morgan Beach manufactured paper products and gunpowder for shipment by rail.

The area’s history of munitions manufacture continued into the twentieth century. The former Morgan estate was part of the T.A. Gillespie Shell Loading Factory in the Morgan section of Sayreville. The factory was said to be the largest load-and-pack ammunition production plant in the world during World War I. In October 1918, explosions over a three-day period at the Gillespie plant killed more than 100 people, and reputedly destroyed 300 buildings, leveling the factory and most of Sayreville and South Amboy. The plant was located on a mile-long parcel south of Ernston Road between Nathan Boulevard and the Garden State Parkway. The explosions detonated enough ammunition “to supply the Western Front for six months” a government report stated in 1919—approximately 12 million pounds of explosives, more than 300,000 loaded artillery shells and numerous rail cars. Some suspected sabotage. Shells were found in 1994 and again in 1997 around Dwight D. Eisenhower Elementary School on South Ernston Road. A total of 5,080 pieces of ordnance, sections of shells were found by the US Army Corps of Engineers. The site is now bounded by condominiums and marinas (McAnally 1995; NJHM ca. 2000).

The advent of the automobile after World War I freed people from reliance on the railroad to move between destinations, fueling increased suburbanization and increasing the volume of vehicular traffic. As a result, the emphasis of New Jersey’s transportation activities shifted during the 1920s from improving rail transportation to improving automobile traffic as construction of county and state highways escalated. For example, the New Jersey State highway department took over numerous roads by 1926, including Route 4 between Rahway and the shore through the Amboys (present-day portions of New Jersey Route 35 and Route 9) (A.G. Lichtenstein 1994:Mid-8). “In Middlesex County, for instance, summer holiday traffic to the Jersey Shore on Route 4 increased

from over 12,000 vehicles per day in 1921 to over 43,000 in 1936” (A.G. Lichtenstein 1994:Mid-8).

Due to increasing traffic gridlocks, a plan emerged to separate local traffic from through traffic by the construction of superhighways. “From 1926 to 1941 new highway and bridge construction in Middlesex County reached unprecedented levels buoyed by the infusion of New Deal work project funds in the 1930s. Routes built or significantly improved included portions of present-day US 1 (1928-1932); NJ 18 (1931-1933); US 130 (1934-1941); US 9 (1936-1941); and NJ 35 (1936-1942)” (A.G. Lichtenstein 1994:Mid-9). The Garden State Parkway (NJ 4) was conceptualized in 1945 as a 164-mile-long (its present length is 172.5 miles) parkway to connect northern New Jersey with the shore resorts and to alleviate congestion on US 1, US 9 and NJ 35. By the early 1950s less than 20 miles had been completed. In 1952, the New Jersey Highway Authority was created “to construct, operate and maintain a self-sufficient toll parkway from Paramus to Cape May” and took over development of the parkway (Eastern Roads 2005). It was completed in late October 1954.

### **3.3.6 Long Island Sound Region**

After 1609, voyages by Dutch captains established outposts in this portion of North America to advance the commercial interests of the United Provinces of the Netherlands. As Dutch knowledge of the region grew, so did their interest in developing the commercial prospects of the fur trade. Captain Adriaen Block became the first European to sail through Hell’s Gate (*Hellegat*), a narrow tidal strait in the East River through to Long Island Sound. He was also the first to land at Montauk Point where he encountered local Native Americans. As early as 1614, a fortified trading post and several houses had been constructed on Manhattan to attest to the Dutch presence. About that time Block also discovered the Connecticut River (and named it the *Versche Rivier*, or Fresh River) and reconnoitered Narraganset Bay. With the establishment of the Dutch West India Company (*Westindische Compagnie*) in 1621 and during the next forty years Dutch ships arrived with increasing regularity to trade with the Native groups they encountered (Brasser 1978a:82, 1978b:200-203; Jacobs 2009). New Amsterdam was established in 1624.

The Dutch established a fortified trading post (*Huys de Hoop*, Fort or House of Hope) at what is now the City of Hartford in 1633. Despite a small Dutch contingent, the English established contemporaneous settlements along the Connecticut River, basing their claim to the area on the visit by Genoan mariner Giovanni Caboto (John Cabot) in 1497. Shortly after the Dutch arrival, William Holmes of Plymouth, Massachusetts, sailed up the Fresh River (the English called the river “Connecticut” after the local Native American group) and founded the settlement of Matianick (Windsor) ten miles north of the Dutch fort. A subsequent smallpox epidemic decimated those local Native Americans. English settlement increased in the Connecticut River valley in 1636 when communities were established at Saukiog (Hartford) by Thomas Hooker and Wethersfield by John Oldham and Nathaniel Foote. These three communities would join as the Connecticut Colony. In 1638, John Davenport, Puritan minister, established the settlement of Quinnipiac (present-day New Haven) with a congregation of 500. The Connecticut River colony and the New Haven Colony developed as separate entities until 1665 when the two groups and their satellites

formally merged, although both Hartford and New Haven served as capitals until 1875 (New Netherlands Institute nd; Montagna 1978; Salwen 1978:173; Mead 1992[1911]:29, 230).



**Figure 3.8. Long Island Sound Region, NYNJHAT Study**  
(USACE, New York District 2021).

Areas east of the Hudson River in present-day New York State were occupied by Munsee-speaking groups, such as the Wappinger (the Dutchess-Putnam area), the Kichtawink (northern Westchester), the Sinsink (Ossining), and the Wiechquaeskeck (eastern Westchester and southwestern Connecticut), although the internal politics and external boundaries of these groups are uncertain (aboriginal groups in the mid-Hudson are discussed generally as “Delaware Indians”). Native Americans in southwestern Connecticut during this period were loosely grouped as Paugusett or Siwanoy, and occupied coastal villages of Petuquapaen, Asamuck, Patomuck, and Miossahassaky (Bragdon 1996:21; Cobbs and Wiegand 1997; Mead 1992[1911]).

The first purchase of Indian land in the lower Hudson Valley north of what is now the Harlem River was made by the WIC in 1639. About the same time, Jonas Broncks purchased land along the river that now bears his name in what would become Morrisania. The Dutch called this area north of Manhattan *Vredeland* ("land of peace") (Kim 1978:4-8; Gehring and Starna 1988: xiii-xxiv; French and Clark 1925:31, 35, 167).

With the Dutch gradually moving eastward from the Hudson River and the English moving westward from the Connecticut River, conflict was inevitable. Foreshadowing the English takeover, New Englanders had successfully infiltrated what would become western Connecticut and eastern Westchester to establish trading posts and settlements by the 1640s. As a result of the paucity of Dutch inhabitants (less than 2,000 people lived in New Netherland by the mid-seventeenth century), WIC directors allowed some English settlements to exist under their jurisdiction, if those homesteaders took an oath of allegiance to Dutch authority. For example, Dutch Director Willem Kieft allowed John Throckmorton (or Throgmorton) and 35 families to settle along the eastern shore of what is now Bronx County (the area became known as Throgs Neck). The Dutch called the area Oostdorp or East Town. In 1646, Adriaen van der Donck acquired the area around what is now the City of Yonkers (and was called Colendonck) (French and Clark 1925; Cunningham 1992:6-7).

Dutch attempts to assert control over areas east to the Connecticut River led to tension and violence with the resident Indian groups as well as with the English in the 1630s and 1640s. These tensions were exacerbated by the increasing number of Europeans and enslaved people entering New Netherland and New England. Settlers in New Netherland were encouraged by Dutch officials to establish farming communities within the colony. Subsequent skirmishes among the Dutch, the Pequots, the Narragansetts, the English, and the Block Island Indians escalated into the Pequot War of 1637, which embroiled central Connecticut and led to the virtual destruction of the tribe (Brasser 1978a).

Further, in the 1640s Director Kieft attempted to assert Dutch jurisdiction over the settlements in what is now the Town of Greenwich. At this time Greenwich was part of the Town of Stamford and had been settled by people from the Town of Stamford. In 1642, English settlers in Greenwich pledged allegiance to the Dutch on the condition that the Dutch provide security against the Indians. As a result of the settlers' acquiescence, Greenwich became a manor with Robert Feaks and Daniel Patrick as the "patroons" (Mead 1992 [1911]:8-9). Feaks and Patrick were the original purchasers of the area in what is now Old Greenwich and Riverside from the Indians, although they were acting as agents for the New Haven Colony. Patrick believed the Dutch provided a better option for security than the English. The following year a contingent of Dutch and English soldiers landed at present-day Sound Beach to disperse an Indian attack, however the soldiers did not find any Indians to fight (Mead 1992[1911]:16-17, 24).

In 1650, Director Pieter Stuyvesant, still asserting Dutch authority over western Connecticut to the Connecticut River, met with English representatives to settle the broader boundary issues between the Dutch and English claims in western Connecticut and Long Island. The meeting resulted in the establishment of the border between the colonies as a line extending north from the west bank on Greenwich Bay at least ten miles east of the Hudson River, and the Dutch giving up their claims to western Connecticut. The treaty left the Greenwich area jurisdictionally neutral

between the Dutch and English until 1656 when the New Haven Colony exerted control over the area, asserting that it was part of Stamford. However, this agreement—the Treaty of Hartford—was never ratified since England did not recognize the validity of the Dutch claims to New Netherland (History and Genealogical Unit 2004; Baron 2012; Mead 1992[1911]).

Ignoring the settlement between New Netherland and Connecticut, Thomas Pell (of Connecticut) claimed, under Native American conveyance dated November 14, 1654, a large section of Vredeland and called it West Chester. Shortly thereafter he initiated settlement of his land from New England. Although English homesteaders did not begin clear the area around what is now the Town of Rye until 1666, other English pioneers had reached as far west as Byram Lake (west of present-day Interstate-684) by the 1640s. On November 15, 1663, Stuyvesant ceded West Chester to Connecticut. Less than a year later, the entire Dutch colony would be surrendered to English General and new governor Richard Nicolls and renamed New York (Ellis et al. 1967:20-28; Burke 1991:2; French and Clark 1925:167-168, 575-578; Brasser 1978b:204; Goddard 1978:220-222).

Connecticut's boundaries were established with the Royal Charter of 1662, although conflicts over the western boundary with New Netherland remained, even after the Treaty of Breda in 1667 ended the Second Anglo-Dutch War and placed all of what is now New York under English control. Boundary issues stemming from conflicting and expansive colonial charters were resolved in 1682 when an agreement established the Connecticut-New York border 20 miles east of, and parallel to, the Hudson River (Baron 2012; Mead 1992[1911]:23-24).

In 1683, the province of New York was divided into ten counties—Albany, Dutchess, Kings, New York, Orange, Queens, Richmond, Suffolk, Ulster, and West Chester. Albany included all of the northern part of the state including present-day Vermont. By the beginning of the eighteenth century, territory on the east side of the Hudson River had been purchased by rich, politically-connected entrepreneurs and divided into large manors or patents. The Van Rensselaers controlled Rensselaerwyck Manor (1685); Francis Rumbout and Gulian Verplanck acquired Rumbout's Patent (1685); Robert Livingston established Livingston Manor (1686); Stephanus Van Cortlandt established Cortlandt Manor (1697); Adolph Philipse purchased Philipse Highland Patent (1697); Henry Beekman obtained Beekman's Patent (1697); and nine investors combined to purchase the Great Nine Partners Patent, among others. In addition, the far eastern portion of New York was mired in controversy until the 1730s. Called "the Oblong," a thin tract less than two miles wide and running from Rye (Westchester County) through Putnam and Dutchess counties was claimed by both New York and Connecticut due to inconsistencies in the surveying of the Connecticut-New York colonial boundaries (Kim 1978; Blake 1849:99; Hasbrouck 1909:34, 42-43; Pelletreau 1886:8-9).

What is now Westchester County was a hotly contested area by both Dutch entrepreneurs and English settlers during the seventeenth century. Dutch settlers generally hugged the Hudson River shoreline, while English homesteaders infiltrated the county from Connecticut as the growing population in New England led to migration of New Englanders into the sparsely populated areas in New Netherland. English settlements included villages of West Chester (now in the Bronx), Rye, Mamaroneck, East Chester, and Bedford. The oldest permanent settlement in Westchester, the community of Rye was settled in 1660 by John Coe, Peter Disbrow, and Thomas



Studwell who led a group of pioneers from nearby Greenwich onto Manursing Island. They received title from the Siwanoy for an extensive tract of land between the Byram River (Peningo Neck) on the east and Milton Point on the west, which included all of the present-day Town and City of Rye. In 1665 the Connecticut Colony merged these settlements as Rye, although it is unclear whether they actually had the power to do this. In 1683, King Charles gifted his brother James (Duke of York) the area of Rye, which then became part of the Province of New York. The subsequent division of a portion of the western part of the area in 1695 enraged the leaders of Rye who led the rejoining of the rump Rye with the Connecticut Colony. However, a royal decree in 1700 returned Rye to New York (Town of Rye 2013; Centennial Historical Book Committee 1968).

Quakers played an important role in the settlement of the Harlem valley. John Harrison, of Flushing, with four others acquired a tract of land from the local Native groups in what is now Westchester for the purpose of settling Quakers. Called “the Purchase,” this area was situated east of the Mamaroneck River and south of Rye Ponds. By the beginning of the eighteenth century, Westchester County had been carved into six principal freehold manors: Fordham (1661), Pelham (1687), Philipsburgh (1693), Cortlandt (1697), Morrisania (1697), and Scarsdale (1701), with Philipsburgh and Cortlandt being the largest (French and Clark 1925:41, 47).

Cortlandt Manor, the northernmost in Westchester, began at the Hudson River and continued to the first negotiated boundary with Connecticut and measured 10 miles along the river by 20 miles. Obtained by Stephanus van Cortlandt, the manor was initially settled along the river at Croton and Peekskill (French and Clark 1925:48-50). Scarsdale was acquired by Caleb Heathcote (who was also a partner in the Great Nine Partners patent in Dutchess County), and part of the disputed area west of what is now the Town of Rye. This area was part of the 1662 Richbell Patent for all of eastern Westchester, although the patent did not receive royal confirmation. The area was claimed by members of the Town of Rye (who also disputed the Harrison Purchase) as well as owners of the White Plains purchase of 1683 (as part of the Town of Rye). Heathcote purchased Richell’s claim from his heirs and attempted to assert authority over the area. The disputes were finally resolved in the 1720s. Heathcote erected a gristmill and a sawmill along the Mamaroneck River near the Old Westchester path, an Indian trail near Long Island Sound (Baird 1871:150-155; French and Clark 1925:52-54).

The area of present-day Port Chester was known as Saw Pit or Saw Pit Point, the result of the extensive boat-building operations conducted in the area during the eighteenth century. The early settlers engaged in cutting lumber, boat building, trading, shipping, and clamming and oystering (Centennial Historical Book Committee 1968). Transportation was difficult during the eighteenth century, although the Rye-Oyster Bay ferry had begun operation in 1739, and the New York-Boston Post Road linked the area to the two major East Coast cities. Stage service began in 1772. By 1775 Westchester was the richest and most populous county in New York. Predominantly rural, Westchester County and the area around White Plains saw considerable action during the War for Independence. Revolutionary War Battle of White Plains occurred October 28, 1776, during George Washington’s army’s string of defeats during their general retreat from New York into New Jersey that began with the Battle of Brooklyn in late August. Westchester’s population was more than 27,000 in 1800 (Seifried 1994:3).



In March 1788, the Town of Rye was established by the New York State Legislature as one of 20 towns in Westchester County (French and Clark 1925:177). The community at Saw Pit remained a small hamlet of fewer than 20 dwellings during the early nineteenth century. In 1837, the community formally became Port Chester (Centennial Historical Book Committee 1968:8-9). Beginning in the 1840s, with the construction of the first Croton River Dam and the Croton Aqueduct, areas in Westchester County have been flooded to provide the residents of New York City with an adequate water supply. Such bodies of water as Croton Lake, Muscoot reservoir, Kensico Lake, and the Rye Lakes have either been created or enlarged to serve this purpose (French and Clark 1925:349-396). In the nineteenth century, the eastern portion of the county became increasingly urban in character as transportation routes and proximity linked the area to New York City, and later Greater New York. More importantly for the future development of Port Chester, railroad construction during the late 1840s and the completion of the New York & New Haven Railroad (later, New York, New Haven & Hartford Railroad) in 1849, connecting the area to both New Haven and New York City, marked a turning point in the community's history. In May 1868, Port Chester was incorporated as village and had a population of approximately 3,500 which supported six churches, a school, Abendroth's foundry, several coal and lumber yards, a few dozen stores, and a railroad station (Centennial Historical Book Committee 1968:13; McNee 1977:430-431).

On January 1, 1874, Morrisania, West Farms, and King's Bridge were ceded to New York County (the area is now part of the Bronx). Later, in June 1895, Wakefield, Eastchester, Williamsbridge, Spuyten Duyvil, and Town of Westchester were also annexed by New York County (these areas are also now within the Bronx) (French and Clark 1925:180). By 1890 Westchester County had a population in excess of 145,000 (Seifried 1994:3). The eastern areas of Westchester County remained secluded and part of a generalized, rural village/farming community until the late nineteenth century. Agricultural activities focused on dairying, cheese making, and some poultrying. Businesses along Long Island Sound fished and collected oysters (French and Clark 1925:177-180).

Extensive late nineteenth-century/early twentieth-century development in the Town of Rye including the development of railroads, trolleys cars, and paved roads, opened up Westchester County for increased settlement as communities sprout up along and near railroadlines. Moreover, areas in Westchester County were utilized to provide water to the growing metropolis of New York City. For example, the Kensico water system was developed during the 1880s, and included Kensico Dam (completed in 1915) and the Byram Lake Dam, and it drew water from Little and Big Rye ponds and Wampus Lake (French and Clark 1925).

Rye was incorporated as a village in 1904 with approximately 3,500 residents. During the 1920s improved transportation through the advent of parkways and commuter trains facilities suburbanization as the population increased to approximately 9,000 people. In 1941, the village of Rye was incorporated as Westchester County's sixth city.

During the late nineteenth century and early twentieth century, the Village of Port Chester supported a number of notable business operations, including the Abendroth Foundry (established in 1840), RB&W Bolt Works (1882; with operations in Byram as well), Ernest Simons Manufacturing Company (1876), P.R. Mallory tungsten filament wire plant (1916), Arnold Bakers

(1941 in the village), Mint Products Company, the makers of Life Savers candies (1920). Commercial and industrial use of the waterfront slowed after 1920 (Village of Port Chester 2011). In the 1950s, the major manufacturers in Port Chester included the Ernest Simons Manufacturing Company (makers of sheets and pillow cases), RB&W Bolt and Nut Company, Fruit of the Loom, Abendroth Brothers, Beech-Nut LifeSavers, Arnold Bakers, and the Empire Brush Company (Brenner 2004).

The post-World War II period brought infrastructure improvements to the county, and the county's proximity to New York City encouraged suburban sprawl by the upper and middle class professionals who worked in New York City (McNee 1977:430, 437-438). Gradually, large-scale transportation projects and developments (e.g., the automobile, super highways—the Saw Mill River Parkway, the Sprain Brook-Bronx River Parkway, the Hutchinson River Parkway, the Cross Westchester Parkway, and the New England Thruway) facilitated suburban residential expansion of eastern Westchester and the nearby Town of Greenwich, Connecticut, by improving access to New York City (McNee 1977:451-452; Seifried 1994:3).

The transition to a suburban community undermined village retail businesses as many of Port Chester's factories closed and/or relocated. In 1984, LifeSavers shut down its local factory after 64 years, the last major manufacturer to leave the village. In the twenty-first century, economic development in Port Chester has focused on "big-box" retailers, local waterfront restaurants and recreation, hotels, and upscale condominiums (Brenner 2004; Village of Port Chester 2011:3). Population within the Village of Port Chester increased from 22,660 in 1930 to 24,960 in 1960 to 27,867 in 2000. Its population was 28,967 in 2010.

### **3.3.7 Lower Hudson/East River Region**

As noted, Giovanni da Verrazano, in the service of France, explored the southern or lower portion of the Hudson River and New York Bay in 1524. However, it was not until after 1609 with the explorations of Henry Hudson that European exploration and settlement began. The Dutch moved quickly to establish a trading post on Manhattan's southern tip, eager to connect via New York Harbor with the profitable mainland fur trade. The northern parts of the island, especially the Washington Heights area, developed much more slowly, perhaps because the Native American presence in this location demonstrated a much greater resistance to displacement by Europeans (Rubinson & Winter 1988). According to Bolton, the Wickquaesgeck co-existed with the few Dutch settlers in the area for approximately 40 years in the mid-seventeenth century. While conflict arose due to the Native Americans' unfamiliarity with the European concept of absolute property transfer, for the most part, relations remained relatively peaceful. Native American ownership of at least parts of upper Manhattan were recognized by the Dutch settlers as late as 1715 (Bolton 1924).

In 1614, Adriaen Block explored the East River and Long Island Sound and noted the islands within the Upper Bay while journeying into the sound. Not only the first person to use the designation of "Nieuw Netherland" for the area between the English in Virginia and the French in Canada, Block was also the first to apply the name "Manhates" to Manhattan, and the first to show Long Island as an island.



**Figure 3.9. Lower Hudson/East River Region, NYNJHAT Study**  
(USACE, New York District 2021).

About the same time, the *Staten Generaal* of the United Provinces granted exclusive rights to a consortium of merchants to trade and settle New Netherland, who quickly dispatched a small fleet to Manhattan. A few rude huts had already been built by former Indian traders. In 1621, the *Staten Generaal* organized the Dutch West India Company and granted the company a monopoly to trade along the shores of the Americas for 24 years (Burke 1991:1-18). The WIC planned New Amsterdam to be the military, political, and economic center, and two years later a settlement was established at the lower end of Manhattan (Harris et al. 2014:68-71). In 1626, Pieter Minuit arrived as the third Director General and purchased of Manhattan Island from the local Lenape. He later erected a fort in lower Manhattan.





**Figure 3.10. 1916 version of Jacques Cortelyou's 1660 "Castello Plan" of Lower Manhattan.**  
**Note: Wall Street is an actual wall at the right of image.**

The deep indentation in the Harlem River known as "Sherman's Creek" became an important landmark for early settlers in upper Manhattan. To the Dutch, the creek was known as the "Half Kill," a name that distinguished it from the "Great Kill" or Harlem River to the east. Two brooks fed into the creek from the west—the "Run," which originated from Fort Washington to the northwest, and a second brook that meandered through the marshlands to the southwest. Sherman Creek represented an important natural feature on the undeveloped landscape and proved indispensable for the measurement of boundaries. The area surrounding Sherman Creek was known as the Great Meadows. The commanding height of the area was a hill to the southwest of the creek called by the Dutch *Ronde-vly-berg* (or Hill of the Round Meadow), which became the British Fort George during the American Revolution. West of the creek, a thoroughfare known as the King's Way (now Broadway) traveled north-south through the entire length of Manhattan (Bolton 1924).

Throughout most of the seventeenth century, much of upper Manhattan remained largely unsettled. The first land grant in this area was made by Director-General Willem Kieft in 1647 to Pieter Jansen and Huyck Aertsen (Riker 1904; Bolton 1924). When question arose following Jansen's death as to the validity of the title, the land passed to the town of New Haerlem, established in 1656, for a sum of 300 guilders (Riker 1904).

In 1639, Jonas Bronck and his wife, Antonia Slagboom, were the first European settlers in what became the Borough of the Bronx. Bronck purchased 500 acres between the Harlem River and the Aquahung, which became known as the Bronck's River (later, the Bronx River) from two Native sachems, Rauaqua and Taekamuck, and the property became known as "Bronxland." Bronck died in 1643, and his property was sold in 1651. It later became a part of the Manor of Morrisania (Shonnard and Spooner 1900).

One of the most prominent landholders in the early days of European settlement was Jan Dyckman. Dyckman began his farming career in the early 1660s on a parcel of land between present-day 100th and 120th Streets. Subsequent land purchases resulted in his ownership of hundreds of acres on Manhattan. He was included in a grant issued in October 1667 by Willem Kieft to Jan Nagle and 21 other Dutch settlers. Dyckman and Nagle became partners, acquiring the land north of present-day 211th Street, which they leased to their fellow settlers on generous terms for the next twelve years. Eager to assist in the productive development of the region, Dyckman offered other local farmers free advice, fruit trees, and livestock for their bouwerries (Bolton 1924).

Dyckman's Farm eventually came to comprise all the area between the Hudson and the Harlem Rivers. In 1691, when the common lands of New Haerlem were divided among the local patentees, Dyckman received land located immediately south of his 1667 grant and took in "the rolling meadow and marshlands between Inwood Hill and the Harlem River, extending north from Sherman Creek to 211th Street" (Bolton 1924; HCI 1988). Dyckman also acquired an additional 130 acres to the west and south of Sherman Creek that extended as far north as Dyckman Street, as far south as present-day Sickles Street, and took in all of Round Meadow Hill to the Harlem River (Bolton 1924).

The Great Meadows took on tremendous significance during the American Revolution, as the attack and defense of New York City centered largely around the Washington Heights area. The military value of Round Meadow Hill, known also as Laurel Hill for its abundant growth of mountain laurel, was quickly recognized by the American army. In 1776, a small redoubt was constructed on the hill, taking advantage of the hill's steepness as well as the surrounding marshland for security. American troops built a wooden barrier, possibly of abattis form, between there and Fort Tryon, an outpost of Fort Washington to the west. Unfortunately, such defenses proved an inadequate impediment to the advancing British army (Bolton 1924, Robinson & Winter 1988).

British and Hessian forces moved against American positions at Round Meadow Hill on November 16, 1776. The Americans were quickly overwhelmed by the 2,000-man British force and abandoned their redoubts almost as soon as the men landed on Manhattan soil (Bolton 1924). The British lost little time strengthening their position at Round Meadow Hill through the construction of an elaborate system of fortifications. They first constructed a large earthwork, followed in 1781 by a hilltop fort which they named Fort George. Americans did little to loosen the British army's secure hold on Manhattan (Bolton 1924; Robinson & Winter 1988).

After the war, according to Bolton (1924), Round Meadow Hill and the surrounding area quickly lapsed back into its original wild state. Into the first part of the nineteenth century, the town of New Harlem continued to be made up largely of scattered farmsteads. To the east of the King's Way

in particular, the marshy conditions surrounding Sherman Creek deterred development. In 1811, the New York City Commissioners released their now-famous street grid plan for Manhattan. However, the grid did not extend beyond 155th Street, indicating that the Commissioners did not expect the dense urban development of the metropolitan area to reach upper Manhattan anytime soon. Instead, the 1811 Commissioners' Map of the New Haerlem area confirmed the unsettled, rural nature of the region.

By the mid-1800s, dense urban development had begun to cover much of Manhattan. Washington Heights was the last portion of the island to succumb to urbanization, boasting only a handful of residences by 1850 (Bolton 1924; Rubinson & Winter 1988). The first resident was that of J. Van Namee and was located east of present-day Amsterdam Avenue between 185th and 186th Streets. Hudson River Railroad Company incorporated in 1846 to construct and operate a railroad from New York City to East Albany, what is now Rensselaer. The line was fully operational by October 1, 1851. Constructed along the west side of Manhattan, the railroad began at 32nd Street and extended north to Spuyten Duyvil in the Bronx. It continued north along the east shoreline of the Hudson through Westchester County to East Albany.

Improvements in transportation expanded areas available for settlement and economic development. By the middle of the nineteenth century, the Lower East Side, near the waterfront, was north of the city's core and east of the developing factory district. As a result of increased economic activity in the city, New York attracted immigrants, which increased the labor pool and served as market for local products. During this time, the East Side was becoming a slum attracting successive waves of poor immigrants, first the Irish and the Germans, later the Italians and East European Jews. With the improved transportation—a railroad service from lower Manhattan to Harlem had been extended service north into Westchester and White Plains by 1846—and rising incomes, immigrant groups relocated out of the East Side. Some Germans established a community in Yorkville on the Upper East Side; some Jewish people resettled in the Bronx; Greenwich Village attracted more well-off families of Manhattan; and the Italians would later develop their own ethnic settlement (Thompson 1977; Harris et al. 2014:79-82).

For example, this dynamic stimulated the expansion of old industries as well as the development new industries and service. One example of this trend was the development of New York as a center for the import of textiles during the nineteenth century. By the end of the century,

a flood of Jewish tailors began to arrive from Eastern Europe [just at] the time when the invention of the sewing machine and other technological advances had made the ready-to-wear industry possible. The abundance of loft space in old factories near the slums of the Lower East Side was ideally suited to the space requirements of the new industry. New York's unparalleled role as a transport center made the rapid shipment of clothing to all parts of the country relatively easy. The general prestige of the great city helped to established it as a center of style [Harris et al. 2014:79].

This type of development also occurred in the financial industry, including insurance, banking, stock markets, and corporate management, which in turn attracted other services and industries (Thompson 1977: 431).

The completion of the Brooklyn Bridge in 1883 was a significant event in the social, economic, and political history of both New York City and Brooklyn, which further encouraged greater unification their union. In 1898, the New York State legislature established the Greater City of New York, consolidating New York (Manhattan), Brooklyn (Kings County), Staten Island (Richmond County), the Bronx, and Queens into a single city of five boroughs. The Manhattan Bridge was completed in 1909. By the 1920s, ferry service between Manhattan and Brooklyn had terminated.

By the beginning of the twentieth century, subway lines extended into northern portions of Manhattan, although aboveground portions of the system and trolleys were already in use. The increasing available of improved transportation further expanded areas of settlement allowed the spread of immigrants from Ireland, Germany, and Eastern Europe throughout the city. Later migrations on the twentieth century include Russian Jews, African Americans, Puerto Ricans, Cubans, and Dominicans.

As automobiles and the state highway system improved in the 1920s a new form of suburbanization took place. Cities outgrew their boundaries and began to encompass adjacent territory. Residential clusters developed outside the city and maintained strong economic social ties. Upward growth and outward sprawl were the product of technological advances in both communication and transportation which permitted the concentration of jobs and services at the center with a dispersal of residences. New York took full advantage of the new technological advances: steel-framed buildings, elevators, centralized electrical power production, subways, commuter trains, and the telephone. Upward growth took the form of taller buildings, more closely spaced and containing more square footage of land than found anywhere else on earth (Harris et al. 2014:80, citing Thompson 1977:432).

By the late nineteenth century, however, upper Manhattan was in the midst of an unmistakable transition from a rural area to an extension of urban downtown and midtown Manhattan. In the 1870s, maps of upper Manhattan began to shift from an emphasis on topographical landforms to commercial real estate (Rubinson & Winter 1988). South of the Sherman Creek area, Dyckman Street curves to the southeast as it turns into Harlem River Drive, also known as the Speedway.

By 1911, the Interborough Rapid Transit (IRT) subway line reached the Inwood-Washington Heights section of Manhattan, finally bringing about full urbanization of the area. The station was located at the corner of Dyckman Street and Nagle Avenue, thus encouraging development (Rubinson & Winter 1988). The United Electric and Power Company, constructed in 1904, is shown on the Hook, between West 201st and Academy Streets. Numerous piers associated with boat clubs such as the Lone Star Boat Club, Union Boat Club, and Val Ray Boat Club lined the southern shore of Sherman Creek by the mid-twentieth century. By about 1955, to the west of Tenth Avenue, several long buildings associated with the Dyckman Houses public housing project are situated parallel to Dyckman Street.

For the Lower Hudson Region, the *Half Moon* sailed up the future Hudson valley reaching as far north as what is now Albany in 1609. On his return trip down the river, Hudson anchored in what is now Haverstraw Bay, where “people of the mountains” descended upon the vessel. The encounter ended in bloodshed, when a member of the crew killed a Native American for stealing

something from the ship. By 1616, the word “Haverstroo” appeared on Dutch maps for this area; the word “haverstroo” reportedly meaning oat straw in reference to the vegetation along the river shore. By 1621, and for the next 40 years with the establishment of the Dutch West India Company, Dutch ships regularly arrived to trade with the native groups they encountered (Brasser 1978a:82, 1978b:200-203; Gehring and Starna 1988:xiii-xxiv; Burke 1991:2-3; Kim 1978:3-5).

Gradually, the Hudson River valley became incorporated as part of the Dutch colony of New Netherland. At its height New Netherland extended from present-day Albany, New York, and its frontier outpost at Schenectady in the north to what-is-now the state of Delaware in the south. It encompassed parts of what are now the states of New York, New Jersey, Pennsylvania, Maryland, Connecticut, and Delaware (Gehring and Starna 1988:xiii-xxiv; Burke 1991:1-18).

While profits from the fur trade prompted Dutch interactions with these native groups, it also influenced the eventual attempts at colonization, especially along the Hudson River. However, the Patroon system that developed in the Hudson Valley with its large land grants and associated feudal privileges and obligations (e.g., tenancy) did not occur in western Long Island or successfully elsewhere. The issuance of land patents in what would become Kings County began in 1636 when Native Americans sold a tract of land to Jacob Van Corlaer and a tract to Andries Hudde and Wolfert Gerritson Van Couwenhoven. These tracts together would become known as New Amersfoort (or Flatlands) and Bowanus (now Gowanus) (Brasser 1978b:204; Goddard 1978:220-222; Stiles 1884:43-44; Ross 1902:64). With the choicest areas of settlement being the “flat untimbered lands along the shore of the bay and river” reminiscent of land in Holland, additional purchases in western Long Island followed Kieft's acquisition of title for nearly all the remaining property in what would become Kings and Queens counties to settle newcomers (Stiles 1884:43-45).

Called “*t Lange Eylandt*” by Adriaen Block as early as 1611, Long Island became dotted with villages during the middle decades of the seventeenth century and included the settlements of Waal-boght (Wallabout), New Amersfoort (Flatlands), Midwout or vlachte bos (Flatbush), Breuckelen, Boswijck (Bushwick), and Vlissingen (Flushing). The original six towns of Brooklyn were Gravesend (1645), Breuckelen (1646), New Amersfoort (1647), Midwout (1652), New Utrecht (1657), and Boswijck (1661). These towns were incorporated into Kings County by the English when they established the province's counties on November 1, 1683 (Bergen 1884:256; Shorto 2004).

The first European purchase of land in proximity to the East River occurred in 1637 when Joris Jansen de Rapalje (several spellings), a French Huguenot and Walloon, purchased 335 acres of land around a bay of what is now called the East River from the local Canarsee. The Canarsee referred to the land as “Rennegakonk” or “Rennegachonk” (sandy place) in the bend of “Marechkawieck.” The bay was more formally called “the boght of Mareckawieck.” Rapalje had originally settled at Fort Orange, but in short order had relocated to New Amsterdam. He utilized his Long Island purchase as a farm, but he did not move there as his residence until the 1650s. This area was largely on the east side of the bay. As early as 1656, the area was referred to as Waal-boght or Wahle-Boght (Bay of Foreigners), for the large numbers of Walloons who lived there or “Walloon's Bay,” today's Wallabout Bay (Stiles 1867:24, 24n; West 1941:2).



Edward Fiscock received a grant for land at what was the west cape of Marechkawieck on the East River. Jan Haes married Fiscock's widow and received a confirmatory patent for the land on April 2, 1647. This land would later be included as parts of the Brooklyn Navy Yard as well as the estate of Comfort and Joshua Sands. This cape or point at the junction of the Waale-boght with the East River was subsequently called "Martyn's Hook," probably for Jan Martyn, a proprietor in that vicinity about the year 1660 (Stiles 1867:80-81). In the 1720s, the area was described in a land transaction as "one-half the meadow, sand, creek, grist-mill, dam, beach of the old dwelling house, bolting-mill and bolting-house (the new dwelling-house only excepted), situated in Brooklyn, at a place called *Marty's Hook*, as in fence, and bought by the said Hans Jorisse Bergen or Aert Aertsen (Middagh)" (Stiles 1867:81). Rem A. Remsen was the owner of the property during the Revolution.

Other landowners in the Wallabout included Hans Lodewyck (1645); Michael Picet (whose land contained marsh/salt meadow in the bend of the Marechkawick and was later granted to Willem Cornelissen [1646]); Peter Caesar Italien or Caesar Alberti (1643 for a tobacco plantation); Pieter Monfoort; Jan Monfoort (the area later became the Ryerson farm) (Stiles 1867:83-84, 88). As evidenced in several land disputes presented by Stiles (1867:90-92), residents cut marsh grass, which was plentiful in the wide tidal flats of Wallabout (Church and Rutsch 1982:16-17). Areas along the East River incorporated as the village of Breuckelen, in 1646, while areas to the east and south contained numerous bouweries or farms (Stiles 1867:45). In 1679, a pair of Labadist travelers visited the Wallabout and described the bay "as tolerably wide, where the water rises and falls much [tidal]; and is at low water very shallow, and much of it dry" (Stiles 1867:88n).

Foreshadowing this English takeover, New Englanders had successfully infiltrated eastern Long Island and established trading posts and settlements there and in the Connecticut River valley prior to 1650. For all practical purposes, Long Island was divided: the eastern half settled by the English and the western half settled by the Dutch. As a result of the paucity of Dutch inhabitants (less than 2,000 people lived in New Netherland by the mid-seventeenth century), WIC directors had allowed some English settlements to exist under their jurisdiction, if those homesteaders took an oath of allegiance to Dutch authority. Although ascribing to Connecticut jurisdiction instead, these English towns included Hempstead, Gravesend, Jamaica (Rusdorp), Newtown (Middlebury), and Oyster Bay (Ross 1902:46; Spooner 1884:23; Stiles 1884:25; Ellis et al. 1967:20-28; Burke 1991:2).

To compensate for a general lack of laborers in the New World, both the Dutch and the English utilized slave labor for agricultural and maritime activities. At the outset of Brooklyn's settlement, documentary evidence suggests that the number of enslaved persons in the town were few. However, as Brooklyn's agricultural economy expanded in the seventeenth century after the English takeover, the number of enslaved persons imported to the colony increased. By 1698, more than 14 percent of the population of the county was held in bondage—296 slaves out of a total population of 2,017. In 1737, the county's population was 2,348 of whom 564 were enslaved Africans (or about 24 percent slave) (Davis 1991:93; Miller et al. 1979:13-14). By the beginning of the American Revolution, nearly one-third of the population of Kings County was in slavery. These numbers suggest that the county "probably had the highest proportion of slaves to total population of any county north of the Mason-Dixon line" in 1775 (Miller et al. 1979:14; Davis 1991:93). After the war, 1,432 enslaved persons were enumerated in the county in 1790. Several

Brooklyn churches in the nineteenth century formed nodes of the Abolition movement and served as stops on the Underground Railroad, including the African Wesleyan Methodist Episcopal Church, initially located on High Street, and other locations in the nearby Vinegar Hill neighborhood (Wilson 1995; NYC Landmarks 2007).

Dutch settlement began in Westchester County in 1646, when Adriaen van der Donck purchased land from Tackarew, Chief of the Rechgawawancks. With this land acquisition, van der Donck gained title to Westchester's first and only patroonship which he named Colen Donck, or Donck's Colony" (Shorto 2004). The tract contained what became what is now lower Westchester County. The modern name for the City of Yonkers derived from van der Donck title of "Yhonkeer," or "young sir" (Shorto 2004).

After the formation of the Dutch WIC in 1621, Africans were brought into New Netherland as enslaved persons beginning in 1626. During the early decades of the colony, enslaved persons were the property, for the most part, by the WIC, and private ownership was not customary until the 1650s. In the 1660s, while New Amsterdam remained under Dutch control, at least 400 enslaved persons were landed in New Netherland by the company (Harper 2003; Becker 1999; Burke 1991:123-125). In general, Dutch settlement did not extend much beyond the valley flats. In Orange County (which included present-day Rockland County until 1798), 19 of the 219 residents were enslaved in 1698 (early records, prior to 1786, listed enslaved and free blacks as the same, although most were slaves; Davis 1991:81, 91).

Violence erupted between the Native Americans and the Dutch in the 1640s and 1660s over conflicting land issues. During the directorship of Willem Kieft (1638-1647), Native Americans from what would become Westchester County invaded western Long Island, destroying houses along a path from near Gowanus to Mespát (Newtown) to Gravesend. In the aftermath of the attack, more than 100 families fled to New Amsterdam (ostensibly Lower Manhattan) for safety (Spooner 1884:23).

What is now Westchester County was a hotly contested area by both the Dutch entrepreneurs and English settlers during the early seventeenth century. Dutch settlers hugged the Hudson River shoreline, while English homesteaders infiltrated the county from Connecticut to the east and Long Island to the south. By 1664, the county was securely in English control. Quakers played an important role in the settlement of the Harlem valley. John Harrison, of Flushing, with four others acquired a tract of land from the local Native Americans in what is now Westchester for the purpose of settling Quakers. Called "the Purchase," this area measured nine-miles-by-three-miles and was situated east of the Mamaroneck River and south of Rye Ponds. By the beginning of the eighteenth century, Westchester County had been carved into six principal manors: Fordham (1661), Pelham (1687), Philipseburgh (1693), Cortlandt (1697), Morrisania (1697), and Scarsdale (1701), with Philipseburgh and Cortlandt being the largest (French and Clark 1925:41, 47).

Cortlandt Manor, the northernmost in Westchester, began at the Hudson River and continued to the first negotiated boundary with Connecticut and measured 10 miles along the river by 20 miles in land. Obtained by Stephanus van Cortlandt, the manor was initially settled along the river at Croton and Peekskill (French and Clark 1925:48-50). Scarsdale was acquired by Caleb Heathcote

(who was also a partner in the Great Nine Partners patent in Dutchess County) and part of the disputed area west of what is now the Town of Rye. This area was part of the 1662 Richbell Patent for eastern Westchester, although the patent did not receive royal confirmation. The area was claimed by members of the Town of Rye (who also disputed the Harrison Purchase) as well as owners of the White Plains purchase of 1683 (as part of the Town of Rye). Heathcote purchased Richbell's claim from his heirs and attempted to assert authority over the area. The disputes were finally resolved in the 1720s. Heathcote erected a grist mill and a sawmill along the Mamaroneck River near the Old Westchester path, an Indian trail near Long Island Sound (Baird 1871:150-155; French and Clark 1925:52-54). Westchester County and the area around White Plains saw considerable action during the War for Independence. The Revolutionary War Battle of White Plains occurred October 28, 1776, during George Washington's army's general retreat from New York into New Jersey that began with the Battle of Long Island in late August. Westchester's population was more than 27,000 in 1800 (Seifried 1994:3).

As of March 7, 1788, 20 towns were created within Westchester County: Bedford, Cortland, East Chester, Greenburgh, Harrison, Mamaroneck, Mount Pleasant, New Rochelle, North Castle, North Salem, Pelham, Poundridge, Rye, Salem, Scarsdale, Stephentown, Westchester, White Plains, Yonkers, and Yorktown (French and Clark 1925:177). Beginning in the 1840s, with the construction of the first Croton River Dam and the Croton Aqueduct, areas in Westchester County have been flooded to provide the residents of New York City with an adequate water supply. Such bodies of water as Croton Lake, Muscoot reservoir, Kensico Lake, and the Rye Lakes have either been created or enlarged to serve this purpose (French and Clark 1925:349-396). From 1842 to 1905, the 26-mile long aqueduct tunnel connected Croton Lake behind the Old Croton Dam with the receiving and distributing reservoirs in New York City (Rennenkampf 1973:n.d.).

In the nineteenth century, the southern and eastern portion of the Westchester County became increasingly urban in character as transportation routes and proximity linked the area to New York City, and later Greater New York (Meinig 1966b:177-179; McNee 1977:430-431). The twentieth century brought the area infrastructure improvements, and the county's proximity to New York City encouraged suburban sprawl by the middle class and professionals who worked in the city (McNee 1977:430, 437-438). Gradually, developments in transportation (e.g., the automobile, super highways—the Saw Mill River Parkway, the Sprain Brook-Bronx River Parkway, the Hutchinson River Parkway, the Cross Westchester Parkway, and the New England Thruway) improved access to jobs and resources in New York City and Connecticut and has tied the area closely with New York since World War II (McNee 1977:451-452; Seifried 1994:3).

In December 1955, the original Governor Malcom Wilson Tappan Zee Bridge opened as one of the primary crossings of the Hudson River north of New York City. As the longest bridge in New York State, spanning from Grandview-on-Hudson to Tarrytown, the bridge was constructed as the final link of the part of the 570-mile New York State Thruway Authority (NYSTA). The bridge stimulated development and economic growth in the Lower Hudson Valley. Construction of a new bridge alongside the Tappan Zee began in 2013. After 62 years of service, the NYSTA retired the Tappan Zee Bridge in October 2017. The new 3.1-mile long, twin-span Governor Mario M. Cuomo Bridge opened at a total cost of \$3.98 billion in the September of the following year (NYSTA 2019).

In the area of what is now Rockland County, Dutch traders patronized Native Americans related to or allied with the Algonquian Delaware or Lenni Lenape, which included the Haverstraw and Tappan, who occupied the west bank of the Hudson, and the Wappinger, who occupied the east bank (Goddard 1978:220-221; Kim 1978: 4-8; Gehring and Starna 1988:xiii-xxiv). Dutch proprietorship of New Netherland ended in 1664 when the English peacefully seized control of the colony and renamed it New York for Prince James, Duke of York and Albany. Despite this change, land-use and settlement patterns established in the region by the Dutch remained largely the same (Brasser 1978b:204; Goddard 1978:220-222; Headley 1908:263).

First European land transactions in present-day Rockland County occurred south of what is now Piermont at Tappan along the river. Captain De Vries, seeking locations for mill sites, purchased land here from the local Delaware in 1640 and established Vriesland. It is not known if De Vries remained long on his parcel. This short-lived community, if it ever existed, did not survive the mid-century conflicts between the Dutch and the Delaware (Sullivan 2004[1927]). In 1666, Balthazar de Harte, a New York merchant, purchased from the local Delaware an extensive tract of land on the west shore of what is now Haverstraw Bay. Five years later, his purchase, comprising 83,000 acres, was confirmed by the English governor who issued him a formal patent for the area. Other tracts within the rugged Highlands were also purchased by speculators, and it is reported that when Orange County was created in 1683 (at which time it included what is now Rockland County) only a few settlers lived within it. In 1694, Haverstraw was sold to John Allison and John de Noyelles. In 1702, only 268 families were recorded within the county (Cobb nd; Sullivan 2004 [1927]; Cole 1884:176).

On 1 November 1683, the British officially organized Orange County as one of the original twelve counties established in the New York colony (two of which—Dukes and Cornwall—were not within the present boundaries of the state), although the boundary between New York and New Jersey (e.g., the southern boundary of the county) was in dispute until 1769. During the eighteenth century, Orange County began the process of organizing into precincts and towns. Formed in 1686, the Precinct of Orange encompassed the entirety of what is now Rockland County. In 1719, the Precinct of Haverstraw was created and included Haverstraw as well as what are now the towns of Clarkstown, Ramapo, and Stony Point. Haverstraw became a town in 1788 and Clarkstown and Ramapo were removed in 1791. Stony Point became a separate town in 1865 (Cobb nd; Casey 2020).

Orange County incurred slow population growth during the eighteenth century because of the ruggedness of the area's topography and the lack of adequate roads. Most population centers were situated along the banks of the Hudson River prior to the American Revolution, utilizing sloops to move goods and people. Small communities emerged at Haverstraw village and Tappan Slote, what is now Piermont (Muller et al. 1988:8; Casey 2020). Under the British, the incidence of slavery increased in the New York colony during the late seventeenth into the eighteenth centuries, although in rugged Orange County enslaved persons as a percentage of the general population declined through the period (Burke 1991:193, 210; Davis 1991:83). By 1723, the county had a population of 1,244, including 147 enslaved persons (approximately 12 percent). In 1756, the county had 4,886 inhabitants including 430 enslaved persons (approximately 9 percent). On the eve of the American Revolution (1771), the population of Orange County had risen to 10,092, which included 662 enslaved persons (approximately 6.5 percent; Davis

1991:90). Emancipation acts in the New York Legislature were established in 1799 and 1817, and, finally, in 1827, slavery was abolished in the state (Davis 1991:80-83; Harper 2003; Becker 1999).

During the Revolutionary War, the attempt to capture New York was part of a larger strategic initiative by the British to divide the New England colonies from the Middle Atlantic and Southern colonies. British planners believed that once the colonies were successfully split, each region could be brought back more easily into the empire. During early July 1776, British forces from Boston under Admiral Richard Howe, brother of General William Howe, landed on Staten Island in preparation for a larger undertaking (Stiles 1884:51; Ross 1902:334; Carrington 1877:199-205). On the morning of August 22, the British, under the command of General Howe, crossed the Narrows and began landing what would become a force of between 15,000 and 16,000 men and 40 pieces of artillery (other estimates of troop strength are higher) on Long Island at what is now Fort Hamilton. At that time, western Long Island was a low, level plain covered with a dense growth of woods and thickets. Stretching north and east from the coast, the plain was divided by a ridge of hills, extending from New York Bay midway through the island (Stiles 1884:52). This staging area would be the launching point for the multi-prong assault on Patriot defenses near Brooklyn, under the command of George Washington (Stiles 1884:13, 51-53; Bergen 1884:262; Carrington 1877:199-215; Harpaz 1996:B-28).

Fought on August 27, 1776, the Battle of Brooklyn (sometimes referred to as the Battle of Long Island) resulted in the decisive defeat of the outnumbered Patriots, who deftly escaped into Manhattan on the night of August 29 under cover of thick fog. The deadliest single encounter of the Revolution for the Americans, the Battle of Brooklyn cost the rebels 3,000 soldiers, who were either killed, captured or missing. After the evacuation of Washington's troops, New York was occupied for seven years by the British and their Hessian allies, who foraged and encamped throughout the county. During the occupation, according to Bergen (1884:262), "the British, Hessians, Tories and refugees had unlimited range over Long Island, and were quickly joined by 'neutrals' and 'fence gentry'" (Harpuz 1996:B-28; Stiles 1884:13, 32-33, 52; Carrington 1877:199-215). Brooklyn and New York City remained under British-Hessian occupation until November 25, 1783.

Ancillary to the action related to the Battle of Brooklyn, Wallabout Bay achieved notoriety during the war as the anchorage for at least sixteen British prison and hospital ships during the British occupation of New York City. Although the number of American prisoners who died aboard these vessels will never be known, estimates place the number of dead between 11,000 and 12,000 during the period (Lossing 2001 [1850]; Stiles 1867:359). The ships were decaying, out-of-service hulks moored in the bay, some serving as hospital ships. *The Whitby* was reported to be the first of the prison ships moored off Remsen's mill, beginning in October 1776. However, the worst of the lot was reputed to be *The Jersey*, a worn-out, 65-gun sloop (Stiles 1867:333). A former prisoner who survived confinement on *the Jersey*, Christopher Vail wrote:

When a man died, he was carried up on the forecastle and laid there until the next morning at 8 o'clock when they were all lowered down the ship sides by a rope round them in the same manner as tho' they were beasts. There was [sic] 8 died of a day while I was there. They were carried on shore in heaps and hove out the boat on the wharf,

then taken across a hand barrow, carried to the edge of the bank, where a hole was dug 1 or 2 feet deep and all hove in together [DeWan 2008].

General Jeremiah Johnson reported “I saw the sand-beach, between the ravine in the hill [what was Little Street in 1867] and Mr. Remsen’s dock, become filled with graves in the course of two months; and before the First of May, 1777, the ravine alluded to was itself occupied the same way” (Stiles 1867:334). Almost as soon as the bodies were buried in the sandy flats, bones washed out of the marsh with the tides. Excavations in the area by post-war landowner John Jackson as well as later by Brooklyn Navy Yard personnel disturbed those skeletons that had not eroded out of the sandy hills. These bones were reinterred at a ceremonial site west of the Navy Yard in 1808, and later at Fort Greene Park in 1908. General Johnson briefly described the situation on the Wallabout during the period:

It was no uncommon thing to see five or six dead bodies brought on shore in a single morning, when a small excavation would be dug at the foot of the hill, the bodies be cast in, and a man with a shovel would cover them, by shoveling sand down the hill upon them. Many were buried in a ravine of the hill; some on the farm. The whole shore, from Rennie’s Point to Mr. Remsen’s door-yard, was a place of graves; as were also the slope of the hill near the house (subsequently dug away by Mr. Jackson...); the shore from Mr. Remsen’s barn along the mill-pond, to Rapelje’s farm, and the sandy island between the floodgates and the mill-dam, while a few were buried on the shore on the east side of the Wallabout. Thus did Death reign here, from 1776 until the peace. The whole Wallabout was a sickly place during the war. The atmosphere seemed to be charged with foul air from the prison-ships, and with the effluvia of the dead bodies washed out of their graves by the tides. We believe that more than half of the dead buried on the outer side of the mill-pond, were washed out by the waves at high tide, during northeasterly winds. The bones of the dead lay exposed along the beach, drying and bleaching in the sun, and whitening the shore, till reached by the power of a succeeding storm; as the agitated waters receded, the bones receded with them into the deep [Stiles 1867:350n].

Remsen’s land was purchased at auction in 1781 by John Jackson and his brothers, Samuel and Treadwell. Rapalje’s property between what are now Gold and Fulton streets comprising approximately 160 acres was purchased by Comfort and Joshua Sands from the Commissioners of Forfeited Estates on July 13, 1784 for £12,430 in state scrip (Stiles 1867:77-81, 382, 1869:96). The Sands brothers reputedly paid for the purchase with pay certificates issued to Continental soldiers, which they had purchased at a discount in large quantities. The Sands later laid out the area for streets in 1788 and called their village Olympia. Comfort, Joshua, and a third brother, Richardson, were merchants, bankers, New York politicians, and speculators, who provisioned the army in 1777 and 1782 (Stiles 1869:96).

Jackson was an entrepreneur and land developer. One of Jackson’s first projects on his property was the erection of a dock that reputedly enclosed the hull of one of the prison ships that burned in October 1777 (Stiles 1870:945). As he improved his land during the construction of his shipyard, he cut away the high banks that formed the shore, revealing the bones of dead POWs. The small

shipyard constructed *the Canton*, a merchant vessel, and, in 1798, a small frigate, *the John Adams*, for the United States government (West 1941; Church and Rutsch 1982:20).

The Navy Department's tenure on the Wallabout began in February 1801. At that time, Jackson sold his shipyard and an adjacent parcel totaling nearly 42 acres to Francis Childs for \$40,000. Childs, an agent for the government, transferred the deed to the United States for the creation of the New York Shipyard (West 1941:7). The first Navy ship constructed and launched at the Navy Yard was the 74-gun frigate *Ohio*, the largest ship built in America at that time, which was completed in 1820. However, its facilities remained sparse during the first decades of the Navy Yard's existence. "The original Jackson shipyard had consisted of a few buildings used to house wooden boats under construction: the former millpond, in which oak beams and planking were seasoned; the abandoned mill building; and the muddy flats, on which a storage pier and winding access road had been built" (Church and Rutsch 1982:21). During these years, the large mill pond, empty at low water, extended from what is now Sands Street along the present western boundary of the Navy Yard to Flushing Avenue, and then as far as Clinton Avenue, extending into the present park (Stiles 1884:870).

The U.S. Congress passed a bill in 1824 that arranged the navy yards into classes, and the navy yard in Brooklyn became a first-class yard. Through the nineteenth century, the Brooklyn Navy Yard expanded by acquiring adjoining parcels and constructing additional facilities, although the western side of the installation remained the more intensely developed. Prior to the beginning of the Civil War, yard workers constructed four new steam warships, including the *Fulton II* (1837), the Navy's first ocean-going steamship, and the *Niagara* (1857), a frigate that participated in laying the transatlantic cable (Church and Rutsch 1982:24; BNYDC 2007).

In the first decades after the Civil War, numerous warehouses were erected along the waterfront between Fulton Street and Atlantic Basin. The Atlantic Basin (1847) had emerged as an important location of grain handling during this period. The waterfront area in Brooklyn was a prominent shipping center for imported bulk goods, raw materials, and agricultural products. Rail connections served to facilitate the shipment of these materials throughout the region. There also was some specialization according to location. For example, the stores between Atlantic and Pierrepont Streets handled sugar, while stores between Clark and Fulton Street processed coffee, and east of Fulton Street, stores handled tobacco, coffee, and sugar (Brockett 1884:645). As expected, the increasing availability of work on the docks drew a variety of immigrant groups, beginning with the Irish, and shifting to Italians and Scandinavians by later in nineteenth century (Raber Associates 1984a:31-33; Harris et al. 2014:78-79).

The completion of the Brooklyn Bridge in 1883 was a significant event in the social, economic, and political history of both New York City and Brooklyn, which further encouraged greater unification their union. In 1898, the New York State legislature established the Greater City of New York, consolidating New York (Manhattan), Brooklyn (Kings County), Staten Island (Richmond County), the Bronx, and Queens into a single city of five boroughs. The Manhattan Bridge was completed in 1909. By the 1920s, ferry service between Manhattan and Brooklyn had terminated.

The construction of automobile and subway tunnels connecting Brooklyn and Manhattan by the mid-century contributed to the economic decline of the Brooklyn waterfront. However, the area continued to support warehouses and other structures through the 1950s (Harris et al. 2014:78-79).

During the Revolutionary War, both sides of the Hudson River north of New York became the focus of Patriot defenses. The strategic importance of the river was immediately recognized by both American and British strategists (Muller et al. 1988:6-9). By controlling the river and Lake Champlain the British could sever the physical link between the New England colonies and the “bread-basket” colonies of the Middle Atlantic. Defending the river was essential for American military planners. During this time, colonial defenses included fortifications at Sidman’s Fort (at Suffern, western Rockland County), a blockhouse (at Palisades, near High Tor State Park, southwest of Haverstraw), fortifications at Stony Point (north of Haverstraw along the river), Fort Clinton (at Bear Mountain), and Fort Montgomery (in Orange County at Popolopen Creek) (Muller et al. 1988:20-22, 50-52; Casey 2020).

In October 1777, British General Sir Henry Clinton successfully dispersed the American defenses south of West Point, resulting in the evacuation of American forces from the Highlands. The British overran West Point and burned the fortifications on Constitution Island. Upon reaching Kingston, Clinton’s forces received news of General John Burgoyne’s defeat at Saratoga, and quickly returned to New York City (Muller et al. 1988:50-52). By summer of 1779, the British had erected a strong fortification at Stony Point on a rocky bluff surrounded by water and swampland. However, American forces under the command of Brigadier General “Mad” Anthony Wayne captured the fort, taking more than 500 prisoners. After the American victory at Stony Point in July 1779, the Highlands went militarily unchallenged by the British for the rest of the war; although the desire to capture West Point played a significant role in the treachery of Benedict Arnold during his command of the facility (Muller et al. 1988:201-202).

During the American Revolution, area residents were terrorized and subjected to attacks and thefts by Britain’s Tory supporters. Claudius Smith, known as the “Cowboy of the Ramapose [sic],” and his sons were outlaws who stole horses and cattle, invaded and robbed homes, and even murdered some residents. Smith killed Major Nathaniel Strong in his home, which resulted in the Governor of New York posting a reward of \$1,200 for his capture. Smith fled to Long Island and supposed safety among British allies, but he was captured and taken to Goshen where he was hanged on January 22, 1779. During the tenure of Smith gang they hid in several caves and rockshelters (Eager 1846; Cooney nd). Smith’s Clove (in the vicinity of Monroe) is named for him. Skirmishes also occurred between Patriot militia and British troops during attempts by the British to cross the Hudson River, including the exchanges of gunfire at Nyack and Haverstraw (Casey 2020).

The vicissitudes of the Revolutionary warfare left Orange County ravaged, notably the southern two towns—Haverstraw and Orangetown—of the county’s four towns (Cornwall and Goshen were the others). There were few good roads, and the river provided the only means of reliable transportation. Efforts at rebuilding the county required an increase in taxation, especially for the northern two towns which had endured less destruction. However, these efforts ultimately resulted in the creation of Rockland County from Orange County in February 1798. The original towns of



the county were Clarkstown, Haverstraw, Orangetown and Hempstead (renamed Ramapo in 1828) (Casey 2020).

Early industrial activities centered on the use of the area's natural resources, notably timber and mineral mining. Iron and nickel mining were practiced on a small scale before the Revolution in the mountainous areas in the northern and western part of the county, and sandstone and building stone was quarried throughout the nineteenth century, notable near Nyack. As expected, the areas streams attracted sawmills and gristmills. A tannery was in existence at Sloatsburgh as early as 1792 (Sullivan 2004 [1927]).

In 1795 J.G. Pierson erected an extensive nail factory in western Hempstead (Ramapo) to utilize the area's iron deposits and water power (the Ramapo River). By 1813, the operation produced one million pounds of nails per year. The addition of a cotton mill in 1814 led to the creation of the Ramapo Manufacturing Company in 1822. The company ceased business in the 1850s (Casey 2020; McCabe 1976).

Near what is now Garnerville, John Glass completed construction of a calico printing plant on 45 acres along Minisceongo Creek in 1831. He was killed in an accident loading the first shipment bound for New York. Idle for a number of years, the plant was purchased by Thomas and James Garner and Charles Wells. "In 1853 the Rockland Print Works was incorporated to print and dye woolen, cotton and linen goods" and by 1908 it employed 800 workers. The plant was sold to a southern bleachery in 1929, which shipped all the machinery to South Carolina (Cobb nd; McCabe 1966).

The need for transportation to bring manufactured goods from the western part of the county to the Hudson River for shipment resulted in the creation of the Nyack Turnpike. An early route ran indirectly from Suffern to Haverstraw and followed near what is now Route 202. The Nyack turnpike, when completed 17 years after its approval in 1813, connected Nyack to Suffern (notably Pierson's nail operation) and roughly parallels what is now Route 59 across the county. Near Suffern, the turnpike crossed the Orange Turnpike, which led to Albany. The politics over the creation of a new turnpike stimulated a rivalry between Haverstraw and Nyack over which would serve as the port to send goods to New York. The Nyack Turnpike was a boon to Nyack and locations along it and tolls were collected along the route until 1893 (Nannariello 1996).

Although the *Clermont* was in use since 1807, steamboat travel to Rockland did not begin until 1827 when the *Orange* made regular trips between Nyack and New York (Sullivan 2004 [1927]). Steamboats began to run from Haverstraw in 1836 (Cobb nd; Casey 2020). Some of the steamboats docking at Haverstraw included the *Rockland*, the *Warren*, the *Emeline*, the *Chrystenah*, and the *Raleigh* (Cobb nd).

Construction of the railroad during the nineteenth century provided an impetus for both residential and commercial development. Beginning at Piermont in 1838, the New York & Erie Railway began construction of a railroad line to west. The line was completed to Dunkirk on Lake Erie in 1851. In the Town of Haverstraw, the New York & New Jersey Railroad ran from Jersey City through Mount Ivy and Thiells to West Haverstraw in 1873. The line was extended into Haverstraw village in 1887. The West Shore railroad ran through the village beginning in 1883 (Sullivan 2004 [1927]).

By 1837, George S. and Michael Allison owned almost all of the land between Main Street and “the Narrow Passage” in the northern part of the Village of Warren, as Haverstraw was referred at that time. Incorporated as Warren in 1854, the village was renamed Haverstraw in 1874. The Village of Haverstraw “is the largest place in the county [in 1926], probably one of the oldest in point of permanent settlement, and the seat of the greatest single industry in Rockland. It was not even a hamlet until well after the Revolution, and had no store until 1815. In 1837, speculation in real estate gripped the section, and the name of Warren, for a time, was given to a new part of the town. The brick industry, which made Haverstraw, has already been mentioned, and, although the village has thirty-five manufacturing concerns, practically all of these of any size are engaged in the making of brick. The village was incorporated February 14, 1854” (Sullivan 2004 [1927]; Cole 1884:152; Green 1886:372-374).

The Hudson River valley was the center of brickmaking in the nineteenth century into the early twentieth century and Haverstraw was the capital. By 1860, the extensive clay beds along the village’s waterfront provided the raw materials to enable the annual manufacture of 150 million and employment of more than 1,000 men (French 1860). The impetus for the expansion of Haverstraw’s brick industry was Richard VerValen invention of an automatic brick machine in 1852. “The new machine tempered the clay, pressed the malleable clay into molds, and produced bricks of uniform size [and] For the next 75 years, North Rockland was the source of building materials for the colossal growth of New York City” (Casey 2020). By 1884, near the height of brick manufacture, 42 brickyards used 170 brick machines to produce more than 302 million bricks and employ 2,400 workers (Cole 1884).

The Excelsior Brick Company utilized clay dredged from the river and conveyed via trestles to be mixed with clay excavated from inland. In addition to the subaqueous mining, the Excelsior company was innovative in developing a system of “covered-yard drying” (Hall 1972 [1905]:49). The system involved placing the newly molded brick in an enclosure with a special type of shutter that turned on pivot to allow maximum sunlight and that could be closed to keep out rain and moisture. The Excelsior Brick Company did not survive the Depression, closing on July 21, 1933 (Hall 1972 [1905]:49-51; deNoyelles 2002:1-2, 4).

By the beginning of the twentieth century, approximately 42 brickyards were in operation in the Haverstraw area. By this time many yards along the river were excavating below the level of the water. The Excelsior Brick Company, for example, reached a depth of 35 feet below river level, Brickmakers north of Main Street were excavating clay in proximity to residential and business areas below the level of the streets. Houses were subsequently perched on high banks facing the river.

During the twentieth century, the advent of new building materials, such as steel, cement and concrete, undermined the profitability of the brick industry and the number of brickmakers declined to nine in 1925 (from as many as 37 at the start of the century) (deNoyelles 2002:1-2, 4). The availability of the new materials, combined with the Great Depression of the 1930s, caused the demise of the industry in 1941.

Beginning at the south end of Westchester County, the Croton Aqueduct (built 1837-1842) was constructed through the City of Yonkers, Town of Greenburgh (Villages of Hastings-on Hudson, Dobbs Ferry, Irvington and Tarrytown), Town of Mt. Pleasant (village of North Tarrytown), Town of Ossining (Villages of Briarcliff Manor and Ossining), Town of New Castel, and Town of Cortlandt (Village of Crotonville (Rennenkampf 1973:n.d.). Located on the Hudson, the Village of Yonkers was incorporated in 1855, and it was incorporated as a city in 1872. By 1900, rail lines in the New York City region were leading middle-class families to New Rochelle, White Plains, Bronxville, and even into the quiet farming community of Scarsdale. The electrification of the New York Central's commuter lines in 1910 resulted created easier and more convenient commutes between New York City and communities along the Hudson River line.

As of January 1, 1874, Morrisania, West Farms, and King's Bridge were ceded to New York County (the area is now in the Bronx). Later, on June 6, 1895, Wakefield, Eastchester, Williamsbridge, Spuyten Duyvil, and the Town of Westchester were also annexed by New York (this area is also now within the Bronx) (French and Clark 1925:180). By 1890 Westchester County had a population in excess of 145,000 (Seifried 1994:3).

Jersey City, a historically significant New Jersey port of entry and manufacturing center, is situated on a peninsula formed by the Hudson and Hackensack Rivers and Upper New York Bay. Located just across the Hudson River from the island of Manhattan, Jersey City is considered the first permanent European settlement in the state (Jersey City Online n.d.). In 1629, a patroon named Michael Pauw received a grant to plant a Dutch colony on the west side of the Hudson River. Pauw's grant, which eventually became the district of Pavonia, is the earliest known conveyance for what would later become Jersey City (Grundy and Caroselli 1970; Kardas and Larrabee 1978).

By the late 1630s, Pavonia contained three tiny Dutch settlements within the boundaries of present-day Jersey City. These included the settlements of Harsimus, a lowland area near the present Harsimus Cove, Paulus Hook, a "noticeable promontory of high land" where Jersey City was later founded, and Communipaw, an area of relatively high land on the north side of New York Bay (Kardas and Larrabee 1978). These settlements consisted largely of scattered farms known as "bouwerries" that extended along the length of the Hudson shoreline (Rutsch et al. 1977).

Despite more than a decade of relatively peaceful relations with the local Indians, unrest broke out in the early 1640s and escalated into the Dutch-Indian War of 1643-1645. Due in large measure to the poor leadership of Director-General Willem Kieft, the conflict quickly resulted in the destruction of most of the early Dutch farms within the colony of Pavonia (Kardas and Larrabee 1978). In the late 1640s, the Dutch made another attempt to settle the west side of the Hudson under the leadership of a new director-general, Pieter Stuyvesant. After negotiating peace with local Indians, Stuyvesant established a community known as Bergen in the interior portion of the peninsula, to the west of the original settlements. Observing his predecessor's difficulty in defending the widely scattered farmsteads of the earlier settlements, Stuyvesant ordered the village to be enclosed and fortified against attack. As an added protection, the director-general purchased most of what is now Hudson County from the Hackensacks in 1658 (Grundy and Caroselli 1970; Kardas and Larrabee 1978).

In 1664, New Netherland became the English proprietary colony of New Jersey, divided into the provinces of East and West Jersey under the governance of Sir George Carteret and John Lord Berkeley respectively. Following the establishment of English rule, life on the west bank of the Hudson remained relatively unchanged for almost two centuries (Kardas and Larrabee 1978). Carteret granted a new charter to the township of Bergen, guaranteeing its inhabitants the continuation of all rights and privileges previously enjoyed under Dutch rule (Grundy and Caroselli 1970). The only sign of coming change was the area's gradual emergence as a transportation hub and transshipment point between a growing Manhattan community and new settlements to the west (Kardas and Larrabee 1978). More importantly, the settlers began supplying ferry service to Manhattan from several points on the peninsula, including Communipaw Cove (Kardas and Larrabee 1978).

The first community to bear the name Jersey City emerged in the location of the original west shore settlement of Paulus Hook, located between Harsimus Cove on the north and Communipaw on the south. Abraham Isaacs Planck initially purchased this waterfront acreage in 1638 for 550 guilders from the Dutch West India Company, an offshoot of the original Dutch East India Company. Planck established a small settlement on this land, using a portion of it as a tobacco plantation and the remainder for farming and dairy purposes (Rutsch et al. 1977; Marrin 2002).

From the beginning, Jersey City's waterfront played a vital role in its commercial and industrial development. Oystering and shad fishing, both conducted in the mud flats of Communipaw Cove, represented one of the area's earliest and most important industries, until the arrival of the railroads and manufacturing in the nineteenth century polluted and destroyed both the cove and its adjacent waterways (Rutsch et al. 1977). The establishment of an extensive ferry service between Communipaw Cove and the island of Manhattan was another hallmark of Jersey City's early commercial growth. The first ferry service was established by William Jansen around 1661, operating from a landing at the foot of present-day Communipaw Avenue on what was the original south cove shoreline (Rutsch et al. 1977; Kardas and Larrabee 1978). By 1764, Jansen's Ferry had significant competition from the newly established Paulus Hook Ferry, which operated from the foot of Grand Street as part of a stage route between New York and Philadelphia. Both enterprises provided service via rowboats and small, decked sailboats known as periaugers. In 1812, investor and entrepreneur Robert Fulton established a drydock in Paulus Hook and soon began providing ferry service to and from Manhattan Island via steamboat. Over time the ferry industry and the hostelry business that accompanied it contributed greatly to Jersey City's role as the focal point of transportation between major industrial cities in the northeast (Rutsch et al. 1977).

The simultaneous arrival of the railroads and the Morris Canal in the 1830s solidified the city's vital role in the regional economy for the next one hundred years (Jersey City Online n.d.). By 1838, the completed canal provided the city's iron industry with direct access to the coal mines of eastern Pennsylvania as well as important iron markets in the northeast (Rutsch et al. 1977). Meanwhile, numerous railroad lines jockeyed for position along the Hudson's west bank, competing for access to the increasingly important New York Harbor and shipping facilities of Manhattan. By the mid-nineteenth century, the area was known for its network of rail terminals, which included the Erie, Pennsylvania, Lehigh Valley, and Jersey Central Railroads.

The city's extensive waterfront, effective transportation network, and easy access to fuel from Pennsylvania coal mines led logically to the rapid growth of the city's industrial and commercial prowess. Important early enterprises included Dummer's Glasshouse, a waterfront industry established in 1824 just south of the present-day Morris Canal Basin, and the Jersey City Pottery Works, opened on Warren Street in 1825 (Rutsch et al. 1977). The year 1845 marked the beginning of Jersey City's steel industry with the establishment of the Atlas Foundry, followed by the North Point Foundry and Machine Works in 1848 and the Adirondack Steel Works in 1849 (Rutsch et al. 1977). Other well-known companies eventually made their home in Jersey City, including American Can, Emerson Radio, Colgate, and Dixon Ticonderoga (Jersey City Online n.d.).

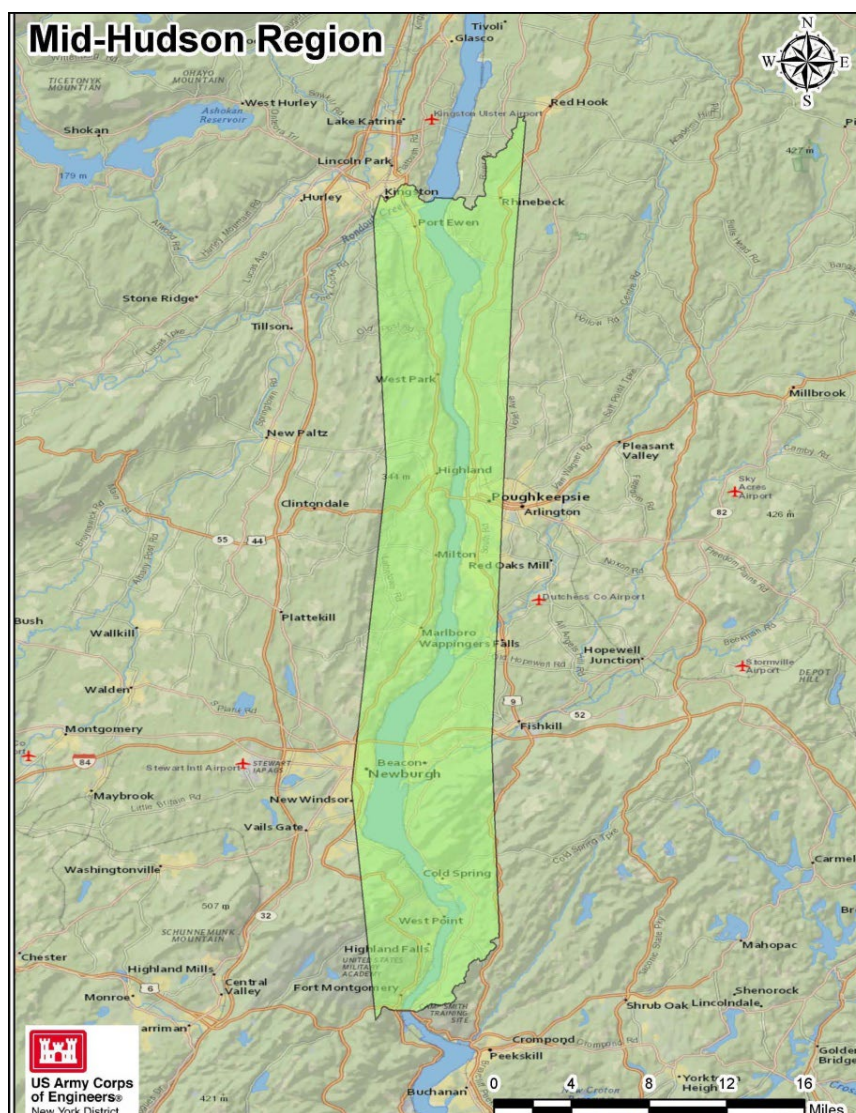
In 1838, Jersey City separated completely from the township of Bergen and formed an independent municipal government (Grundy and Caroselli 1970; Rutsch et al. 1977). Having achieved a greater measure of independence, city officials made a concerted effort to correct some of the city's problems and to undertake several public improvement projects. Streets were graded and filled, and sunken lots filled with stagnant water were eliminated (Rutsch et al. 1977). Over the next two years, Jersey City attracted another one thousand new residents to become the fastest growing municipality in the newly formed Hudson County. Within thirty years the city had outpaced the growth of neighboring communities such as Bergen and Hudson City, who voted in 1870 to consolidate with the city into one large urban area. Nearby Greenville joined the merger three years later (Grundy and Caroselli 1970).

An important linkage between New York and New Jersey was the completion of the George Washington Bridge (1931) at Fort Lee north of Jersey City. Following World War II, the rapid growth of the suburbs around Jersey City delivered a blow to the urban area, which experienced the collapse of its railroads, the death of its manufacturing centers, and the general decline of its public infrastructure (Jersey City Online 2002).

### **3.3.8 Mid-Hudson Region**

At the time of the Dutch arrival at beginning of the seventeenth century, Algonquian-speaking Mohican hunting territory spanned both sides of the Hudson River, with Iroquoian-speaking Mohawk occupying lands well to the west and north (Dunn 1994:45-62). As the seventeenth century progressed, the Hudson roughly divided the territories utilized by the two nations, although the Mohican still hunted areas on the west side of the river. Mohican villages were situated near the rich alluvial flats and islands along the east banks of the Hudson (such as Papscanee Island south of Albany), while Mohawk castles laid some 30 miles west near the Schoharie Creek (Brasser 1978b:198, 202-203; Fenton and Tooker 1978:466-469). While Dutch traders attempted to peacefully patronize both Native groups, tensions between the two escalated into bloodshed as the Mohawk attempted to prohibit Mohican access to both their traditional hunting grounds on the west side of the river and Dutch trade goods at Fort Orange. From about 1624 to 1630, the Mohican became embroiled in a losing war against the Mohawk over the beaver trade, resulting in Mohawk dominance of the territory around Fort Orange. The Mohawk became *de facto* middlemen between Dutch merchants at Fort Orange and other Native American groups

(Dunn 1994:13-30; Fenton and Tooker 1978:466-469; Burke 1991:3-4; Trigger 1978:348-355; Gehring and Starna 1988:xix).



**Figure 3.11. Mid-Hudson Region, NYNJHAT Study (USACE, New York District 2021).**

At the time of Hudson's voyage, the Hudson-Leeds area was utilized by Algonquian-speaking Mohican or Mohican-related Catskill Indians, although the Esopus, related or allied with the Algonquian Delaware, are also referred to as living in the vicinity of Catskill Creek (Brasser 1978a:198; Goddard 1978:213-214). During the early Dutch period, Native Americans lived on the plain near the confluence of Catskill and Kaaterskill creeks, and cultivated maize and tobacco on the plains. Moreover, they maintained their "wigwams" on high ground above to Catskill and a burial area on the high ground overlooking the north bank of the creek (J.B. Beers and Co. 1884:89).

In the area around what is now the City of Kingston, Dutch traders interacted with Native Americans related to or allied with the Algonquian Delaware, which included the Esopus, who occupied the west bank of the Hudson River between the Catskills Mountains and the Highlands near West Point, and the Wappinger, who occupied the east bank. The middle and lower Hudson areas were occupied by Munsee-speaking groups (related to Algonquian), such as the Wappinger (the Dutchess-Putnam area), and the Kichtawink (northern Westchester), although the internal politics and external boundaries of these groups are uncertain (aboriginal groups in the mid-Hudson are discussed generally as “Delaware Indians”). Although the Mohawk were dominant force at Fort Orange, the Mohican remained in authority in the Hudson Highlands. By 1675, the Mohican were the leaders of a confederacy of Highlands Indians which included the Wappinger, the Housatonic (western Massachusetts area), and the Wyachtonok (western Connecticut) (Brasser 1978b:198, 202-204; Goddard 1978:213-214; Burke 1991:3-4; Trigger 1978:348-355; Gehring and Starna 1988:xix).

The fur trade not only motivated Dutch interactions with these groups, but also influenced the eventual attempts at colonization. Land grants in the Hudson River valley began in 1629 when the *Staten Generaal* encouraged settlement in New Netherland by offering large grants of land with feudal privileges and the title of Patroon to any person who established a settlement of more than fifty families on any of the lands in the colony. This led to the creation of large patroonships on both sides of the Hudson River; the most successful of which was Rensselaerswijck in the area around Fort Orange and Beverwijck (present-day Albany; which was laid out by the company in 1652) (Kim 1978:4-8; Ellis et al. 1967:18-25, 74-76; Burke 1991:3-4; Gehring and Starna 1988:xiii-xxiv; Dunn 1994:13-14, 1991).

After a few decades, as Dutch traders penetrated the forests of the Hudson valley, the supply of local pelts declined precipitously due to of intensive harvesting. The Mohican subsequently became embroiled in a period of ultimately unsuccessful warfare with the Mohawk for control of the pelt trade. In addition, these tensions were exacerbated by the increasing number of Europeans and enslaved people entering New Netherland.

As population slowly increased throughout New Netherland, settlements were established in the mid-Hudson Valley (notably Wiltwijck and Nieuw Dorp, present-day Kingston and Hurley), in what would become northern New Jersey, and on western Long Island (Burke 1991:18; Blumin 1976:2). Although the Dutch ostensibly controlled the area along both banks of the river, they continued to have difficulties with the local Native American groups with whom they traded. These difficulties were exacerbated by the increasing number of Europeans and slaves entering New Netherland. These settlers were encouraged by Dutch officials to establish farming communities within the colony. Not unexpectedly, violence erupted between the Native Americans and the Dutch in the 1640s and 1660s over conflicting land issues. In 1643, Algonquian Delaware living either on or near what is now Constitution Island retaliated against abuses inflicted by Dutch traders and farmers as part of what became two years of bitter conflict (Headley 1908:263). In 1663 the Esopus destroyed the newly established farming community at Nieuw Dorp and burned houses at Wiltwijck, killing at least 18 people and taking at least nine prisoners, and igniting year-long hostilities. While Dutch proprietorship of New Netherland ended when the English peacefully seized control of the colony in 1664, land-use and settlement patterns established in the region by the Dutch remained largely the same (Blumin 1976:2; Ruttenber and Clark 1881:809; Brasser

1978b:204; Goddard 1978:220-222; Kim 1978:4-8; Gehring and Starna 1988:xiii-xxiv; Burke 1991:349, 66-67).

**English Colonial Period.** With the English takeover of New Netherland, the fur trade became an essential imperial concern, and subsequent competition with the French in New France (Canada) resulted in the erection of fortified trading posts along the frontier. With the Dutch excluded from New World influence after 1674, the strategic importance of New York as a nexus of trade and commerce increased during the eighteenth century as the colony became enmeshed in the power struggle between England and France for control over North America. Although the state of war between the two European kingdoms convulsed the countryside for nearly one hundred years, the Mid- and Lower Hudson valley escaped a direct role in these conflicts. As the limits of settlement extended both westward and northward with the construction of Fort Oswego (1727), Fort Stanwix (1755), and Fort William Henry (1755), the established areas along the Hudson River developed into staging areas for the military or semi-industrial and agricultural areas producing matériel for the incessant conflicts generally fought on the frontier (Burke 1991:95-110; Brasser 1978b:206; Ellis et al. 1967:52-59).

On November 1, 1683, the area that became known as the Hudson Highlands was officially organized as part of Orange County, one of the original ten counties established by the English in the New York colony. By the beginning of the eighteenth century, territory on the east side of the Hudson River had been purchased by rich, politically connected entrepreneurs and divided into large manors or patents. The Van Rensselaers controlled Rensselaerwyck Manor (1685); Francis Rumbout and Gulian Verplanck acquired Rumbout's Patent (1685); Robert Livingston established Livingston Manor (1686); Stephanus Van Cortlandt established Cortlandt Manor (1697); Adolph Philipse purchased Philipse Highland Patent (1697); Henry Beekman obtained Beekman's Patent (1697); and nine investors combined to purchase the Great Nine Partners Patent, among others (Kim 1978).

Although the first enslaved people were brought into New Netherland as early as 1626, private ownership was not customary until the 1650s. During the early decades of the colony slaves were owned for the most part by the West India Company. However, in the 1660s, while New Amsterdam remained under Dutch control, at least 400 enslaved Africans were landed in New Netherland by the company (Burke 1991:123-125). Prominent Dutch landowners usually owned several slaves, who were passed on to heirs. Under the British during the late seventeenth century and early eighteenth century, the incidence of slavery increased in the New York colony in general (Burke 1991:193, 210; Davis 1991:83). For example, Ulster County had a population of 2,923 (including 566 enslaved people, 19.4 percent of the population) in 1723. In 1746, the county had 5,265 inhabitants including 1,111 enslaved people (approximately 21 percent of the population). However, on the eve of the American Revolution (1771), the population of Ulster County had risen to 13,950, which included 1,954 enslaved people (constituting approximately 14 percent of the population) (Davis 1991:88-89). English and Dutch farmers in the Hudson valley apparently relied heavily on slave labor, although the more steeply sloped areas were likely lightly populated.

Settlement of what is now Ulster County increased in the late seventeenth century after the English takeover of New Netherland. Although settlement focused on the Kingston-Hurley area, pioneers gradually filtered down the Rondout Creek and Wallkill River valleys so that most of the



rest of the county was divided among colonial patentees between 1665 and 1715. For example, the New Paltz Patent covered 92,126 acres and was granted by Provincial Governor Edmund Andros to a group of French Huguenots that included Louis du Bois, Christian Deyo (or Doyou), Abraham Hasbrouck, Pierre Doyou, Louis Bevier, Antonie Crespel, Abraham du Bois, Hugo Freer, Isaac du Bois, and Simon Le Fevre (Ruttenber 1907:52; Clearwater 1907:265, 306).

The nearby Hurley Patent (from which much of the present-day Town of Rosendale was formed) was granted to Philip P. Schuyler, Matthew Blanchar (or Blanshan), Cornelius Wynkoop, Anthony Crespel, Roeliff Swartout, Thomas Hall, Heynear Albertse Roore, Louis du Bois, Jan Valckert, Goossen Gerritse, and Jan Thommassen, among others (Clearwater 1907:262). Marbletown was granted from Queen Anne in 1703 (Clearwater 1907:275; Sylvester 1880b:66-67). Early villages in what is now Ulster County included the renamed Dutch settlements of Kingston and Hurley as well as Marbletown (1667) and New Paltz (1679) (Ruttenber 1907:49-56).

The Orange County Highlands incurred slow population growth during the period between the mid-eighteenth century and the mid-nineteenth century as a result of the ruggedness of the region's topography and the lack of adequate roads (Muller et al. 1988:8). Regarding the area around West Point, Captain Horace M. Reeve observed that "Until the American troops began to cut timber for military purposes, and to crown the surrounding hills with forts and redoubts, West Point and the neighboring Highlands were little else than a wilderness of rugged hills and virgin forests" (Headley 1908:264). While probably an exaggeration, most population centers, including the village of Buttermilk Falls (currently contiguous with the Military Academy on the south and now called Highland Falls), were situated along the west bank of the Hudson River prior to the American Revolution. Orange County had a population of 1,244 (including 147 slaves) in 1723. On the eve of the American Revolution (1771), the population of the county had risen to 10,092, which included 662 slaves (Davis 1991:89-91).

Relative peace of the Hudson Valley ended in October 1777, when British Major General Sir Henry Clinton successfully dispersed the American defenses at Fort Montgomery, resulting in the evacuation of American forces from the Hudson Highlands. The British overran West Point and burned the fortifications on Constitution Island. British forces continued to burn and pillage the larger farms and river towns as they moved northward up the Hudson. Upon reaching Kingston, Clinton's forces received news of Burgoyne's defeat at Saratoga and, after torching the village, quickly returned to New York City, leaving the mid-Hudson Valley to the colonials. With the return of the Orange County Highlands to American control by early November 1777, American military planners devised a stronger system of defense for the region (Diamant 1994:115-120, 131-132; Muller et al. 1988:50-52). After the American victory at the Battle of Stony Point in July 1779, the Highlands fortifications went militarily unchallenged by the British for the rest of the war; although the desire to capture West Point played a significant role in the treachery of Benedict Arnold during his command of the facility. The inhospitable mountains surrounding West Point were abandoned by the Army at the war's conclusion, and the outlying fortifications were dismantled and sold or fell into ruin (Muller et al. 1988:201-202, 205).

**Ulster County.** During the first half of the nineteenth century, the most important event in the economic history of the county was the creation of the Delaware & Hudson (D&H) Canal in the 1820s. Incorporated in April 1823, the D&H Canal Company broke ground for its venture in July

1825. The route of the canal nearly bisected Ulster County, connecting the Pennsylvania coalfields around Honesdale to the Hudson River at Rondout, just south of Kingston. In 1826, during the excavation of the canal through what is now the Town of Rosendale, D&H engineers discovered a natural hydraulic cement (Rosendale cement) along Rondout Creek near what was then known as the hamlet of Lawrenceville. As a result, the excavation of the 108-mile, 110-lock D&H led directly to the quarrying, burning and grinding of cement after 1826. John Littlejohn held the first contract to provide cement for the D&H (Clearwater 1907:358; Blumin 1976:51-55). Completed in October 1828, the D&H canal was built to a depth of four feet and was navigable by boats capable of holding 30 tons. The canal was enlarged in 1842 to accommodate boats of 40 tons. The canal carried boats loaded with Pennsylvania coal and Rosendale cement for the New York City market. By 1851 the canal was deepened again and could accommodate boats capable of carrying 120 tons (Sylvester 1880b:153-155; Blumin 1976:54-56).

After a short-lived decline in the demand for cement with the completion of the D&H, production was revived by Judge Lucas Elmendorf (who was succeeded by Watson E. Lawrence) and Jacob Snyder (Clearwater 1907:357-358). Watson E. Lawrence founded the Lawrenceville Cement Works in 1828. The cement business boomed during the middle decades of the nineteenth century in the entire county. As Rondout Creek valley became flushed with cement money, the village of Rosendale changed from farming community to an industrial town. The village had an important canal that carried the Pennsylvania coal trade to the Hudson River and the burgeoning cement industry to the market of New York City. Economic prosperity brought immigrant laborers as well as social and financial changes and problems. In an effort to contain the cement industry within a single political entity, the Town of Rosendale was created from the towns of Marbletown, New Paltz, and Hurley in April 1844 and covered the majority of the cement deposit (Blumin 1976; Sylvester 1880b:15).

The area was generally farmland during the nineteenth century, although farming would be limited in the more steeply sloped areas. Agricultural activities consisted mainly of grain cultivation, potato-growing, sheep, horse, and cattle-raising and dairying, and general farming. Many farmers cultivated apple and other fruit trees to supplement their income. Ancillary crops included grape-growing and winemaking, honey production, and maple sugar and syrup production (Sylvester 1880b:239; Ruttenber 1907:27).

In the mid-nineteenth century, peat harvesting in the northeastern portion of the Town of Lloyd was practiced by the Hudson River Peat Company of New York. This business had been abandoned by 1880. Over the course of the nineteenth century, various grist and woolen mills were established by Charles White, A. Brinkerhoff, N.D. Elting, and Hiram Hasbrouck. Termiening & De Graw had a wagon-felloes and bent-wood factory, as did James Weismiller (Sylvester 1880b:130).

Another industry in the town was the mining of bluestone, used for the bases of bridges, abutments, and arches. The first quarry was owned and operated by Charles Woolley in 1820. Another quarry was owned by J.I. Clearwater, beginning in 1845. This business eventually developed into the Fuller, Clearwater & Co. quarry, opened around 1880. Bluestone from Lloyd has been used for bridges in Poughkeepsie and Albany, the Odd-Fellows' Hall on Centre Street in New York City, and the Brooklyn Water-Works (Sylvester 1880b:130).

Over the course of the nineteenth century, New Paltz Landing developed as an important river port. The first ferry across the Hudson River to Poughkeepsie was established by Abraham Elting in the eighteenth century, using oars, and then sails. By the late nineteenth century, the ships were powered by steam (Clearwater 1907:269; Sylvester 1880b:130). A trolley road was built along the New Paltz turnpike between New Paltz and Highland Landing in 1897. This was used for heavy freight and passenger traffic and was the impetus for the development of summer boarding houses in the area at the turn of the twentieth century. It remained in operation until 1926 (Clearwater 1907:271; Greene 1931).

In the 1870s the Wallkill Valley Railroad was sited between the villages of New Paltz and Rosendale in the Town of Rosendale. Connecting with the Erie Railroad at Goshen, the Wallkill Valley line carried commuters, freight, and farm produce until the 1930s. The line eventually went bankrupt in the 1970s and the rails were pulled up in the early 1980s (Sylvester 1880b:154-155; Clearwater 1907:359).

**Orange County.** Orange County incurred slow population growth during the period between the mid-eighteenth century and the mid-nineteenth century as a result of the ruggedness of the area's topography and the lack of adequate roads (Muller et al. 1988:8). Most population centers were situated along the banks of the Hudson River prior to the American Revolution. Orange County had a population of 44,175 in 1800, and achieved its current boundaries in 1801. At that time, there were ten townships, including the Town of Blooming Grove, which was formed from Cornwall in 1799. The Town of Blooming Grove remained a largely rural township and the Village of Blooming Grove was the largest settlement, including a small number of houses and a church.

The establishment of the Wallkill Valley Railway in 1866 was a most important event for the Town of Montgomery. Connecting with the Erie Railroad at Goshen, the Wallkill Valley line carried commuters, freight, and farm produce until the 1930s. However, manufacturing operations were also notable components of economy during the nineteenth century. The Walden Woolen Factory was founded in 1823 and was a leading business in the village of Walden during the mid-1900s. The New York Knife Company, organized in 1852 at Matteawan in Dutchess County relocated to a former Walden cotton factory in 1856. It manufactured table and pocket cutlery of every kind. Other businesses included the Walden Condensed Milk Company (organized in 1864 and later replaced by the Walden Soap Works); the Walden Brickyard (1868); the Walden Knife Company (1870); the Schrader Cutlery Company (1904); the Rider Ericsson Engine Company; the Wooster Manufacturing Company; and, the William Crabtree & Sons (Headley 1908).

The Town of Blooming Grove was reduced in 1830 with the formation of Hamptonburgh, and again in 1845 with the creation of Chester. Wineries developed in various parts of Orange County during the nineteenth century. At Washingtonville, John Jacques established the Americans Oldest Winery in 1839. Portions of the county expanded during the nineteenth century after the New York, Lake Erie & Western Railway was built in 1850. The principal cities in the county during the nineteenth and early twentieth centuries were, and are still, Newburgh, Middletown, and Port Jervis. Newburgh became the largest city in the county and was incorporated in 1865. Middletown was incorporated in 1888. Although located on the Wallkill River, the city developed as a railroad hub, first with the Erie Railroad, and then also with the Ontario & Western Railroad. With the

railroad came the establishment of factories and settlers. The population of the village was 433 in 1838, and increased to 12,000 in 1888. By 1920, there were 18,420 residents in the city. Port Jervis, located on the Delaware River, became the third largest city on the county. It was incorporated as a city in 1907 (Headley 1908).

At the beginning of the twentieth century, the City of Newburgh was the leading city of Orange County, with a population of nearly 27,000, and was “the largest commercial city on the Hudson between New York and Albany” (Headley 1908). The Newburgh area was patented to John Evans in 1694, but was reconveyed in smaller tracts after 1700. The area was originally settled in 1709 by a group Palatines, although the formal patent was not granted until 1719. After the Revolution, what is now Newburgh became a shipping point of importance as a result of its harbor, and the Village of Newburgh was incorporated in 1800. The lumber business was especially valuable and large quantities of ship timber, planks and staves were sent south to New York City. Shipbuilding was also conducted. During the 1830s, Newburgh's economy thrived as a nexus of river and land trade, as well as supporting its own indigenous industrial base. However, the completion of the Erie Canal, the D&H Canal, and, later, the Erie Railroad diverted much of this trade away from the city (Newburgh was incorporated as a city in 1865) (Headley 1908).

Between 1883 and 1885 John C. Rose acquired 300 acres of land approximately six miles north of Newburgh on the route of the Hudson River & West Shore Railroad to open a brick manufacturing establishment. At that time, he also bought the Hudson River mansion and estate of Bancroft Davis. Rose razed the mansion for a brickyard. The firm of Rose & Company was incorporated in 1884. His 16 brick machines had a capacity of 24,000 bricks per day each; the firm produced 40 million bricks annually for shipment mostly to New York City. The company town that emerged around the brickyard was Roseton. At its peak, The Rose Brick Company sold 400 million brick a year worldwide, and its bricks were used in the construction of the Empire State Building and the Waldorf Astoria, among other structures. The company filed for bankruptcy in 1919. The site is now occupied by a terminal of the Hess oil company (Hutton 2003). North of The Rose Brick Company brickyard, the Arrow Brick Company was located on Danskammer Point and produced five million brick annually during the early 1900s.

**Dutchess County.** When Dutchess County was formed in 1683, it included all of present-day Putnam County and part of what is now Columbia County (south of the Roeliff-Jansen Kill). The present-day towns of Germantown and Clermont (then part of Livingston Manor) were annexed to Albany County on May 27, 1717. Putnam County was created June 12, 1812. The county was divided into 13 large patents owned by absentee landlords who lived in New York City, including Rumbout's patent (1685); the Pawling patent (1696); Beekman's patent (1703); the Great Nine Partners patent (1697); the Little Nine Partners patent (1706); and the Oblong (1731). By 1714, “only 60 householders [were] established within these wide borders” comprising 445 people (Hasbrouck 1909:34-42, 57-58; Bayne 1937:3). Despite the slow start, population and increased rapidly in the years prior to the American Revolution. “In 1737 Dutchess ranked seventh in population among the counties of the state, and from 1756 to 1775 it ranked second only to Albany County. ... The growth was caused largely by the efforts of the patent owners to split up their lands. Contrary to the pattern of settlement in New England, Dutchess was settled by single families. Houses were widely separated, encouraged by unusually friendly Indians, and few villages existed until after the Revolution” (Bayne 1937:3).

The county has gone through several phases of economic development and extensive political subdivision. At its inception the economy was overwhelmingly agricultural. County farmers produced primarily wheat as a cash crop and hay as well as meat and leather. These activities were supplemented by rural industries such as grist, saw, and fulling/carding mills. Each village community had their own specialists, including blacksmiths, carpenters, chandlers, coopers, harness makers, shoemakers, and wheelwright. Some towns also had a tanner or a hatter. The earliest road (1731) in the eastern portion of the county connected Dover farmers to Poughkeepsie. The completion of the Erie Canal in 1825 wrecked the wheat economy as better agricultural lands in western New York and beyond provided more and cheaper grain (Bayne 1937:3-7, 36, 53; Hasbrouck 1909:60-65).

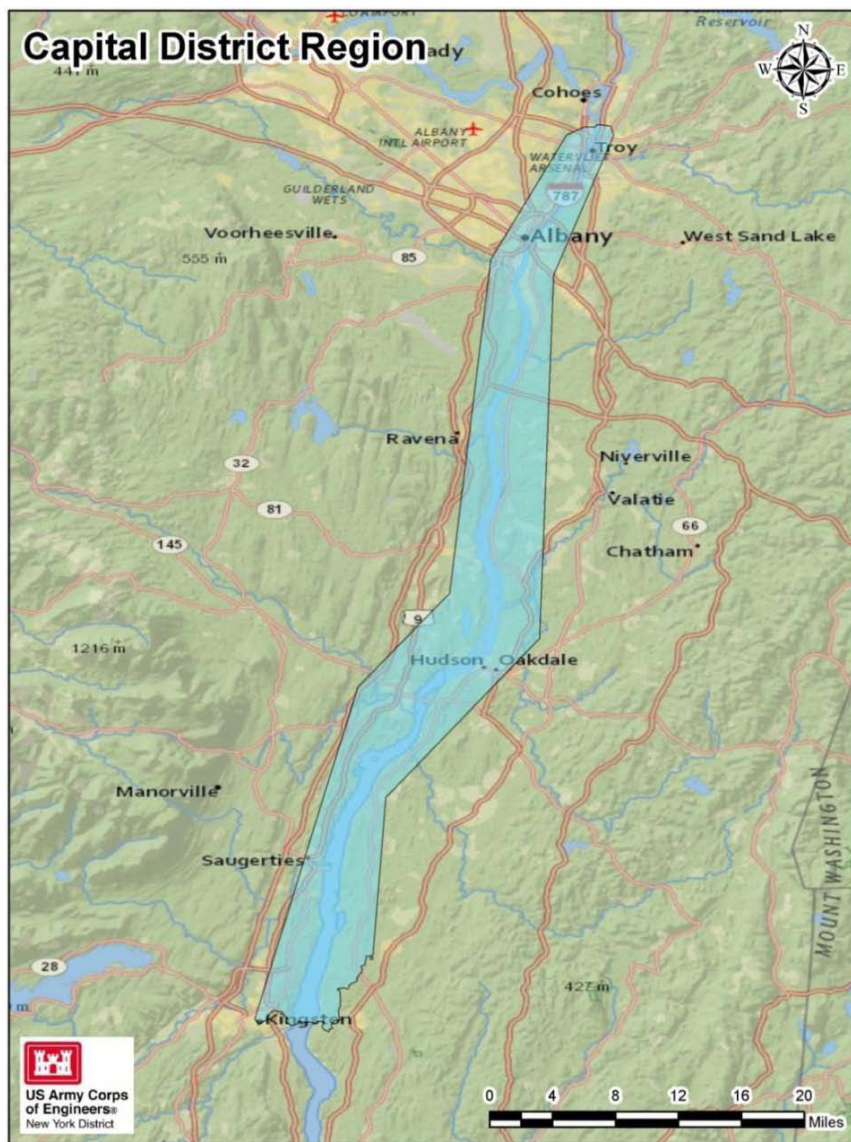
From 1825 to 1870, Dutchess farmers switched from wheat to meat. Eastern, Harlem Valley farmers generally lacked sufficient transportation to make grain-growing profitable, so many switch to cattle or sheep raising and dairying. As a result, Harlem Valley villages served originally as watering or stopping points for cattle drovers on their way to the New York market. In addition, the towns and cities along the Hudson, such as Poughkeepsie and Wappingers Falls, developed textile industries where carding machines and other mills had the river route to market. Several eastern towns with water access also developed cloth factories, including Amenia and Stanford (Bayne 1937:7-8, 53). Railroad expansion during this period propelled the economy. In 1851, the Hudson River line opened, and connected Poughkeepsie to New York City. The Harlem line was completed through the county the following year, "providing the entire eastern tier of towns with transportation to New York. The Dutchess & Columbia and the Poughkeepsie & Eastern railroads were built between 1869 and 1873, opening up the central portion of the county" (Bayne 1937:13).

While industrial development continued after 1870, however, location mattered in regards to the type of activity conducted. Factories and urban areas in western Dutchess County continued to grow as numerous railroad lines increased the area's access to New York. After 1900 industrial development became concentrated in larger villages and cities and larger factories instead of small village shops. In the more rugged areas of eastern Dutchess, dairying became the leading industry supplying cheese makers and the new Borden process for preserving (condensing) milk with raw material. Between 1870 and 1930 the population of the county rose from 74,041 in 1870 to 105,462 in 1930. After 1920, refrigerated trucks cut into the dairying business in Dutchess as western milk entered the market. In addition, suburbanization of rural areas began as non-farming rural residents (not including those on Hudson River estates) utilized the improving roads (such as the Eastern States Parkway (present-day Taconic Parkway) and interurbans to get to their jobs in the larger villages and cities. This process has intensified over the last 50 years (Bayne 1937:4-5, 17, 53).

### **3.3.9 Capital District Region**

In 1609, the English navigator Henry Hudson sailed up the North, later Hudson, River, reaching as far north as what is now the City of Albany. Near the site of present-day Castleton (south of Albany), Mohicans living in a village along the river provided food and entertainment to Hudson

and his crew (Brasser 1978a:79-82, 1978b:200-203; Ellis et al. 1967:18-25; Gehring and Starna 1988:xiii-xxiv).



**Figure 3.12. Capital District Region, NYNJHAT Study (USACE, New York District 2021).**

Dutch ships arrived soon after to trade with the Native groups they encountered, while the French remained preoccupied with their territories in what is now Canada. Ca. 1614, two employees of the Dutch Van Tweenhuysen Company—Captain Hendrick Christiaensz and Jaques Eelckens (sometimes Jacob Eelkens)—negotiated a treaty with the local Mohican and Mohawk that allowed for the establishment of a short-lived trading post (called Fort Nassau). This post was erected on Castle Island south of present-day City of Albany. A confluence of difficulties, including squabbles between the Dutch traders and their Native American customers, conflicts between the Mohawk and the Mohican, and seasonal flooding of the fort, forced the abandonment of this post prior to 1618. In 1621, the *Staten Generaal* of the United Provinces organized the WIC and granted the

company a monopoly to trade along the shores of the Americas for a period of 24 years (Brasser 1978a:79-82, 1978b:200-203; Gehring and Starna 1988:xiii-xxiv; Jacobs 2009:19-31; Dunn 1994:13-30).

During the next forty years, the Hudson River valley gradually became incorporated as part of the Dutch colony of New Netherland. At its height New Netherland comprised sparsely settled clusters scattered along the North River, extending from present-day Albany, New York, and its satellite at Schenectady, in the north to what-is-now the state of Delaware in the south. The Dutch prosecuted the prized pelt trade from their base in New Netherland, competing with the English in the Connecticut River valley and the Swedes in the Delaware River valley (Gehring and Starna 1988:xiii-xxiv; Kim 1978:3-5).

Amsterdam merchants recognized the potential value of the Hudson Valley for the trade in furs, and established a fortified trading post on the west bank of the Hudson River at what would become the City of Albany in 1624. This location, called Fort Orange, would become the first permanent European settlement along the Hudson River (Ellis et al. 1967:18-25; Gehring and Starna 1988:xiii-xxiv; Burke 1991:3-18; Kim 1978:3-5).

At the time of the Dutch arrival at beginning of the seventeenth century, Algonquian-speaking Mohican hunting territory spanned both sides of the Hudson River, with Iroquoian-speaking Mohawk occupying lands well to the west and north (Dunn 1994:45-62). As the seventeenth century progressed, the Hudson roughly divided the territories utilized by the two nations, although the Mohican still hunted areas on the west side of the river. Mohican villages were situated near the rich alluvial flats and islands along the east banks of the Hudson (such as Papscaanee Island south of Albany), while Mohawk castles laid some 30 miles west near the Schoharie Creek. The Albany-Rensselaer area was Mohican territory during the early Dutch period. However, after 1620, the Mohawk, protective of their position as suppliers of pelts to the traders at Fort Orange, expanded the range of their trading efforts into the traditional areas of other Native groups. The relationship between the Mohawk and the Mohican, as a result, became increasingly hostile during the seventeenth century (Dunn 1991; Brasser 1978b:198, 202-203; Fenton and Tooker 1978:466-469). While Dutch traders attempted to peacefully patronize both Native groups, tensions between the two escalated into bloodshed as the Mohawk attempted to prohibit Mohican access to both their traditional hunting grounds on the west side of the river and Dutch trade goods at Fort Orange. From about 1624 to 1630, the Mohican became embroiled in a losing war against the Mohawk over the beaver trade, resulting in Mohawk dominance of the territory around Fort Orange. The Mohawk became de facto middlemen between Dutch merchants at Fort Orange and other Native American groups (Dunn 1994:13-30; Fenton and Tooker 1978:466-469; Burke 1991:3-4; Trigger 1978:348-355; Gehring and Starna 1988:xix).

At the time of Hudson's voyage, the Hudson-Leeds area was utilized by Algonquian-speaking Mohican or Mohican-related Catskill Indians, although the Esopus, related or allied with the Algonquian Delaware, are also referred to as living in the vicinity of Catskill Creek (Brasser 1978a:198; Goddard 1978:213-214). During the early Dutch period, Native Americans lived on the plain near the confluence of Catskill and Kaaterskill creeks, and cultivated maize and tobacco on the plains. Moreover, they maintained their "wigwams" on high ground above to Catskill and a

burial area on the high ground overlooking the north bank of the creek (J.B. Beers and Co. 1884:89).

In the area around what is now the City of Kingston, Dutch traders interacted with Native Americans related to or allied with the Algonquian Delaware, which included the Esopus, who occupied the west bank of the Hudson River between the Catskills Mountains and the Highlands near West Point, and the Wappinger, who occupied the east bank. The middle and lower Hudson areas were occupied by Munsee-speaking groups (related to Algonquian), such as the Wappinger (the Dutchess-Putnam area), and the Kichtawink (northern Westchester), although the internal politics and external boundaries of these groups are uncertain (aboriginal groups in the mid-Hudson are discussed generally as “Delaware Indians”). Although the Mohawk were dominant force at Fort Orange, the Mohican remained in authority in the Hudson Highlands. By 1675, the Mohican were the leaders of a confederacy of Highlands Indians which included the Wappinger, the Housatonic (western Massachusetts area) and the Wyachtonok (western Connecticut) (Brasser 1978b:198, 202-204; Goddard 1978:213-214; Burke 1991:3-4; Trigger 1978:348-355; Gehring and Starna 1988:xix).

The fur trade not only motivated Dutch interactions with these groups, but also influenced the eventual attempts at colonization. Land grants in the Hudson River valley began in 1629 when the Staten Generaal encouraged settlement in New Netherland by offering large grants of land with feudal privileges and the title of Patroon to any person who established a settlement of more than fifty families on any of the lands in the colony. This led to the creation of large patroonships on both sides of the Hudson River; the most successful of which was Rensselaerswijck in the area around Fort Orange and Beverwijck (present-day Albany; which was laid out by the company in 1652). An Amsterdam diamond merchant and one of the directors of the West India Company, Kiliaen van Rensselaer purchased in 1630 an extensive tract covering the west side of the Hudson surrounding Fort Orange extending from approximately Cohoes Falls near the Mohawk-Hudson confluence south to below the present-day Normanskill. Small areas on the east side of the Hudson were included in his tract. This parcel was later expanded in the 1680s after the English takeover of New Netherland to encompass approximately 850,000 acres on both sides of the river (i.e., the Manor of Rensselaerwyck) (Kim 1978:4-8; Ellis et al. 1967:18-25, 74-76; Burke 1991:3-4; Gehring and Starna 1988:xiii-xxiv; Dunn 1994:13-14, 1991).

As expected, settlement of the Hudson Valley occurred first along the river and adjacent lowlands since the mountainous interior was considered impenetrable wilderness until after the Revolutionary War. While the manor comprised lands on both sides of the Hudson, settlement clustered along the flat alluvial lands along both banks of that river, especially near Fort Orange and Beverwijck. By the early 1650s the population of Beverwijck had increased to 230 people with 18 farms under cultivation (Burke 1991:18-19). As early as 1643, the Patroon and Adrian Van der Donck, a governmental official in Beverwijck, both wanted to establish a settlement near the confluence of Catskill Creek and the Hudson River, but neither did. Three years later Cornelius Antonissen Van Slyck acquired a grant for lands along the Catskill, but never claimed it. In 1649, Brandt Van Slechtenhorst purchased a large tract in this area from the Indians, but since his purchase had been obtained without the permission of the West India Company, Pieter Stuyvesant, the Direct General of New Netherland, had him arrested and voided the purchase by



1652. Farmers who had previously leased lands from Van Slechtenhorst were allowed to remain without feudal burdens (Vedder 1927:52; J.B. Beers and Co. 1884:90).

Farmers from Rensselaerwijck established bouweries (farmsteads) in the Esopus Creek valley beginning in 1652. This community was called Esopus and did not possess a true village. Later, when tensions arose between the Dutch and the Esopus Indians, Director General Pieter Stuyvesant order the erection of fortifications along the river in 1658. The area of fortifications (the present-day Rondout area) was called Rondhuit (Dutch for standing timbers); the village that developed around the stockade was called Wiltwijck (Dutch for wild place; the present-day City of Kingston). Several years later overcrowding at Wiltwijck led to the founding of Nieuw Dorp (Dutch for “new village”) near what is now the Village of Hurley. In 1663 the Esopus destroyed the newly established farming community at Nieuw Dorp and burned houses at Wiltwijck, killing at least 18 people and taking at least nine prisoners. While Dutch proprietorship of New Netherland ended when the English peacefully seized control of the colony in 1664, land-use and settlement patterns established in the region by the Dutch remained largely the same (Blumin 1976:2; Brasser 1978b:204; Goddard 1978:220-222; Kim 1978:4-8; Greene 1931:I:92; Gehring and Starna 1988:xiii-xxiv; Burke 1991:349, 66-67).

Despite increasing competition with the local Indians over land and resources, Dirck Teunisse Van Vechten acquired a tract of land near the confluence of Catskill and Kaaterskill creeks in 1681 and received a formal patent for the area in 1686. Van Vechten operated a sawmill and a flour mill on the Vosenkill, as well as purveyed molasses, rum and lumber. The gristmill was in operation until at least 1741. His farm produced maize, tobacco, wheat, flax, and wool. A wharf had been erected near the confluence by 1715 (Vedder 1927:43, 52-53, 1922:41-42; J.B. Beers and Co. 1884:90-91). Samuel Van Vechten, heir of Dirck Teunisse Van Vechten, erected a dam across the Catskill in 1715, and operated grist and saw mills as well as a general store. Teunis Van Vechten, nephew of Samuel, built new grist and sawmills as well as a new mill-dam in 1770 at a cost of £1,000 (Vedder 1922:46).

In 1683, the province of New York was divided into ten counties—Albany, Dutchess, Kings, New York, Orange, Queens, Richmond, Suffolk, Ulster and West Chester. Albany included all of the northern part of the state including present-day Vermont. By the beginning of the eighteenth century territory on the east side of the Hudson River from Albany to New York City had been patented to rich, politically-connected entrepreneurs and divided into large manors or patents. The Van Rensselaers controlled Rensselaerwyck Manor (1685); Francis Rumbout and Gulian Verplanck acquired Rumbout’s Patent (1685); Robert Livingston established Livingston Manor (1686); Stephanus Van Cortlandt established Cortlandt Manor (1697); Adolph Philipse purchased Philipse Highland Patent (1697); Henry Beekman obtained Beekman’s Patent (1697); and nine investors combined to purchase the Great Nine Partners Patent, among others (Kim 1978). The west side of the river, more rugged and less hospitable, was also patented, but in smaller parcels and settled with less initial success.

At the time of their creation in 1683, the dividing line between Albany and Ulster counties stood, at first, at Murderer’s Creek near what is now the Village of Athens (Vedder 1927:4) and then, after 1733, readjusted to present-day Saugerties Creek in the Town of Saugerties (J.B. Beers and Co. 1884:30).

Ulster County upon its creation included the towns of Kingston, Hurley, Marbletown, New Paltz, and Fox Hall and by 1733 comprised land between Murderers Creek near the Highlands on the south (present-day Orange County) and Saugerties Creek on the north (Brink 1906:227). Ulster County attained its present size in 1809 when sections were removed for the creation of Sullivan County and a piece was added to Orange County. Sections of Ulster County had been removed earlier: taken for the creation of Delaware County in 1797, and for Greene County in 1800.

The Catskill Patent was “the largest and most valuable patent ever granted for lands now entirely within [Greene C]ounty. It embraced five ‘great plains,’ called by the Indians, Wachachkeek, Wichquanachteck, Pachquiack, Assiskowacheek, and Potick, with all the land included in a sweep of four miles from the outer edge of the plains in all directions” (J.B. Beers and Co. 1884:25). Containing in excess of 35,000 acres, the patent comprised the flats at what is now Leeds. The land was purchased from the Indians by Silvester Salisbury and Marte Gerritse Van Bergen on July 8, 1678, with the formal patent granted by Provincial Governor Edmund Andros on March 27, 1680. “A confirmatory purchase was made of the Indians by Cornelius Van Dyke and Martin Gerritse June 13<sup>th</sup> 1684, and a corresponding patent was issued by Gov[ernor Thomas] Dongan April 29<sup>th</sup> 1688. Several small tracts that fell within its limits were excepted” (J.B. Beers and Co. 1884:26, 93-96; see also Vedder 1927:39-40; Gallt 1915:122-124). Settlement in the Catskill Creek area increased slowly after 1675. Early industry in the area included tanning (using hemlock trees), sawmilling, and creating charcoal pits. Later industry included brickmaking, and cement after 1900. The Catskill Cement Company founded in 1899 and produced 1,000 barrels of Portland cement a day by 1909 (Vedder 1927:39-50, 1922:21-22; J.B. Beers and Co. 1884:94-97; Gallt 1915:151-152).

Under the British during the late seventeenth century and early eighteenth century, the incidence of slavery increased in the New York colony in general (Burke 1991:193, 210; Davis 1991:83). For example, Ulster County as a whole had a population of 2,923 (including 566 enslaved people, 19.4 percent of the population) in 1723. In 1746, the county had 5,265 inhabitants including 1,111 enslaved people (approximately 21 percent of the population). However, on the eve of the American Revolution (1771), the population of Ulster County had risen to 13,950, which included 1,954 enslaved people (constituting approximately 14 percent of the population) (Davis 1991:88-89). English and Dutch farmers in the Hudson valley apparently relied heavily on enslaved labor, although the more steeply slopes areas were likely lightly populated.

In addition to Dutch and British settlers, German immigrants from the Palatinate arrived in the mid-Hudson Valley in the early eighteenth century. More than 3,000 German refugees left England for the Province of New York in January 1710 (more than 700 died on the journey over or while in quarantine on Nutten [later Governor’s] Island). They were initially settled in the Hudson Valley to work, serf-like, for the British government in order to “raise hemp for cordage, and to manufacture tar and pitch, so that the government would no longer be obliged to buy these much-needed commodities for ship-building from other countries” (German American Corner 2000; Benton 1999 [1856]). Robert Hunter had devised a scheme to supply necessary products to the British Navy and petitioned the Board of Trade to provide a labor force for his project. As a result, Palatine refugees, who had flocked to London to escape dire economic conditions in their homeland, would be resettled in the colonies to provided labor under Hunter’s “Naval Stores”

project, among other locales in the British New World (Witthoff 1999). In 1710, while Hunter was appointed Governor of New York, the Germans were resettled on lands purchased from Robert Livingston of Livingston Manor (in exchange for the contract to provision the immigrants) as well as on tracts on the west shore of the Hudson River, such as West Camp, Kaatsbaan and Saugerties in what is now Ulster County (J.B. Beers and Co. 1884:24; Witthoff 1999). For a variety of reasons, the project was a total failure and the Palatines were forced to fend for themselves. Nearing starvation, 50 families relocated to the Schoharie Creek area, with consent of the Indians in October 1712 (Witthoff 1999). Despite the failure of the “Naval Stores” project, the fertility and availability of land near the Wallkill and Rondout Creek beckoned settlers during the eighteenth century as farming was the primary economic activity in the area (Sylvester 1880b:229-231).

Settlement of what is now Ulster County increased in the late seventeenth century after the English takeover of New Netherland. Although settlement focused on the Kingston-Hurley area, pioneers gradually filtered down the Rondout Creek and Wallkill River valleys so that most of the rest of the county was divided among colonial patentees between 1665 and 1715. For example, the New Paltz Patent covered 92,126 acres and was granted by Provincial Governor Edmund Andros to a group of French Huguenots that included Louis du Bois, Christian Deyo (or Doyou), Abraham Hasbrouck, Pierre Doyou, Louis Bevier, Antonie Crespel, Abraham du Bois, Hugo Freer, Isaac du Bois, and Simon Le Fevre (Ruttenber 1907:52; Clearwater 1907:265, 306).

The nearby Hurley Patent (from which much of the present-day Town of Rosendale was formed) was granted to Philip P. Schuyler, Matthew Blanchar (or Blanshan), Cornelius Wynkoop, Anthony Crespel, Roeliff Swartout, Thomas Hall, Heynear Albertse Roore, Louis du Bois, Jan Valckert, Goossen Gerritse, and Jan Thommassen, among others (Clearwater 1907:262). Marbletown was granted from Queen Anne in 1703 (Clearwater 1907:275; Sylvester 1880b:66-67). Early villages in what is now Ulster County included the renamed Dutch settlements of Kingston and Hurley as well as Marbletown (1667) and New Paltz (1679) (Ruttenber 1907:49-56).

What is now Rensselaer County was initially part of van Rensselaer's Patroonship, the Manor of Rensselaerswyck. Later, this manor was part of a much larger Albany County from 1683, when the ten original counties of the colony of New York were created, until 1791 (Sylvester 1880a:11-12). For the most part, settlement of the lands on the east side of the river commenced in the 1630s by tenants of the Patroon and filtered eastward at a glacially slow pace as the Patroon purchased land from the Mohican. For the longest time settlement hugged the alluvial lands along the shore (Sylvester 1880a:11-12, 398; Dunn 1991:13-14). Although areas in the present-day City of Rensselaer had European residents in the 1630s and 1640s, the eastern towns of Sand Lake, Nassau, and Stephentown were not permanently settled by European-Americans until after the 1750s. As late as 1714, the manor contained a total population of 427, while Albany County had a population of around 1,708 (Kim 1978:235-236). As early as 1642 ferry service was operated between the east and west side of the river (Sylvester 1880a:333; Anderson 2009 [1897]).

During the American Revolution, British General John Burgoyne traversed northern New York during his ill-fated plan to divide the rebellious colonies. Part of this campaign, the Battle of Bennington was fought in what is now Walloomsac in the Town of Hoosick in the eastern part of Rensselaer County, less than ten miles northwest of Bennington, Vermont. The battle was fought prior to the decisive Battle of Saratoga in late summer 1777 and resulted in the death or capture

of a significant portion of Burgoyne's Hessians, undermining the strength of his offensive firepower. Without the Patriot victory at Bennington, the outcome of Saratoga may have been different.

During the war, both sides of the Hudson River became the focus of Patriot defenses. The strategic importance of the river was immediately recognized by both American and British strategists (Diamant 1994:2-5; Muller et al. 1988:6-9). By controlling the river and Lake Champlain the British could sever the physical link between the New England colonies and the "bread-basket" colonies of the Middle Atlantic. Defending the river thus was essential for Patriot military planners. During this time, the advent and development of American defenses resulted in the establishment of military posts. In Orange County, these military posts would eventually become the U.S. Military Academy in 1802. The fortification system was designed to prevent the British from sailing up the Hudson River (Diamant 1994:85-132; Muller et al. 1988:20-22, 50-52).

Antislavery sentiments in the northern colonies emerged during the American Revolution. Despite these sentiments, between 1786 and 1790, the number of enslaved people increased from 18,998 to 21,329. Emancipation acts in the New York legislature were established in 1799 and 1817 (Davis 1991:80-83). In 1803, black residents in New York City rioted, burning parts of the city and destroying homes. Finally, in 1827, slavery was abolished in the state (Harper 2003; Becker 1999).

**Rensselaer County.** For the most part, settlement of the lands on the east side of the Hudson River commenced in the early 1630s by tenants of the Patroon and filtered eastward at a glacially slow pace. For the longest time settlement hugged the alluvial lands along the shore. As late as 1714, the eighty-year-old manor contained a total population of 427, while Albany County had a population around 1,708 (Kim 1978:235-236). After the Revolutionary War, New Englanders began migrating into and through Rensselaer County, resulting in conflict between the Massachusetts and New York over the area's boundary (Kim 1978).

The earliest public roads in the county date prior to the Revolution and include the "Old Post Road," that ran along the river and connected Troy to New York City, and paths that approximate the current Routes 9 and 2. The Farmers Turnpike along the river and the Boston-Albany Turnpike were utilized prior to 1800 (Sylvester 1880a:402). Once roads in the area had developed, settlement and growth followed. While the landowners worked the land in preparation to sow their crops or graze their animals, an abundance of wild animals provided options as a source of food. Deer, bear, raccoon, rabbit, partridge and wild turkey populated the area's forests, as did dangerous competition from wildcats and wolves (Meinig 1966a:165-166).

The present-day City of Rensselaer was formed by the merger of three villages—Bath-on-the-Hudson, East Albany, and Greenbush—and a portion of the Town of North Greenbush (Sinclair 1976:40-44). This area was part of the Town of Greenbush when it was created in 1792 (or 1795) from the Town of Rensselaerswyck. A ferry connecting the town to Beverwijck (Albany) had been established by 1642 by Hendrick Albertson. Although a grist mill and a sawmill had been erected by 1806, the general lack of water power (i.e., adequate rivers and streams) retarded the town's growth (Sylvester 1880a:334-339; Anderson 2009 [1897]).

In 1868, Albany Aniline and Chemical Company erected a factory to make fuchsia and aniline blue dyes in the southern part of the town, near the port. By the turn of the nineteenth century, this company was part of the Hudson River Aniline & Color Works, which subcontracted with the Friedrich Bayer Company and was later purchased by it. In 1905, Bayer erected facilities at the site for making aspirin, phenacetin, and other pharmaceuticals. The first commercial manufacture of Bayer aspirin in the United States was made at this Rensselaer site (Ricard 1994:25). The American government seized the Rensselaer plant during World War I (Bayer, as a German entity, was seen as supporting the German government) and sold it at auction in 1918. Sterling Products, a maker of patent medicines, was the highest bidder and was awarded the plant and the American rights to the Bayer name and trademark. More interested in the pharmaceutical aspects of the company, Sterling Products sold the dye portion of the business to Grasselli Chemical Company (ca. 1919). The chemical plant passed through several owners during the twentieth century: American I.G. Chemical Corp. (1929), General Aniline & Film (GAF) Corp (1939), GAF Corp (1964), and BASF (1978). BASF (Badische Anilin und Soda-Fabrik Aktiengesellschaft [AG]), which can trace its beginnings to 1865, shut down the plant at the end of December 2000 (Ricard 1994:25-27, 2001:17; Sinclair 1976:33).

By the 1870s, two railroad lines traversed the western portion of the county. The Boston-Albany Railroad and the New York Central-Hudson River railroad ran in a southerly direction through the then-Town/Village of Greenbush and the towns of East Greenbush and Schodack, with the Hudson River line hugging the riverbank (Beers 1876; Sylvester 1880a).

By the turn of the nineteenth century, the cities of Albany, Troy, and to a lesser extent Rensselaer had become industrial centers linked to the nation by a ribbon of rails. New industries, powered by steam and coal, propelled the region into the forefront of the Industrial Revolution. The variety of goods produced in these factories included textiles, stoves, bells, furniture, iron products, weapons, crockery, beer and tin products. The variety and availability of work attracted immigrant laborers to the region, especially Irish, German, British and French-Canadians (Walkowitz 1981:3-12). The western portion of the project area nearest the Hudson river was part of this industrialized area, although areas of agriculture were also present. The areas further east were either part of a generalized rural village/farming community or were utilized for stock-raising and lumbering-related industries during the nineteenth century as properties along the project area were parceled out to individual landowners. Agricultural activities continued to focus on dairying, cheese-making, poultrying, and potato cultivation with little market gardening. A few farms utilized fruit crops such as apples, cranberries, and cherries to supplement their incomes. Most of the industries in the towns were situated along the Hudson or along streams and rivers (Meinig 1966b:177-178; Sylvester 1880a).

The twentieth century brought the area infrastructure improvements, including the widening and paving of streets and roadways, and the erection of bridges. Other public services began to improve living conditions at the turn of the century: gas lines and water mains were laid starting in the 1890s and electricity was made available ca. 1900 (Meinig 1966b). These improvements were usually initiated along the more industrialized and populated area along the Hudson River. Gradually, these changes filtered into the eastern hills and valleys. With improved transportation, the rural parts of the county became increasingly attractive to people seeking more bucolic lifestyles. As the cities of Troy and Albany, and areas along the waterfront, attracted business and

industry, nearby towns experienced growth as developments in transportation (e.g., the automobile, paved roads, bridges over the Hudson) improved access to jobs and resources for people who chose to live in less urban settings. The project area remained largely undeveloped although residential and commercial establishments have developed since World War II.

**Albany County.** Albany County was one of the original counties created by the English in the Province of New York in 1683; it attained its present geographic extent in 1809. Originally subsumed in the seventeenth-century Manor of Rensselaerswyck, the Town of Bethlehem in Albany County was established on March 12, 1793 from the Town of Watervliet. The Town of New Scotland was created from the Town of Bethlehem in April 1832. The Dutch were the initial European settlers of the town, establishing a short-lived trading post—Fort Nassau—on Westerlo (or Castle) Island at the mouth of the Normanskill in 1614. Mohicans may have farmed the Castle Island prior to the arrival of the Dutch, as they did Papscaene Island to the east. Located on the Hudson River flood plain, the fort was abandoned ca. 1617. Permanent settlement began by tenants of the Patroon in the 1630s along the area's creeks and streams, as well as the flood plain. Growth of the future town was slow until after the American Revolution (French 1860).

**Columbia County.** Columbia County was settled from Albany through tenants of the great landowners (Van Rensselaer and Livingston), Palatinate Germans, and New Englanders beginning in the late seventeenth century. In 1685, the Patroonship of Van Rensselaer (1630) was confirmed as Manor of Rensselaerwyck, and contained 170,000 acres in the future Columbia County (*The Hudson Gazette* 1900:14-15). With a foothold along the river, settlement was established on these Columbia County acres in what is now Claverack, which served as the seat of the Lower Manor of Johannes Van Rensselaer and comprised approximately 170,000 acres. Further south, Livingston Manor contained 160,240 acres around the Roeliff-Jansen Kill and covered a large portion of the present towns of Livingston, Clermont, Copake, Ancram, Gallatin, Germantown, and Taghkanic. This manor was granted to Robert Livingston, an ally of the Van Rensselaers, by Governor Dongan in 1686 (and confirmed by royal charter in 1715) (Kim 1978:37, 284; Hughes 1887:iv-vi; *The Hudson Gazette* 1900:15-17, 24).

In 1710, New York Governor Robert Hunter purchased 6,000 acres of Livingston Manor for settlement by Palatinate Germans who had served in the British Army. Later called Germantown, this area contained 1,178 inhabitants engaged in tar-making and preparing “naval stores” in 1711. By the middle of the eighteenth century New Englanders began to filter into the eastern mountains of the future Columbia County, squatting in what are now the towns of Canaan, New Lebanon, Chatham, and Austerlitz (Hughes 1887:iv-vi; *The Hudson Gazette* 1900:15-17, 24).

From 1683 to 1717, the Roeliff-Jansen Kill served as the boundary between Albany and Dutchess counties. As a result, all of Livingston Manor north of the Roeliff-Jansen Kill was part of Albany County and all of the manor south of the creek was part of Dutchess County. From 1717 to 1772, all of Livingston Manor was included within Albany County. In 1772 the area that would become Columbia County was divided into four districts: the District of the Manor of Livingston; the District of Claverack; the District of Kinderhook; and the King's District. Between 1772 and 1786 (when Columbia County was created), two additional districts were formed—Germantown (from Livingston Manor), and Hillsdale (from Claverack) (*The Hudson Gazette* 1900:34-35).

Columbia County was formed from Albany County in April 1786. Agriculturally-oriented, the county's farmers produced rye, oats, corn, potatoes, buckwheat, and some wheat and hay. The eastern portion of the county specialized in stockraising and dairying (*The Hudson Gazette* 1900:1, 3).

Within the county, the initial roads included the Albany-Boston Stage Road in northern part of county (approximately Route 20) which followed the course of Wyomanock Creek in New Lebanon; the Stockbridge-Albany Turnpike through Canaan (approximately path of Route 90); the Hudson to Massachusetts Line Turnpike (1799-1800) through Taghkanic, Copake, and Hillsdale (approximate path of Route 23); and the Rensselaer-Columbia Turnpike (1799). More than six other routes were chartered before 1813 (*The Hudson Gazette* 1900:48). The earliest railroad in the county was the Boston & Albany Road, which connected Kinderhook, Chatham, and Canaan, (between 1838 and 1841). In 1852, the New York & Harlem Line (running northerly through Ancram, Copake, Claverack, and Ghent) intersected the Boston & Albany Road at Chatham. The so-called Harlem Extension (through New Lebanon into Rensselaer County) was known at one time as the Lebanon Springs Road was completed through the area to Vermont in 1869. The Poughkeepsie, Hartford & Boston line passed through Ancram by 1872, and the Rhinebeck to Connecticut Railroad (part of Philadelphia, Reading & New England system in 1900) reached Ancram by 1874 and complete in 1875 (*The Hudson Gazette* 1900:3, 76-80).

In the twentieth century, eastern areas of the county in the Harlem Valley comprised parts of generalized rural village/farming communities. Agricultural activities continued to focus on dairying, cheese-making, poultrying, and potato cultivation with little market gardening. A few farms utilized fruit crops such as apples, cranberries, and cherries to supplement their incomes. Most of the industries in the county were situated along the Hudson or along streams and rivers (Meinig 1966b:177-178; Sylvester 1880a). As expected, the twentieth century brought the area infrastructure improvements, including the paving of streets and roadways, and other public services, such as gas lines, water mains and electricity (Meinig 1966b). Gradually, with improved transportation, the rural parts of the county became increasingly attractive to people seeking more bucolic lifestyles and nearby towns experienced growth as developments in transportation (e.g., the automobile, paved roads, bridges over the Hudson) improved access to jobs and resources for people who chose to live in less urban settings. Areas along the Hudson River attracted residential developments and commercial establishments since before World War II.

Founded by businessmen, whalers, and merchants from Rhode Island and Massachusetts, the City of Hudson development as an important economic center in the area and was one of the busiest ports on the Hudson River. What is now the City of Hudson was formed from the Town of Claverack and was part of the land grant purchased from the Indians in 1662 by Jan Frans Van Hoesen. This purchase was confirmed by Governor Richard Nicoll in May 1667. Emerging as a local shipping center for area farmers during the eighteenth century, the developing settlement and harbor were called Claverack Landing. New Englanders arrived after the Revolution in 1783, and by April 1785 the settlement was incorporated as the City of Hudson, and became the home port of 25 whaling ships. It attained its present size in 1837 (*The Hudson Gazette* 1900).

However, international difficulties at the beginning of the nineteenth century followed by the War of 1812 decimated Hudson's whaling economy, from which it would not recover until the 1830s.

By the time the Hudson River whaling industry recovered, the City of Hudson was no longer the lone whaling port in the Hudson River valley. In 1832, Matthew Vasser, Paraclete Potter, and Alexander J. Coffin organized the Poughkeepsie Whaling Company, which operated between 1832 and 1837. A contemporary, the Dutchess Whaling Company operated between 1833 and 1844. In all, four Hudson River whaling companies operated at least 30 vessels, and the area prospered with the flow of sperm whale oil. However, economic dislocations associated with the Panic of 1837 undermined the whaling industry. Further, other options for artificial light were developed during this period, and whaling died out in the Hudson valley by ca. 1845 (Levine 2012; Attafuah-Wadee 2013).

During the nineteenth century general economic activities in the Taconic Hills continued to focus on hunting, trapping, lumbering, and limited agricultural production, as the rocky outcrops and steep slopes surrounding the project areas generally precluded commercial agriculture. Despite these obstacles, a few farmers devoted some of their activities to grazing livestock, including sheep, poultry, and pigs, and to fruit crops (Meinig 1966a:165-166). The area remained part of a generalized rural farming community during the nineteenth century as properties within the project area were parceled out to individual landowners who established farmsteads or other agricultural enterprises or left the land vacant. Agricultural activities continued to focus on dairying, cheese-making, poultrying, and potato cultivation with little market gardening. A few farms utilized fruit crops such as apples, cranberries, grapes and cherries to supplement their incomes (Meinig 1966b:177-178). During the late nineteenth century, numerous and varied small manufacturing plants flourished throughout the countryside in villages and small cities.

[D]escriptions in the 1870's [sic] of Columbia County reported more than sixty factories, mostly in country villages, and it may be taken as fairly typical of the counties along the main Hudson-Mohawk axis. Products were principally cotton goods, paper (much of it from raw straw), and agricultural equipment. ... This scale and variety of factories was partly a carry-over from an earlier era characterized by many small water-powered mills and partly of the newer era of larger steam-powered mills [Meinig 1966b:179].

Clusters of structures formed small villages in the vicinity of the route and transportation networks allowed the transportation of goods and people to the larger cities and villages along the river.

The twentieth century has seen increasing activity in the vicinity of the project area. A period of infrastructure improvements, including the widening and paving of streets and roadways, and the erection of bridges also occurred. Around the turn of the century, other public services began to improve living conditions in the area: gas lines and water mains were laid starting in the 1890s and electricity had been available since ca. 1900 (Meinig 1966b). As the cities of Hudson and Poughkeepsie and areas along the waterfront attracted tourists and businesses, such as IBM, towns experienced growth as developments in transportation (e.g, the automobile, paved roads, bridges over the Hudson) improved access to jobs and resources for the general population. The project area remained largely rural although residential subdivisions and commercial establishments have developed after World War II.

**Greene County.** Named for Nathaniel Greene, Major General during Revolutionary War, Greene County was formed in March 1800 from Ulster and Albany counties. Two towns from each county (Catskill and Windham [and a part of Woodstock] from Ulster and Coxsackie and Freehold [later,



Durham] from Albany) were included within the new county, although the third 'e' was intermittently applied during its first years of existence (Vedder 1927: 4, 5, 11-12, 37; J.B. Beers and Co. 1884:30-32, 119; Gallt 1915:57, 369).

Lands within what is now Greene County were subject to numerous colonial patents during both the Dutch and English settlement periods, but few pioneers settlers in this area prior to 1700. Saw and grist mills were operated at what are is now Athens and Leeds during the early eighteenth century. Ira or Stephen Day erected the first flouring mill in the hamlet of Leeds (Vedder 1922:38, 39). The village of Catskill's shipyards constructed brigs, sloops and schooners for the Hudson River shipping industry and from 1792 to 1801 the number of residences robustly increased from ten to 156 in the village (Vedder 1927:44, 47; J.B. Beers and Co. 1884:138-139). The Village of Athens was a port on the Hudson-Athens ferry route and was a thriving hub for shipbuilding, brick making and ice harvesting during the nineteenth century. Prior to 1815, sloops dominated freighting industry and area leaders included Bogardus & Cook (ca. 1800), the Day family, Donnelly, Cook & Co., F.N. Wilson, and Penfield, Day & Co. With the coming of the steamboats in the early nineteenth century, Athens and Catskill became ports of call with numerous docks and wharves. In 1814 three steamboats regularly traveled past the region from New York. By 1828 steamboats began traveling between Catskill and New York and continued to until at least 1884. The Hudson River Day line was founded in 1855 (J.B. Beers and Co. 1884:139; Gallt 1915:75-76, 82).

Improvements in transportation infrastructure during the nineteenth century played an important role in the economic prosperity of the area. Kings Highway, a north-south running road was created along the west bank of the Hudson in 1703. Authorized in 1800 by the State Legislature, the Susquehanna Turnpike (the present-day Mohican Trail [New York State Route 145]) ran through the northern portion of Greene County from the Village of Catskill west to Wattles' Ferry on the Susquehanna River (J.B. Beers and Co. 1884:44; Gallt 1915:370; Vedder 1922:24). The Town of Athens was created in 1830.

Lumbering was leading industry in the town at first as most settlers in order to grow their crops of corn, tobacco, wheat or barley had to clear their lots of trees in this once heavily forested area. Once cut and dried, timber, such as elm, beech and maple, was burned and processed by asheries into either a white powder called "pearl ash" or potash, sometimes called "black salts." The sale of wood ashes was the only cash-producing crop for many early settlers during their first years in New York. By 1796, potash and pearl ash were important commodities—"potash sold for \$175 a ton, and to produce a ton, from five to seven hundred bushels of ashes were required. The ashes sold for one shilling a bushel" (Vedder 1927:38). Workers at this time received about \$13 a month and were hard to find (Vedder 1927:38). While the pioneers cleared the land, an abundance of wild animals provided options as a source of food. Deer, bear, raccoon, rabbit, partridge and wild turkey populated the area's forests, as did dangerous competition from wildcats, wolves and bears. Substantial bounties were advertised for killed wolves (Gallt 1915:235; Ellis et al. 1967:78-79).

While the Towns of Athens and Catskill remained agricultural, the arrival of the railroads contributing to the area's subsequent industrialization, railroads traversed the town in the nineteenth century. "The railroads of 1838 and [18]82 found footing along the banks of the Catskill

which has furrowed a channel and washed bare the rocky palisade along its course ..." (Vedder 1922:55). The Catskill & Canajoharie Railroad was constructed to Cooksburgh in 1838, then failed. And the Saratoga & Hudson River Railroad had a station at the Village of Athens, but was abandoned in 1867. The West Shore, the Stony Clove, and the Catskill Mountain railroads all opened in 1882. A new depot for the West Shore line was built in the Village of Catskill in 1912 (Gallt 1915:88, 93). In 1882 the Catskill Mountain Railroad "was built to open up the mountain section and operated to Palenville, Cairo, Leeds, South Cairo, Laurenceville and the Mountain House on Otis Summit, Haines Falls, and Tannersville" (Gallt 1915:93). The Catskill Street railroad (trolley) was built to Leeds in 1892 (Gallt 1915:89).

Aside from shipping and agriculture, manufacturing played an important part in the economic growth of the Town of Catskill in the nineteenth century. A lime factory that began operation in 1833 was still active in 1884. While the Swartout tan-yard, which made harnesses and other leather products went out of business ca. 1880, the Imperial Facing Mill (a foundry) was established in 1880. B. Wiltse & Co. were plowmakers whose operation was founded in 1808 as Dutchers. Other industrial operations included the National Register-listed Hop-o-Nose Knitting Company (1881), the Harris Manufacturing Co. (LTD) (a woolen mill, established in 1864), and the Excelsior Pottery and Drain Tile and Pipe Works (1865) (J.B. Beers and Co. 1884:100-101). Improvements in communications occurred with the incorporation of the Catskill, Cairo, & Windham Telegraph Company (1879) and the Catskill Telegraph & Telephone Company (1881) (J.B. Beers and Co. 1884:138).

Prominent businesses in the mid-1920s were Catskill Hardware & Lumber Co., Welsh & Grey Lumber Co., New Era Apple Products Co., Inc. (in Leeds, incorporated 1926), Mayone Brick Co., (1916), Catskill Creamery (1925), Edison Post Apple Products Corp (sweet cider and vinegar 1924), Rip van Winkle Golf and Country Club, Catskill County Club and Jefferson Heights Improvement Co., (Vedder 1927:176). As the century progressed, a trend toward suburbanization affected the area based on its location approximately 30 miles south of the City of Albany and about 30 miles north of the City of Kingston. However, outside the larger villages the majority of the town remained rural. The New York State Thruway was completed east of project area in the 1950s and Route 23 has been during 1970s.

### **3.4 AFFECTED ENVIRONMENT: OVERVIEW OF CULTURAL RESOURCES IN THE STUDY AREA**

Cultural resources are vulnerable to the impacts of storm surges, flooding, and sea-level rise. These types of exposures can diminish the physical and historic integrity of archaeological sites, historic buildings, and cultural landscapes through physical damage or destruction. Integrity is essential for historic properties to retain their designations as National Historic Landmarks, State / National Register listed or eligible resources, NYC Landmarks, and / or NPS parks or site units, examples of all of which are present throughout the study area.

**World Heritage Sites.** Two United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites are in the study area: the Statue of Liberty National Monument

(1984) and the Guggenheim Museum in the 20th-Century Architecture of Frank Lloyd Wright (2019) (UNESCO 2022).

**National Historic Landmarks (NHLs).** National Historic Landmarks are historic properties that illustrate the heritage of the United States. Each of the more than 2,600 NHLs represents an outstanding aspect of American history and culture (NPS 2022a). There are many types of NHLs which include historic buildings, sites, structures, objects, and districts. Only 3% of properties on the National Register of Historic Places are NHLs. Nationally significant properties convey important stories that have meaning for all Americans, regardless of where they live. A nationally significant property may:

- Be the location of an event that had a significant impact on American history overall.
- Be the property most strongly associated with a nationally significant figure in American history.
- Provide an outstanding illustration of a broad theme or trend in American history overall.
- Be an outstanding example of an architectural style or significant development in engineering.
- Be part of a group of resources that together form a historic district.
- Be a property that can provide nationally significant archeological information

New York State has 275 NHLs, approximately 168 (or 61% percent) of which are in the study area. New York County has 92 NHLs, the highest concentration of NHLs in both the state and study area. Two of these are transportation-related resources which are in both New York and New Jersey: Palisades Interstate Park (Hudson River) and the Holland Tunnel (NPS 2022a). The State of New Jersey has 58 NHLs, of which approximately 22 (34% percent) are in the study area. Other NHL property types in the study area include military, maritime, manufacturing, recreational, residential, educational, and religious.

**Traditional Cultural Properties.** A Traditional Cultural Property is “one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in the community’s history, and (b) are important in maintaining the continuing cultural identity of the community” (Parker and King 1998:1). At present, these properties are not quantified for the study area. If present, they may be associated with Native American Nations, as well as ethnic groups related to more recently arrived populations from Europe, Asia, Africa, South America, and Australia, along with those from elsewhere in North America.

**Ethnographic Resources.** In NPS parlance, ethnographic resources are “sites, structures, objects, landscapes, and natural resources or features of traditional importance to a contemporary cultural group through associations three generations or more in length” (Rockman et al. 2016:19). At present, these resources are not quantified for the study area. If present, they may be associated with Native American Nations, as well as ethnic groups related to more recently arrived populations from Europe, Asia, Africa, South America, and Australia, along with those from elsewhere in North America.

**Table 3.2. Total NHLs in or partially in the study area.**

<b>New York</b>	<b>New Jersey</b>
Albany County: 10 NHLs	Bergen County: 3 NHLs
Bronx County: 6 NHLs	Essex County: 2 NHLs
Columbia County: 3 NHL	Hudson County: 2 NHLs
Dutchess County: 7 NHLs	Middlesex County: 1 NHL
Greene County: 1 NHLs	Monmouth County: 7 NHLs
Kings County: 9 NHLs	Passaic County: 2 NHLs
New York County: 90 NHLs	Union County: 3 NHLs
Orange County: 5 NHLs	Jersey City, Hudson County, NJ and New York City, New York County, NY: 1 NHL
Putnam County: 2 NHLs	West Bank of the Hudson River, Bergen County, NJ and Orange and Rockland: 1 NHL
Richmond County: 6 NHLs	
Rockland County: 3 NHLs	
Queens County: 4 NHLs	
Ulster County: 3 NHLs	
Westchester County: 15 NHLs	
Croton to New York City, Westchester, Bronx, & New York Counties, NY: 1 NHL	
New York City, New York County, NY and Jersey City, Hudson County, NJ: NHLs	

**Cultural Landscapes.** A cultural landscape is “a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person, or exhibiting other cultural or aesthetic values” (NPS 2021). The National Park Service defines four types of cultural landscapes, which are not mutually exclusive: Historic Designed Landscapes; Historic Sites; Historic Vernacular Landscapes; and Ethnographic Landscapes. At present, cultural landscapes are not well-quantified for the study area.

**Museum Collections.** The NYNJHAT study area contains numerous museum collections associated with the rich and varied cultural history of New York and New Jersey, the United States, and other collections from around the world. Museum collections are housed in various types of buildings and storage facilities. The buildings housing these collections are often historic properties or historic sites that range from a small historic house museum such as the Wyckoff House Museum in Brooklyn, an NHL and the first building to be designated a New York City Landmark, to The Metropolitan Museum of Art, the largest art museum in the Western Hemisphere. There are approximately 145 museums in New York City alone.

### **3.4.1 New York Study Area: National Park Service Sites, National Heritage Areas, State Heritage Areas, NRHP Properties, and New York City Landmarks**

The NYNJHAT Study Area in New York includes all five boroughs of New York City, which encompass approximately one million buildings of innumerable types and combination of uses (City of New York 2013:2019).

**National Park Service Sites: New York Study Area.** National Park Service Sites are administered by the federal government. NPS sites in the study area contain a wide variety of cultural resources and historic landscapes. Fourteen NPS Sites are in the New York Study Area, eleven of which are in New York City. The New York Harbor Parks in the study area represent over 400 years of American history. These are the most iconic and visible parks in the harbor area. Among them are:

**The Statue of Liberty National Monument** in New York Harbor includes both Liberty Island and Ellis Island. Dedicated in 1886, the colossal 305 ft-tall Statue is considered a masterpiece of the human spirit in its design and execution (UNESCO Criterion i). The statue is a symbol of the migration of people from many countries into the United States in the late 19<sup>th</sup> and the early 20<sup>th</sup> centuries (UNESCO Criterion vi). Within the boundaries of the property are located all the elements necessary to understand and express the outstanding universal value of the Statue of Liberty. Ellis Island served as the largest and most active immigration station from 1892 to 1924. It was incorporated into the Statue of Liberty National Monument in 1965.

**Governors Island National Monument** lies at the confluence of the Hudson and East Rivers in New York Harbor. Two fortifications, Fort Jay and Castle Williams, were erected on the island between 1796 and 1811 as part of the First and second Systems of Fortifications. Governors Island served as an early outpost to protect New York City from enemy naval attack and its fortifications were integral parts of a larger coastal defense network. The island is also part of a Larger National Historic Landmark District. Governors Island Historic District consists of a group of over 100 structures that were continuously used by the U.S. military for more than two hundred years.

**Castle Clinton National Monument** is located at the southern tip of Manhattan represents both the growth of New York City and the nation. Constructed between 1808 and 1811, the West Battery (Castle Clinton) was one of four fortifications built to defend New York Harbor for the War of 1812.

**National Heritage Areas (NHAs): New York Study Area.** National Heritage Areas are designated by the U.S. Congress as places where historic, cultural, and natural resources combine to form cohesive, nationally important landscapes (NPS 2019). Unlike national parks, NHAs are large lived-in landscapes. The New York part of the study area includes portions of three NHAs:

**Gateway National Recreation Area.** Gateway National Recreation Area spans 27,000 acres from Sandy Hook in New Jersey to Breezy Point in New York City. Established in 1972, the park serves as a gateway from the ocean into New York Harbor, America's largest port. It consists of three park units in two states: Jamaica Bay and Staten Island in New York and Sandy Hook in New Jersey (see below). The park contains a wide diversity of resources related to defense, aviation, maritime safety, public recreation, and natural resource protection. The Jamaica Bay Unit includes places such as Floyd Bennett Field in Brooklyn, New York City's first municipal airport, and two military facilities at Fort Tilden and Floyd Bennett Field, which were integral for the defense of New York Harbor and the nation. The Staten Island Unit includes a former airfield and two former Army fortifications, Fort Wadsworth and Battery Weed.

**Maurice D. Hinchey Hudson River National Valley National Heritage Area.** The Hudson River Valley National Heritage Area was designated by Congress in 1996 to recognize the importance of the history and the resources of the Hudson River Valley to the nation. The New York part of the study area extends through the center of the three Hudson Valley Regions in the NHA: Lower, Middle, and Upper. The 150-mile-long Hudson Valley NHA extends north from the lower Hudson Valley at Yonkers to the Albany Capital District and encompasses the counties of Albany, Rensselaer, Columbia, Greene, Ulster, Dutchess, Orange, Putnam, Westchester, and Rockland, and the Village of Waterford in Saratoga County. There are now more than 100 designated Heritage Sites of the Maurice D. Hinchey Hudson River Valley NHA. Those along the Hudson are significant for their association with several themes: Architecture, Arts, Artist & the Hudson River School; Corridor of Commerce; environment; Freedom & Dignity; Landscapes & Gardens; and Revolutionary War (Hudson River Valley National Heritage Area n.d.).

**Erie Canalway National Heritage Corridor.** Designated by U.S. Congress in 2000, the Erie Canalway National Heritage Corridor spans 524 miles across New York State. The eastern terminus of the Erie Canalway in the Capital District Region is in the study area. The designation specifically recognizes the canal for its role in shaping the American economy and settlement, as an embodiment of the Progressive Era emphasis on public works, and as a nationally significant work of early 20<sup>th</sup> century engineering and construction. The NYS Canal System has also been designated an NHL (Erie Canalway National Heritage Corridor 2022).

**New York State Heritage Areas.** The Heritage Area System (formerly known Urban Cultural Park System) is a state-local partnership established to preserve and develop areas that have special significance to New York State. Heritage Areas encompass some of the state's most significant natural, historic, and cultural resources. Sections of five NYS Urban Heritage Areas are within the study; these include Harbor Park (New York City), Ossining, Kingston, Albany and Hudson-Mohawk-River Spark (Troy). The western end of the Long Island North Shore Heritage Area is also in the study area (NYS OPRHP 2022). USS Slater is a heritage site moored on the Hudson River in Albany, it is the last remaining WWII Destroyer Escort now a floating museum.

**National Register Listed and Eligible Resources: New York Study Area.** According to the NY SHPO CRIS, more than 64,400 National Register Listed or Eligible Resources cultural resources are in the New York study area. This includes 426 archaeological sites (138 listed and 288 eligible), 63,666 individual aboveground historic resources (51,127 listed and 12,539 eligible properties), and 332 historic districts (202 listed and 130 eligible). There are an additional 1,504 known archaeological sites that have yet to be investigated to determine whether they are eligible for S/NRHP.

**New York State Museum Archaeological Sites.** The NYSM has records for 450 archaeological sites and 712 archaeological areas in the study area.

**New York City Landmarks.** The New York City Landmarks Preservation Commission (LPC) administers the city's Landmarks Preservation Law. It is responsible for protecting New York City's architecturally, historically, and culturally significant buildings and sites by granting them landmark or historic district status and regulating them after designation (NYC LPC 2022). According to the Landmarks Law, the purpose of safeguarding the buildings and places that represent New York City's cultural, social, economic, political, and architectural history is to:

- Stabilize and improve property values;
- Foster civic pride;
- Protect and enhance the city's attractions to tourists;
- Strengthen the economy of the city; and
- Promote the use of historic districts, landmarks, interior landmarks, and scenic landmarks for the education, pleasure, and welfare of the people of the city (NYC LPC 2022).

NYC LPC landmarks are designated in four categories: individual landmarks, interior landmarks (i.e., building interiors), scenic landmarks, and historic districts. The National Register is separate from the LPC although many of New York City's individual landmarks and historic districts are also listed on the National Register. There are more than 37,600 landmark properties in New York City, most of which are in 152 historic districts and historic district extensions in all five boroughs (NYC LPC 2022). The NYNJHAT study area includes all the NYC boroughs. Most NYC LPC landmarks are concentrated in the boroughs of Manhattan and Brooklyn.

NYC LPC Scenic Landmarks designation requires an outdoor site meet the following criteria: it must be at least 30 years old; have "a special character or special historical or aesthetic interest or value as part of the development, heritage, or cultural characteristics of the City, state, or nation;" and be a landscape feature or aggregate of landscape features. All eleven NYC Scenic Landmarks are in the study area. These include seven in Manhattan: Central Park, Grand Army Plaza, Bryant Park, Verdi Square, Morningside Park, Riverside Park, and Fort Tyron Park (Hudson River). The other four scenic landmarks are in Brooklyn: Prospect Park, Eastern Parkway, Coney Island (Riegelmann) Boardwalk (Lower New York Bay & Atlantic Ocean), and Ocean Parkway.

Approximately 29 NYC Landmark individual properties and historic districts have been identified as partially in or adjacent to the 100-m Direct APEs for the project alternatives (see Sections 5 to 9).

### **3.4.2 New Jersey Study Area: National Heritage Areas, NRHP Properties, and Heritage Trails**

**National Heritage Areas: New Jersey Study Area.** The study area in New Jersey overlaps with two NHAs:

**Gateway National Recreation Area.** Gateway National Recreation Area spans 27,000 acres from Sandy Hook in New Jersey to Breezy Point in New York City. Established in 1972, the park serves as a gateway from the ocean into America's largest port New York Harbor. It consists of three park units in two states: Jamaica Bay, Sandy Hook, and Staten Island. The park contains a wide diversity of resources related to defense, recreation, aviation, maritime safety, public recreation, and natural resource protection. The Sandy Hook Unit is lies within the Fort Hancock and Sandy Hook Proving Ground National Historic Landmark, the site of the oldest surviving lighthouse in the country. Fort Hancock was one of the places vital to American defense from 1895 to the nuclear age.

**Crossroads of the American Revolution National Heritage Area.** The New Jersey Study Area includes heritage sites within the Crossroads of the American Revolution National Heritage Area. New Jersey played a crucial role in the American Revolution due to its strategic location near the center of the American Colonies. Designated in 2006, the heritage area encompasses approximately 2,155 square miles in New Jersey including 212 municipalities in 14 counties. The study area spans portions of nine of the 14 counties in the NHA (Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth). The NHA has many historic and cultural resources associated with Revolutionary War history, including buildings, sites landscapes, and archaeological sites (Crossroads of the American Revolution 2021).

**National Register Listed and Eligible Resources: New Jersey Study Area.** The State of New Jersey has approximately 1,765 National Register listings (NPS 2022b). This includes archaeological sites, individual historic resources, and historic districts. The USACE requested NJ SHPO datasets were not available for review as part of this Tier 1 EIS.

The number of S/NRHP-listed and eligible properties in or partially in the study area shall be ascertained in the next phase of the NYNJHAT study, Tier 2 EIS. A large portion of New Jersey's urban, industrial, and population centers are in the study area and a proportional number of its historic properties are likely contained therein.



**New Jersey Women's Heritage Trail.** The study area includes sites in the New Jersey Women's Heritage Trail. The Trail uses historic places to communicate the collective story of women, both famous and private, who contributed to the agricultural, industrial, labor, and domestic history of the state (NJ SHPO 2005; 2020b). One example in the study area is Women's Federation Memorial in Palisades Interstate Park, Bergen County. The New Jersey Federation of Women's Clubs played a key role in saving the Palisades. The Trail also recognizes women associated with the history of National Historic Landmarks and national Park sites such as at Sandy hook, Gateway NRA and Ellis Island.

### 3.4.3 Submerged Cultural Resources

The submerged cultural resources portion of the Direct APE is defined as the depth and breadth of the geographic areas potentially affected by any bottom-disturbing activities. The marine Direct APE also includes maritime cultural resources landward of the shoreline (i.e., onshore) and resources offshore of the New York-New Jersey Harbor and tributaries.

The NYS OPRHP has information on more than 1,000 shipwreck sites and reported losses, though there may be as many as 10,000 shipwrecks in state waters (NPS 2022a). There are an estimated 3,000 shipwrecks wrecked and sunk in New Jersey waters (NPS 2022b). This general summary addresses the potential of identifying submerged cultural resources in the NYNJHAT study area and methods to be used in future maritime archaeological investigations after the Project Alternative is implemented.

There are two kinds of historic resources that might be impacted underwater on the U.S. Continental Shelf: submerged Native American sites and shipwrecks. The latter is deposited by sinking, and the former were inundated and buried by sea level rise during the latest Pleistocene and Holocene times. Shipwreck archaeology is a well-practiced discipline, with decades of development of method and theory. Submerged prehistoric site archaeology is, on the other hand, a nascent discipline, but it is increasingly clear to historic resources managers that these sites need study in several types of submerged settings, especially offshore New York and New Jersey (Panamerican Consultants [Panamerican] 2020:3).

**Potential For Encountering Submerged Native American Sites.** Preceramic-period sites in the Northeast are most often found on the high ground of major river terraces, often at confluences, overlooking wide expanses of land. Drainages at these times were larger, longer, and more vigorous, swollen by glacial meltwater that could move glacial outwash boulders, cobbles, and pebbles—accumulations of which have the potential to provide lithic resources. As sea levels rose, the mouths of rivers were drowned; creating bays, estuaries, and salt marshes that migrated over the low slope of the retreating coastal plain. Some of these settings would have been attractive to humans for settlement or exploitation. Lee and back-bay settings such as these may also serve to preserve sites as estuarine sedimentation protects earlier or contemporary deposits from transgressive erosion (Panamerican 2020:17).

While analysis of magnetic and sidescan sonar data with respect to historic archaeological sites entails observing individual objects recorded in the data, the identification of potential prehistoric

archaeological sites via a remote sensing survey is more complex. Current remote sensing technology cannot identify existing submerged archaeological sites with any frequency. Instead, the data are used to identify submerged and buried landforms that are likely to have been used for habitation when the area was exposed such as terraces, or features formed by human behavior that are large enough to be remotely sensed, namely shell midden feature (Panamerican 2020:17).

Paleolandscapes can be exposed and apparent on the seafloor during examination of sidescan sonar data, but others are buried under layers of marine sediments; in which case, penetration of the seabed by subbottom profiler is necessary for assessment (Panamerican 2020:18).

Analysis of seismic data utilizes criteria such as linearity, strength of reflection (as indicated by the darkness and thickness of reflectors), and uniformity of reflector patches to determine differences in the stratigraphy. Strong reflectors are indicative of sediment characteristics that reflect more sound energy and will typically show up as lines of high contrast in the subbottom image, including indurated surfaces or peat beds (Plets et al. 2007). Likewise, weaker reflectors are indicative of sediments that attenuate the sound with little reflection, particularly sand and shell beds (Panamerican 2020:18).

Areas of interest for Native American archaeological sites include the margins of stream channels, lakes, ponds, other bodies of water, and the margins/shoals of estuarine environments. Channel facies will show up as a series of concave-shaped reflectors. Other potential reflectors include deltaic features (wedges) and foreset beds that are indicated by the presence of alternating layers of varying reflective properties with indicated slope (Panamerican Consultants 2020:18).

**Modeling For Native American Sites in Submerged Setting.** In principle, there are three types of data that can help model for where submerged prehistoric sites might be in any specific setting: local geology; local sea level rise history; and local culture history (Faught and Gusick 2011).

Knowing the geology of the NYNJHAT project area locations and the local history of sea level changes will establish what areas in the vicinity of the project areas were available for occupation and when. Under a “terrestrial analog” modeling methodology, like that used by Faught (2004) or that discussed by Benjamin (2010), likely areas for habitation or exploitation along the Atlantic seaboard tend to be found in settings that are near water (rivers, lakes, and wetlands) and usually in places of moderate to no slope. Coastal occupations, like those expected in the survey area, produce weir features and midden deposits that are likely in paleoestuary settings, in the lee of paleobarrier features, and, of course, on the margins of paleochannels. While there is no direct method of remote sensing submerged prehistoric artifacts or sites, geophysical data, sidescan sonar, and subbottom profiler geophysical devices are critical for identifying preserved paleolandscape features like river pathways and estuarine deposits potential for prehistoric archaeological sites (Panamerican 2020:3).

The potential for any submerged prehistoric resource within the NYNJHAT project area locations is directly related to the geomorphology of the ocean bottom and are the result of past landscapes altered by post-Pleistocene sea-level changes and subsequent marine processes. The configuration of the seafloor is reflective of a number of processes, including multiple glacial

advances, isostatic rebound (uplift), subsequent marine incursion (and loading), and modern seafloor processes. Data to reconstruct this geological history have come from cores, seismic remote sensing, and sediment studies Panamerican 2020:3).

**Archaeological Site and Shipwreck Inventory.** Studies of ship losses have been conducted for the New York Harbor area, which demonstrate that numerous vessels have been lost since the early seventeenth century. Vessel types spanning every era in U.S. History have traversed the waters off New York, making it a haven for a variety of shipwreck sites, many still undocumented and unidentified.

Estimates of the number of shipwrecks in the region run from the hundreds into the thousands. The Long Island and New Jersey coastlines form the two sides of a “funnel” directing traffic into New York’s great harbor, and have witnessed more shipwrecks than anywhere else along the East Coast of the United States, with the possible exception of Cape Hatteras, along the Carolina Outer Banks [Sheard 1998:8].

A number of sources have been written concerning the history of the approach to New York Harbor and the subsequent loss of numerous vessels due to foul weather, lack of navigational aids, marine accidents, or simply grounding-out near the surf zone (followed by the subsequent degradation of the hull if the vessel could not be removed). Rattray (1973:50) mentions that the southern shore of Long Island is well known for shifting sandbars that parallel the whole length of the island. Any and all of these factors helped to make both the approach to New York Harbor and the harbor itself a haven for shipwreck disasters (Panamerican Consultants 2020:35).

Considering the volume of shipping that moved in and out New York Harbor for the last three centuries and the Office of Coast of Survey’s Automated Wreck and Obstruction Information System (AWOIS) the probability of shipwreck remains can be considered high within NYNJHATS study area regions of Jamaica Bay Region, Lower Bay Region, Upper Bay/ Arthur Kill Region, Lower Hudson/East River Region, and Long Island Sound (Automated Wreck and Obstruction Information System [AWOIS 2016]. The AWOIS database generally lists more modern wrecks or obstructions from after the turn of the century. The study area is in AWOIS Area Code B (Cape Cod to Sandy Hook; includes Long Island Sound, New York Harbor, and the Hudson River below Troy) and Area Code C (Sand Hook to Cape May; includes south shore of Long Island) (AWOIS 2013:n.p.) It should be noted that the database contains many non-vessel obstructions, including rocks, sunken buoys, buoys anchors, and sewage outfall pipes, and a great deal of uninvestigated snags and hangs. It may also include vessels that were wire dragged or otherwise salvaged or removed. Accuracy of locational information varies from on-site verified coordinates to very generalized (Panamerican 2020:18).

The report written by the Harvard University Institute for Conservation Archaeology (ICA) study of the Atlantic Coast titled *Summary and Analysis of Cultural Resource Information on the Continental Shelf from the Bay of Fundy to Cape Hatteras* (Moir 1979) supplies some useful information regarding the final disposition, durability, historic shipping, data, and categories of shipwrecks:

A. Shipwreck locations

(1) References to shipwreck location are often vague, owing principally to the difficulty of locating things at sea. Even as late as World War II it was not customary or feasible for merchant ships to maintain their position at sea with any great accuracy. Thus, a position reported at the time of the vessel's distress often refers to the last known position rather than the actual position at the time of the wreck.

(2) The change from sail to steam power during the mid-nineteenth century seems not to have affected shipwreck location.

B. Construction material and durability of shipwrecks

(1) Wooden shipwrecks tend to break up and disintegrate due to the effects of storms and/or attacks of marine organisms, with their remains scattered over an area much larger than the original dimension of the ship.

(2) Steel-vessel shipwrecks tend to retain a greater degree of structural integrity than wooden vessels.

(3) The early steel (actually iron) vessels of the 1860s were generally made of thin sheets of metal and tended to sink rapidly and scatter their remains over larger areas than the later, more-rigidly constructed steel vessels.

C. Historic shipping

(1) The Harvard University study presents a brief history of shipping in the Greater New York Harbor area and makes predictions as to probable primary locations for shipwrecks for the various periods. New York Harbor has been an active port since the first Dutch settlements, and in fact since the early 1800s it has been a leading--often the leading--American port for commercial shipping. Because modern aids to navigation appeared only toward the latter part of the nineteenth century, it is probable that yearly vessel losses peaked during the period 1850-1880 (That the data contained in this shipwreck inventory does not show a peak towards the latter part of the nineteenth century is problematic, but perhaps is due only to the onset of record keeping in the twentieth century).

D. Shipwreck data sources through time

(1) Pre-1800: there are not many records of any sort pertaining to shipwrecks during this period; what records do exist tend to be located now in European archives, since the ships involved, until 1776, were of European registry. Potential shipwreck locations are derived from analysis of shipping routes, trade, and settlement patterns.

(2) 1800-1880: coastal newspapers are the major source for information about ship arrivals and departures and about ship losses during this period.

(3) 1880-present: By 1880 the U.S. Life Saving Service was publishing lists of casualties in its annual report. By 1910 a list of vessels lost was also included in Merchant Vessels of the United States, an annual record of registered vessels published by various government branches. By 1915 the U.S. Life Saving Service was taken over by the U.S. Coast Guard, which also published annual reports of casualties and assistance.

#### E. Categories of areas of expected shipwrecks

- (1) Primary: locations where popular shipping route pass through hazardous waters and/or close to shorelines.
- (2) Secondary: coastal and shoal areas less frequently utilized but known to contain submerged hazards and lee shores.
- (3) Tertiary: deep-water areas of major shipping channels, where shipwreck density relates directly to traffic density” [Engebretsen 1982:2-3].

These factors (compiled by ICA) aided in establishing a shipwreck inventory for Lower New York Bay in a report titled *New York Harbor and Adjacent Channels Study Shipwreck Inventory* compiled by Jan Engebretsen in 1982. In cooperation with the USACE and Port Authority of New York, this study established the potential for shipwrecks within navigation channels (and adjacent areas) in and near New York Harbor. Engebretsen (1982:3) created the inventory “of all known shipwrecks in the Greater New York Harbor area” using several shipwreck compendiums, lesser inventories, and government reports.

The *Merchant Steam Vessels of the United States 1790-1868*, also known as “The Lytle-Holdcamper List,” originally compiled in 1952 and reprinted in 1975, indicates the potential for vessels lost in and near the NYNJHAT study area. The Lytle-Holdcamper List is a comprehensive register of most steam vessels in the United States, and indicates the name, rig, tonnage, year and place built, first homeport, and its final disposition. Also included is a list of losses. Approximately 3,800 steam-powered vessels are noted as being lost. Of this number, 42 are reported as lost off New York, New York (Lytle and Holdcamper 1975).

Annual Reports of Operations of the U.S. Life Saving Service are also helpful in identifying the locations and names of shipwrecks. The U.S. Life Saving Service maintained stations in the NYNJHAT study area (e.g., New York, Coney Island, Sheepshead Bay, Rockaway Point, Far Rockaway, Kings Point, Sandy Hook, Monmouth Beach, Long Branch) during the latter half of the nineteenth century well into the twentieth century (U.S. Life-Saving Service Heritage Association n.d.).

**Hudson River’s Submerged Heritage: From Troy Dam to George Washington Bridge.** A rich heritage of maritime history lies beneath the Hudson River Estuary. For as many as 12,000 years before European colonization the Hudson River had a vital role in Native American life as an important natural resource and for inter-village trading (Hudson River Maritime Museum [MRMM] n.d.]). Since the early 17<sup>th</sup> century, the river has influenced the development and expansion of the United States as well as served as a link for domestic and international shipping trade. Recent archaeological and historical research suggests that the Hudson River embodies an unprecedented repository of undisturbed shipwrecks which represent Euro-American commerce, military operations, technical developments, and social history (MRMM n.d.])

Activities on or near a water body such as the Hudson River have unavoidably led to human-made objects both large and small becoming part of the riverbed either through sea-level rise or through falling from the river surface. The Hudson River Benthic Mapping Project conducted benthic mapping of more than 165 miles of the river conducted between 1998 and 2003

uncovered 300-400 possible shipwrecks and other structures submerged beneath the river. Multi-beam sonar swath bathymetry identified hundreds of anomalies that appeared to be shipwrecks. Subsequent dives have identified specific historic submerged resources. Other types of submerged resources include railroad cars and submerged sites dating to periods when the river's water level was much lower (MRMM 2015:4,7).

Sites dating from the seventeenth and eighteenth centuries may be contained in the riverbed that include the wrecks of Dutch sloops, British and American warships and barriers to navigation associated with the American Revolution. Dutch shipbuilding along the Hudson River began in winter of 1613-1614. The *Onrust* was commissioned to explore and trade along the Hudson and East Rivers and Long Island Sound. Hudson River sloops were adapted to meet the river's unique navigational conditions in the decades leading up to the American Revolution. In 2007, verification field work was conducted at the site of sunken defensive structures known as *cheveaux-de-frise* in the river north of the U.S. Military Academy at West Point. These structures were used by the Colonial forces during the American Revolution (MRMM 2015:7,8,11,12).

The bed of the Hudson River is primarily the property of New York State administered by the New York State Office of General Services (NYS OGS). The Abandoned Shipwreck Act of 1987 – along with other New York State statutes, rules, regulations and case law – establishes that title and responsibility for these submerged resources rests with New York State.

**Study Area Submerged Resources in New York.** Of the 1,930 archaeological sites in the study area that are cataloged in the NY SHPO CRIS, at least 68 are shipwrecks. Neither CRIS nor the NYSM site database has listings for off-shore Native American sites in the study area. NOAA's ENC database lists 711 shipwrecks in the study area, of which 562 are in New York State.

**Study Area Submerged Resources in New Jersey.** NOAA's ENC database lists 711 shipwrecks in the study area, of which 149 are in New Jersey.

## 4.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 1: NO ACTION

The no action or no-build alternative was evaluated against the project purpose and need. The no action or no-build alternative would have impacts to existing aesthetic, visual, historical, or cultural resources since there would be no measures to manage future flood risks that are expected to be exacerbated by relative sea level rise. Thousands of archaeological and aboveground resources in the study area are at risk of damage or destruction from coastal flooding and sea-level rise. Additionally, submerged resources may be affected by underwater storm action and changes in seawater flow that accompany sea-level rise and flooding.

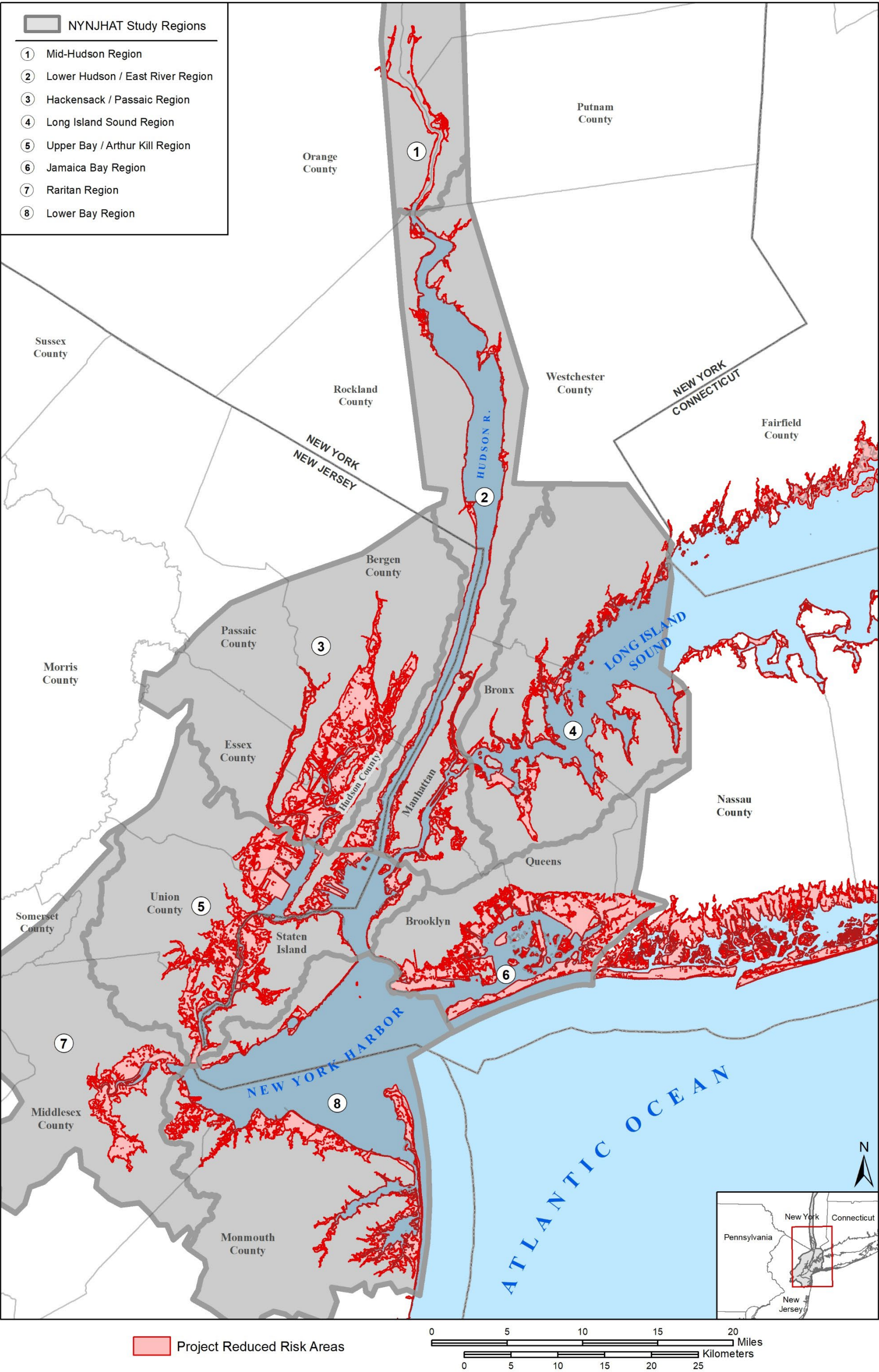
Cultural resources in the New York-New Jersey metropolitan area and the Hudson River Valley face increasing threats and challenges from environmental changes. Historical storms have severely impacted the New York- New Jersey Harbor region, including Hurricane Sandy in 2012 which impacted twenty-six states. New York and New Jersey were the most severely impacted, with the greatest damage in the New York Metropolitan Area. For example, storm surges of 12.65 feet and 9.4 feet above normal high tide were reported at Kings Point on the western end of Long Island Sound and the Battery at the southern tip of Manhattan, respectively (USACE 2019:5). Flood depths due to the storm tide were as much as nine feet in Manhattan, Staten Island, and other low-lying areas within the New York Metropolitan Area. Sandy significantly damaged many historic buildings, some beyond repair. The storm exposed vulnerabilities associated with inadequate coastal storm risk management (CSRM) measures which resulted in damaging impacts to cultural resources in New York- New Jersey Harbor region.

Some of the New York's and New Jersey's earliest Euro-American communities are located along or near waterfronts, both coastal and inland. Native American archaeological sites in the study area are also most often located near low-elevation sources of water, such as coastlines, estuaries, and rivers. Historic buildings, landmarks, and archaeological sites are increasingly vulnerable to the effects of environmental change including flooding and erosion from high tides and severe storms.

According to data provided by the USACE, without flood protection measures, roughly 184.2 square miles of the study area will be within the 100-year flood zone, of which 73.9 square miles are in New York and 110.3 square miles are in New Jersey (Figure 4.1). The affected area includes parts of all the study areas, with the exception of the Capital District Region. In New York, this area contains: at least three cemeteries (the Canarsie Cemetery, the Slight Family Graveyard, and an unidentified cemetery that appears on a United States Geological Survey [USGS] map); 1,691 listed properties, of which 1,651 individual properties and 31 are districts properties; 1,070 properties that are eligible for the Register (1,030 individual properties and 40 districts); 160 archaeological sites cataloged in the NYSHPO CRIS (of which 12 are NRHP-listed, 20 are NRHP-eligible, and 128 have not been investigated to the extent needed to determine whether they are NRHP-eligible); 39 archaeological sites recorded by the NYSM; and 331 NYSM archaeological areas.

A small sample of the NRHP-Listed properties that would be directly (physically) affected by the no-action alternative includes: the Washington, Manhattan, and Brooklyn Bridges; the United States Military Academy; the SoHo Historic District; the Holland Tunnel; Greenwich Village Historic District; Governor's Island; the New York Stock Exchange; Brooklyn Navy Yard; the East Harlem Historic District; and the Old Croton Aqueduct.





**Figure 4.1. NYNJHATS Study area of potential effect for the no-action alternative (Alternative 1)** (Study area and reduced risk area data provided by USACE; base map data source: ESRI 2010).



## 4.1 General Effects of Sea Level Rise on Cultural Resources

The NPS's *Cultural Resources Climate Change Strategy* identifies climate change impacts to cultural resources caused by sea level rise and coastal flooding, and provides summaries of those effects (Rockman et al. 2016). The types of cultural resources addressed in the Strategy include: archaeological resources, buildings and structures, cultural landscapes, ethnographic resources, and museum collections, all of which are present in the area of potential effect for the New York-New Jersey Harbor and Tributaries flood risk management system no-action alternative and will likely be adversely affected if the alternative is selected. Sea level rise events include: inundation and increased flooding events; increased frequency and/or severity of storm surges; increased coastal erosion; and higher water table (Rockman et al. 2016:23). The risks to the types of cultural resources present in the study area discussed in the Climate Change Strategy are summarized in Tables 4.1 to 4.5.

**Table 4.1. Effects of sea level rise and flooding on archaeological sites, as outlined in the National Park Service's *Cultural Resources Climate Change Strategy* (Rockman et al. 2016).**

<b>Inundation and Increased Flooding Events</b>
<ul style="list-style-type: none"><li>• Total submersion of coastal sites</li><li>• Downstream movement of items due to undercut shoreline sediments</li><li>• Changes in pH of buried artifacts and/or buried environments</li><li>• Reduced site integrity due to ground heave and subsidence</li><li>• Increased risk of looting from exposure</li><li>• Increased erosion of sites due to encroaching water levels, wave action exposure, and increased exposure to wet/dry cycles</li></ul>
<b>Increased Frequency and/or Severity of Storm Surge</b>
<b>During Surge:</b> <ul style="list-style-type: none"><li>• Destruction - total site loss</li><li>• Erosion from wave action</li></ul> <b>Post-Surge:</b> <ul style="list-style-type: none"><li>• Disturbance or removal during response and clean-up<sup>1</sup></li></ul>
<b>Increased Coastal Erosion</b>
<ul style="list-style-type: none"><li>• Full loss of coastal sites and artifacts</li><li>• Partial loss of sites and artifacts</li><li>• Exposure of new and known archeological sites</li><li>• Altered erosion patterns from reduction/changes in Arctic sea ice</li><li>• Increased risk of looting from exposure</li></ul>
<b>Higher Water Table</b>
<ul style="list-style-type: none"><li>• Damage to artifacts, stratigraphy, soil features from saturation of site from below</li></ul>

**Table 4.2. Effects of sea level rise and flooding on buildings and structures, as outlined in the National Park Service's *Cultural Resources Climate Change Strategy* (Rockman et al. 2016).**

<b>Inundation and Increased Flooding Events</b>
<p><b>During Flood:</b></p> <ul style="list-style-type: none"> <li>• Submersion of coastal sites</li> <li>• Increase in nuisance flooding leading to problems of access and higher likelihood of range of flood damage</li> <li>• Damage to or overwhelming of drainage systems, leading to associated building damage</li> </ul> <p><b>Post-Flood:</b></p> <ul style="list-style-type: none"> <li>• Deterioration/corrosion of infrastructure not designed for inundation or salt water exposure</li> <li>• Increased cracking due to associated ground heave and subsidence</li> <li>• Crystallization of salts introduced to buildings by seawater</li> <li>• Disassociation of historic districts, settings due to increased pressure to relocate or elevate structures or surrounding structures</li> <li>• Loss of access leading to loss of use</li> </ul>
<b>Increased Frequency and/or Severity of Storm Surge</b>
<p><b>During Surge:</b></p> <ul style="list-style-type: none"> <li>• Structural damage or collapse from moving force of storm surge</li> <li>• Damage to utilities, generators and electrical systems</li> </ul> <p><b>Post-Surge:</b></p> <ul style="list-style-type: none"> <li>• Cracks in building and associated destabilization of buildings and pipes due to ground heave and subsidence/shrink-swell soils</li> <li>• Erosion of supporting ground around structure</li> <li>• Changes to surrounding landforms, which may affect future drainage</li> <li>• Increased pressure to relocate or elevate structures, and/or surrounding structures (may also be pre-flood)</li> </ul>
<b>Increased Coastal Erosion</b>
<ul style="list-style-type: none"> <li>• Loss or compromise of structure</li> <li>• Increased pressure to relocate or elevate structures, and/or surrounding structures</li> <li>• Increased rusting, corrosion, and salt deposits due to increased salt in the environment as the coastline encroaches</li> </ul>
<b>Higher Water Table</b>
<ul style="list-style-type: none"> <li>• Rising damp, often marked by efflorescence/ salt deposits</li> <li>• Rot of subsurface components from higher water table</li> <li>• Flooding damage in basements and other below grade features</li> <li>• Structural damage due to buoyant forces</li> </ul>

**Table 4.3. Effects of sea level rise and flooding on cultural landscapes, as outlined in the National Park Service's *Cultural Resources Climate Change Strategy* (Rockman et al. 2016).**

<b>Inundation and Increased Flooding Events</b>
<ul style="list-style-type: none"> <li>• Variable damage/ loss of organic and inorganic materials and landscape features</li> <li>• Decline/ disappearance of some vegetation species, other species favored</li> <li>• Soil erosion</li> <li>• Soil infertility due to waterlogged, anaerobic conditions</li> </ul>
<b>Increased Frequency and/or Severity of Storm Surge</b>
<ul style="list-style-type: none"> <li>• Immediate alteration/ destruction of historic landscape</li> <li>• Decline/ disappearance of some vegetation species, other species favored</li> <li>• Soil infertility from soil erosion, loss of topsoil4 Loss of landscape features</li> </ul>
<b>Increased Coastal Erosion</b>
<ul style="list-style-type: none"> <li>• Decline/ disappearance of some vegetation species, other species favored</li> <li>• Soil infertility from loss of topsoil</li> <li>• Loss or compromise of associated structure</li> </ul>
<b>Higher Water Table</b>
<ul style="list-style-type: none"> <li>• Decline disappearance of important vegetation species, other species favored</li> <li>• Soil infertility due to waterlogged, anaerobic conditions</li> </ul>

**Table 4.4. Effects of sea level rise and flooding on ethnographic resources, as outlined in the National Park Service's *Cultural Resources Climate Change Strategy* (Rockman et al. 2016).**

<b>Inundation and Increased Flooding Events</b>
<ul style="list-style-type: none"> <li>• Loss of or limited access to traditional places and culturally important sites (e.g. burial grounds, subsistence areas)</li> <li>• Loss of plant and animal species for subsistence, medicine, ceremony, etc</li> <li>• Submersion of homelands in island and coastal communities and corresponding stresses to and loss of social connections and interactions</li> </ul>
<b>Increased Frequency and/or Severity of Storm Surge</b>
<ul style="list-style-type: none"> <li>• Increased risk of inundation of homes and towns, esp. during unpredictable and extreme weather Increased risk of loss of natural and cultural resources</li> <li>• Increased risk of loss of traditional knowledge associated with natural and cultural resources</li> </ul>
<b>Increased Coastal Erosion</b>
<ul style="list-style-type: none"> <li>• Loss of cultural memory and connections to homeland due to increased migration and splitting of traditional communities</li> <li>• Loss of culturally significant symbols, plants, and animals</li> <li>• Increased risk of loss of traditional knowledge associated with both natural and cultural resources</li> </ul>
<b>Higher Water Table</b>
<ul style="list-style-type: none"> <li>• Loss of or limited access to culturally important sites (eg burial grounds)</li> <li>• Decrease in productivity of arable land</li> </ul>

**Table 4.5. Effects of sea level rise and flooding on museum collections, as outlined in the National Park Service's *Cultural Resources Climate Change Strategy* (Rockman et al. 2016).**

<b>Inundation and Increased Flooding Events</b>
<p><b>Facilities</b></p> <p>Added strain on existing museum facilities and staff due to salvage operations</p> <p>Increased cracking associated with ground heave and subsidence</p> <p>Potential leaks in collection storage areas and potential wetting of museum objects</p> <p><b>Collections</b></p> <p>Increase risk of mold</p> <p>Increase rusting/corrosion of metals</p> <p>Damage and destruction post-flood from humidity and moisture</p>
<b>Increased Frequency and/or Severity of Storm Surge</b>
<p><b>Facilities</b></p> <ul style="list-style-type: none"> <li>• Added strain on existing museum facilities and staff due to emergency operations</li> <li>• Damage to utilities, generators and electrical systems</li> <li>• Structural collapse from moving force of storm surge</li> <li>• Changes to surrounding landforms or vegetation, which may affect future drainage</li> </ul> <p><b>Collections</b></p> <ul style="list-style-type: none"> <li>• Damage to items and disassociation of materials and records during emergency evacuations</li> <li>• Increase risk of rot, fungal/insect attack, mold and mildew</li> <li>• Increase rusting/corrosion of metals</li> <li>• Widespread damage and disassociation from flood waters</li> </ul>
<b>Increased Coastal Erosion</b>
<p><b>Facilities</b></p> <ul style="list-style-type: none"> <li>• Limited storage capacity to protect growing numbers of at-risk artifacts</li> <li>• Added strain on existing museum facilities and staff due to salvage operations</li> </ul>
<b>Higher Water Table</b>
<p><b>Facilities</b></p> <ul style="list-style-type: none"> <li>• Potential for higher relative humidity levels in collections storage areas</li> <li>• Increased risk of rising damp/rot from higher water tables</li> </ul>

## **5.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 2: HARBOR-WIDE STORM SURGE BARRIER + SHORE-BASED MEASURES**

Project Alternative 2 has measures and features to be constructed in seven of the investigation's study regions: Hackensack / Passaic; Lower Hudson / East River; Long Island Sound; Upper Bay / Arthur Kill; Jamaica Bay; Raritan; and Lower Bay (Figure 5.1).

The alternative incorporates SBMs in combination with the Outer Harbor storm surge barrier connecting Sandy Hook, New Jersey to Rockaway Point on the Rockaway Peninsula, as well as the storm surge barrier at Throgs Neck. To mitigate the residual flood risk, RRFs are proposed along the shorelines of the Lower and Upper Bay, the Arthur Kill region, the Raritan River, Jamaica Bay, the Hackensack River and Passaic River, the Lower Hudson and East River for this alternative. Induced flooding is expected to occur in the western end of the Long Island Sound as a result of the presence of the Throgs Neck storm surge barrier, thus, IFFs are proposed in this region.

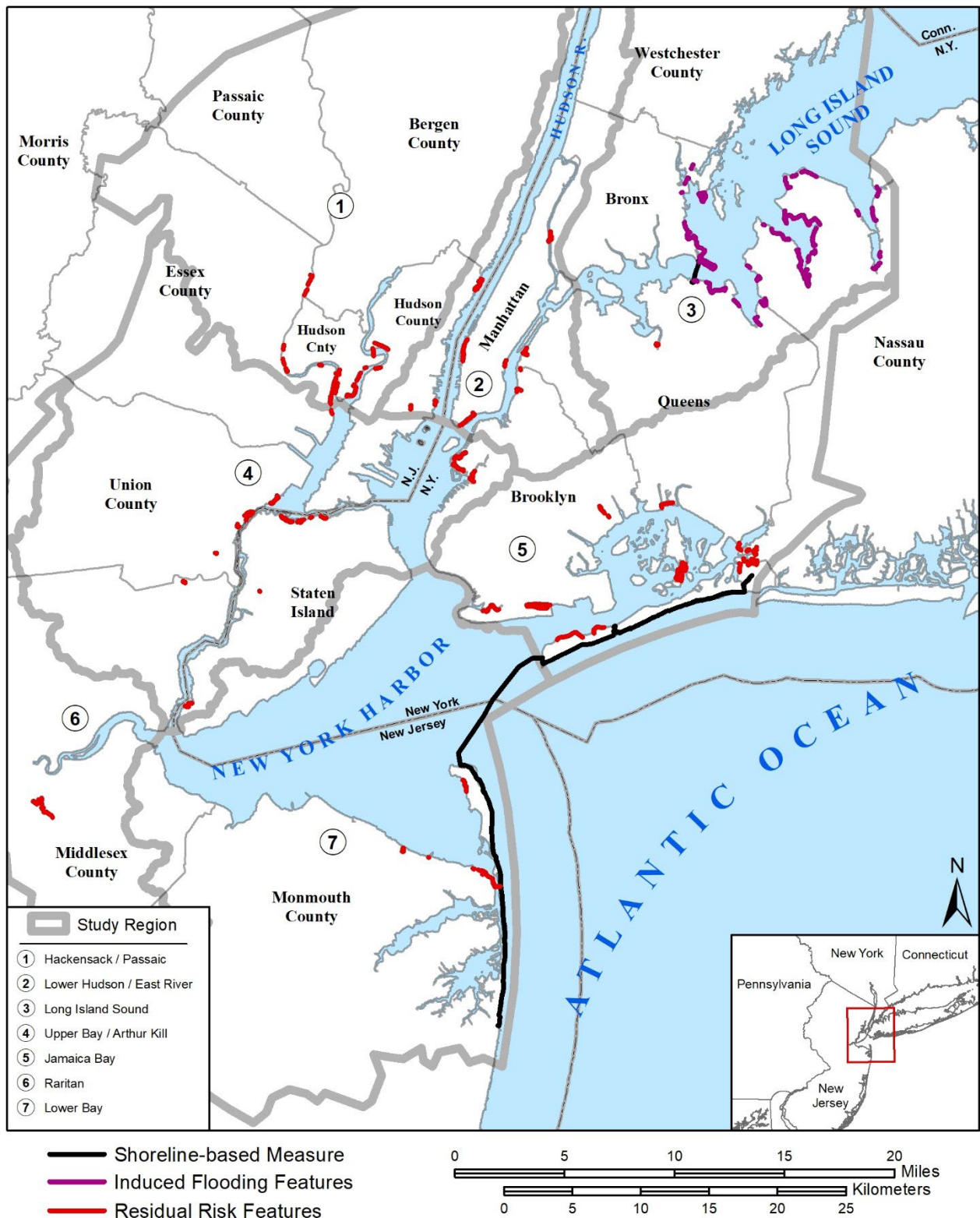
Preliminary measure dimensions total 91.3 linear miles (147 km), of which 61.3 miles (99 km) are in New York and 30 miles (48 km) are in New Jersey. The project measures and features include:

- SBMs: 32.3 linear miles (52 km) (16.16 miles [26 km] in New York and 16.16 miles [26 km] in New Jersey)
- IFFs: 22.8 linear miles (36.7 km) (all in New York)
- RRFs: 36.2 linear miles (58.3 km) (22.3 miles [35.7 km] in New York and 13.8 miles [22.2 km] in New Jersey)

Alternative 2 includes two features which could conceptually broadly address coastal storm surge. And wave attack from either the New York Bight or Long Island Sound to most of the study area. The first feature contains the Sandy Hook-Breezy Point (SH-BP) storm surge barrier, which is the largest under consideration with a potential length of over 30 miles (including shore-based measures tying into high ground). The barrier will be in the Lower Bay and Jamaica Bay study regions. Its components include a levee, berm and surge gate/barrier system connecting to Sandy Hook, New Jersey, across the transect to Breezy Point of Rockaway peninsula. The SH-BP feature contains an over six-mile (32,530 ft/ 9,915 m) long storm surge barrier, which is the largest under consideration. The proposed storm surge barrier would span the entrance to the New York and New Jersey Harbor, from Breezy Point on the Rockaway peninsula to Sandy Hook. The first feature also includes a second similar surge barrier enclosure along the East River at Throgs Neck between the Bronx and Queens. The Throgs Neck feature includes 4,510-ft (1375-m) long surge gate. The total length of this first feature's structural components (levees, etc.) measures an estimated 139,636 ft (42,561 m).

The second feature of this conceptual alternative is at Pelham Park in the Bronx along western Long Island Sound which is outside of the SH-BP and Throgs Neck surge gates to the north. The Pelham Park feature includes the 850-ft (259-m) long Pelham Bay Gate and 8,300 ft (2,530 m) of levees, all of which are in the Long Island Sound study region.

These three surge gate structures require approximately 9,800 feet (2,987 m) of floodwalls, levees and operable flood gates on land to tie-in to high ground. Alternative 2 also includes shore protection measures in various locations of the following areas: the Raritan River Basin, Raritan & Sandy Hook shoreline, Rahway River Basin, Hackensack/Meadowlands, shoreline along Hudson River-Upper Hudson, Brooklyn shoreline along Upper Bay, Brooklyn shoreline along East



**Figure 5.1. Alternative 2 SBMs, IFFs, and RRFs in New York and New Jersey (ESRI 2010).**

River, Brooklyn – Lower Bay, Coney Island/Creek shoreline, Queens shoreline along western Long Island Sound (LIS), Bronx shoreline along western Bronx, Bronx shoreline along western LIS, Northern Nassau County shoreline western LIS, and Jamaica Bay.

The area of potential effect for this alternative includes the physical footprint of each measure as well as the viewsheds of the historic properties within one mile.

## **5.1 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 2: CULTURAL RESOURCES WITHIN THE ALTERNATIVE DIRECT APE**

The Direct APE for this alternative consists of the physical footprint of individual measures and a 100 m (328 ft) buffer around each measure which consists of a total area of 11.88 sq mi (30.8 sq km). Alternative 2 has the potential for adverse effects to historic properties in and adjacent to the 100-m (328 ft) Direct APE. This section provides the results of a preliminary review of cultural resources data available in the NYS OPRHP and NJ HPO databases, as well as the NOAA ENC database and the NYC Landmarks Preservation Commission's internet-accessible geographic information system, for proposed measures in Alternative 2. To protect archaeological sites, in compliance with federal and state laws, their locations and names are not provided in this Draft Tier 1 EIS report.

The features proposed for Alternative 2 could involve the construction of structures that have a potential to affect directly historic properties and cultural resources in both terrestrial and submerged environments (Table 5.1). The proposed alternative is in an area that would be considered to have a moderate to high probability for terrestrial and submerged cultural resources to occur. At the most general level, Native American archaeological sites are most likely to be located near water; by definition, submerged resources are in water; and early non-Native American settlements clustered near water, particularly in the time before plumbing and sanitary sewer systems.

**New York.** The Direct APE for the alternative in New York is approximately 7.78 sq mi (20.2 sq km). This area intersects: 14 SHPO-cataloged archaeological sites (of which three are listed in the NRHP, three are NRHP-eligible; and eight have not been investigated sufficiently to determine their NR-eligibility); five archaeological sites in the NYSM inventory; 17 NYSM archaeological areas; 85 above-ground historic properties that are NR eligible (of which 76 are individual properties and 9 are historic districts); 200 NR-listed individual properties; five NR-listed historic districts; four LPC individual properties; four LPC districts and a National Recreation Area (the Jamaica Bay Unit of the Gateway National Recreation Area) (Table 5.1; Figure 5.2). The NOAA ENC database lists 43 shipwrecks in the New York portion of the Direct APE. The SHPO data does not indicate there are any cemeteries in the APE.

**New Jersey.** The Direct APE in New Jersey is approximately 4.1 sq mi (10.6 sq km). This area overlaps with: 27 NJSHPO archaeological grids (of which three contain NR-listed sites, nine have eligible sites, and 15 have sites that have not been investigated to determine their NR-eligibility); 23 National Register-eligible aboveground properties (of which 13 are individual properties and 10 are districts); five NR-listed individual properties; three NR-listed historic districts; one National Historic Landmark (the Fort Hancock Sandy Hook Proving Ground Historic District National Historic Landmark); and a National Recreation Area (the Sandy Hook Unit of the Gateway National Recreation Area) (see Table 5.1; Figure 5.2). The NOAA ENC database shows four shipwrecks in the Direct APE in New Jersey.

**Table 5.1. Preliminary Totals of Cultural Resources within 100 meters (328 ft) of Alternative 2 Measures (Direct APE)** *(after data from the NYSHPO, NYSM, NJSHPO, NPS, NOAA, and the NYC LPC).*

<b>Historic Property Type</b>	<b>Number of properties in New York Direct APE</b>	<b>Number of properties in New Jersey Direct APE</b>
National Historic Landmark	0	1
Historic District, NR-listed	5	3
Historic District, NR-eligible	9	10
Individual aboveground property, NR-listed	200	5
Individual aboveground property, NR-eligible	76	13
NYC LPC individual landmarks	4	-
NYC LPC landmark districts	4	-
Archaeological site, NR-listed*	3	3
Archaeological site, NR-eligible*	3	9
Archaeological site, undetermined eligibility*	8	15
NYSM archaeological site	5	-
NYSM archaeological area	17	-
Shipwreck	43	4
National Recreation Area	1	1
Cemeteries	0	-

\*Totals for New Jersey refer to LUCY archaeological grids, which may contain more than one archaeological site.





**Figure 5.2. Location of Units in the Gateway National Recreation Area** (*NPS Brochure Map, Gateway National Recreation Area*).

## ALTERNATIVE 2: SHORELINE-BASED MEASURES

**New York and New Jersey: Sandy Point-Breezy Point (Outer Harbor Barrier).** The Alternative 2 Outer Harbor Barrier and its shoreline-based measures are in the Jamaica Bay and Lower Bay study regions, and extend across parts of New York and New Jersey.

**Outer Harbor Barrier in New York.** The land connection for the north end of the Sandy Point-Breezy Point storm surge barrier is on the southwest tip of the Rockaway Peninsula at Breezy Point in Queens. The 5,895 ft (1,797 m) buried seawall/dune spans the Atlantic Shoreline of the peninsula at Breezy Point to a point between Beach 33<sup>rd</sup> and Beach 34<sup>th</sup> streets. From which point, a 1,244-ft (379-m) long levee extends north to the southeast side of the Rockaway Freeway and parallels the freeway north-northeasterly to Cornaga Ave in Far Rockaway.

The Direct APE includes portions of the Jamaica Bay Unit of Gateway National Recreation Area (Gateway NRA) on the western end of the Rockaway Peninsula, which contains Jacob Riis Park, Fort Tilden, and Breezy Point. Approximately 22 archeological sites, most dating to the time after the arrival of Europeans, have been identified in the Jamaica Bay Unit of the Gateway National Recreation Area. (JMA 2011:i). Two non-Native American archaeological sites are in and adjacent to in the APE; the sites have not been sufficiently investigated to determine if they are eligible for the S/NRHP.

The oceanfront of two S/NRHP listed historic districts are in the direct APE, Jacob Riis Park and Fort Tilden. Two S/NRHP-eligible historic districts have oceanfront property in the APE, Silver Gull Beach Club Historic District (Beach 193<sup>rd</sup> St) and Breezy Point Surf Club Historic District (1 Beach 227<sup>th</sup> St). The S/NRHP-eligible St. Rose of Lima Roman Catholic Church complex at 130 Beach 34<sup>th</sup> St is in the APE. The S/NRHP-eligible former Neponsit Beach Hospital for Children on Rockaway Beach Blvd is adjacent to the APE.

There are no designated LPC Landmarks in the Direct APE. One locally significant landmark, Flight 587 Memorial Park, is in the APE at Beach 116<sup>th</sup> St. The memorial is part of the NYC Parks system.

**Outer Harbor Barrier in New Jersey.** The land connection for the south end of the Sandy Point-Breezy Point storm surge barrier is on the northern tip of Sandy Hook in Middletown Township, Monmouth County. The Sandy Hook-Rockaway Barrier Tie-in is a 13,963 ft /26.4 mi (42,561 m/42.6 km) long buried sea wall that extends south from the northern tip of Sandy Hook along the shoreline to Great Lawn Beach at Madison Ave in Long Branch.

Measures located within Gateway NRA include Fort Hancock and Sandy Hook Proving Ground Historic District National Historic Landmark (NHL). There are eight archaeological grids in the Sandy Hook Unit, five of which are partially in the APE. South of Sandy Hook there is one S/NRHP listed archaeological grid and two identified archaeological grids partially in the APE.

One S/NRHP listed resource is in the APE, the U.S. Life-Saving Station #4 on Seacrest Rd and Ocean Ave in the Borough of Monmouth Beach. One individual S/NRHP eligible property is adjacent to the APE, 468 Ocean Ave in the City of Long Branch, Monmouth County. Several identified individual resources scattered along the shoreline are in or adjacent to the project APE.

This alternative would have adverse effects from construction to the Fort Hancock and Sandy Hook Proving Ground District National Historic Landmark as well as other historic properties within the Gateway National Recreation Area.

**New York City: Queens shoreline & islands in Jamaica Bay (Jamaica Bay Barrier Tie-in).**

The Queens shoreline SBM is in the Jamaica Bay study region. The measure consists of a system of large floodwalls, large and medium levees, deployable flood barrier-vehicle gates, and buried seawall/dunes (natural and urban). The west end of the measure begins on the north shore of Rockaway Peninsula at Jacob Riis Park. A 1,538-ft (469-m) long medium levee is proposed to extend south along the park's mall and cross over the mall into the park's golf course. The levee turns south crossing the boardwalk into the beach where it will connect with a buried seawall/dune (natural) that extends easterly around the perimeter of the elliptical shaped boardwalk. From Jacob Riis Park, a five-mile-long buried seawall/dune (urban) will extend easterly along the Rockaway shoreline through Rockaway Beach to a large levee between Beach 33<sup>rd</sup> St and Beach 34<sup>th</sup> St. The levee runs north connecting to a large floodwall on the south side of MTA railroad along Rockaway Freeway. The floodwall follows the railroad northeasterly to Ocean Crest Blvd in Far Rockaway. The APE encompasses portions of recreational land, undeveloped land, and urban residential land.

There are no known archaeological sites in the APE. The APE is partially in one archaeologically sensitive area.

The west end of this measure is proposed in the S/NRHP-listed Jacob Riis Park Historic District, a Gateway NRA unit. Contributing resources of the historic district are in the direct APE. Fort Tilden, also a Gateway NRA unit, is adjacent to the west side of the park but not in the APE. The S/NRHP-eligible St. Rose of Lima Roman Catholic Church complex 130 Beach 84<sup>th</sup> St is in the APE. The S/NRHP-eligible former Neponsit Beach Hospital for Children on Rockaway Beach Blvd is adjacent to the APE.

**New York: Throgs Neck Barrier and SBM.** The Throgs Neck Barrier and its associated SBMs are in the Long Island Sound study region. At Throgs Neck, between the Bronx and Queens, the surge gate structure is estimated to involve approximately 4,510 ft (1,275 m) of navigational and auxiliary surge gates. The north land connection is on a point south of Indian Trail at Penfield Avenue in the Throgs Neck neighborhood of the Bronx, west of Throgs Neck Bridge. Adjacent properties are primarily residential. The land connection for the south end is on an undeveloped commercial/industrial lot in the Whitestone neighborhood of Queens, near 152<sup>nd</sup> St and Powells Cove Blvd. Adjacent properties are mostly commercial. Throgs Neck Barrier Tie-in also consists of floodwalls.

**Bronx.** There are no known archaeological sites in or adjacent to the Throgs Neck APE in the Bronx. An archaeologically sensitive area is partially in the APE. The NOAA ENC database indicates there is a shipwreck at the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Queens.** There are no known archaeological sites in or adjacent to the Queens APE. The APE is in a NYSM archaeological site area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York: Pelham Bay.** The Pelham Bay measure is in the Long Island Sound study region. It involves approximately 850 ft (259-m) of navigable and auxiliary surge gates with approximately 8,300 ft (2,530 m) of associated SBMs including floodwalls and levees. It includes one relatively small embayment next to Pelham Bay Park in the Bronx along western Long Island Sound. The surge gates are proposed along the east side of Pelham Bay Bridge (Shore Rd) at the mouth of the Hutchinson River in the Bronx. The south land location is adjacent to the Bronx-Pelham Landfill. The north land location is in Pelham Bay Park. The levee feature location is north of the surge gates in Pelham Bay Park on the north side of Bartow Circle along the east side of Shore Rd.

One NYSM site area and one other NYSM archaeological site with an unevaluated S/NRHP eligibility status are partially in the APE. Several overlapping archaeological sensitive areas are partially in the APE.

The southwestern portion of the S/NRHP-eligible Pelham Bay Park Historic District is partially in the APE. Pelham Bay Park contains the S/NRHP listed Robert and Marie Lorillard Bartow House and the Orchard Beach Bath House and Promenade, both individual NYC Landmarks, which are to the northeast and east of the APE. The south end of the S/NRHP eligible Pelham Bay and Split Rock Clubhouse and Golf Course containing the club parking lot is partially in the APE.

## **ALTERNATIVE 2: INDUCED FLOODING FEATURES**

**New York: IFFs on the Bronx shoreline along western LIS Pelham Barrier.** The IFF features for the Bronx shoreline along the western Long Island Sound are all in the Long Island Sound study region.

**Hutchinson River IFF.** This feature consists of two large levees on the north and south sides of Hutchinson River near Pelham Bay Bridge. The south levee is proposed on the north end of Bronx Pelham Landfill. The north levee location is in the south edge of Pelham Bay Park.

One NYS Museum Area and overlapping archeologically sensitive areas are partially in the APE.

Two S/NRHP-eligible resources are partially in the APE: BIN 2240200 – Shore Road Bridge (Pelham Parkway Bridge or Pelham Bay Bridge) and Pelham Bay Park Historic District. The park contains the S/NRHP-listed and LPC Landmark Bartow-Pell Mansion and several individual LPC landmarks, which are not in the APE.

**Throgs Neck IFF.** This feature consists of IFFs along Throgs Neck which extend around the peninsula and along the bay shore of the Locust Point neighborhood. This area includes Fort Schuyler on Throgs Point and the SUNY Maritime College, and Locust Point Yacht Club. Surrounding properties are primarily residential.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and one NYSM Museum Site are partially in the APE.

One S/NRHP-listed historic district, Fort Schuyler, and the S/NRHP-eligible Throgs Neck Bridge are partially in the APE.

**Eastchester Bay IFF.** This feature consists of IFFs along Eastchester Bay from Cross Bronx Expressway (US Route 265) north to Barkley Ave in the Edgewater neighborhood of the Bronx. It includes two separate measures (north and south). Note, the south measure is in both Alternatives 2 and 3A. The south measure begins near the MTA Bridges and Tunnels property off Locust Dr on the north side of the expressway. From which point, the south section follows the shoreline north to 1<sup>st</sup> Ave and terminates in Bicentennial Veterans Memorial Park. The north section begins on the north side of the creek in the park near Bronxonia Yacht Club. It follows the shoreline north to Layton Ave. Adjacent properties are residential, commercial, social, and recreational in use.

One NYSM area, two NYSM sites, and one unevaluated site are partially in the APE. Overlapping archeologically sensitive areas are partially in the APE.

One S/NRHP eligible property is partially in the APE, North Tower Firehouse (Main St at 9<sup>th</sup> St [south section])

**Rodman Neck IFF.** This feature consists of IFFs around the southern third of Rodman Neck in Pelham Bay Park, which contains the NYPD shooting range.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and overlapping archeologically sensitive areas are partially in the APE. The NOAA ENC database indicates there is a shipwreck at the APE.

The S/NRHP-eligible Pelham Bay Park Historic District is partially in the APE.

**New York: IFFs on the Queens shoreline along western Long Island Sound (LIS).** The IFF features for the Queens shoreline along the western Long Island Sound are all in the Long Island Sound study region.

**Little Bay IFF.** This feature consists of floodwalls and a levee along the northwestern Queens Shoreline at Little Bay at Fort Totten Park and the Whitestone-Beechurst neighborhood. The west end begins near 166<sup>th</sup> St at Cryders Point. It follows the shoreline to underneath the Throgs Neck Bridge and extends along Little Bay Park to Fort Totten on Totten Ave. Surrounding properties are primarily residential housing (apartment buildings, multi-family, and single).

There are no known archaeological sites identified in or adjacent to the APE. Two archeologically sensitive areas are partially in the APE. Three unevaluated archaeological sites are in Fort Totten.

The S/NRHP-eligible Fort Totten Historic District and NYC Historic Landmark District is partially in the APE. Six contributing resources of the historic district located near the fort's entrance are in the APE. One S/NRHP-listed building is in the district to the north of the APE, Officers Club (Bldg 208). The S/NRHP-eligible Throgs Neck Bridge is partially in the APE. One NYC Individual Landmark is partially in the APE, the Arthur Hammerstein House (168-05 Powells Cove Blvd) on Cryders Point.

**Little Neck Bay IFF.** This feature consists of two sections of IFFs at Little Neck Bay along the shorelines of the Douglaston neighborhood in Queens and Great Neck Estates neighborhood in Nassau County. The west SBMs extend along the west shoreline of Douglaston beginning at the Long Island Railroad near 41<sup>st</sup> Ave. It continues north to just

east of 233<sup>rd</sup> Pl. The east section starts at West Dr and extends south through Memorial Field where it crosses the bay. From the south end of the bay in Great Neck, it continues north along the west shoreline of Great Neck Estates to near South Circle Dr.

There are no known archaeological sites identified in or adjacent to the APE. Two NYSM areas and overlapping archeologically sensitive areas partially in the APE.

The S/NRHP-eligible Douglaston Historic District (also NYC Historic District Landmark) and one individual S/NRHP-eligible resource (6 Shore Dr, Great Neck) are partially in the APE.

**New York: IFFs on the Northern Nassau County shoreline, western LIS.** The IFF features for Northern Nassau County along the western Long Island Sound are all in the Long Island Sound study region.

**Great Neck IFF.** This feature consists of non-contiguous IFFs along the northwest shoreline of Nassau County on Long Island Sound in the communities of Great Neck, Saddle Rock, Kings Point, and Manhasset.

There are no known archaeological sites identified in or adjacent to the APE. One archaeologically sensitive area for a historic site is partially in the APE.

Three individual S/NRHP-eligible properties are partially in the APE: Saddle Rock Grist Mill (Grist Mill Ln); Krim Residence (229 Dock Ln), Grove Point (19 Harbor Rd).

**Plandome IFF.** This feature consists of non-contiguous IFFs along the northwest shoreline of Nassau County along Long Island Sound in the communities of Great Neck, Thomaston, Manhasset, and Plandome.

There are no known archaeological sites identified in or adjacent to the APE. One archaeologically sensitive area is partially in the APE.

The S/NRHP-listed Plandome Village Historic District and four individual S/NRHP eligible resources are partially in the APE; Manhasset Valley (cow neck); LI Railroad Bridge (Thomaston, North Hempstead); Myers-Dale House (2 Shoredale Dr); Manhasset Bay Yacht Club (445 Main St); and a commuter yacht ("Aphrodite").

**Port Washington IFF.** This feature consists of a storm surge barrier, tide gate, and two IFFs along the northwest shoreline of Nassau County in Port Washington. The south section begins near Estate Dr and extends north along the Port Washington shoreline past the Manhasset Bay Yacht Club to the south end of the Town Dock off Main St. The north section begins in the northeast corner of Sunset Park on the west side of Shore Rd. From the park, the north section follows shoreline to the storm barrier location. it continues westerly along Manhasset Bay Marina and turns north at Tom's Point Marina and continues to the tide gate location. The north section extends west from Manorhaven Town Park following the shoreline to Plum Beach Point peninsula.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and one archaeologically sensitive area are partially in the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

The S/NRHP-eligible Main Street Historic District and four individual S/NRHP eligible resources are partially in the APE: Cornwall House (50 Cornwall Ln); Inisfree (Ferrari Residence, 5 Pelham Ave); Zausner Residence (Plum Beach Point Rd); and Frederick K. C. Hicks Estate (Barkers Point Rd, Sands Point).

**Sands Point IFF.** This feature consists of three sections of IFFs along the northern shoreline of the Village of Sands Point. The western section begins at Lighthouse Rd near Sands Point Rd and follows the shoreline north to a point southwest of the intersection of Lighthouse Rd and Middle Neck Rd. A 1,378-ft (420-m) long seawall is proposed to the east of Sands Point Lighthouse near Hoffstoft Ln. The third section begins near Prospect Point and extends east across East Creek. It follows the shoreline southeasterly to a point on the west side of Hempstead House at 127 Middle Neck Rd.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM site area is partially in the APE.

The S/NRHP-listed Gould-Guggenheim Estate (Sands Point Preserve) and two individual S/NRHP eligible resources are partially in the APE; W.E. Seaman Hotel (Lighthouse Rd) and Beacon Towers Garage and Wall (250 Middle Neck Rd). The S/NRHP-eligible Sands Point Light House (Sands Point Road) is adjacent to the APE to the north. Note, the S/NRHP-eligible H.B. Swope Estate/'Lands End' (Hoffstoft Ln) was demolished.

**Hempstead Harbor IFF.** This feature consists of IFFs along Hempstead Harbor in the communities of Port Washington, Sea Cliff, and Glen Cove. A 1,341-ft (409-m) long seawall is proposed in Port Washington along the Beacon Hill Colony on West Shore Dr. SBMs on the east side of the harbor in Sea Cliff include two sections containing a storm surge barrier, seawall, floodwall, and levee. The south section begins at Tappan Beach on Prospect Ave. It continues north along the shoreline to just north of Prospect Ave at Carpenter Point. The south end of the north section starts at the Sea Cliff Beach near the Sea Cliff Yacht Club. It extends north, crossing Glen Cove Creek, until its northern terminus at Garvies Point Rd. near the Hempstead Harbor Club in Glen Cove.

One unevaluated archaeological site, a reported Colonial Euro-American and Native American cemetery, is partially in the APE. Two archaeologically sensitive areas are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Roslyn Harbor IFF.** This feature includes two sections of IFFs in Roslyn Harbor in Roslyn. The south SBMs include a tide gate and levees along the south shoreline north of Northern Blvd/NY 25A. The north IFF location is between Cedarmere Park to a point just north of the intersection of Byrant Ave and Montrose Ct.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM site area is partially in the APE.

The S/NRHP listed Cedarmere-Clayton Estates Historic District and five individual S/NRHP-listed resources are partially in or adjacent to the APE; George W. Denton House (57 West Shore Rd); Pearsall House (435 Bryant Ave) Sycamore Lodge (355 Bryant Ave); Springbank (Residence, 340 Bryant Ave); and Stephen and Charles Smith House (Bryant Ave).

## ALTERNATIVE 2: RESIDUAL RISK FEATURES

**New Jersey: RRFs on the Passaic Mainstem.** The Passaic Mainstem RRFs in New Jersey are all in the Hackensack / Passaic study region.

**Clay Street Bridge RRF.** This feature consists of a 1,040-ft long (317-m) floodwall along the east side of Passaic River between Clay St Bridge and Fourth Ave Conrail Bridge (NX Bridge) in the Borough of East Newark, Hudson County.

One S/NRHP-eligible archaeological grid is partially in the APE.

The west side of the NHL Clark Thread Company Historic District along Passaic Ave is partially in the APE. Identified resources partially in or adjacent to the APE include Fourth Avenue Conrail Bridge (NX Bridge) and Erie Lackawanna (EL) Patterson Branch Railroad Historic District

**North Arlington RRF.** This feature consists of two revetments on the west shoreline of the Passaic River, between Belleville Turnpike and Hendel Ave in North Arlington Township, Bergen County. Adjacent properties are commercial and recreational.

There are no known archeological sites or in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified individual historic property is adjacent to the APE, NJ Route 7 Bridge (SI&A 0208150).

**Passaic Upriver RRF.** This feature consists of floodwalls and a berm on the west side of Passaic River in Belleville Township, Essex County. RRFs are proposed along the east side of Main St, between Terry St to just north of Roosevelt Ave. Commercial properties are adjacent to the APE.

There are no known archeological sites in or adjacent to the APE.

The S/NRHP-eligible Passaic River Valley Historic District is in the APE. The eastern border of the district is Main Street, where the feature is proposed.

**Bridge Street Bridge RRF.** This feature consists of two revetments along the west shore of Passaic River between Bridge St and New Jersey Railroad St in Harrison Township, Hudson County.

Two S/NRHP-listed archaeological grids are partially in the APE. Two individual S/NRHP-eligible resources are in or adjacent to the APE, New Jersey Rail Road and Transportation Company Corridor At-Grade Segment (Railroad Ave and Spur Line) and Bridge Street Bridge (SI&A #0700H03).

**New Jersey: Passaic River Tidal Basin RRFs.** The Passaic Tidal Basin RRFs in New Jersey are all in the Hackensack / Passaic study region.

**Essex County Correctional Facility RRF.** This feature consists of a series of floodwalls along the City of Newark shoreline from point north of Wilson Ave at the Sunoco plant north along Commonwealth / Panamerican



the industrial properties and the Essex County Correctional Facility (354 Doremus Ave) to Raymond Blvd.

Four S/NRHP-eligible archaeological grids are partially in the APE.

The S/NRHP-listed US Routes 1 & 9 Truck Bridge (SI&A #0705151), over Passaic River and Doremus Ave, is partially in the APE. Two previously identified individual historic properties are partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge and 86-126 Doremus Ave.

**Route 1 Bridge RRF.** This feature consists of a 1,325-ft (404-m) floodwall on the south shoreline of the Passaic River in an industrial area of Jersey City. It extends along Broadway to the railroad corridor.

There are no known archeological sites in or adjacent to the APE.

Two S/NRHP-eligible historic districts, New Jersey Railroad Bergen Cut Historic District and Hackensack River Lift Bridges Historic District, are partially in the APE. Two individual S/NRHP-eligible resources, Wittpenn Bridge (SI&A #0909150) and Pennsylvania Railroad Harsimus Branch (Conrail/CSX) Bridge over the Hackensack River, are partially in the APE. Two previously identified individual historic properties are partially in the APE, 275 Broadway and National Biscuit Company Warehouse (133 Halleck Avenue).

**Hudson County Correctional Facility RRF.** This feature consists of three floodwalls the along the Hackensack River on the east side of Kearny Point, Hudson County. The floodwalls are proposed between Lincoln Highway (US Routes 1 and 1-9) and Stern Ave, just north of Pulaski Skyway.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150; US Routes 1 & 9 over the Passaic River and the Hackensack River) and the S/NRHP-eligible PSE&G Kearny Generating Station (at Stern Ave) are partially in the APE.

**Kearny Point RRF.** This feature consists of a 5,160-ft (1,573-m) long floodwall along the Hackensack River on the east side of Kearny Point, Hudson County. The south end is on the southeast corner of the peninsula on the east side of Eastern Rd at the south basin of the former Kearney Shipyard. It extends north to the former shipyard's north basin at Lincoln Highway (US Routes 1 and 1-9).

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Morris Canal Historic District and the S/NRHP-eligible Federal Shipbuilding and Dry Dock Company, Kearny Shipyard Historic District are partially in the APE.

**South Kearny-Passaic RRF.** This feature consists of a 2,340-ft (713-m) long floodwall along the Passaic River on the west side of Kearny Point, Hudson County. It extends north from Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge near Distribution Ave to south of Ford Ln. The surrounding properties are commercial and industrial.

There are no known archaeological sites in or adjacent to the APE.

One previously identified individual historic property is partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge.

**Meadowlands Gate RRF.** This feature consists of a 5,833-ft (1,778-m) long berm along on the south shoreline of Hackensack River in Kearney Township, Hudson County.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Passaic River RRF.** This feature consists of a 1,258-ft (383-m) long floodwall on the east shoreline of Passaic River in Kearny Township, Hudson County. Its south end begins on the south side of Pulaski Skyway and extends north to a point west of 3<sup>rd</sup> St.

There are no known archaeological sites in or adjacent to the APE. The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150) is partially in the APE.

Three previously identified individual historic properties are partially in the APE; Lloyd A. Fry Roofing Company (55 Jacobus Ave); Valentine & Co. (81 Jacobus Ave); and Coastal Oil Company (89 Jacobus Ave).

**Dock Bridge RRF.** This feature consists of floodwalls and a revetment on the east shoreline of the Passaic River in Harrison Township, Hudson County it extends north from Dock Bridge to Burlington St.

There are no known archaeological sites in or adjacent to the APE.

Three S/NRHP-listed resources are partially in or adjacent to the APE: Dock Bridge (Amtrak Northeast Corridor Line over Passaic River); Newark Penn Station and Dock Bridge (Boundary Increase and Additional Documentation); and Pennsylvania Railroad New York to Philadelphia Historic District.

**Harrison Reach RRF.** This feature consists of floodwalls on the south shoreline of the Passaic River near Blanchard St in the City of Newark, Essex County.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE: Eagle-Picher Lead Company (76 Blanchard St) and Benjamin Moore & Company (122-152 Lister Ave).

**New Jersey: Hackensack/Meadowlands RBDM – Meadowlands Gate.** The Hackensack / Meadowlands RBDM is in the Hackensack / Passaic study region. This feature consists of a 5,633-ft (1,717-m) long berm along the northeast shoreline of the Hackensack River at Penhorn Creek Tributary in Jersey City.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE, Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection, Hudson Generating Station and Erie Lackawanna-New York and Greenwood Lake Branch right of way.

**New Jersey: Newark Bay RRFs.** The Newark Bay RRFs are in the Upper Bay / Arthur Kill study region.

**Shell / Passaic RRF.** This feature consists of an 879-ft (268-m) long floodwall along northern portion of the Shell Oil Company shoreline in the City of Newark.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District is partially in the APE (Doremus and Wilson Avenues).

**Norfolk Southern RRF.** This feature consists of a 2,808-ft (856-m) long revetment along the City of Elizabeth shoreline from Marciante Jackson Millet Park to the industrial complex at Trumball St.

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Singer Factory Historic District and one S/NRHP-eligible historic district is partially in the APE, Central Railroad of New Jersey Main Line Corridor Historic District.

**New Jersey: Raritan River Basin RRFs.** The Raritan River Basin RRFs are all in the Raritan study region.

**South River RRF.** This feature consists of a discontinuous system of floodwalls and a revetment in the Boroughs of Somerset and Sayreville in Middlesex County. It is proposed along the west side of South River and a South River tributary. The feature is roughly bound by the river to the east, Causeway St to the south, Reid Street to the west and Main St to the north. A community park and garden along the river is within the APE. Commercial properties are adjacent to the APE. A flood wall, berm and revetments are proposed to the south on the west side of the river at Herman St just north of the railroad

One S/NRHP-eligible archaeological grid is partially in the APE.

Two S/NRHP-eligible historic districts are partially in the APE, Herrmann-Aukam Company Historic District (Herman St) and Raritan River Railroad Historic District.

**Whitehead RFF.** A 2,735-ft (1,824-m) berm is proposed on the southwest side of South River in the Borough of Somerset. The northwest end of the feature begins at Serviss St off Whitehead Ave. The berm parallels Deer Creek Village and turns southeasterly along Levinson Ave. It extends along the west side of the river to Brant St. Adjacent properties are primarily residential.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Raritan & Sandy Hook Shoreline RRFs.** The RRFs on the Raritan and Sandy Hook Shoreline are all in the Lower Bay study region.

**Highlands RRF.** This feature consists of revetments and a floodwall in the Borough of Highlands in Monmouth County. The structures follow Raritan Bay and Shrewsbury River channel shorelines from near Gravelly Point Rd to Veterans Memorial Park on Bay Ave to the southeast. A floodwall is proposed on the north side of Sandy Hook Bridge (Navesink Ave/NJ Route 36). The west end of the floodwall is proposed in a marina at 2 Bay Ave in Highlands and the east end on Sandy Hook in the Gateway NR in the Borough of Sea Bright. Note, the Hancock and Sandy Hook Proving Ground Historic District, a NHL historic district is to the north of the south floodwall in Sea Bright.

One S/NRHP eligible archaeological grid is partially in the APE.

One individual S/NRHP-eligible resource is partially in the APE, Bahrs Landing Restaurant and Marina (2 Bay Ave, Highlands). One identified resource is partially in the APE, a building at 24-26 Shrewsbury Avenue.

**Many Mind Creek RRF.** This feature consists of a small floodwall in Atlantic Highlands, between Ave A and Hennessey Blvd.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in the APE.

**New Jersey: Rahway River Basin, Caseys Creek RFF.** The RRF at Caseys Creek is in the Upper Bay / Arthur Kill study region. The feature consists of a tide gate and berms in the southwest portion of Joseph Medwick Memorial Park in the Borough of Carteret in Middlesex County.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Shoreline along Arthur Kill.** The RRFs on the Shoreline along Arthur Kill are in the Upper Bay / Arthur Kill study region.

**Tremley RRF.** This feature consists of a tide gate and floodwalls on the north side of Tremley Point Rd along the west side of NJ Turnpike (I-95) in the City of Linden, Union County.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Morses Creek RRF.** This feature consists of an 1,0060-ft long floodwall along the Arthur Kill shoreline at Morses Creek in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-eligible Sound Shore Railroad Historic District and a contributing resource, Morses Creek Bridge, are partially in the APE. The previously identified Elizabethport Cohesive Area is partially in and adjacent to the APE.

**Elizabeth River RRF.** This feature consists of an 1,150-ft long floodwall along the north shoreline of the Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

One individual S/NRHP-eligible resource is partially in the APE, South Front Street Bridge (SI&A #2004001) over Elizabeth River.

**Elizabethport RRF.** This feature consists of revetments and floodwalls along the shoreline of the peninsula between Arthur Kill and Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

The S/NRHP-eligible Staten Island Railroad Historic District and two individual S/NRHP-eligible resources are partially in the APE: South Front Street Bridge (SI&A #2004001) over Elizabeth River; South First Street Bridge (Str. #2004002) over Elizabeth River; and Staten Island Railway Lift Truss Bridge over Arthur Kill.

**New Jersey: Jersey City RRF on the shoreline along Upper Bay.** The Jersey City RRF is in the Lower Hudson / East River study region. This feature consists of a 1,488-ft (454-m) long deep bulkhead along the Upper Bay in Jersey City. The south end begins at Grand St near the Jersey City 911 Memorial. It extends north along the shoreline to just north of Christopher Columbus Dr.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Hudson and Manhattan Railroad Transit System [Historic District] is partially in the APE. Individually S/NRHP-eligible properties in or partially in the APE include Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, and Early Jersey City Brick Sewers (Grand, Montgomery, and Pearl streets). The previously identified Harborside Terminal (Morgan Street at Hudson River) is partially in and adjacent to the APE.

**New Jersey: RRFs on the shoreline along the Hudson River.** The Hudson River RRFs in New Jersey are in the Lower Hudson / East River study region.

**Upper Hudson RRF.** A 5,576 ft (1,700-m) deep bulkhead is proposed on the west Hudson River shoreline in North Bergen Township, Hudson County.

Three identified archaeological grids are partially in the APE. The NOAA ENC database shows there is a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs on the Western Shore of Staten Island.** The RRFs on the west shore of Staten Island are in the Upper Bay / Arthur Kill study region.

**Tottenville RRF.** This feature consists of floodwalls, a deep bulkhead, and a revetment along Arthur Kill in the Tottenville Marina area of Staten Island.

There are no known archaeological sites in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows four shipwrecks in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Arthur Kill RRF.** This feature consists of a floodwall across a creek near Burke Ave in the William Davis Wildlife Refuge near Burke Ave. It is adjacent to the Travis-Chelsea neighborhood.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island RRFs at Mariners Harbor.** The Mariners Harbor RRFs are in the Upper Bay / Arthur Kill study region.

**Mariners Harbor East RRF.** A 4,107-ft (1,252-m) long deep bulkhead is proposed on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood. It extends east from north of Richmond Terr near Arlington Ave to just east of Union Ave. Adjacent properties are commercial and industrial.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows a shipwreck in the APE.

One S/NRHP-listed resource is in the APE, Standard Oil Co. No. 16 (Harbor Tug) at Mariners Harbor.

**Mariners Harbor West RRF.** This feature consists of a deep bulkhead, revetments, and floodwalls on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood west of Bayonne Bridge. It extends east from a point north of Mariners Lane to Winant Ave. Adjacent properties are recreational; commercial and industrial.

No known archaeological sites in the APE. One NYSM area is partially in APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. The NOAA ENC database indicates there is a shipwreck in the APE.

Two individual S/NRHP-eligible resources and NYC Landmarks are partially in the APE: Standard Varnish Works Factory Office Building (2589 Richmond Terr); and a Building at 2585 Richmond Terr.

**New York City: Northern Shore of Staten Island, Bayonne Bridge RRF.** The Bayonne Bridge RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a floodwall on the east side of Bayonne Bridge near Nicholas Ave, north of Richmond Terrace.

No known archaeological sites in the APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island Bergen Point RRF.** The Bergen Point RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a deep bulkhead and a revetment on the north shoreline of Staten Island along Kill Van Kull at Bergen Point. The west end begins at a point just west of Port Richmond Ave and extends east to the northwest corner of the Port Richmond Water Pollution Control Plant property.

There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. One NYSM area is partially in APE. The NOAA ENC database indicates there is a shipwreck in the APE.

The S/NRHP-eligible Port Richmond Commercial Historic District (along Port Richmond Ave and Richmond Terr) is partially in the APE.

**New York City: West Side SBM, Chelsea RRF.** The Chelsea RRF is in the Lower Hudson / East River study area. The feature consists of a 5,526 ft-(1,684-m) long deep bulkhead along the Hudson River shoreline in the Chelsea neighborhood of Manhattan. The south end begins at Pier 57 at Hudson River Park (11<sup>th</sup> Ave and W 15<sup>th</sup> St). It extends north along Hudson River Park, an NYC Park unit, and continues to a point just north of W 34<sup>th</sup> St at Pier 76.

An unevaluated non-Native American archaeological site is in the APE. Its archaeologically sensitive area buffer is partially in the APE. Three individual S/NRHP-listed resources are partially in the APE: Pier 57; Frying Pan Shoals Lightship No. 115 (Pier 63); and John J. Harvey, fireboat (Pier 63). The S/NRHP-eligible and NYC Landmark West Chelsea Historic District is partially in and adjacent to the APE. Other S/NRHP-eligible resources include PIERS 59-62 (Piersheads of Piers 60 & 61 are eligible) and Baltimore & Ohio Railroad Float Transfer Bridge (Pier 66a).

**New York City: RRFs on the Brooklyn shoreline along Upper Bay.** The Brooklyn shoreline RRFs are in the Upper Bay / Arthur Kill study region.

**Gowanus Canal RRF.** This feature consists of a navigable gate and a 1,211-ft long deep bulkhead on the west side of the Gowanus Canal near the Gowanus Expy (I-278).

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-eligible Gowanus Canal Historic District are partially in the APE.

**South Slope RRF.** A deep bulkhead is proposed around the shoreline of Sunset Industrial Park at 19<sup>th</sup> St. Near the Gowanus Canal. The south end begins in Guttenberg/North Bergen Waterfront Park (7100 River Rd). This feature extends north to the residential community at Cove Ln.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs on the Manhattan East River shoreline.** The Manhattan East River shoreline RRFs are in the Lower Hudson / East River study region.

**Wall Street RRF.** This feature consists of a 4,466-ft (1,361-m) long floodwall along the East River in Manhattan between Broad St and Robert F. Wagner Sr. Place. It crosses the FDR Dr continues northwesterly along Robert F. Wagner Sr. Place.

There are no known archaeological sites in or adjacent to the APE. Overlapping archaeologically sensitive areas for historic sites along the East River are partially in the APE. South Street Seaport is partially in the APE.

Numerous contributing resources in the S/NRHP-listed and NYC Landmark South Street Seaport Historic District are partially in and adjacent to the APE. Three individual S/NRHP-listed and NYC Landmark resources are partially in the APE: Whitehall Ferry Terminal; First Police Precinct Station House; and Brooklyn Bridge. S/NRHP-eligible resources partially in the APE include Governor Alfred E. Smith Houses Historic District and 120 Wall Street Offices.

**Kips Bay RRF.** This feature consists of a 1,598-ft (487-m) long floodwall along the east shoreline of Manhattan between E 30<sup>th</sup> St and E 35<sup>th</sup> St. It extends through East River Greenway.

There are no known archaeological sites in or adjacent to the APE. An archaeologically sensitive area for a historic site is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Lenox Yard RRF.** This feature consists of a deep bulkhead along the shoreline in Upper Manhattan neighborhood near Lenox Yard just north of W 147<sup>th</sup> St. It stretches roughly two-city blocks north to W 149 St.

There are no known archaeological sites in or adjacent to the APE. One NYSM area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs in Brooklyn along the East River.** Brooklyn's East River RRFs are in the Upper Bay / Arthur Kill study region.

**Greenpoint Long Island RRF.** A deep bulkhead is proposed along the south shore of Bushwick Inlet at N 12<sup>th</sup> St. and the Hudson River shoreline to Hurricane Point at N 9<sup>th</sup> St in the Greenpoint neighborhood of Brooklyn. This measure is partially located in Bushwick Inlet Park and Marsha P. Johnson State Park.

There are no known archaeological sites in or adjacent to the APE. An archaeologically sensitive area for a historic site is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified historic district (Marsha P. Johnson State Park) and one previously identified individual resource are partially in the APE.



**Atlantic Basin RRF.** This measure consists of a 5,282-ft (1,610-m) long floodwall along Clinton Wharf in the Red Hook Atlantic Basin Terminal in the Red Hook neighborhood of Brooklyn. The southwest end of the outer floodwall begins at Ferris St and Wolcott St and continues northeasterly along Ferris St to Central Wharf. It extends northeast along the Bowne St to Imlay St and terminates at Brooklyn Battery Tunnel I-478. The surrounding area consists of Brooklyn Cruise Terminal, commercial properties, and Red Hook Container Terminal.

There are no known archaeological sites in or adjacent to the APE.

Four S/NRHP-eligible historic properties are in or adjacent to the APE: 49 Ferris St; 151, 153, 155 Sullivan St. Two previously inventoried unevaluated resources are adjacent to the proposed floodwall: New York Dock Co. Atlantic Warehouses (100 and 160 Imlay St).

**New York City: Brooklyn shoreline along Upper Bay, Red Hook RRF.** The Red Hook RRF is in the Upper Bay / Arthur Kill study region. Four floodwalls are proposed in the Red Hook neighborhood at Erie Basin along Reed, Beard, and Halleck streets between Conover St and Columbia St. The northwest area begins at Van Dyke St and extends southwest on Conover St to Reed St. It continues northeast along Van Brunt St and turns southeast on Reed St. The southeast section begins on Beard St near Dwight St and extends southeasterly to Columbia St. An in-water feature is proposed in Red Hook Recreation Area, a NYC park unit. The surrounding area consists of former industrial buildings and commercial properties.

There are no known archaeological sites in or adjacent to the APE.

One S/NRHP-listed resource is in the APE, Lehigh Valley Railroad Barge 79 (290 Conover St). Two individual S/NRHP-eligible resources are partially in the APE, Beard Store and Warehouse Pier (21 connected brick warehouses, 421-573 Beard St) and Red Hook Stores (480-500 Van Brunt St).

**New York City: Brooklyn RRFs in Canarsie.** The Canarsie RRFs are in the Jamaica Bay study region. They include revetments and floodwalls totaling 2,670 ft (814 m) in length to be built along Fresh Creek northeast of East 108<sup>th</sup> Street.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

The measures will be at the Fresh Creek Nature Preserve.

**New York City: Queens RRFs along the Jamaica Bay and nearby shorelines.** All the Jamaica Bay shoreline RRFs are in the Jamaica Bay study region.

**Breezy Point RRF.** The Breezy Point RRF is a 7,067-ft-(2,154-m)-long-berm along Rockaway Inlet north of the Breezy Point neighborhood.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Roxbury RRF.** The Roxbury RRF includes a series of berms and revetments along Rockaway Inlet at the north edge of the Roxbury neighborhood. The measures total 3,618 linear ft (1,102 m).

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

The RRF's Direct APE contains two S/NRHP-eligible properties: an auto shop and garage on Beach Channel Drive. It also overlaps with the NR-listed Fort Tilden Historic District. The RRF is inside the Gateway National Recreation Area.

**Old Howard Beach RRF.** The RRFs at Old Howard beach include a floodwall, berms, and navigable gates that total 3,675 linear ft (1,120 m) along the north edge of Jamaica Bay at Charles Memorial Park and Hamilton Beach Park.

There are no known archaeological sites in or adjacent to the APE. A NYSM archaeological area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Broad Channel RRF.** The Broad Channel RRF surrounds the Broad Channel neighborhood in the center of Jamaica Bay. Its measures include a series of bulkheads, berms, and road raisings that total 24,518 linear ft (7,473 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Head of Bay RRF.** The Head of Bay RRF includes a navigable gate, floodwall, and a series of berms, at the southwest end of Head of Bay, an inlet southeast of John F. Kennedy International Airport. The measures total 2,948 linear ft (899 m).

There are no known archaeological sites in or adjacent to the APE. The easternmost berm in the feature is inside a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Inwood Marina RRF.** The Inwood Marina RRF is a deployable flood barrier with related floodwalls, a berm, and a bulkhead near the Inwood Marina south of the Inwood Country Club. The measures total 2,628 linear ft (801 M).

There are no known archaeological sites in or adjacent to the APE. The 100-m APE overlaps a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Norton Basin RRF.** The Norton Basin RRF is a 2,400-ft-(730-m)-long floodwall to be constructed along the west shore of Bayswater, straddling the Bayswater Avenue pump station.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Bayswater Park RRF.** The Bayswater Park RRF is a berm that will be located on the southwest side of Motts Basin near the northwest end of that channel. It totals 1,462 linear ft (446 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin South RRF.** The Motts Basin South RRF is a deployable flood barrier and a series of bulkheads and floodwalls at the south and southeast edges of Mott Basin. The measures total 3,771 linear ft (1,150 m).

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin North RRF.** The Motts Basin North RRF is a 662-ft-(202-m)-long floodwall along the north edge of Motts Basin.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs on the Queens shoreline along the East River.** The Queens East River shoreline RRFs are in the Jamaica Bay study region.

**Newtown Creek RRF.** This feature consists of a navigable gate at the mouth of Newton Creek between Greenpoint in Brooklyn and Long Island City in Queens.

There are no known archaeological sites in or adjacent to the APE. A NYSM area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Long Island City RRF.** A 3,904-ft long deep bulkhead is proposed in Long Island City. The south end extends through the north end of Gantry Plaza State Park and 11<sup>th</sup> St Basin. It continues northeasterly along the shoreline to Con Edison-The Learning Center property near 44th St.

There are no known archaeological sites in or adjacent to the APE. Two archaeologically sensitive areas are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Gantry Plaza State Park, an unevaluated previously inventoried resource, contains the NYC Landmark Pepsi Cola Sign which is located south of the APE.

**New York City: Brooklyn RRFs in the Lower Bay, Coney Island / Creek shoreline.** The Brooklyn Lower Bay RRFs are in the Jamaica Bay study region.

**Coney Island Creek RRF.** Two deep bulkhead systems are proposed for Coney Island Creek in Coney Island. The west system begins Coney Island Fire Station Pumping Station (Coney Island Community Park) at Neptune Ave and 23<sup>rd</sup> St and runs along the shoreline to a point north of the end of West 19<sup>th</sup> St and east of Crosby Ave. The east system commences northeasterly from a parking lot at Hart Pl and W 16<sup>th</sup> St. It continues southeast along the creek, passing Stillwell Ave and the NY MTA rail line, to a point between West 12<sup>th</sup> St and Shell Rd.

There are no known archaeological sites identified in or adjacent to the APE. The NOAA ENC database indicates there are 11 shipwrecks in the APE.

One individual S/NRHP-listed resource is partially in the APE Coney Island Fire Station Pumping Station. Two individual S/NRHP-eligible resources are partially in the APE, Cropsey Avenue Bridge and Mark Twain IS 239 for the Gifted and Talented.

**Sheepshead Bay RRF.** Deep bulkheads are proposed in Sheepshead Bay in the Sheepshead Bay and Manhattan Beach neighborhoods of Brooklyn. Surrounding properties are residential and commercial.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM Museum Area and one archaeologically sensitive area are partially in the APE. The NOAA ENC database shows 18 shipwrecks in the APE.

The S/NRHP-eligible Greenlawn Colony Historic District and two individual S/NRHP-eligible resources are partially in the APE, the W. I. L. Lundy Brothers Restaurant Building (1901 Emmons Ave) and PS 195 Manhattan Beach (131 Irwin St).

**New York City: Bronx shoreline along Harlem River, Yankee Stadium RRF.** The Yankee Stadium RRF is in the Lower Hudson / East River study region. The feature consists of a 2,896-ft (883-m) long deep bulkhead near Concourse Village neighborhood in the Bronx. It stretches north along the Harlem River shoreline from near Pier 5 and the Stadium Tennis Center to just north of Macombs Dam Bridge.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM Area is partially in the APE.

Macomb's Dam Bridge (former Central Bridge) is partially in the APE; it is a NYC Landmark and S/NRHP-eligible resource.

## 5.2 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 2: CULTURAL RESOURCES WITHIN VISUAL IMPACT AREA (INDIRECT EFFECTS)

Measures proposed for Alternative 2 will involve the construction of structures that have a potential to indirectly affect historic properties, most prominently by altering the visible environment (i.e., setting) of those resources. For this study, the visual impact study area (Indirect APE) includes those places within one mile (1.6 km) of proposed facilities for Alternative 2 that are in the potential viewshed (based on topography). The total area within one mile of Alternative 2 is 268.13 sq miles (694.5 sq km), within which project measures are potentially visible from 189.29 sq miles (490.3 sq km). This Visual Impact Area, or Zone of Visual Influence (ZVI), encompasses parts of northeast New Jersey, all New York City counties, and northwest Nassau County on Long Island. As of this writing, spatial data is available only for resources in New York, so this preliminary visual impact analysis for Alternative 2 only addresses historic properties in the New York ZVI. The largest ZVI study area occurs in New York.

**Preliminary Viewshed Analysis: New York.** Of the two states where Alternative 2 measures will be constructed, the largest visual effect will be in New York. The total area within one mile of Alternative 2 structures in New York is 165.87 sq miles (729.6 sq km), 61.9 percent of the total area within a mile in both states. Within that area in New York, alternative structures will be potentially visible from 126.5 sq miles (327.6 sq km), 76.2 percent of the total area within a mile of the project in New York. According to the NYSHPO data, this area where the alternative will potentially be visible contains: 8,193 NR-listed aboveground individual properties; 47 NR-listed historic districts; 2,280 NR-eligible aboveground individual properties; 48 NR-eligible districts; and 12 cemeteries (Table 5.2).

**Table 5.2. Summary of historic properties in New York within one mile of Alternative 2 structures, and the total historic properties within that area from which project structures will potentially be visible (after data from the NY SHPO).**

Historic property type	Total within one mile	Total in topographic viewshed within one mile
NR-listed individual building	11,948	8,193
NR-listed historic district	50	47
NR-eligible individual building	3,715	2,280
NR-eligible historic district	51	48
Cemetery	22	12

**Preliminary Viewshed Analysis: New Jersey.** The total area within one mile of Alternative 2 measures in New Jersey is 102.3 sq miles (265 sq km), 38.1 percent of the total area within a mile in both project states. In the New Jersey area, Alternative 2 structures will potentially be visible from 62.8 sq miles (162.7 sq km), 61.4 percent of the total terrain within a mile of the project in that state. A preliminary visual impact analysis of historic properties in New Jersey is not presented in this Tier I Draft EIS because cultural resources spatial data from the state unavailable as of this writing. The New Jersey visual impact analysis is anticipated to be included in the next phase of cultural resources and environmental investigations for the NYNJHAT Study.

## **6.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3A: MULTI-BASIN STORM SURGE BARRIERS AND SHORELINE-BASED MEASURES**

Project Alternative 3A includes features and measures in seven of the investigation's study regions: Hackensack / Passaic; Lower Hudson / East River; Long Island Sound; Upper Bay / Arthur Kill; Jamaica Bay; Raritan; and Lower Bay (Figure 6.1). The measures include:

Alternative 3A integrates SBMs with the storm surge barriers at Verrazano-Narrows, Arthur Kill, Throgs Neck, and Jamaica Bay. To mitigate the residual flood risk, RRFs are proposed along the shorelines of the Upper Bay, the Arthur Kill region, Jamaica Bay, the Hackensack River and Passaic River, the Lower Hudson and East River. Induced flooding is expected to occur along the Lower Bay, the Raritan River and the western end of Long Island Sound as a result of the presence of the above stated storm surge barriers, thus, IFFs are proposed in these regions.

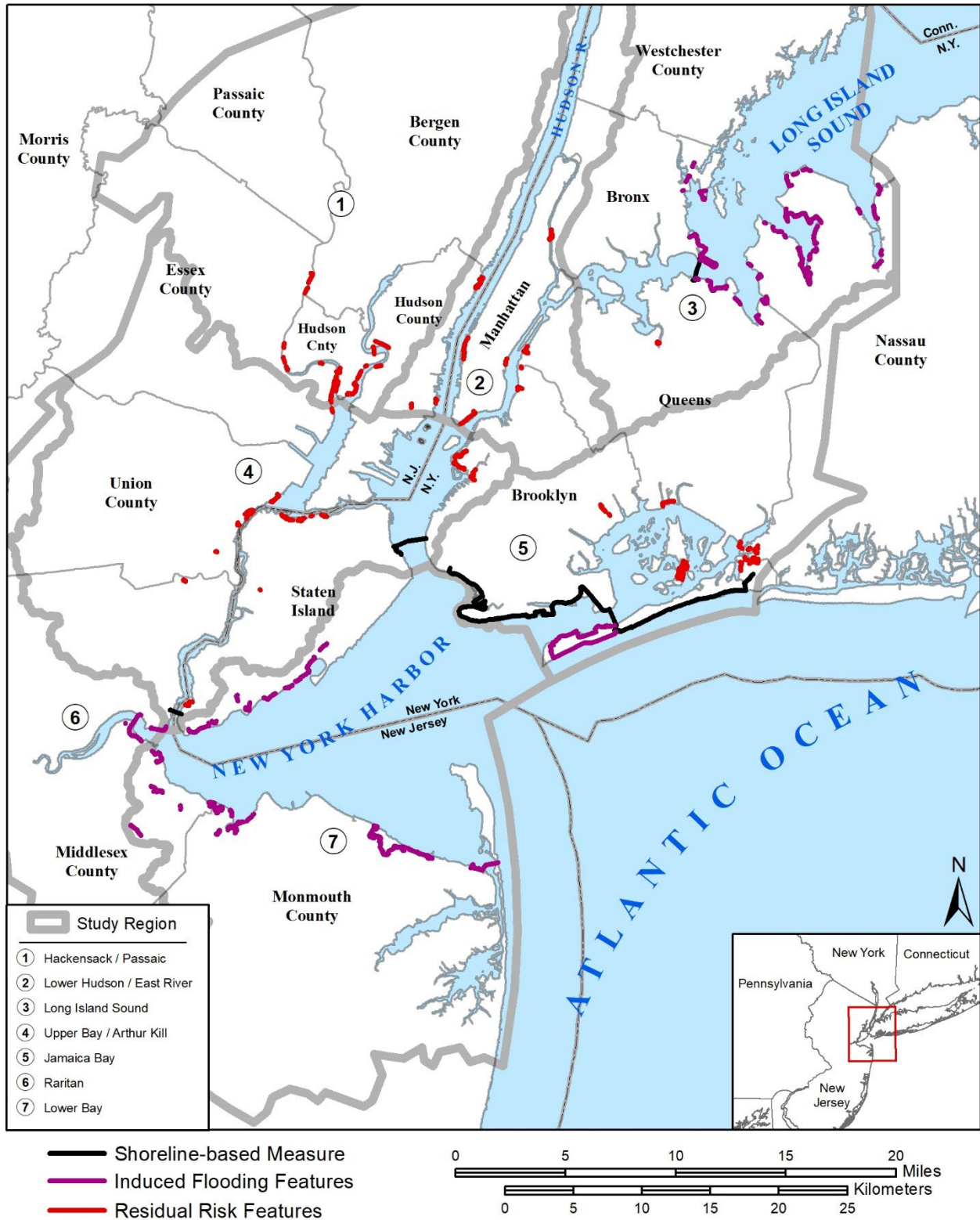
The current design for the alternative includes 104.3 linear miles (167.9 km) of measures, of which 77.5 linear miles (124.7 km) are in New York and 26.8 miles (43.1 km) are in New Jersey. Among the measures are:

- SBMs: 26.6 linear miles (42.8 km) (of which 26.3 linear miles [42.3 km] are in New York and .3 miles [.5 km] are in New Jersey)
- IFFs: 50.6 linear miles (81.4 km) (33.8 miles [54.4 km] in New York and 16.8 miles [27 km] in New Jersey)
- RRFs: 27.1 linear miles (43.6 km) (17.4 miles [28 km] in New York and 9.7 miles [15.6 km] in New Jersey)

Alternative 3A includes four storm surge barriers at: Jamaica Bay / Rockaway Inlet / Coney Island / Brooklyn Shoreline; Pelham Bay; Verrazano-Narrows; and Arthur Kill. The barriers and their shore-based structures that tie them into higher ground measure approximately: 141,661 linear ft (43,178 meters) (Jamaica Bay / Rockaway Inlet / Coney Island / Brooklyn Shoreline); 5,758 linear ft (1,755 meters) (Pelham Bay); 11,047 linear ft (3,367 meters) (Verrazano Narrows); and 2,868 linear ft (874 meters) (Arthur Kill), respectively.

Alternative 3A also includes shore protection measures in various locations of the following areas: the Raritan River Basin, the Rahway River, the New Jersey and Staten Island shorelines on New York Harbor, Cheesequake Creek, Hackensack/Meadowlands, shoreline along Hudson River-Upper Hudson, Brooklyn shoreline along Upper Bay, Brooklyn shoreline along East River, Brooklyn – Lower Bay, Coney Island/Creek shoreline, Queens shoreline along western Long Island Sound (LIS), Bronx shoreline along western Bronx, Bronx shoreline along western LIS, Northern Nassau County shoreline western LIS, the shoreline at Rockaway Point, and Jamaica Bay.

The area of potential effect for this alternative includes the physical footprint of each measure as well as the viewsheds of the historic properties within one mile.



**Figure 6.1. Alternative 3A SBMs, IFFs, and RRFs in New York and New Jersey (ESRI 2010).**

## **6.1 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3A: CULTURAL RESOURCES WITHIN THE ALTERNATIVE DIRECT APE**

The Direct APE for this alternative consists of the physical footprint of individual measures and a 100 m (328 ft) buffer around each measure which consists of a total area of 13.58 sq mi (35.2 sq km). Alternative 3A has the potential for adverse effects to historic properties in and adjacent to the 100-m (328 ft) Direct APE. This section provides the results of a preliminary review of cultural resources data available in the NYS OPRHP and NJ HPO databases, as well as the NOAA ENC database and the NYC Landmarks Preservation Commission's internet-accessible geographic information system, for proposed measures in the alternative. To protect archaeological sites, in compliance with federal and state laws, their locations and names are not provided in this Draft Tier 1 EIS report.

The features proposed for Alternative 3A could involve the construction of structures that have a potential to affect directly historic properties and cultural resources in both terrestrial and submerged environments (Table 6.1). The proposed alternative is in an area that would be considered to have a moderate to high probability for terrestrial and submerged cultural resources to occur. At the most general level, Native American archaeological sites are most likely to be located near water; by definition, submerged resources are in water; and early non-Native American settlements clustered near water, particularly in the time before plumbing and sanitary sewer systems.

**New York.** The Direct APE in New York is approximately 9.86 sq mi (25.5 sq km). The alternative's Direct APE intersects: 17 SHPO-cataloged archaeological sites (of which three are listed in the NRHP, three are NRHP-eligible; and 11 have not been investigated sufficiently to determine their NR-eligibility); five archaeological sites in the NYSM inventory; 33 NYSM archaeological areas; 72 above-ground historic properties that are NR eligible (of which 62 are individual properties and 10 are historic districts); 174 NR-listed individual properties; six NR-listed historic districts; seven LPC landmarks; and a National Recreation Area (the Jamaica Bay Unit of the Gateway National Recreation Area) (see Table 6.1; Figure 6.2). The NOAA ENC database lists 23 shipwrecks in the New York portion of the Direct APE. The SHPO data does not indicate there are any cemeteries in the APE.

**New Jersey.** The Direct APE in New Jersey is approximately 3.72 sq mi. This area overlaps with: 30 NJSHPO archaeological grids (of which two contain NR-listed sites, 17 have eligible sites, and 11 have sites that have not been investigated to determine their NR-eligibility); 33 National Register-eligible aboveground properties (of which 15 are individual properties and 18 are districts); six NR-listed individual properties; three NR-listed historic districts; one identified cohesive area (the Elizabethport Cohesive Area); two National Historic Landmarks (the Fort Hancock Sandy Hook Proving Ground Historic District National Historic Landmark and the Clark Thread Company Historic District); and a National Recreation Area (the Sandy Hook Unit of the Gateway National Recreation Area) (see Table 6.1; Figure 6.2). The NOAA ENC database shows six shipwrecks in the New Jersey portion of the Direct APE.



**Table 6.1. Preliminary Totals of Cultural Resources within 100 meters (328 ft) of Alternative 3A Measures (Direct APE)** (after data from the NYSHPO, NYSM, NJSHPO, NPS, NOAA, and the NYC LPC).

Historic Property Type	Number of properties in New York Direct APE	Number of properties in New Jersey Direct APE
National Historic Landmark	0	2
Historic District, NR-listed	6	3
Historic District, NR-eligible	10	18
Individual aboveground property, NR-listed	174	6
Individual aboveground property, NR-eligible	62	15
NYC LPC individual landmarks	7	-
NYC LPC landmark districts	0	-
Archaeological site, NR-listed*	3	2
Archaeological site, NR-eligible*	3	17
Archaeological site, undetermined eligibility*	11	11
NYSM archaeological site	5	-
NYSM archaeological area	33	-
Shipwreck	23	6
National Recreation Area	1	1
Cemeteries	0	-

\*Totals for New Jersey refer to LUCY archaeological grids, which may contain more than one archaeological site.



**Figure 6.2. Location of Units in the Gateway National Recreation Area** (*NPS Brochure Map, Gateway National Recreation Area*).

### ALTERNATIVE 3A: BARRIERS AND SHORELINE-BASED MEASURES

**New York City and New Jersey: Arthur Kill Barrier.** The Alternative 3A Arthur Kill Barrier and its shoreline-based measures are in the Upper Bay / Arthur Kill study region, and extend across parts of New York and New Jersey.

The 1,760-ft (536-m) long Arthur Kill Gate extends from the west land connection in Perth Amboy, New Jersey at Washington St to the east land connection in Tottenville Shore Park in Staten Island. The Arthur Kill measure includes 200-ft (61-m) long seawall. Tottenville Shore Park, an NYC Parks unit, consists of discontinuous park areas; the APE is in the park area along Hopping Ave at the foot of Arthur Kill Road.

**Arthur Kill Barrier in New York.** A considerable number of Native American artifacts and burial sites have been found near Tottenville Shore Park. The Aakawaxung Munahanung (Island Protected from the Wind) Archaeological Site, an LPC Landmark Site, is in the city's

Conference House Park at the southern-most point of Staten Island. The landmark site includes approximately 20 acres of highly archaeologically sensitive land. It is the first NYC landmark that specifically recognizes the many generations of Indigenous Peoples who lived in the area beginning about 8,000 years ago and continuing through the Colonial period.

There are vessel hulks (canal boats, barges, car floats, etc.) along the Tottenville shoreline. There are no recorded terrestrial archaeological sites in the Arthur Kill APE. This measure has potential to impact Vessel hulks (canal boats, barges, car floats, etc.) along Tottenville shoreline.

One S/NRHP-eligible historic property is in the Arthur Kill APE, a residence at 65 Hopping Ave.

**Arthur Kill Barrier in New Jersey.** There are no known archaeological sites in or adjacent to the APE. This measure has potential to impact Vessel hulks (canal boats, barges, car floats, etc.) along Vessel hulks (canal boats, barges, car floats, etc.) along the Perth Amboy shoreline. The NOAA ENC database shows a shipwreck in the APE in New Jersey.

**New York City: Verrazano-Narrows Barrier.** The Alternative 3A Verrazano-Narrows Barrier and its shoreline-based measures are in the Upper Bay / Arthur Kill study region in New York.

The 6,420-ft (1,957 m) long Verrazano Narrows Gate extends from the west land connection in the Rosebank neighborhood of Staten Island to the Fort Hamilton neighborhood in Brooklyn. The Staten Island section of the feature is situated on the shoreline in the area between Chestnut Ave. and St. Mary's Ave. A proposed 630-ft (192-m) long seawall extends across the shoreline and then turns inland to cross Edgewater St and terminates on the west side of Church Lane. This area contains maritime-related buildings and structures. The Brooklyn section of the feature is on the west side of Shore Parkway opposite 88<sup>th</sup> Street. A 630-ft long floodwall will extend north from the land connection point to opposite 86<sup>th</sup> Street. One other feature in the Brooklyn section consists of a 103-ft (31 m) levee at the north end of the floodwall.

**Verrazano-Narrows Barrier SBMs.** This feature consists of four deployable flood barriers and four floodwalls in Staten Island and Brooklyn. In Staten Island, a system of floodwalls stretches from along the shoreline from a point north of Willow Ave and continues southeasterly and then follows the north side of Edgewater Ave. The southeast terminus is at Alice Austen Park (2 Hyland Blvd).

**Verrazano-Narrows Barrier SBMs on Staten Island.** No terrestrial archaeological sites are in or partially in the Staten Island APE. An archaeologically sensitive area is partially in the APE.

Two S/NRHP-listed and NYC Landmark resources are partially in and adjacent to the APE Alice Austen House and McFarlane-Bredt House. One S/NRHP-eligible historic property is in the APE, St. Mary's R.C. Church complex (1107 Bay St). The parcel containing the church and rectory on the east side of Bay Street are in the APE, while St. Mary's School stands on a separate lot on the west side of the street.

**Verrazano-Narrows Barrier SBMs in Brooklyn.** The APE is in a New York State Museum (NYSM) archaeological site area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The APE contains a section of the Shore Park and Parkway, a NYC Parks unit.

**New York: Throgs Neck Barrier.** The Throgs Neck Barrier and its shoreline-based measures are in the Long Island Sound study region.

The barrier's surge gate structure is estimated to involve approximately 4,510 ft (1,275 m) of navigational and auxiliary surge gates. The north land connection is on a point south of Indian Trail at Penfield Avenue in the Throgs Neck neighborhood of the Bronx, west of Throgs Neck Bridge. Adjacent properties are primarily residential. The land connection for the south end is on an undeveloped commercial/industrial lot in the Whitestone neighborhood of Queens, near 152<sup>nd</sup> St and Powells Cove Blvd. Adjacent properties are mostly commercial. Throgs Neck Barrier Tie-in also consists of floodwalls.

**Barrier structures in the Bronx.** There are no known archaeological sites in or adjacent to the Throgs Neck APE. An archaeologically sensitive area is partially in the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Barrier structures in Queens.** There are no known archaeological sites in or adjacent to the Queens APE. The APE is in a NYSM archaeological site area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York: Pelham Bay Barrier.** The Pelham Bay Barrier and its shoreline-based measures are in the Long Island Sound study region.

The Pelham Bay measure involves approximately 850 ft (259-m) of navigable and auxiliary surge gates with approximately 8,300 ft (2,530 m) of associated SBMs including floodwalls and levees. It includes one relatively small embayment next to Pelham Bay Park in the Bronx along western Long Island Sound. The surge gates are proposed along the east side of Pelham Bay Bridge (Shore Rd) at the mouth of the Hutchinson River in the Bronx. The south land location is adjacent to the Bronx-Pelham Landfill. The north land location is in Pelham Bay Park. The levee feature location is north of the surge gates in Pelham Bay Park on the north side of Bartow Circle along the east side of Shore Rd.

One NYSM site area and one other NYSM archaeological site with an unevaluated S/NRHP eligibility status are partially in the APE. Several overlapping archaeological sensitive areas are partially in the APE.

The southwestern portion of the S/NRHP-eligible Pelham Bay Park Historic District is partially in the APE. Pelham Bay Park contains the S/NRHP listed Robert and Marie Lorillard Bartow House and the Orchard Beach Bath House and Promenade, both individual NYC Landmarks, which are to the northeast and east of the APE. The south end of the S/NRHP eligible Pelham Bay and Split Rock Clubhouse and Golf Course containing the club parking lot is partially in the APE.

**New York: Jamaica Bay barrier and associated SBMs.** The Jamaica Bay barrier and its associated SBMs are all in the Jamaica Bay study region.

The measure involves a combination of SBMs along with multiple surge gate structures in the southern part of Brooklyn to the mouth of Jamaica Bay and then to Rockaway Peninsula. The 5,505 ft (1,678 m) Jamaica Bay Gate is proposed east of Marine Parkway Bridge. On land, this feature involves approximately 118,029 ft (25,975 m) of floodwall, levees, seawalls, operable flood gates, elevated promenades, buried seawall/dunes, and tide gates to connect the surge gate structures and to tie-in to high ground at the feature terminuses. On Rockaway Peninsula this feature includes a buried seawall/dune that extends across the ocean shoreline from the proposed levee in Jacob Riis Park east to a point between Beach 33<sup>rd</sup> St and Beach 34<sup>th</sup> St. From which point, a 1,244-ft (379-m) long levee extends north to the southeast side of the Rockaway Freeway and parallels the freeway north-northeasterly to Cornaga Ave in Far Rockaway.

In Brooklyn, features proposed on Barren Island include a system of buried seawall/dune, flood walls, and levees which follow the south shore of the island, the west side of Flatbush Ave and the Belt Parkway to Gerritsen Inlet. From the inlet, the line of protection for this feature continues west through Plumb Island and Plumb Beach. A 3,615.49-ft (1102-m) long levee terminates at Lew Fidler Park at Bringham St in Sheepshead Bay, the north land location for the storm surge barrier. The south land location is on the northwest corner of Manhattan Beach at Seawall Ave. Seawalls are proposed along proposed for the east end of Manhattan Beach, along Seawall Ave and John Berry Blvd. Ave. A floodwall is proposed around the perimeter of Manhattan Beach Park. SBMs continue west along the Atlantic shoreline to the west end of Coney Island. Seawalls are proposed for the western end of Coney Island at Seagate. The line of protection for this measure continues with SBMs proposed along the northwest shoreline of Coney Island through Coney Island Creek Park and Kaiser Park to the tide gate across Coney Island Creek to West 23<sup>rd</sup> St. The north location landing for the tide gate is in Calvert Vaux Park. SBMs are proposed along the entire shoreline of park and the park's northwest boundary. From the park, SBMs are proposed along shoreline to Dyker Beach Park at to the eastern boundary of U.S. Army Garrison Fort Hamilton.

The APE includes portions of the Jamaica Bay Unit of Gateway NRA which includes two S/NRHP-listed properties, Jacob Riis Park Historic District on the Rockaway Peninsula and Floyd Bennet Field Historic District in Brooklyn. Fort Tilden is adjacent to the west boundary of Jacob Riis Park. A 1,538-ft (469-m) long levee is proposed for the western portion of Jacob Riis Park which will span from the Jamaica Bay to the Atlantic Ocean shoreline. Plumb Island Beach is also in the Gateway NRA.

**Barrier structures in Brooklyn.** Four archaeologically sensitive areas are partially in the Brooklyn direct APE. The NOAA ENC database indicates there are nine shipwrecks in the APE.

Historic properties in the direct Brooklyn APE include: S/NRHP-listed Coney Island Fire Station Pumping Station at 2301 Neptune Ave in Coney Island; Floyd Bennet Field, State Register listed only, in the Gateway NRA on Barren Island; S/NRHP-eligible Coney Island Historic District: S/NRHP individually eligible properties: residence at 921 Oriental Blvd in Manhattan Beach, Saint Margaret Mary Roman Catholic Church at 4256 Ocean Ave in Manhattan Beach, Building at 4200 Atlantic Ave in Seagate, U. S. Coast Guard Coney Island Light at 4750 Beach 47<sup>th</sup> St in Seagate, and Mark Twain IS 239 for the Gifted and Talented at 2401 Neptune Ave in Coney Island.

Coney Island (Riegelmann) Boardwalk is a NYC Scenic Landmark in the direct APE. One other LPC Scenic Landmark is adjacent to the APE, Ocean Parkway. Six LPC Individual Landmarks are in the direct APE: The Cyclone at 834 Surf Ave, Wonder Wheel at 3059 West 12<sup>th</sup> St, Parachute Jump on Riegelmann Boardwalk at West 16<sup>th</sup> St, Child's Restaurant Building at 2101 Boardwalk at West 21<sup>st</sup> St, and two Historic Street Lampposts at South Side Pedestrian Bridge (Belt Parkway Exit 4 & Exit 5).

**Barrier structures in Queens.** An archaeologically sensitive area for an unknown site type is in Jacob Riis Park (Gateway NRA) and partially in the Rockaway Direct APE.

This feature is proposed in the S/NRHP listed Jacob Riis Park Historic District. The National Register eligible St. Rose of Lima Roman Catholic Church complex at 130 Beach 34<sup>th</sup> Street is in the project APE. The S/NRHP-eligible former Neponsit Beach Hospital for Children on Rockaway Beach Blvd is adjacent to the APE.

There are no designated New York City Landmarks in the Queens APE. One locally significant landmark, Flight 587 Memorial Park, is in the APE at Beach 116<sup>th</sup> St. The memorial is part of the NYC Parks system.

### **ALTERNATIVE 3A: INDUCED FLOODING FEATURES**

**New Jersey: IFFs on the Raritan and Sandy Hook Shoreline.** The IFFs on the Raritan and Sandy Hook Shoreline are in the Raritan and Lower Bay study regions.

**Raritan River IFF.** This feature consists of IFFs along a residential subdivision on John T. O'Leary Blvd (Thomas J Dohany Homes) in the City of South Amboy, Middlesex County. It extends northwesterly to Augusta St.

Two S/NRHP eligible archaeological grids are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Highlands IFF.** This feature consists of revetments and a floodwall in the Borough of Highlands in Monmouth County. The structures follow Raritan Bay and Shrewsbury River channel shorelines from near Gravelly Point Rd to Veterans Memorial Park on Bay Ave to the south east. A floodwall is proposed on the north side of Sandy Hook Bridge (Navesink Ave/NJ Route 36). The west end of the floodwall is proposed in a marina at 2 Bay Ave in Highlands and the east end on Sandy Hook in the Gateway NRA in the Borough of Sea Bright.

There are no known archeological sites in or adjacent to the APE.

National Historic Landmark Fort Hancock and Sandy Hook Proving Ground Historic District are partially in the APE. One individual S/NRHP-eligible resource is partially in the APE, Bahrs Landing Restaurant and Marina (2 Bay Ave, Highlands). One identified resource is partially in the APE, a building at 24-26 Shrewsbury Avenue. Note, the Hancock and Sandy Hook Proving Ground Historic District, NHL historic district is to the north of the south floodwall in Sea Bright.

**Sandy Hook Bay IFF.** This feature consists of IFFs along the shoreline in the Borough of Atlantic Highlands and Middletown Township in Monmouth County. The east end begins at

Avenue A and extends west to the Leonardo State Marina. From the marina, it continues west to the west side of the intersection of Florence and Cedar avenues. This feature resumes on the west side Normandy Rd in Middletown Township, extending west and northwesterly to the east side of Church St in Bayshore Waterfront Park. The western terminus is on the shoreline north of Church St.

Two S/NRHP eligible archaeological grids are partially in the APE.

Two S/NRHP eligible historic districts are partially in the APE, Naval Ammunition Depot Earle Historic District and Shoal Harbor Rural Historic District. One individual S/NRHP eligible resource is partially in the APE Octagon House at 26 Church St in Middletown. Five individual identified resources are partially in or adjacent to the APE.

**Keyport-Cheesquake IFF.** This measure consists of a system of discontinuous SBMs in the Borough of Keyport and Aberdeen Township in Monmouth County, and Old Bridge Township and Borough of Sayreville in Middlesex County. The eastern features are proposed between at a point east of Locust St to just west of Washington St in Keyport. Several parks, marinas and a yacht club are adjacent to this measure.

This feature includes a seawall along the west side of Matawan Creek parallel to Riverdale Dr, south off Route 35 in Aberdeen Township and inland levees in Old Bridge at the edge of Cheesquake State Park and in Parlin. Levees are proposed in Cliffwood Beach in Aberdeen along a residential subdivision (Lakeshore Dr and Greenwood Ave). The westernmost feature is located at Raritan Bay Waterfront Park in the Borough of Sayreville.

Three identified archaeological grids are partially in the APE.

Two S/NRHP eligible historic districts are partially in the APE, First Street Historic District, Front Street Historic District. One identified historic district is partially in the APE, Brown's Point Historic District.

**Highlands IFF.** A storm surge barrier and a large levee are proposed in Sandy Hook Bay between Snug Harbor Beach (Snug Harbor Ave) in the Borough of Highlands in Monmouth County the west shoreline of Sandy Hook.

There are no known archeological sites in or adjacent to the APE.

National Historic Landmark Fort Hancock and Sandy Hook Proving Ground Historic District is partially in the APE. There are no individual S/NRHP-listed or-eligible historic properties in or adjacent to the APE.

**New Jersey: IFF along the Raritan / Arthur Kill shoreline, Perth Amboy.** The Raritan / Arthur Kill IFF at Perth Amboy is in the Upper Bay / Arthur Kill and Lower Bay study regions. The IFF includes a roughly-1,000-ft-long elevated promenade adjacent to some Raritan River shoreline measures.

Two archaeological grids with NR-eligible sites are partially in the APE. The NOAA ENC database shows a shipwreck in the APE.

The measure's Direct APE intersects or is adjacent to four identified historic properties: the Perth Amboy Pump Station; the Saint Demetrios Greek Orthodox Church; a building at 52

First Street and another at 51 Madison Avenue. It is also adjacent to the NR-listed Lawrence Kearny House.

**New York City: IFFs on the southeast shoreline of Staten Island.** The IFFs along the southeast shoreline of Staten Island are in the Lower Bay study region. This measure includes a system of noncontiguous SBMs along the south shoreline of Staten Island. A levee begins at Conference House Park in the Tottenville neighborhood near Carteret St and runs along the shoreline to Page Ave. Another levee is proposed in Butler Manor Wood at the foot Richard Ave. SBMs are proposed in the sections of shoreline between Huegeonot Beach at Yeomalt Ave and Poillion Ave, Harold Ave and Woods of Arden Rd, and Retford Ave and Fairlawn Ave at Great Kills Harbor and Park (Gateway NRA).

Several NYSM archaeological site areas along south Staten Island are partially in the APE. Overlapping archaeologically sensitive areas span the south shore of the island. The NOAA ENC database shows a shipwreck in the APE.

S/NRHP listed and NYC Landmark Seguire House (440 Saguine Ave) and NRHP listed Poillon-Seguire-Britton House (369 Great Kills Rd) are partially in the APE. The S/NRHP eligible and NYC Landmark Manee-Seguire Homestead (509 Saguine Ave) is partially in the APE.

**New York City: IFF at Breezy Point along Queens shoreline.** The Breezy Point IFF is in the Jamaica Bay study area. It consists of 7.5 miles of measures including a deployable flood barrier, reinforced dunes, floodwalls, and levees around the Roxbury and Breezy Point neighborhoods at the west end of the Rockaway Peninsula, just east of Marine Parkway Bridge.

One archaeologically sensitive area is partially in the APE. It contains the NR-listed Fort Tilden Bulkhead site and the Life-Saving Station site, about which not enough is known to determine its NR-eligibility. The NOAA ENC database indicates there is a shipwreck in the APE.

It overlaps the NR-eligible Silver Gull Beach Club Historic District, the NR-listed Fort Tilden Historic District, four individually NR-listed properties (Battery Kessler, Battery HS-315, the telephone pit at HS324, and the HS 324 pistol range), and 14 NR-eligible properties.

**New York City: Little Bay IFF on Queens shoreline along western Long Island Sound (LIS).** The Little Bay IFF is in the Long Island Sound study region. This feature consists of floodwalls and a levee along the northwestern Queens Shoreline at Little Bay at Fort Totten Park and the Whitestone-Beechurst neighborhood. The west end begins near 166<sup>th</sup> St at Cryders Point. It follows the shoreline to underneath the Throgs Neck Bridge and extends along Little Bay Park to Fort Totten on Totten Ave. Surrounding properties are primarily residential housing (apartment buildings, multi-family, and single).

There are no known archaeological sites identified in or adjacent to the APE. Two archeologically sensitive areas are partially in the APE. Three unevaluated archaeological sites are in Fort Totten.

The S/NRHP-eligible Fort Totten Historic District and NYC Historic District Landmark is partially in the APE. Six contributing resources of the historic district located near the fort's entrance are in the APE. One S/NRHP-listed building is in the district to the north of the APE, Officers Club (Bldg 208). The S/NRHP-eligible Throgs Neck Bridge is partially in the



APE. One NYC Individual Landmark is partially in the APE, the Arthur Hammerstein House (168-05 Powells Cove Blvd) on Cyrders Point.

**New York City: Hutchinson River IFF on Bronx shoreline along western LIS Pelham Barrier.**

The Hutchinson River IFF is in the Long Island Sound study region. This feature consists of two large levees on the north and south sides of Hutchinson River near Pelham Bay Bridge. The south levee is proposed on the north end of Bronx Pelham Landfill. The north levee location is in the south edge of Pelham Bay Park

One NYS Museum Area is and overlapping archeologically sensitive areas are partially in the APE.

Two S/NRHP-eligible resources are partially in the APE: BIN 2240200 - Shore Road Bridge (Pelham Parkway Bridge or Pelham Bay Bridge) and Pelham Bay Park Historic District. The park contains the S/NRHP- listed Bartow-Pell Mansion, and LPC Landmark, and several individual LPC landmarks, which are not in the APE.

**New York City: IFFs on Bronx shoreline along western LIS.** The Bronx-LIS IFFs are all in the Long Island Sound study region.

**Throgs Neck IFF.** This feature consists of IFFs along Throgs Neck which extend around the peninsula and along bayshore of the Locust Point neighborhood. This area includes Fort Schuyler on Throgs Point and the SUNY Maritime College, and Locust Point Yacht Club. Surrounding properties are primarily residential.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and one NYSM Museum Site are partially in the APE.

One S/NRHP-listed historic district, Fort Schuyler, and the S/NRHP-eligible Throgs Neck Bridge are partially in the APE.

**Eastchester Bay IFF.** This feature consists of IFFs along Eastchester Bay from Cross Bronx Expy (US Route 265) north to Barkley Ave in the Edgewater neighborhood of the Bronx. It includes two separate measures (north and south). Note, the south measure is in both Alternatives 2 and 3A. The south measure begins near the MTA Bridges and Tunnels property off Locust Dr on the north side of the expressway. From which point, the south section follows the shoreline north to 1<sup>st</sup> Ave and terminates in Bicentennial Veterans Memorial Park. The north section begins on the north side of the creek in the park near Bronxonia Yacht Club. It follows the shoreline north to Layton Ave. Adjacent properties are residential, commercial, social, and recreational in use.

One NYSM area, two NYSM sites, and one unevaluated site are partially in the APE. Overlapping archeologically sensitive areas are partially in the APE.

One S/NRHP eligible property is partially in the APE, North Tower Firehouse (Main St at 9th St [south section])

One NYSM area, two NYSM sites, and one unevaluated site are partially in the APE. Overlapping archeologically sensitive areas are partially in the APE.

One S/NRHP eligible property is partially in the APE, North Tower Firehouse (Main St at 9th St [south section])

**Rodman Neck B IFF.** This feature consists of IFFs around the southern third of Rodman Neck in Pelham Bay Park, which contains the NYPD shooting range.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and overlapping archeologically sensitive areas are partially in the APE.

The S/NRHP-eligible Pelham Bay Park Historic District is partially in the APE.

**New York City: Little Neck B IFF on Queens shoreline along western LIS.** The Queens-LIS IFF is in the Long Island Sound study region. This feature consists of two sections of IFFs at Little Neck Bay along the shorelines of the Douglaston neighborhood in Queens and Great Neck Estates neighborhood in Nassau County. The west SBMs extend along the west shoreline of Douglaston beginning at the Long Island Railroad near 41<sup>st</sup> Ave. It continues north to just east of 233<sup>rd</sup> Pl. The east section starts at West Dr and extends south through Memorial Field where it crosses the bay. From the south end of the bay in Great Neck, it continues north along the west shoreline of Great Neck Estates to near South Circle Dr.

There are no known archaeological sites identified in or adjacent to the APE. Two NYSM areas and overlapping archeologically sensitive areas partially in the APE.

The S/NRHP-eligible Douglaston Historic District (also NYC Historic District Landmark) and one individual S/NRHP-eligible resource (6 Shore Dr, Great Neck) are partially in the APE.

**New York State: IFFs on Northern Nassau County shoreline in western LIS.** The Nassau County IFFs are all in the Long Island Sound study region.

**Great Neck IFF.** This feature consists of discontinuous IFFs along the northwest shoreline of Nassau County on Long Island Sound in the communities of Great Neck, Saddle Rock, Kings Point, and Manhasset.

There are no known archaeological sites identified in or adjacent to the APE. One archaeologically sensitive area for a historic site is partially in the APE.

Three individual S/NRHP-eligible properties are partially in the APE: Saddle Rock Grist Mill (Grist Mill Ln); Krim Residence (229 Dock Ln), Grove Point (19 Harbor Rd).

**Plandome IFF.** This feature consists of discontinuous IFFs along the northwest shoreline of Nassau County along Long Island Sound in the communities of Great Neck, Thomaston, Manhasset, and Plandome.

There are no known archaeological sites identified in or adjacent to the APE. One archaeologically sensitive area is partially in the APE.

The S/NRHP-listed Plandome Village Historic District and four individual S/NRHP eligible resources are partially in the APE; Manhasset Valley (cow neck); LI Railroad Bridge (Thomaston, North Hempstead); Myers-Dale House (2 Shoredale Dr); Manhasset Bay Yacht Club (445 Main St); and a commuter yacht ("Aphrodite").

**Port Washington IFF.** This feature consists of a storm surge barrier, tide gate, and two IFFs along the northwest shoreline of Nassau County in Port Washington. The south section begins near Estate Dr and extends north along the Port Washington shoreline past the Manhasset Bay Yacht Club to the south end of the Town Dock off Main St. The north section begins in the northeast corner of Sunset Park on the west side of Shore Rd. From the park, the north section follows shoreline to the storm barrier location. It continues westerly along Manhasset Bay Marina and turns north at Tom's Point Marina and continues to the tide gate location. The north section extends west from Manorhaven Town Park following the shoreline to Plum Beach Point peninsula.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM area and one archaeologically sensitive area are partially in the APE. The NOAA ENC database shows two shipwrecks in the APE.

The S/NRHP-eligible Main Street Historic District and four individual S/NRHP eligible resources are partially in the APE; Cornwall House (50 Cornwall Ln); Inisfree (Ferrari Residence, 5 Pelham Ave); Zausner Residence (Plum Beach Point Rd); and Frederick K. C. Hicks Estate (Barkers Point Rd, Sands Point).

**Sands Point IFF.** This feature consists of three sections of IFFs along the northern shoreline of the Village of Sands Point. The western section begins at Lighthouse Rd near Sands Point Rd and follows the shoreline north to a point southwest of the intersection of Lighthouse Rd and Middle Neck Rd. A 1,378-ft (420-m) long seawall is proposed to the east of Sands Point Lighthouse near Hoffstoft Ln. The third section begins near Prospect Point and extends east across East Creek. It follows the shoreline southeasterly to a point on the west side of Hempstead House at 127 Middle Neck Rd.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM site area is partially in the APE.

The S/NRHP-listed Gould-Guggenheim Estate (Sands Point Preserve) and two individual S/NRHP eligible resources are partially in the APE; W.E. Seaman Hotel (Lighthouse Rd) and Beacon Towers Garage And Wall (250 Middle Neck Rd). The S/NRHP-eligible Sands Point Light House (Sands Point Road) is adjacent to the APE to the north. Note, the S/NRHP-eligible H.B. Swope Estate/'Lands End' (Hoffstoft Ln) was demolished.

**Hempstead Harbor IFF.** This feature consists of IFFs along Hempstead Harbor in the communities of Port Washington, Sea Cliff, and Glen Cove. A 1,341-ft (409-m) long seawall is proposed in Port Washington along the Beacon Hill Colony on West Shore Dr. SBMs on the east side of the harbor in Sea Cliff include two sections containing a storm surge barrier, seawall, floodwall, and levee. The south section begins at Tappan Beach on Prospect Ave. It continues north along the shoreline to just north of Prospect Ave at Carpenter Point. The south end of the north section starts at the Sea Cliff Beach near the Sea Cliff Yacht Club. It extends north, crossing Glen Cove Creek, until its northern terminus at Garvies Point Rd. near the Hempstead Harbor Club in Glen Cove.

One unevaluated archaeological site, a reported Colonial Euro-American and Native American cemetery, is partially in the APE. Two archaeologically sensitive areas are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Roslyn Harbor IFF.** This feature includes two sections of IFFs in Roslyn Harbor in Roslyn. The south SBMs include a tide gate and levees along the south shoreline north of Northern Blvd/NY 25A. The north IFF location is between Cedarmere Park to a point just north of the intersection of Byrant Ave and Montrose Ct.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM site area is partially in the APE. The S/NRHP listed Cedarmere-Clayton Estates Historic District and five individual S/NRHP-listed resources are partially in or adjacent to the APE; George W. Denton House (57 West Shore Rd); Pearsall House (435 Bryant Ave) Sycamore Lodge (355 Bryant Ave); Springbank (Residence, 340 Bryant Ave); and Stephen and Charles Smith House (Bryant Ave).

### **ALTERNATIVE 3A: RESIDUAL RISK FEATURES**

**New Jersey: Passaic Mainstem RRFs.** The Passaic Mainstem RRFs are all in the Hackensack / Passaic study region.

**Clay Street Bridge RRF.** This feature consists of a 1,040-ft long (317-m) floodwall along the east side of Passaic River between Clay St Bridge and Fourth Ave Conrail Bridge (NX Bridge) in the Borough of East Newark, Hudson County.

One S/NRHP-eligible archaeological grid is partially in the APE.

The west side of the NHL Clark Thread Company Historic District along Passaic Ave is partially in the APE. Identified resources partially in or adjacent to the APE include Fourth Avenue Conrail Bridge (NX Bridge) and Erie Lackawanna (EL) Patterson Branch Railroad Historic District.

**North Arlington RRF.** This feature consists of two revetments on the west shoreline of the Passaic River, between Belleville Turnpike and Hendel Ave in North Arlington Township, Bergen County. Adjacent properties are commercial and recreational.

There are no known archeological sites or in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified individual historic property is adjacent to the APE, NJ Route 7 Bridge (SI&A 0208150).

**Passaic Upriver RRF.** This feature consists of floodwalls and a berm on the west side of Passaic River in Belleville Township, Essex County. RRFs are proposed along the east side of Main St, between Terry St to just north of Roosevelt Ave. Commercial properties are adjacent to the APE.

There are no known archeological sites in or adjacent to the APE.

The S/NRHP-eligible Passaic River Valley Historic District is in the APE. The eastern border of the district is Main Street, where the feature is proposed.

**Bridge Street Bridge RRF.** This feature consists of two revetments along the west shore of Passaic River between Bridge St and New Jersey Railroad St in Harrison Township, Hudson County.

Two S/NRHP-listed archaeological grids are partially in the APE.

Two individual S/NRHP-eligible resources are in or adjacent to the APE, New Jersey Rail Road and Transportation Company Corridor At-Grade Segment (Railroad Ave and Spur Line) and Bridge Street Bridge (SI&A #0700H03).

**New Jersey: Passaic River Tidal Basin RRFs.** The Passaic River Tidal Basin RRFs are all in the Hackensack / Passaic study region.

**Essex County Correctional Facility RRF.** This feature consists of a series of floodwalls along the City of Newark shoreline from point north of Wilson Ave at the Sunoco plant north along the industrial properties and the Essex County Correctional Facility (354 Doremus Ave) to Raymond Blvd.

Four S/NRHP-eligible archaeological grids are partially in the APE.

The S/NRHP-listed US Routes 1& 9 Truck Bridge (SI&A #0705151), over Passaic River and Doremus Ave, is partially in the APE. Two previously identified individual historic properties are partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge and 86-126 Doremus Ave.

**Route 1 Bridge RRF.** This feature consists of a 1,325-ft (404-m) floodwall on the south shoreline of the Passaic River in an industrial area of Jersey City. It extends along Broadway to the railroad corridor.

There are no known archeological sites in or adjacent to the APE.

Two S/NRHP-eligible historic districts, New Jersey Railroad Bergen Cut Historic District and Hackensack River Lift Bridges Historic District, are partially in the APE. Two individual S/NRHP-eligible resources, Wittpenn Bridge (SI&A #0909150) and Pennsylvania Railroad Harsimus Branch (Conrail/CSX) Bridge over the Hackensack River, are partially in the APE. Two previously identified individual historic properties are partially in the APE, 275 Broadway and National Biscuit Company Warehouse (133 Halleck Avenue).

**Hudson County Correctional Facility RRF.** This feature consists of three floodwalls the along the Hackensack River on the east side of Kearny Point, Hudson County. The floodwalls are proposed between Lincoln Highway (US Routes 1 and 1-9) and Stern Ave, just north of Pulaski Skyway.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150; US Routes 1 & 9 over the Passaic River and the Hackensack River) and the S/NRHP-eligible PSE&G Kearny Generating Station (at Stern Ave) are partially in the APE.

**Kearny Point RRF.** This feature consists of a 5,160-ft (1,573-m) long floodwall along the Hackensack River on the east side of Kearny Point, Hudson County. The south end is on the southeast corner of the peninsula on the east side of Eastern Rd at the south basin of the former Kearney Shipyard. It extends north to the former shipyard's north basin at Lincoln Highway (US Routes 1 and 1-9).

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Morris Canal Historic District and the S/NRHP-eligible Federal Shipbuilding and Dry Dock Company, Kearny Shipyard Historic District are partially in the APE.

**South Kearny-Passaic RRF.** This feature consists of a 2,340-ft (713-m) long floodwall along the Passaic River on the west side of Kearny Point, Hudson County. It extends north from Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge near Distribution Ave to south of Ford Ln. The surrounding properties are commercial and industrial.

There are no known archaeological sites in or adjacent to the APE.

One previously identified individual historic property is partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge.

**Meadowlands Gate RRF.** This feature consists of a 5,833-ft (1,778-m) long berm along on the south shoreline of Hackensack River in Kearney Township, Hudson County.

There are no known archaeological sites or S/NRHP listed/eligible resources in or adjacent to the APE.

**Passaic River RRF.** This feature consists of a 1,258-ft (383-m) long floodwall on the east shoreline of Passaic River in Kearny Township, Hudson County. Its south end begins on the south side of Pulaski Skyway and extends north to a point west of 3rd St.

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150) is partially in the APE. Three previously identified individual historic properties are partially in the APE: Lloyd A. Fry Roofing Company (55 Jacobus Ave); Valentine & Co. (81 Jacobus Ave); and Coastal Oil Company (89 Jacobus Ave).

**Dock Bridge RRF.** This feature consists of floodwalls and a revetment on the east shoreline of the Passaic River in Harrison Township, Hudson County it extends north from Dock Bridge to Burlington St.

There are no known archaeological sites in or adjacent to the APE.

Three S/NRHP-listed resources are partially in or adjacent to the APE: Dock Bridge (Amtrak Northeast Corridor Line over Passaic River); Newark Penn Station and Dock Bridge (Boundary Increase and Additional Documentation); and Pennsylvania Railroad New York to Philadelphia Historic District

**Harrison Reach: RRF.** This feature consists of floodwalls on the south shoreline of the Passaic River near Blanchard St in the City of Newark, Essex County.

One identified archaeological grid is partially in the APE.

There are no S/NRHP-listed or-eligible historic properties in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE, Eagle-Picher Lead Company (76 Blanchard St) and Benjamin Moore & Company (122-152 Lister Ave).

**New Jersey: Hackensack/Meadowlands RBDM – Meadowlands Gate.** The Hackensack / Meadowlands RBDM is in the Hackensack / Passaic study region. This feature consists of a 5,633-ft (1,717-m) long berm along the northeast shoreline of the Hackensack River at Penhorn Creek Tributary in Jersey City.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE, Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection, Hudson Generating Station and Erie Lackawanna-New York and Greenwood Lake Branch right of way.

**New Jersey: Newark Bay RRFs.** The Newark Bay RRFs are in the Upper Bay / Arthur Kill study region.

**Shell / Passaic RRF.** This feature consists of an 879-ft (268-m) long floodwall along northern portion of the Shell Oil Company shoreline in the City of Newark.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District is partially in the APE (Doremus and Wilson Avenues).

**Norfolk Southern RRF.** This feature consists of a 2,808-ft (856-m) long revetment along the City of Elizabeth shoreline from Marciante Jackson Millet Park to the industrial complex at Trumball St.

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Singer Factory Historic District and one S/NRHP-eligible historic district is partially in the APE, Central Railroad of New Jersey Main Line Corridor Historic District.

**New Jersey: Raritan River Basin RRFs.** The Raritan River Basin RRFs are all in the Raritan study region.

**Raritan River RRF.** This feature consists of a storm surge barrier in the mouth of the Raritan River on the east side of NJ Route 35 at Marsh Point between the cities of South Amboy and Perth Amboy, Middlesex County. A 5,767-ft (1,758 m) long levee is proposed in South Amboy. A 3,919-ft (1,194-m) elevated promenade along the southeast shoreline (Sadowski Parkway) of Perth Amboy from the Path Rail Line to a point just north of Lewis St.

Three S/NRH-eligible archaeological grids are partially in the APE. The S/NRHP-listed Raritan Copper Works is partially in the APE (Elm and Market Streets, Perth Amboy). Two S/NRHP eligible historic districts are partially in the APE, Perth Amboy and Elizabethport Branch of the Central Railroad of New Jersey Historic District and New York and Long Branch Railroad Historic District.

Three individual S/NRHP-eligible resources are in the APE; Raritan River Swing Span Draw Bridge; Overhead Contact System, Pennsylvania Railroad Company (Between Rahway, Union County and South Amboy, Middlesex County); Railroad Signal Bridge, Perth Amboy & Elizabethport Branch of the Central Railroad of New Jersey; and Lawrence Kearny House (63 Catalpa Street). Two previously identified properties in or adjacent to the APE Perth Amboy Pump Station (2 Second St).

**South River RRF.** This feature consists of a discontinuous system of floodwalls and a revetment in the Boroughs of Somerset and Sayreville in Middlesex County. It is proposed along the west side of South River and a South River tributary. The feature is roughly bound by the river to the east, Causeway St to the south, Reid Street to the west and Main St to the north. A community park and garden along the river is within the APE. Commercial properties are adjacent to the APE. A flood wall, berm and revetments are proposed to the south on the west side of the river at Herman St just north of the railroad.

One S/NRHP-eligible archaeological grid is partially in the APE.

Two S/NRHP-eligible historic districts are partially in the APE, Herrmann-Aukam Company Historic District (Herman St) and Raritan River Railroad Historic District.

**Whitehead RFF.** A 2,735-ft (1,824-m) berm is proposed on the southwest side of South River in the Borough of Somerset. The northwest end of the feature begins at Serviss St off Whitehead Ave. The berm parallels Deer Creek Village and turns southeasterly along Levinson Ave. It extends along the west side of the river to Brant St. Adjacent properties are primarily residential.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Rahway River Basin, Caseys Creek RFF.** The RRF at Caseys Creek is in the Upper Bay / Arthur Kill study region. The feature consists of a tide gate and berms in the southwest portion of Joseph Medwick Memorial Park in the Borough of Carteret in Middlesex County.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Shoreline along Arthur Kill.** The RRFs on the Shoreline along Arthur Kill are in the Upper Bay / Arthur Kill study region.

**Tremley RRF.** This feature consists of a tide gate and floodwalls on the north side of Tremley Point Rd along the west side of NJ Turnpike (I-95) in the City of Linden, Union County.

One identified archaeological grid is partially in the APE.



No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Morses Creek RRF.** This feature consists of an 1,0060-ft long floodwall along the Arthur Kill shoreline at Morses Creek in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-eligible Sound Shore Railroad Historic District and a contributing resource, Morses Creek Bridge, are partially in the APE. The previously identified Elizabethport Cohesive Area is partially in and adjacent to the APE.

**Elizabeth River RRF.** This feature consists of an 1,150-ft long floodwall along the north shoreline of the Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

One individual S/NRHP-eligible resource is partially in the APE, South Front Street Bridge (SI&A #2004001) over Elizabeth River.

**Elizabethport RRF.** This feature consists of revetments and floodwalls along the shoreline of the peninsula between Arthur Kill and Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

The S/NRHP-eligible Staten Island Railroad Historic District and two individual S/NRHP-eligible resources are partially in the APE: South Front Street Bridge (SI&A #2004001) over Elizabeth River; South First Street Bridge (Str. #2004002) over Elizabeth River; and Staten Island Railway Lift Truss Bridge over Arthur Kill.

**New Jersey: Jersey City RRF on the shoreline along Upper Bay.** The Jersey City RRF is in the Lower Hudson / East River study region. This feature consists of a 1,488-ft (454-m) long deep bulkhead along the Upper Bay in Jersey City. The south end begins at Grand St near the Jersey City 911 Memorial. It extends north along the shoreline to just north of Christopher Columbus Dr.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Hudson and Manhattan Railroad Transit System [Historic District] is partially in the APE. Individually S/NRHP-eligible properties in or partially in the APE include Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, and Early Jersey City Brick Sewers (Grand, Montgomery, and Pearl streets). The previously identified Harborside Terminal (Morgan Street at Hudson River) is partially in and adjacent to the APE.

**New Jersey: RRFs on the shoreline along the Hudson River.** The Hudson River RRFs in New Jersey are in the Lower Hudson / East River study region.

**Upper Hudson RRF.** A 5,576 ft (1,700-m) deep bulkhead is proposed on the west Hudson River shoreline in North Bergen Township, Hudson County.

Three identified archaeological grids are partially in the APE. The NOAA ENC database shows there a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs on the Western Shore of Staten Island.** The RRFs on the west shore of Staten Island are in the Upper Bay / Arthur Kill study region.

**Tottenville RRF.** This feature consists of floodwalls, a deep bulkhead, and a revetment along Arthur Kill in the Tottenville Marina area of Staten Island.

There are no known archaeological sites in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows four shipwrecks in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Arthur Kill RRF.** This feature consists of a floodwall across a creek near Burke Ave in the William Davis Wildlife Refuge near Burke Ave. It is adjacent to the Travis-Chelsea neighborhood.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island RRFs at Mariners Harbor.** The Mariners Harbor RRFs are in the Upper Bay / Arthur Kill study region.

**Mariners Harbor East RRF.** A 4,107-ft (1,252-m) long deep bulkhead is proposed on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood. It extends east from north of Richmond Terr near Arlington Ave to just east of Union Ave. Adjacent properties are commercial and industrial.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows a shipwreck in the APE.

One S/NRHP-listed resource is in the APE, Standard Oil Co. No. 16 (Harbor Tug) at Mariners Harbor.

**Mariners Harbor West RRF.** This feature consists of a deep bulkhead, revetments, and floodwalls on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood west of Bayonne Bridge. It extends east from a point north of Mariners Lane to Winant Ave. Adjacent properties are recreational; commercial and industrial.

No known archaeological sites in the APE. One NYSM area is partially in APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. The NOAA ENC database indicates there is a shipwreck in the APE.

Two individual S/NRHP-eligible resources and NYC Landmarks are partially in the APE:

Standard Varnish Works Factory Office Building (2589 Richmond Terr); and a Building at 2585 Richmond Terr.

**New York City: Northern Shore of Staten Island, Bayonne Bridge RRF.** The Bayonne Bridge RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a floodwall on the east side of Bayonne Bridge near Nicholas Ave, north of Richmond Terrace.

No known archaeological sites in the APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island Bergen Point RRF.** The Bergen Point RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a deep bulkhead and a revetment on the north shoreline of Staten Island along Kill Van Kull at Bergen Point. The west end begins at a point just west of Port Richmond Ave and extends east to the northwest corner of the Port Richmond Water Pollution Control Plant property.

There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. One NYSM area is partially in APE. The NOAA ENC database indicates there is a shipwreck in the APE.

The S/NRHP-eligible Port Richmond Commercial Historic District (along Port Richmond Ave and Richmond Terr) is partially in the APE.

**New York City: RRFs on Brooklyn shoreline along Upper Bay.** The Brooklyn Upper Bay RRFs are in the Upper Bay / Arthur Kill study region.

**Red Hook RRF.** The Red Hook RRF is in the Upper Bay / Arthur Kill study region. Four floodwalls are proposed in the Red Hook neighborhood at Erie Basin along Reed, Beard, and Halleck streets between Conover St and Columbia St. The northwest area begins at Van Dyke St and extends southwest on Conover St to Reed St. It continues northeast along Van Brunt St and turns southeast on Reed St. The southeast section begins on Beard St near Dwight St and extends southeasterly to Columbia St. An in-water feature is proposed in Red Hook Recreation Area, a NYC park unit. The surrounding area consists of former industrial buildings and commercial properties.

There are no known archaeological sites in or adjacent to the APE.

One S/NRHP-listed resource is in the APE, Lehigh Valley Railroad Barge 79 (290 Conover St). Two individual S/NRHP-eligible resources are partially in the APE, Beard Store and Warehouse Pier (21 connected brick warehouses, 421-573 Beard St) and Red Hook Stores (480-500 Van Brunt St).

**South Slope RRF.** A deep bulkhead is proposed around the shoreline of Sunset Industrial Park at 19<sup>th</sup> St. Near the Gowanus Canal. The south end begins in Guttenberg/North Bergen Waterfront Park (7100 River Rd). This feature extends north to the residential community at Cove Ln.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRF at Wall Street on the Manhattan shoreline along East River.** The Wall Street RRF is in the Lower Hudson / East River study region. It consists of a 4,466-ft (1,361-m) long floodwall along the East River in Manhattan between Broad St and Robert F. Wagner Sr. Place. It crosses the FDR Dr continues northwesterly along Robert F. Wagner Sr. Place.

There are no known archaeological sites in or adjacent to the APE. Overlapping archaeologically sensitive areas for historic sites along the East River are partially in the APE. South Street Seaport is partially in the APE.

Numerous contributing resources in the S/NRHP-listed and NYC Landmark South Street Seaport Historic District are partially in and adjacent to the APE. Three individual S/NRHP-listed and NYC Landmark resources are partially in the APE: Whitehall Ferry Terminal; First Police Precinct Station House; and Brooklyn Bridge. S/NRHP-eligible resources partially in the APE include Governor Alfred E. Smith Houses Historic District and 120 Wall Street Offices.

**New York City: West Side SBM, Chelsea RRF.** This feature consists of 37 components, among which are floodwalls, deep bulkheads, vehicular gates, and pedestrian gates along the Hudson River in the Chelsea neighborhood of Manhattan. The south end begins at Pier 57 at Hudson River Park (11th Ave and W 16th St). It extends north along Hudson River Park, an NYC Park unit, and continues to a point just north of West 29<sup>th</sup> St. A small section of RFFs is to the north between 34<sup>th</sup> St at Pier 76 Hudson River Park.

An unevaluated historic site is in the APE. Its archaeologically sensitive area buffer is partially in the APE.

Three individual S/NRHP-listed resources are partially in the APE: Pier 57; Frying Pan Shoals Lightship No. 115 (Pier 63); and John J. Harvey, fireboat (Pier 63). The S/NRHP-listed Gansevoort Market Historic District and S/NRHP-eligible and NYC Landmark West Chelsea Historic District are partially in and adjacent to the APE. Other S/NRHP-eligible resources include PIERS 59-62 (Piersheads of Piers 60 & 61 are eligible) and Baltimore & Ohio Railroad Float Transfer Bridge (Pier 66a).

**New York City: RRFs in Brooklyn along the East River.** Brooklyn's East River RRFs are in the Upper Bay / Arthur Kill study region.

**Greenpoint Long Island RRF.** A deep bulkhead is proposed along the south shore of Bushwick Inlet at N 12<sup>th</sup> St. and the Hudson River shoreline to Hurricane Point at N 9<sup>th</sup> St in the Greenpoint neighborhood of Brooklyn. This measure is partially located in Bushwick Inlet Park and Marsha P. Johnson State Park.

There are no known archaeological sites in or adjacent to the APE. An archaeologically sensitive area for a historic site is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified historic district (Marsha P. Johnson State Park) and one previously identified individual resource are partially in the APE.

**Atlantic Basin RRF.** This measure consists of a 5,282-ft (1,610-m) long floodwall along Clinton Commonwealth / Panamerican

Wharf in the Red Hook Atlantic Basin Terminal in the Red Hook neighborhood of Brooklyn. The southwest end of the outer floodwall begins at Ferris St and Wolcott St and continues northeasterly along Ferris St to Central Wharf. It extends northeast along the Bowne St to Imlay St and terminates at Brooklyn Battery Tunnel I-478. The surrounding area consists of Brooklyn Cruise Terminal, commercial properties, and Red Hook Container Terminal.

There are no known archaeological sites in or adjacent to the APE.

Four S/NRHP-eligible historic properties are in or adjacent to the APE: 49 Ferris St; 151, 153, 155 Sullivan St. Two previously inventoried unevaluated resources are adjacent to the proposed floodwall: New York Dock Co. Atlantic Warehouses (100 and 160 Imlay St).

**New York City: RRFs on the Queens shoreline along the East River.** The Queens East River shoreline RRFs are in the Jamaica Bay study region.

**Newtown Creek RRF.** This feature consists of a navigable gate at the mouth of Newton Creek between Greenpoint in Brooklyn and Long Island City in Queens.

There are no known archaeological sites in or adjacent to the APE. A NYSM area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Long Island City RRF.** A 3,904-ft long deep bulkhead is proposed in Long Island City. The south end extends through the north end of Gantry Plaza State Park and 11<sup>th</sup> St Basin. It continues northeasterly along the shoreline to Con Edison-The Learning Center property near 44th St.

There are no known archaeological sites in or adjacent to the APE. Two archaeologically sensitive areas are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Gantry Plaza State Park, an unevaluated previously inventoried resource, contains the NYC Landmark Pepsi Cola Sign which is located south of the APE.

**Flushing Creek: RRF.** This feature consists of a berm and a tide gate in Flushing Creek on the north side of the railroad near Flushing Meadows Park Corona Park in Queens. Van Wyk Expy I-678 is on the east side of the feature.

One NYSM Area and two archaeologically sensitive areas are partially in the APE. is partially in the APE.

The S/NRHP-eligible Flushing Meadows-Corona Park is partially in the APE. There are no S/NRHP-listed resources in or partially in the APE.

**New York City: Brooklyn RRFs in Canarsie.** The Canarsie RRFs are in the Jamaica Bay study region. They include revetments and floodwalls totaling 2,670 ft (814 m) in length to be built along Fresh Creek northeast of East 108<sup>th</sup> Street.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

The measures will be at the Fresh Creek Nature Preserve.

**New York City: Queens RRFs along the Jamaica Bay and nearby shorelines.** All the Jamaica Bay shoreline RRFs are in the Jamaica Bay study region.

**Old Howard Beach RRF.** The RRFs at Old Howard beach include a floodwall, berms, and navigable gates that total 3,675 linear ft (1,120 m) along the north edge of Jamaica Bay at Charles Memorial Park and Hamilton Beach Park.

There are no known archaeological sites in or adjacent to the APE. A NYSM archaeological area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Broad Channel RRF.** The Broad Channel RRF surrounds the Broad Channel neighborhood in the center of Jamaica Bay. Its measures include a series of bulkheads, berms, and road raisings that total 24,518 linear ft (7,473 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Head of Bay RRF.** The Head of Bay RRF includes a navigable gate, floodwall, and a series of berms, at the southwest end of Head of Bay, an inlet southeast of John F. Kennedy International Airport. The measures total 2,948 linear ft (899 m).

There are no known archaeological sites in or adjacent to the APE. The easternmost berm in the feature is inside a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Inwood Marina RRF.** The Inwood Marina RRF is a deployable flood barrier with related floodwalls, a berm, and a bulkhead near the Inwood Marina south of the Inwood Country Club. The measures total 2,628 linear ft (801 M).

There are no known archaeological sites in or adjacent to the APE. The 100-m APE overlaps a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Norton Basin RRF.** The Norton Basin RRF is a 2,400-ft-(730-m)-long floodwall to be constructed along the west shore of Bayswater, straddling the Bayswater Avenue pump station.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Bayswater Park RRF.** The Bayswater Park RRF is a berm that will be located on the southwest side of Motts Basin near the northwest end of that channel. It totals 1,462 linear ft (446 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin South RRF.** The Motts Basin South RRF is a deployable flood barrier and a series of bulkheads and floodwalls at the south and southeast edges of Mott Basin. The measures total 3,771 linear ft (1,150 m).

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin North RRF.** The Motts Basin North RRF is a 662-ft-(202-m)-long floodwall along the north edge of Motts Basin.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Yankee Stadium RRF on Bronx shoreline along Harlem River.** The Yankee Stadium RRF is in the Lower Hudson / East River study region. This feature consists of a 2,896-ft (883-m) long deep bulkhead near Concourse Village neighborhood in the Bronx. It stretches north along the Harlem River shoreline from near Pier 5 and the Stadium Tennis Center to just north of Macombs Dam Bridge.

There are no known archaeological sites identified in or adjacent to the APE. One NYSM Area is partially in the APE.

Macomb's Dam Bridge (former Central Bridge) is partially in the APE; it is a NYC Landmark and S/NRHP-eligible resource.

## **6.2 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3A: CULTURAL RESOURCES WITHIN VISUAL IMPACT AREA (INDIRECT EFFECTS)**

Measures proposed for Alternative 3A will involve the construction of structures that have a potential to indirectly affect historic properties, most prominently by altering the visible environment (i.e., setting) of those resources. For this study, the visual impact study area (Indirect APE) includes those places within one mile (1.6 km) of proposed facilities for the alternative that are in the potential viewshed (based on topography). The total area within one mile of Alternative 3A is 293.2 sq miles (759.4 sq km), within which project measures are potentially visible from 208.63 sq miles (540.3 sq km). This Visual Impact Area, or Zone of Visual Influence (ZVI), encompasses parts of northeast New Jersey, all New York City counties, and northwest Nassau County on Long Island. As of this writing, spatial data is available only for resources in New York, so this preliminary visual impact analysis for Alternative 3A only

addresses historic properties in the New York ZVI. The largest ZVI study area occurs in New York.

**Preliminary Viewshed Analysis: New York.** Of the two states where Alternative 3A measures will be constructed, the largest visual effect will be in New York. The total area within one mile of Alternative 3A structures in New York is 195.13 sq miles (505.4 sq km), 66.6 percent of the total area within a mile in both states. Within that area in New York, alternative structures will be potentially visible from 152.26 sq miles (394.4 sq km), 78 percent of the total area within a mile of the project in New York. According to the NYSHPO data, this area where the alternative will potentially be visible contains: 9,016 NR-listed aboveground individual properties; 48 NR-listed historic districts; 2,459 NR-eligible aboveground individual properties; 51 NR-eligible districts; and 12 cemeteries (Table 6.2).

**Table 6.2. Summary of historic properties in New York within one mile of Alternative 3A structures, and the total historic properties within that area from which project structures will potentially be visible (*after data from the NY SHPO*).**

<b>Historic property type</b>	<b>Total within one mile</b>	<b>Total in topographic viewshed within one mile</b>
NR-listed individual building	12,046	9,016
NR-listed historic district	51	48
NR-eligible individual building	3,862	2,459
NR-eligible historic district	54	51
Cemetery	25	12

**Preliminary Viewshed Analysis: New Jersey.** The total area within one mile of Alternative 3A measures in New Jersey is 98.1 sq miles (254.1 sq km), 33.4 percent of the total area within a mile in both project states. In the New Jersey area, Alternative 3A structures will potentially be visible from 56.4 sq miles (146.1 sq km), 57.5 percent of the total terrain within a mile of the project in that state. A preliminary visual impact analysis of historic properties in New Jersey is not presented in this Tier I Draft EIS because cultural resources spatial data from the state unavailable as of this writing. The New Jersey visual impact analysis is anticipated to be included in the next phase of cultural resources and environmental investigations for the NYNJHAT Study.



## **7.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3B: MULTI-BASIN STORM SURGE BARRIERS + SHORELINE-BASED MEASURES**

Project Alternative 3B has measures and features in five of the investigation study regions: Hackensack / Passaic; Lower Hudson / East River; Long Island Sound; Upper Bay / Arthur Kill; and Jamaica Bay (Figure 7.1).

The alternative integrates SBMs along with the Arthur Kill, Kill Van Kull, Jamaica Bay, Newtown Creek, Gowanus Canal, and Flushing Creek storm surge barriers. The required SBMs include risk reduction of the New Jersey Upper Bay and Hudson River shoreline from Liberty State Park to Hoboken, New York City West Side shoreline from Brooklyn Bridge to Pier 78, East Harlem shoreline from Carl Schurz Park to Washington Heights, the Red Hook shoreline and the Long Island City-Astoria shoreline from Astoria Park to Ed Koch Queensboro Bridge. To mitigate the residual flood risk, RRFs are proposed along the shorelines of the Upper Bay, the Arthur Kill region, Jamaica Bay, and the Hackensack and Passaic Rivers. Induced flooding is expected to occur in portions of the East River and Harlem River and on the flood side of the Jamaica Bay storm surge as a result of the presence of the above stated storm surge barriers, thus, IFFs are suggested to be placed in these regions.

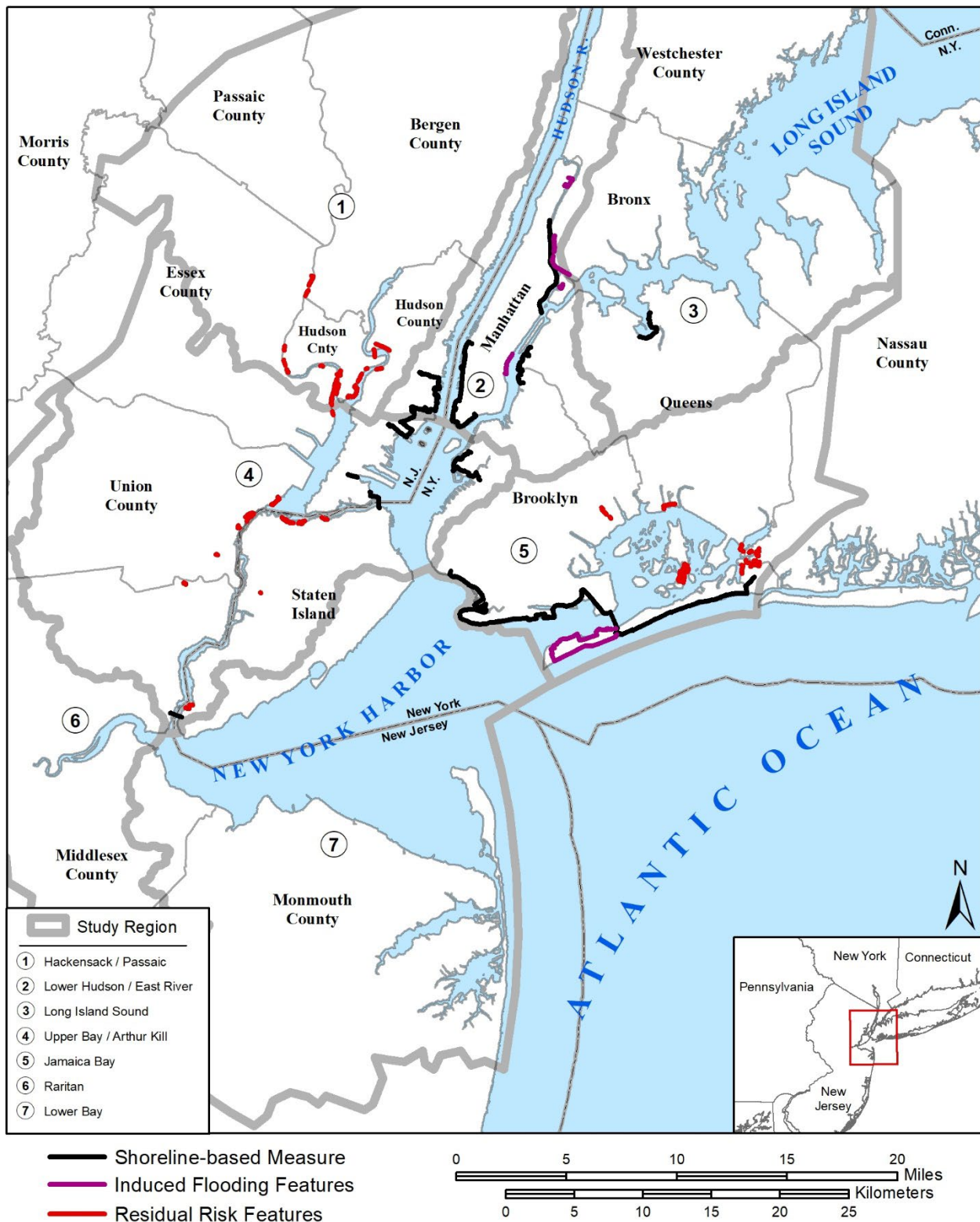
Preliminary dimensions for the alternative total 83.3 linear miles (134.1 km), of which 53.6 miles (86.3 km) is in New York and 29.7 miles (47.8 km) is in New Jersey. Project measures and features include:

- SBMs: 52.8 linear miles (85 km) (43 miles [69.2 km] of which is in New York and 9.8 miles [15.8 km] is in New Jersey)
- IFFs: 11.8 linear miles (19 km) (all of which is in New York).
- RRFs: 18.7 linear miles (30.1 km) (10.6 miles [17.1 km] of which is in New York and 8.1 miles [13 km] is in New Jersey).

Alternative 3B consists of features at multiple bays, rivers, creeks, and numerous shoreline areas. The largest single feature in this conceptual alternative is a dual surge gate system at the southern mouth of the Arthur Kill (the same as in conceptual alternative 3A), and the eastern mouth of the Kill Van Kull between Bayonne, NJ and Staten Island, NY. The navigational and auxiliary surge gate structures at these locations are estimated to have a total length of 4,080 ft (1,243 m), with an associated 10,055 ft (3,065 m) of SBMs comprising floodwalls and operable flood gates to tie-in to high ground.

The second feature involves a combination of SBMs and multiple surge gate structures along the Brooklyn shoreline to the mouth of Jamaica Bay and then to Rockaway Peninsula (the same feature as in conceptual alternative 3A). These surge gate structures at the mouth of Jamaica Bay, Gerritsen Creek, Sheepshead Bay, and Coney Island Creek are estimated to involve navigational and auxiliary gates with associated static barriers of approximately 3,980 ft (1,213 m), 300 ft (91 m), 825 ft (251 m), and 400 ft (122 m), respectively, to connect to adjacent land. On land, this feature involves approximately 118,029 ft (35,975 m) of floodwall, levees, seawalls, operable flood gates, elevated promenades, buried seawall/dunes, and tide gates to connect the surge gate structures and to tie-in to high ground at the feature terminuses.

Five other features located solely within New York City involve surge gate structures on various tributaries in predominantly low-lying areas with adjacent SBMs to tie-in to high ground. These



**Figure 7.1. Alternative 3B SBMs, IFFs, and RRFs in New York and New Jersey (ESRI 2010).**

five features are located at the southern Bronx shoreline (including the Bronx River and Westchester creek), Pelham Bay (the same as in conceptual alternatives 2 and 3A), Flushing Creek (Queens), Newtown Creek (border of Brooklyn and Queens), and the Gowanus Canal (Brooklyn). Estimated lengths of the surge gate structures for these five conceptual features are 300 ft (91 m), 340 ft (104 m), 850 ft (259 m), 260 ft (79 m), 250 ft (76 m), and 130 ft (40 m), respectively. The SBM associated with these surge gate structures in these five features have an estimated length of 25,774 ft (7,856 m), 8,293 ft (2,527 m), 14,183 ft (4,323 m), 17,554 ft (5,350 m), and 4,019 ft (1,225 m), respectively, including floodwalls, levees, seawalls, operable flood gates, and elevated promenades.

Alternative 3B also includes eight storm surge barriers with potential lengths of 3,200 ft (975 m) at Arthur Kill, 5,000 ft (1,524 m) at Gowanus, 8,000 ft (2,438 m) at Kill Van Kull, 10,000 ft (2,048 m) at Pelham Bay, and 15,000 ft (4,572 m) at Flushing Bay, 18,000 ft (5,486 m) at Newtown Creek, 27,000 ft (8,230 m) at Westchester Creek/Bronx River, and 125,000 ft (38,100 m) at Jamaica Bay, respectively (including shore-based measures tying into high ground).

The area of potential effect for this alternative includes the physical footprint of each measure as well as the viewsheds of the historic properties within one mile.

## **7.1 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3B: CULTURAL RESOURCES WITHIN THE ALTERNATIVE DIRECT APE**

The Direct APE for this alternative consists of the physical footprint of individual measures and a 100 m (328 ft) buffer around each measure which consists of a total area of 10.35 sq mi (36.8 sq km). Alternative 3B has the potential for adverse effects to historic properties in and adjacent to the 100-m (328 ft) Direct APE. This section provides the results of a preliminary review of cultural resources data available in the NYS OPRHP and NJ HPO databases, as well as the NOAA ENC database and the NYC Landmarks Preservation Commission's internet-accessible geographic information system, for proposed measures in Alternative 3B. To protect archaeological sites, in compliance with federal and state laws, their locations and names are not provided in this Draft Tier 1 EIS report.

The features proposed for Alternative 3B could involve the construction of structures that have a potential to affect directly historic properties and cultural resources in both terrestrial and submerged environments (Table 7.1). The proposed alternative is in an area that would be considered to have a moderate to high probability for terrestrial and submerged cultural resources to occur. At the most general level, Native American archaeological sites are most likely to be located near water; by definition, submerged resources are in water; and early non-Native American settlements clustered near water, particularly in the time before plumbing and sanitary sewer systems.

**New York.** The Direct APE for Alternative 3B in New York is approximately 7.91 sq mi (20.5 sq km). This Direct APE intersects: 19 SHPO-cataloged archaeological sites (of which four are listed in the NRHP, four are NRHP-eligible; and 11 have not been investigated sufficiently to determine their NR-eligibility); 15 NYSM archaeological areas; 94 above-ground historic properties that are NR eligible (of which 83 are individual properties and 11 are historic districts); 212 NR-listed individual properties; eight NR-listed historic districts; 21 LPC landmarks; and a National Recreation Area (the Jamaica Bay Unit of the Gateway National Recreation Area) (see Table 7.1; Figure 7.2). The NOAA ENC database lists 21 shipwrecks in the New York portion of the Direct APE. The SHPO data does not indicate there are any cemeteries in the APE.

**New Jersey.** The Direct APE in New Jersey is approximately 2.44 sq mi (6.3 sq km). This area overlaps with: 31 NJSHPO archaeological grids (of which three contain NR-listed sites, 13 have eligible sites, and 15 have sites that have not been investigated to determine their NR-eligibility); 31 National Register-eligible aboveground properties (of which 20 are individual properties and 11 are districts); seven NR-listed individual properties; nine NR-listed historic districts; one identified cohesive area (the Elizabethport Cohesive Area); and two National Historic Landmarks (the Holland Tunnel and the Clark Thread Company Historic Districts) (see Table 7.1; Figure 7.2). The NOAA ENC database shows five shipwrecks in the New Jersey portion of the Direct APE.

**Table 7.1. Preliminary Totals of Cultural Resources within 100 meters (328 ft) of Alternative 3B Measures (Direct APE)** (after data from the NYSHPO, NYSM, NJSHPO, NPS, NOAA, and the NYC LPC).

Historic Property Type	Number of properties in New York Direct APE	Number of properties in New Jersey Direct APE
National Historic Landmark	0	2
Historic District, NR-listed	8	9
Historic District, NR-eligible	11	11
Individual aboveground property, NR-listed	212	7
Individual aboveground property, NR-eligible	83	20
NYC LPC individual landmarks	21	-
NYC LPC landmark districts	0	-
Archaeological site, NR-listed*	4	3
Archaeological site, NR-eligible*	4	13
Archaeological site, undetermined eligibility*	11	15
NYSM archaeological site	0	-
NYSM archaeological area	15	-
Shipwreck	21	5
National Recreation Area	1	0
Cemeteries	0	-

\*Totals for New Jersey refer to LUCY archaeological grids, which may contain more than one archaeological site.



**Figure 7.2. Location of Units in the Gateway National Recreation Area** (*NPS Brochure Map, Gateway National Recreation Area*).

### ALTERNATIVE 3B: GATES AND BARRIERS

**New York City and New Jersey: Arthur Kill Barrier.** The Alternative 3A Arthur Kill Barrier and its shoreline-based measures are in the Upper Bay / Arthur Kill study region, and extend across parts of New York and New Jersey.

The 1,760-ft (536-m) long Arthur Kill Gate extends from the west land connection in Perth Amboy, New Jersey at Washington St to the east land connection in Tottenville Shore Park in Staten Island. The Arthur Kill measure includes 200-ft (61-m) long seawall. Tottenville Shore Park, an NYC Parks unit, consists of discontinuous park areas; the APE is in the park area along Hopping Ave at the foot of Arthur Kill Road.

**Arthur Kill Barrier in New York.** A considerable number of Native American artifacts and burial sites have been found near Tottenville Shore Park. The Aakawaxung Munahanung (Island Protected from the Wind) Archaeological Site, an LPC Landmark Site, is in the city's

Conference House Park at the southern-most point of Staten Island. The landmark site includes approximately 20 acres of highly archaeologically sensitive land. It is the first NYC landmark that specifically recognizes the many generations of Indigenous Peoples who lived in the area beginning about 8,000 years ago and continuing through the Colonial period.

There are vessel hulks (canal boats, barges, car floats, etc.) along the Tottenville shoreline. There are no recorded terrestrial archaeological sites in the Arthur Kill APE. This measure has potential to impact Vessel hulks (canal boats, barges, car floats, etc.) along Tottenville shoreline.

One S/NRHP-eligible historic property is in the Arthur Kill APE, a residence at 65 Hopping Ave.

**Arthur Kill Barrier in New Jersey.** There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

This measure has potential to impact Vessel hulks (canal boats, barges, car floats, etc.) along Vessel hulks (canal boats, barges, car floats, etc.) along the Perth Amboy shoreline. The NOAA ENC database shows a shipwreck in the APE in New Jersey.

**New York City and New Jersey: Kill Van Kull Gate.** The Kill Van Kull Gate is in the Upper Bay / Arthur Kill study region. It is the largest single feature in this conceptual alternative and is a dual surge gate system at the southern mouth of the Arthur Kill and the eastern mouth of the Kill Van Kull between Bayonne, NJ, and Staten Island, NY. The navigational and auxiliary surge gate structures at these locations are estimated to have a total length of 4,080 ft (1,44 m), with an associated 10,055 ft (3,065 m) of SBMs comprising floodwalls and operable flood gates to tie-in to high ground.

The north land location is on Constable Hook in Bayonne at the International Matex Tank Terminal (IMMT). Floodwalls are proposed along the river to the southeast corner of Bayonne Golf Club. The south land location is in the North Shore Waterfront Esplanade Park, a NYS Parks unit, in the St. George neighborhood of Staten Island. A floodwall is proposed in the park.

**Gate APE in Bayonne, New Jersey.** One S/NRHP-listed archaeological grid and one S/NRHP-eligible archaeological grid are partially in the APE.

There are no known historic properties in the Bayonne section of the APE.

**Gate APE on Staten Island.** This measure is in a NYSM area.

The S/NRHP-eligible St. Peter's R.C. Church complex at 53 St Marks Pl is partially in the APE. The St. George/New Brighton Historic District is a NYC Landmark. Only a few Individual properties within this NYC Landmark Historic District are S/NRHP eligible, most of the properties have not been evaluated by NYS OPRHP. One residence (272 Richmond Terrace) in the historic district is S/NRHP eligible.

**New York City: Jamaica Bay barrier and associated SBMs.** The Jamaica Bay barrier and its associated SBMs are all in the Jamaica Bay study region.

The measure involves a combination of SBMs along with multiple surge gate structures in the southern part of Brooklyn to the mouth of Jamaica Bay and then to Rockaway Peninsula. The 5,505 ft (1,678 m) Jamaica Bay Gate is proposed east of Marine Parkway Bridge. On land, this feature involves approximately 118,029 ft (25,975 m) of floodwall, levees, seawalls, operable flood gates, elevated promenades, buried seawall/dunes, and tide gates to connect the surge gate structures and to tie-in to high ground at the feature terminuses. On Rockaway Peninsula this feature includes a buried seawall/dune that extends across the ocean shoreline from the proposed levee in Jacob Riis Park east to a point between Beach 33<sup>rd</sup> St and Beach 34<sup>th</sup> St. From which point, a 1,244-ft (379-m) long levee extends north to the southeast side of the Rockaway Freeway and parallels the freeway north-northeasterly to Cornaga Ave in Far Rockaway.

In Brooklyn, features proposed on Barren Island include a system of buried seawall/dune, flood walls, and levees which follow the south shore of the island, the west side of Flatbush Ave and the Belt Parkway to Gerritsen Inlet. From the inlet, the line of protection for this feature continues west through Plumb Island and Plumb Beach. A 3,615.49-ft (1102-m) long levee terminates at Lew Fidler Park at Bringham St in Sheepshead Bay, the north land location for the storm surge barrier. The south land location is on the northwest corner of Manhattan Beach at Seawall Ave. Seawalls are proposed along proposed for the east end of Manhattan Beach, along Seawall Ave and John Berry Blvd. Ave. A floodwall is proposed around the perimeter of Manhattan Beach Park. SBMs continue west along the Atlantic shoreline to the west end of Coney Island. Seawalls are proposed for the western end of Coney Island at Seagate. The line of protection for this measure continues with SBMs proposed along the northwest shoreline of Coney Island through Coney Island Creek Park and Kaiser Park to the tide gate across Coney Island Creek to West 23<sup>rd</sup> St. The north location landing for the tide gate is in Calvert Vaux Park. SBMs are proposed along the entire shoreline of park and the park's northwest boundary. From the park, SBMs are proposed along shoreline to Dyker Beach Park at to the eastern boundary of U.S. Army Garrison Fort Hamilton.

The APE includes portions of the Jamaica Bay Unit of Gateway NRA which includes two S/NRHP- listed properties, Jacob Riis Park Historic District on the Rockaway Peninsula and Floyd Bennet Field Historic District in Brooklyn. Fort Tilden is adjacent to the west boundary of Jacob Riis Park. A 1,538-ft (469-m) long levee is proposed for the western portion of Jacob Riis Park which will span from the Jamaica Bay to the Atlantic Ocean shoreline. Plumb Island Beach is also in the Gateway NRA.

**Barrier structures in Brooklyn.** Four archaeologically sensitive areas are partially in the Brooklyn direct APE. The NOAA ENC database indicates there are nine shipwrecks in the APE.

Historic properties in the direct Brooklyn APE include: S/NRHP-listed Coney Island Fire Station Pumping Station at 2301 Neptune Ave in Coney Island; Floyd Bennet Field, State Register listed only, in the Gateway NRA on Barren Island; S/NRHP-eligible Coney Island Historic District: S/NRHP individually eligible properties: residence at 921 Oriental Blvd in Manhattan Beach, Saint Margaret Mary Roman Catholic Church at 4256 Ocean Ave in Manhattan Beach, Building at 4200 Atlantic Ave in Seagate, U. S. Coast Guard Coney Island Light at 4750 Beach 47<sup>th</sup> St in Seagate, and Mark Twain IS 239 for the Gifted and Talented at 2401 Neptune Ave in Coney Island.

Coney Island (Riegelmann) Boardwalk is a NYC Scenic Landmark in the direct APE. One other LPC Scenic Landmark is adjacent to the APE, Ocean Parkway. Six LPC Individual Landmarks are in the direct APE: The Cyclone at 834 Surf Ave, Wonder Wheel at 3059 West 12<sup>th</sup> St, Parachute Jump on Riegelmann Boardwalk at West 16<sup>th</sup> St, Child's Restaurant Building at 2101 Boardwalk at West 21<sup>st</sup> St, and two Historic Street Lampposts at South Side Pedestrian Bridge (Belt Parkway Exit 4 & Exit 5).

**Barrier structures in Queens.** An archaeologically sensitive area for an unknown site type is in Jacob Riis Park (Gateway NRA) and partially in the Rockaway Direct APE.

This feature is proposed in the S/NRHP listed Jacob Riis Park Historic District. The National Register eligible St. Rose of Lima Roman Catholic Church complex at 130 Beach 34<sup>th</sup> Street is in the project APE. The S/NRHP-eligible former Neponsit Beach Hospital for Children on Rockaway Beach Blvd is adjacent to the APE.

There are no designated New York City Landmarks in the Queens APE. One locally significant landmark, Flight 587 Memorial Park, is in the APE at Beach 116<sup>th</sup> St. The memorial is part of the NYC Parks system.

**New York City: Flushing Creek Gate.** The Flushing Creek Gate is in the Long Island Sound study region. The 480-ft (146-m) long Flushing Creek storm surge barrier is proposed approximately 1,000 ft (305 m) west of the west side of the Whitestone Expressway. SBMs, floodwalls and seawalls are proposed along Flushing Creek and the east shoreline of Flushing Bay. The north section of the measure begins at the surge barrier and extends west along the creek and north along the bay to the intersection of 25<sup>th</sup> St and 120<sup>th</sup> St. From the surge barrier, the south section of the measure runs southwesterly along Marina Road through the World's Fair Marina in Flushing Meadows Corona Park, a NYC Parks unit.

One previously identified archaeological site without an S/NRHP eligibility evaluation is in the direct APE. The boundaries of three archaeologically sensitive areas are partially in the direct APE.

The S/NRHP-eligible World's Fair Marina Pavilions, or the 'Candela' structures, on the Flushing Bay Promenade are in the APE. The World's Fair Marina area is partially in the APE. This resource was recently determined to be not individually eligible or eligible as a discontinuous element of the S/NRHP-eligible Flushing Meadows Corona Park Historic District, which is to the south of the measure.

### **ALTERNATIVE 3B: SHORELINE-BASED MEASURES**

**New Jersey: Hudson River Shoreline Based Measures.** The SBMs along the Hudson in New Jersey are in the Lower Hudson / East River and Upper Bay / Arthur Kill study regions. The measure includes a system of SBMs measuring 142,111 ft (43,315 m) in length along the Hudson River shoreline in New Jersey, primarily in Jersey City. The southern terminus begins at a point on Bayview Ave, east of Garfield Ave, and extends southeasterly through Liberty State Park. The park is opposite both Liberty Island and Ellis Island. This feature then turns northward around the park's edge following Freedom Way, Thomas McGovern Dr, and Phillip St to the Morris Basin Canal. The measure continues east to the mouth of the canal where it turns north at the Colgate Clock and runs along the west shoreline of the Hudson River to 18<sup>th</sup> St near the New Jersey Transit Hoboken Yard. It continues west to a point just north Hoboken Ave near Monmouth St.



There are four S/NRHP-eligible archaeological grids are partially in the APE. The APE extends through portions of six identified archaeological grids.

The west land location of the Holland Tunnel, a National Historic Landmark, is in the APE (also S/NRHP listed). Two S/NRHP-eligible listed historic districts are partially in the APE, Morris Canal Historic District (Morris Canal Tidewater Basin) and Paulus Hook Historic District. One individual National Register listed is in the APE, the Central Railroad of New Jersey Terminal (CRRNJ Terminal Museum) on Johnston Ave. Several S/NRHP-eligible historic districts and individual historic properties are partially in the APE. Historic districts include Morris Canal Historic District Boundary Increase (Sugar House), Hudson and Manhattan Railroad Transit System Historic District (PATH Railroad), Hoboken Historic District, Old Main Delaware, Lackawanna and Western Railroad Historic District, and Hoboken Freight Terminal Rail Yard Historic District (includes Long Slip).

Individually S/NRHP-eligible properties include Black Tom Site Morris on Pesin Dr. in Liberty State Park, Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, Early Jersey City Brick Sewers at multiple locations, Erie Lackawanna Railroad and Ferry Yard Hoisting Engine House and Steam Engines, Lackawanna Warehouse and Viaduct 16th St between Jersey Ave and Grove St, Grove St Bridge, Holbrook Manufacturing Company at 319 Coles St, Old and New Bergen Tunnels NJ Transit Morristown Line at Milepost 1.46, and Belvedere Court at 364-270 Palisade Ave.

One identified historic property is in the APE, Harborside Terminal Morgan St on the Hudson River.

**New Jersey: Kill Van Kull Tie-In SBM on the shoreline along Upper Bay.** The Kill Van Kull Tie-In SBM is in the Upper Bay / Arthur Kill study region. The feature consists of a deployable flood barrier and a large floodwall along the Hudson River in the City of Bayonne. It extends east along the north side of E 32<sup>nd</sup> St from the west side of the NJ Transit Hudson Bergen Light Rail to the northwest corner of Bayonne Golf Club at the Hudson River Waterfront Walkway. The golf club was built on landfill on the former Bayonne dump site.

One previously identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

**New York City: East Harlem Shoreline SBMs.** The SBMs along the East Harlem shoreline are all in the Lower Hudson / East River study region. This measure involves 17,153 ft (5,228 m) of SBMs along the west shoreline of the East River and Harlem River. The south end of this measure begins at the north end of Carl Schurz Park, a NYC Parks unit, in the Yorkville neighborhood of Manhattan. The APE extends north along the East River Esplanade (a NYC Parks unit), which forms the edge of Manhattan as it meets the East River. Sections of the esplanade feature various designs and resources. From the Ferry Dock at East 90th St, the APE follows Bobby Wagner Walk along the East River and continues north along the Harlem River in the East Harlem neighborhood. At the Harlem River Lift Bridge, the APE extends through Harlem River Drive Greenway to 145<sup>th</sup> St. The measure continues north through Harlem River Park Bikeway, a NYC Parks Unit. Near West 150<sup>th</sup> St a flood wall is proposed to cross under Harlem River Drive and continue north on the west side of the thoroughfare. It runs along the eastern edge of two NYC Parks playgrounds Frederick Johnson Playground Percy E. Sutton Playground and then crosses

under Harlem River Drive from the east edge of Brigadier General Charles Playground at 153<sup>rd</sup> St. The measure continues north along the river and cross under Harlem Drive where it terminates at point at the south end of Highbridge Park, opposite West 164<sup>th</sup> and West 165<sup>th</sup> streets in Washington Heights. The measure passes under eight bridges, Hart Island Bridge, Robert F. Kennedy Bridge, Willis Ave Bridge (PATH), Third Ave Bridge, Park Ave Bridge, Madison Ave Bridge, 145<sup>th</sup> St Bridge, and Macombs Dam Bridge.

Two S/NRHP listed archaeological sites are partially in or adjacent to the APE. The NOAA ENC database indicates two shipwrecks are in the APE.

Three S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: Archibald Gracie Mansion in Carl Schurz Park (East End Ave at East 88<sup>th</sup> St), Municipal Asphalt Plant at East 91<sup>st</sup> St, and 369<sup>th</sup> Regiment Armory (2367 5<sup>th</sup> Ave). The S/NRHP listed East Harlem Historic District is partially in the APE. This district is not a LPC Landmark, but it contains two NYC Individual Landmarks that are adjacent and partially in the APE: Thomas Jefferson Play Center (First Ave between East 111<sup>th</sup> and East 114<sup>th</sup> streets) and Benjamin Franklin High School (now the Manhattan Center for Science and Mathematics, 260 Pleasant Ave).

Nine S/NRHP eligible resources are partially in or adjacent to the APE: Wards Island Pedestrian Bridge at 103<sup>rd</sup> St; East River Houses (NYCHA complex) at 416 East 105<sup>th</sup> St; 107<sup>th</sup> St Recreational Pier; Manhattan Grit Chamber Building (Art Deco) East 110<sup>th</sup> St; RFK Bridge-Harlem River (formerly Triborough Bridge) East 125<sup>th</sup> St; Willis Ave Bridge (First Ave); Metro-North Harlem River Lift Bridge (aka Park Avenue Railroad Bridge); Madison Avenue Bridge (at 138<sup>th</sup> St); and Riverbend Houses (1968) at 138<sup>th</sup> and 142<sup>nd</sup> streets, Harlem River Drive, and Fifth Ave.

**New York City: SBM on the Queens East River shoreline at Newton Creek.** The Newton Creek SBM is in the Lower Hudson / East River study region. This measure consists of a system of large floodwalls, a seawall, and a large levee in Long Island City, Queens. The south end begins in Gantry Plaza State Park opposite 49<sup>th</sup> St Ave. It extends north through the park to the 11<sup>th</sup> St Basin wraps around the basin and continues north along the river to 43<sup>rd</sup> Ave.

There are no known archaeological sites in the APE. Overlapping archaeologically sensitive areas are partially in the APE.

The LPC landmark Pepsi Cola Sign in Gantry Plaza State Park is in the APE. The sign and park have not been evaluated for S/NRHP eligibility.

**New York City: SBM (Gowanus Canal Barrier Tie-in) in Brooklyn along the East River.** The Gowanus Canal Barrier Tie-in is in the Upper Bay / Arthur Kill study region. The measure consists of a system of large floodwalls, seawalls, and deployable flood barrier-vehicle gates in the Red Hook neighborhood of Brooklyn. The south end begins on the west side of the warehouse pier at 499 Van Brunt St. It continues northwesterly along Conover St and wraps around to Pier 44 Waterfront Garden, a NYC Parks unit. From the park, SBMs are proposed inland to the north along Ferris St to the Atlantic Basin. It continues northeasterly along Bowne, Imlay, and Van Brunt streets. At the intersection of Van Brunt and Union streets, a flood wall extends southeast along Union St to Columbia St.

There are no known archaeological sites in or adjacent to the APE.

One S/NRHP-listed resource is in the APE, Lehigh Valley Railroad Barge 79 (290 Conover St). Seven individual S/NRHP-eligible resources are partially in the APE, Beard Store and Warehouse Pier (21 connected brick warehouses, 421-573 Beard St) and Red Hook Stores (480-500 Van Brunt St), Pier 41 (175 Van Dyke St), German-American Mutual Warehousing and Security Company warehouse (106 Ferris St), Wittemann Brothers Bottlers Supplies & Machinery Co. (49 Ferris St), 151 Sullivan St, 153 Sullivan St, 155 Sullivan St.

**New York City: SBM at Gowanus Canal Basin.** The Gowanus Canal SBM is in the Upper Bay / Arthur Kill study region. It consists of a system of large floodwalls, medium levees, deployable flood barrier-vehicle gates, and a seawall in Red Hook neighborhood of Brooklyn. The west end begins at Erie Basin at the south end of warehouse pier at 499 Van Brunt St and extends northeasterly to Beard St. It continues easterly on Beard and Halleck streets and crosses Red Hook Park. At Henry Basin, a floodwall is proposed along the east side of the basin to Bryant St where it runs east to the Gowanus Canal. The east end terminates at on the west side of the canal at the Gowanus Expy/BQE (I-478/I-278).

There are no known archaeological sites in or adjacent to the APE.

Approximately six contributing resources of the S/NRHP-eligible Gowanus Canal Historic District are partially in the APE. Three individual S/NRHP-eligible resources are partially in the project area: Beard Store and Warehouse Pier (21 connected brick warehouses; 421-573 Beard St); Red Hook Stores (480-500 Van Brunt St); and Red Hook Grain Elevator (Columbia St).

**New York City: New York City West Side SBMs on the Manhattan shoreline along the Hudson River.** The West Side SBMs on the Manhattan shoreline are in the Lower Hudson / East River study region. The measure's APE begins in Battery Park and extends west to the river at Battery Park Esplanade. It then continues north along the west side of Manhattan through Battery Park City, Tribeca, Hudson Square (Greenwich Village), West Village, Meatpacking District, and Chelsea neighborhoods. The north end of the measure terminates at Hudson Yards (34<sup>th</sup> St). The measure is proposed on a section of Hudson River Park, which was built on the remnants of New York's industrial waterfront.

The Hudson River APE stretches across portions of several archaeologically sensitive areas. Two unevaluated historic sites are in or adjacent to the APE.

Castle Clinton National Monument is partially in the APE. Two S/NRHP listed historic districts and NYC Landmarks are partially in or adjacent to the APE: Wall Street Historic District and Gansevoort Market Historic District. Several contributing resources of the Gansevoort Market Historic District on West Street and Tenth Ave are in the APE. Two S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: City Pier A (Battery Pl) and Westbeth / former Bell Telephone Laboratories (463 West St).

Eight individual S/NRHP-listed resources are partially in or adjacent to the APE. Shearwater, sloop (North Cove Marina); Machigonne (Yankee) Ferryboat North Moore St; Holland Tunnel; LILAC (United States Lighthouse Tender, Pier 40); Pier 57; Merchants Refrigerating Company Warehouse (501 West 16<sup>th</sup> St); Frying Pan Shoals Lightship No. 115; and John J. Harvey, fireboat.

One NYC Historic District Landmark, Weehawken Street Historic District is partially in the

APE. Two individual S/NRHP eligible properties in the district are in the APE, Old Oyster House (Munson House/392 West St) and former Holland Hotel (396-397 West St). One S/NRHP-eligible individual resource and LPC Individual Landmark is partially in the APE: American Seamen's Friend Society Sailors' Home and Institute (113 Jane St). Two S/NRHP-eligible historic districts and NYC Landmarks are partially in or adjacent to the APE, Tribeca North Historic District and West Chelsea Historic District. Contributing resources in the district in the APE include the buildings at 250-253 and 254-255 West St.

Seven individual S/NRHP-eligible resources are partially in or adjacent to the APE: Brooklyn-Battery Tunnel - Vent/Blower Building; Whitehall Building (17 Battery Pl) Wagner Park (Battery Pl); PIERS 59-62 (Piersheds of Piers 60 & 61, West St); Seamen's House YMCA/Now Bayview Correctional Facility (West 20<sup>th</sup> St); Baltimore & Ohio Railroad Float Transfer Bridge (Pier 66a, West 26<sup>th</sup> Street at West ); High Line Freight Railroad (New York Central, Tenth Ave); and New York Improvements & Tunnel Extension of the Pennsylvania Railroad (beneath Hudson River).

**New York City: New York City West Side SBMs on the Manhattan shoreline along the East River.** The East River West Side SBMs are in the Lower Hudson / East River study region. The East River Section APE begins on the north side of the Brooklyn Bridge along Robert F. Wagner Sr. Place in Two Bridges neighborhood. It continues west under the Brooklyn Bridge and turns southwest along the west shoreline of the East River. The measure extends through South Street Seaport area and the Financial District neighborhood to the Staten Island Ferry Terminal where it turns inland around the edge of The Battery along State St. It connects with the New York City West Side SBM near Battery Pl and State St.

The East River Section APE is partially in three overlapping archaeologically sensitive areas. Two archaeological sites are in the South Street Historic District. One S/NRHP-eligible historic site and one unevaluated site are partially in the APE.

Castle Clinton National Monument is partially in the APE. Two S/NRHP listed and LPC Landmark historic districts, South Street Seaport Historic District and Wall Street Historic District, are partially in the APE. Contributing resources to both districts are partially in and adjacent net to the APE. These include the many maritime related resources in South Street Seaport and the US Customhouse (Bowling Green) United States Lines Building in the Wall Street Historic District.

Five S/NRHP listed individual resources are partially in or adjacent to the APE: Brooklyn Bridge; First Police Precinct Station House; Municipal Ferry Pier (a.k.a Battery Maritime Bldg. or Whitehall Ferry Terminal) 11 South Street; Joralemon Street Tunnel (IRT); James Watson House (7 State St); and Battery Park Control House (State St). Five of the six resources are LPC Individual Landmarks, excludes Joralemon Street Tunnel (IRT).

Three S/NRHP eligible resources are partially in or adjacent to the APE: Governor Alfred E. Smith Houses (along Robert F. Wagner Sr. Place); 20 Wall Street Offices (former American Sug); and Old South Ferry Station (State St). One lamppost on the corner of State and Bridge streets is a LPC Landmark (Historic Street Lamppost).

### **ALTERNATIVE 3B: INDUCED FLOODING FEATURES**

**New York City: Kips Bay IFF on the Manhattan shoreline along the East River IFF.** The Kips Bay IFF is in the Lower Hudson / East River study region. A 1,947-ft (593-m) long elevated promenade and floodwall and 3,021-ft (921-m) long seawall are proposed to extend north from East 25<sup>th</sup> St in the Kips Bay neighborhood through the Murray Hill neighborhood and terminates just north of the Queens Midtown Tunnel at the United Nations Headquarters (East 43<sup>rd</sup> St). The south end of this measure begins at the United Nations International School 24-50 FDR Dr at East 25<sup>th</sup> St and extends along the east side of the FDR Drive through Glick Park, a NYC Parks unit.

One archaeologically sensitive area is partially in the APE.

Bellevue Hospital Center is partially in the APE on the west side of FDR Dr N. The complex includes buildings that are S/NRHP eligible and inventoried buildings without S/NRHP eligibility determinations. Three individual S/NRHP-eligible resources are partially in the APE: FDR Drive; Queens-Midtown Tunnel and Ventilation Building (I-495); Queens Midtown Tunnel; and United Nations Headquarters. The entire 9.44-mile FDR Drive, beginning north of the Battery Park underpass and running along the East River to the 125<sup>th</sup> St/RFK Bridge exit.

**New York City: IFFs on the Bronx shoreline along the Harlem River.** The IFFs in the Bronx along the Harlem River are in the Lower Hudson / East River and Long Island Sound study regions. A system of floodwalls is proposed along the Bronx shoreline of the Harlem River in the Mott Haven neighborhood. The measure begins at a point on the west side of Robert E. Kennedy Bridge Toll Road (aka Triborough Bridge) south of 132<sup>nd</sup> St and continues northwesterly under the Willis Avenue, Third Avenue, and Park Avenue bridges. It continues to a point along the west side East 135<sup>th</sup> St, just south of East 138<sup>th</sup> St. Another floodwall is proposed north of the 145<sup>th</sup> St Bridge along the east side of Mill Pond Park. At the northeast corner of the park, the measure extends east and north east under the Major Deegan Expressway (US 87). It terminates near 153<sup>rd</sup> St south of Macombs Dam Park.

The southernmost feature of this measure is on Randalls and Wards Islands. A 1,724-ft long floodwall is proposed around Icahn Park in Randalls Island Park.

**Randalls and Wards Islands.** No archaeological sites were identified in the Randalls and Wards Islands APE. The entirety of Randalls and Wards Islands is in archaeologically sensitive areas.

The S/NRHP eligible Robert E. Kennedy Bridge is in the APEs for the Randalls and Wards Islands and the Bronx shoreline. The bridge has been designated an American Society of Civil Engineers (ASCE) Landmark.

**Bronx.** Two unevaluated historic sites are in the Bronx APE, Mott Haven Canal site and J.L. Mott Iron Works. The Bronx shoreline APE extends through two NYSM areas and overlapping archaeologically sensitive areas.

Six S/NRHP-eligible historic properties are in or partially in the Bronx APE: Robert E. Kennedy Bridge; Bronx Grit Chamber Building (Beaux Arts) East 132<sup>nd</sup> St (also NYC Individual Landmark); manufacturing building at 120 Bruckner Blvd; Willis Avenue Bridge; Mugler Shoring/J.L. Mott Iron Works Bldg Complex; Metro-North Harlem River Railroad Lift Bridge (aka Park Avenue Railroad Bridge); and Madison Avenue Bridge.

**New York City: IFF at Breezy Point along Queens shoreline.** The Breezy Point IFF is in the Jamaica Bay study area. It consists of 7.5 miles of measures including a deployable flood barrier, reinforced dunes, floodwalls, and levees around the Roxbury and Breezy Point neighborhoods at the west end of the Rockaway Peninsula, just east of Marine Parkway Bridge.

One archaeologically sensitive area is partially in the APE. It contains the NR-listed Fort Tilden Bulkhead site and the Life-Saving Station site, about which not enough is known to determine its NR-eligibility. The NOAA ENC database indicates there is a shipwreck in the APE.

It overlaps the NR-eligible Silver Gull Beach Club Historic District, the NR-listed Fort Tilden Historic District, four individually NR-listed properties (Battery Kessler, Battery HS-315, the telephone pit at HS324, and the HS 324 pistol range), and 14 NR-eligible properties.

### **ALTERNATIVE 3B: RESIDUAL RISK FEATURES**

**New Jersey: Passaic Mainstem RRFs.** The Passaic Mainstem RRFs are all in the Hackensack / Passaic study region.

**Clay Street Bridge RRF.** This feature consists of a 1,040-ft long (317-m) floodwall along the east side of Passaic River between Clay St Bridge and Fourth Ave Conrail Bridge (NX Bridge) in the Borough of East Newark, Hudson County.

One S/NRHP-eligible archaeological grid is partially in the APE.

The west side of the NHL Clark Thread Company Historic District along Passaic Ave is partially in the APE. Identified resources partially in or adjacent to the APE include Fourth Avenue Conrail Bridge (NX Bridge) and Erie Lackawanna (EL) Patterson Branch Railroad Historic District.

**North Arlington RRF.** This feature consists of two revetments on the west shoreline of the Passaic River, between Belleville Turnpike and Hendel Ave in North Arlington Township, Bergen County. Adjacent properties are commercial and recreational.

There are no known archeological sites or in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified individual historic property is adjacent to the APE, NJ Route 7 Bridge (SI&A 0208150).

**Passaic Upriver RRF.** This feature consists of floodwalls and a berm on the west side of Passaic River in Belleville Township, Essex County. RRFs are proposed along the east side of Main St, between Terry St to just north of Roosevelt Ave. Commercial properties are adjacent to the APE.

There are no known archeological sites in or adjacent to the APE.

The S/NRHP-eligible Passaic River Valley Historic District is in the APE. The eastern border of the district is Main Street, where the feature is proposed.

**Bridge Street Bridge RRF.** This feature consists of two revetments along the west shore of Passaic River between Bridge St and New Jersey Railroad St in Harrison Township, Hudson County.

Two S/NRHP-listed archaeological grids are partially in the APE.

Two individual S/NRHP-eligible resources are in or adjacent to the APE, New Jersey Rail Road and Transportation Company Corridor At-Grade Segment (Railroad Ave and Spur Line) and Bridge Street Bridge (SI&A #0700H03).

**New Jersey: Passaic River Tidal Basin RRFs.** The Passaic River Tidal Basin RRFs are all in the Hackensack / Passaic study region.

**Essex County Correctional Facility RRF.** This feature consists of a series of floodwalls along the City of Newark shoreline from point north of Wilson Ave at the Sunoco plant north along the industrial properties and the Essex County Correctional Facility (354 Doremus Ave) to Raymond Blvd.

Four S/NRHP-eligible archaeological grids are partially in the APE.

The S/NRHP-listed US Routes 1& 9 Truck Bridge (SI&A #0705151), over Passaic River and Doremus Ave, is partially in the APE. Two previously identified individual historic properties are partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge and 86-126 Doremus Ave.

**Route 1 Bridge RRF.** This feature consists of a 1,325-ft (404-m) floodwall on the south shoreline of the Passaic River in an industrial area of Jersey City. It extends along Broadway to the railroad corridor.

There are no known archeological sites in or adjacent to the APE.

Two S/NRHP-eligible historic districts, New Jersey Railroad Bergen Cut Historic District and Hackensack River Lift Bridges Historic District, are partially in the APE. Two individual S/NRHP-eligible resources, Wittpenn Bridge (SI&A #0909150) and Pennsylvania Railroad Harsimus Branch (Conrail/CSX) Bridge over the Hackensack River, are partially in the APE. Two previously identified individual historic properties are partially in the APE, 275 Broadway and National Biscuit Company Warehouse (133 Halleck Avenue).

**Hudson County Correctional Facility RRF.** This feature consists of three floodwalls the along the Hackensack River on the east side of Kearny Point, Hudson County. The floodwalls are proposed between Lincoln Highway (US Routes 1 and 1-9) and Stern Ave, just north of Pulaski Skyway.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150; US Routes 1 & 9 over the Passaic River and the Hackensack River) and the S/NRHP-eligible PSE&G Kearny Generating Station (at Stern Ave) are partially in the APE.

**Kearny Point RRF.** This feature consists of a 5,160-ft (1,573-m) long floodwall along the Hackensack River on the east side of Kearny Point, Hudson County. The south end is on the southeast corner of the peninsula on the east side of Eastern Rd at the south basin of the former Kearney Shipyard. It extends north to the former shipyard's north basin at Lincoln Highway (US Routes 1 and 1-9).

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Morris Canal Historic District and the S/NRHP-eligible Federal Shipbuilding and Dry Dock Company, Kearny Shipyard Historic District are partially in the APE.

**South Kearny-Passaic RRF.** This feature consists of a 2,340-ft (713-m) long floodwall along the Passaic River on the west side of Kearny Point, Hudson County. It extends north from Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge near Distribution Ave to south of Ford Ln. The surrounding properties are commercial and industrial.

There are no known archaeological sites in or adjacent to the APE.

One previously identified individual historic property is partially in the APE, Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge.

**Meadowlands Gate RRF.** This feature consists of a 5,833-ft (1,778-m) long berm along on the south shoreline of Hackensack River in Kearney Township, Hudson County.

There are no known archaeological sites or S/NRHP listed/eligible resources in or adjacent to the APE.

**Passaic River RRF.** This feature consists of a 1,258-ft (383-m) long floodwall on the east shoreline of Passaic River in Kearny Township, Hudson County. Its south end begins on the south side of Pulaski Skyway and extends north to a point west of 3rd St.

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-listed Pulaski Skyway (Structure Nos. 0704-150 & 0901-150) is partially in the APE. Three previously identified individual historic properties are partially in the APE: Lloyd A. Fry Roofing Company (55 Jacobus Ave); Valentine & Co. (81 Jacobus Ave); and Coastal Oil Company (89 Jacobus Ave).

**Dock Bridge RRF.** This feature consists of floodwalls and a revetment on the east shoreline of the Passaic River in Harrison Township, Hudson County it extends north from Dock Bridge to Burlington St.

There are no known archaeological sites in or adjacent to the APE.

Three S/NRHP-listed resources are partially in or adjacent to the APE: Dock Bridge (Amtrak Northeast Corridor Line over Passaic River); Newark Penn Station and Dock Bridge (Boundary Increase and Additional Documentation); and Pennsylvania Railroad New York to Philadelphia Historic District



**Harrison Reach: RRF.** This feature consists of floodwalls on the south shoreline of the Passaic River near Blanchard St. in the City of Newark, Essex County.

One identified archaeological grid is partially in the APE.

There are no S/NRHP-listed or-eligible historic properties in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE, Eagle-Picher Lead Company (76 Blanchard St) and Benjamin Moore & Company (122-152 Lister Ave).

**New Jersey: Hackensack/Meadowlands RBDM – Meadowlands Gate.** The Hackensack / Meadowlands RBDM is in the Hackensack / Passaic study region. This feature consists of a 5,633-ft (1,717-m) long berm along the northeast shoreline of the Hackensack River at Penhorn Creek Tributary in Jersey City.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Two previously identified individual historic properties are partially in the APE, Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection, Hudson Generating Station and Erie Lackawanna-New York and Greenwood Lake Branch right of way.

**New Jersey: Newark Bay RRFs.** The Newark Bay RRFs are in the Upper Bay / Arthur Kill study region.

**Shell / Passaic RRF.** This feature consists of an 879-ft (268-m) long floodwall along northern portion of the Shell Oil Company shoreline in the City of Newark.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District is partially in the APE (Doremus and Wilson Avenues).

**Norfolk Southern RRF.** This feature consists of a 2,808-ft (856-m) long revetment along the City of Elizabeth shoreline from Marciante Jackson Millet Park to the industrial complex at Trumball St.

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Singer Factory Historic District and one S/NRHP-eligible historic district is partially in the APE, Central Railroad of New Jersey Main Line Corridor Historic District.

**New Jersey: Raritan River Basin RRFs.** The Raritan River Basin RRFs are all in the Raritan study region.

**South River RRF.** This feature consists of a noncontiguous system of floodwalls and a revetment in the Boroughs of Somerset and Sayreville in Middlesex County. It is proposed along the west side of South River and a South River tributary. The feature is roughly bound by the river to the east, Causeway St to the south, Reid Street to the west and Main St to the north. A community park and garden along the river is within the APE. Commercial

properties are adjacent to the APE. A flood wall, berm and revetments are proposed to the south on the west side of the river at Herman St just north of the railroad.

One S/NRHP-eligible archaeological grid is partially in the APE.

Two S/NRHP-eligible historic districts are partially in the APE, Herrmann-Aukam Company Historic District (Herman St) and Raritan River Railroad Historic District.

**Whitehead RFF.** A 2,735-ft (1,824-m) berm is proposed on the southwest side of South River in the Borough of Somerset. The northwest end of the feature begins at Serviss St off Whitehead Ave. The berm parallels Deer Creek Village and turns southeasterly along Levinson Ave. It extends along the west side of the river to Brant St. Adjacent properties are primarily residential.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Rahway River Basin, Caseys Creek RFF.** The RRF at Caseys Creek is in the Upper Bay / Arthur Kill study region. The feature consists of a tide gate and berms in the southwest portion of Joseph Medwick Memorial Park in the Borough of Carteret in Middlesex County.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New Jersey: Shoreline along Arthur Kill.** The RRFs on the Shoreline along Arthur Kill are in the Upper Bay / Arthur Kill study region.

**Tremley RRF.** This feature consists of a tide gate and floodwalls on the north side of Tremley Point Rd along the west side of NJ Turnpike (I-95) in the City of Linden, Union County.

One identified archaeological grid is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Morses Creek RRF.** This feature consists of an 1,0060-ft long floodwall along the Arthur Kill shoreline at Morses Creek in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

The S/NRHP-eligible Sound Shore Railroad Historic District and a contributing resource, Morses Creek Bridge, are partially in the APE. The previously identified Elizabethport Cohesive Area is partially in and adjacent to the APE.

**Elizabeth River RRF.** This feature consists of an 1,150-ft long floodwall along the north shoreline of the Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE.

One individual S/NRHP-eligible resource is partially in the APE, South Front Street Bridge (SI&A #2004001) over Elizabeth River.

**Elizabethport RRF.** This feature consists of revetments and floodwalls along the shoreline of the peninsula between Arthur Kill and Elizabeth River at Elizabethport in the City of Elizabeth, Union County.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

The S/NRHP-eligible Staten Island Railroad Historic District and two individual S/NRHP-eligible resources are partially in the APE: South Front Street Bridge (SI&A #2004001) over Elizabeth River; South First Street Bridge (Str. #2004002) over Elizabeth River; and Staten Island Railway Lift Truss Bridge over Arthur Kill.

**New Jersey: Jersey City RRF on the shoreline along Upper Bay.** The Jersey City RRF is in the Lower Hudson / East River study region. This feature consists of a 1,488-ft (454-m) long deep bulkhead along the Upper Bay in Jersey City. The south end begins at Grand St near the Jersey City 911 Memorial. It extends north along the shoreline to just north of Christopher Columbus Dr.

One S/NRHP-eligible archaeological grid is partially in the APE.

The S/NRHP-eligible Hudson and Manhattan Railroad Transit System [Historic District] is partially in the APE. Individually S/NRHP-eligible properties in or partially in the APE include Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, and Early Jersey City Brick Sewers (Grand, Montgomery, and Pearl streets). The previously identified Harborside Terminal (Morgan Street at Hudson River) is partially in and adjacent to the APE.

**New Jersey: RRFs on the shoreline along the Hudson River.** The Hudson River RRFs in New Jersey are in the Lower Hudson / East River study region.

**Upper Hudson RRF.** A 5,576 ft (1,700-m) deep bulkhead is proposed on the west Hudson River shoreline in North Bergen Township, Hudson County.

Three identified archaeological grids are partially in the APE. The NOAA ENC database shows there a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: RRFs on the Western Shore of Staten Island.** The RRFs on the west shore of Staten Island are in the Upper Bay / Arthur Kill study region.

**Tottenville RRF.** This feature consists of floodwalls, a deep bulkhead, and a revetment along Arthur Kill in the Tottenville Marina area of Staten Island.

There are no known archaeological sites in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows four shipwrecks in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Arthur Kill RRF.** This feature consists of a floodwall across a creek near Burke Ave in the William Davis Wildlife Refuge near Burke Ave. It is adjacent to the Travis-Chelsea neighborhood.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island RRFs at Mariners Harbor.** The Mariners Harbor RRFs are in the Upper Bay / Arthur Kill study region.

**Mariners Harbor East RRF.** A 4,107-ft (1,252-m) long deep bulkhead is proposed on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood. It extends east from north of Richmond Terr near Arlington Ave to just east of Union Ave. Adjacent properties are commercial and industrial.

One NYSM Area is partially in the APE. Overlapping archaeologically sensitive areas span the western shoreline of Staten Island. The NOAA ENC database shows a shipwreck in the APE.

One S/NRHP-listed resource is in the APE, Standard Oil Co. No. 16 (Harbor Tug) at Mariners Harbor.

**Mariners Harbor West RRF.** This feature consists of a deep bulkhead, revetments, and floodwalls on the north shoreline of Staten Island along Kill Van Kull in the Mariners Harbor neighborhood west of Bayonne Bridge. It extends east from a point north of Mariners Lane to Winant Ave. Adjacent properties are recreational; commercial and industrial.

No known archaeological sites in the APE. One NYSM area is partially in APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. The NOAA ENC database indicates there is a shipwreck in the APE.

Two individual S/NRHP-eligible resources and NYC Landmarks are partially in the APE: Standard Varnish Works Factory Office Building (2589 Richmond Terr); and a Building at 2585 Richmond Terr.

**New York City: Northern Shore of Staten Island, Bayonne Bridge RRF.** The Bayonne Bridge RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a floodwall on the east side of Bayonne Bridge near Nicholas Ave, north of Richmond Terrace.

No known archaeological sites in the APE. There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**New York City: Staten Island Bergen Point RRF.** The Bergen Point RRF is in the Upper Bay / Arthur Kill study region. The feature consists of a deep bulkhead and a revetment on the north shoreline of Staten Island along Kill Van Kull at Bergen Point. The west end begins at a point just

west of Port Richmond Ave and extends east to the northwest corner of the Port Richmond Water Pollution Control Plant property.

There are overlapping archaeologically sensitive areas across the northern shoreline of Staten Island. One NYSM area is partially in APE. The NOAA ENC database indicates there is a shipwreck in the APE.

The S/NRHP-eligible Port Richmond Commercial Historic District (along Port Richmond Ave and Richmond Terr) is partially in the APE.

**New York City: Brooklyn RRFs in Canarsie.** The Canarsie RRFs are in the Jamaica Bay study region. They include revetments and floodwalls totaling 2,670 ft (814 m) in length to be built along Fresh Creek northeast of East 108<sup>th</sup> Street.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

The measures will be at the Fresh Creek Nature Preserve.

**New York City: Queens RRFs along the Jamaica Bay and nearby shorelines.** All the Jamaica Bay shoreline RRFs are in the Jamaica Bay study region.

**Old Howard Beach RRF.** The RRFs at Old Howard beach include a floodwall, berms, and navigable gates that total 3,675 linear ft (1,120 m) along the north edge of Jamaica Bay at Charles Memorial Park and Hamilton Beach Park.

There are no known archaeological sites in or adjacent to the APE. A NYSM archaeological area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Broad Channel RRF.** The Broad Channel RRF surrounds the Broad Channel neighborhood in the center of Jamaica Bay. Its measures include a series of bulkheads, berms, and road raisings that total 24,518 linear ft (7,473 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Head of Bay RRF.** The Head of Bay RRF includes a navigable gate, floodwall, and a series of berms, at the southwest end of Head of Bay, an inlet southeast of John F. Kennedy International Airport. The measures total 2,948 linear ft (899 m).

There are no known archaeological sites in or adjacent to the APE. The easternmost berm in the feature is inside a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Inwood Marina RRF.** The Inwood Marina RRF is a deployable flood barrier with related floodwalls, a berm, and a bulkhead near the Inwood Marina south of the Inwood Country Club. The measures total 2,628 linear ft (801 M).

There are no known archaeological sites in or adjacent to the APE. The 100-m APE overlaps a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Norton Basin RRF.** The Norton Basin RRF is a 2,400-ft-(730-m)-long floodwall to be constructed along the west shore of Bayswater, straddling the Bayswater Avenue pump station.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Bayswater Park RRF.** The Bayswater Park RRF is a berm that will be located on the southwest side of Motts Basin near the northwest end of that channel. It totals 1,462 linear ft (446 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin South RRF.** The Motts Basin South RRF is a deployable flood barrier and a series of bulkheads and floodwalls at the south and southeast edges of Mott Basin. The measures total 3,771 linear ft (1,150 m).

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin North RRF.** The Motts Basin North RRF is a 662-ft-(202-m)-long floodwall along the north edge of Motts Basin.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

## **7.2 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 3B: CULTURAL RESOURCES WITHIN VISUAL IMPACT AREA (INDIRECT EFFECTS)**

Measures proposed for Alternative 3B will involve the construction of structures that have a potential to indirectly affect historic properties, most prominently by altering the visible environment (i.e., setting) of those resources. For this study, the visual impact study area (Indirect APE) includes those places within one mile (1.6 km) of proposed facilities for the alternative that are in the potential viewshed (based on topography). The total area within one mile of Alternative 3B is 189.4 sq miles (490.5 sq km), within which project measures are

potentially visible from 130.2 sq miles (337.2 sq km). This Visual Impact Area, or Zone of Visual Influence (ZVI), encompasses parts of northeast New Jersey, all New York City counties, and northwest Nassau County on Long Island. As of this writing, spatial data is available only for resources in New York, so this preliminary visual impact analysis for Alternative 3B only addresses historic properties in the New York ZVI. The largest ZVI study area occurs in New York.

**Preliminary Viewshed Analysis: New York.** Of the two states where Alternative 3B measures will be constructed, the largest visual effect will be in New York. The total area within one mile of Alternative 3A structures in New York is 127.7 sq miles (330.7 sq km), 67.4 percent of the total area within a mile in both states. Within that area in New York, alternative structures will be potentially visible from 100.7 sq miles (260.8 sq km), 78.8 percent of the total area within a mile of the project in New York. According to the NYSHPO data, this area where the alternative will potentially be visible contains: 12,302 NR-listed aboveground individual properties; 51 NR-listed historic districts; 3,316 NR-eligible aboveground individual properties; 47 NR-eligible districts; and 11 cemeteries (Table 7.2).

**Table 7.2. Summary of historic properties in New York within one mile of Alternative 3B structures, and the total historic properties within that area from which project structures will potentially be visible (*after data from the NY SHPO*).**

<b>Historic property type</b>	<b>Total within one mile</b>	<b>Total in topographic viewshed within one mile</b>
NR-listed individual building	14,843	12,302
NR-listed historic district	56	51
NR-eligible individual building	4,157	3,316
NR-eligible historic district	50	47
Cemetery	20	11

**Preliminary Viewshed Analysis: New Jersey.** The total area within one mile of Alternative 3B measures in New Jersey is 61.7 sq miles (159.8 sq km), 32.6 percent of the total area within a mile in both project states. In the New Jersey area, Alternative 3B structures will potentially be visible from 29.5 sq miles (76.4 sq km), 47.8 percent of the total terrain within a mile of the project in that state. A preliminary visual impact analysis of historic properties in New Jersey is not presented in this Tier I Draft EIS because cultural resources spatial data from the state unavailable as of this writing. The New Jersey visual impact analysis is anticipated to be included in the next phase of cultural resources and environmental investigations for the NYNJHAT Study.

## **8.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 4: SINGLE BASIN STORM SURGE BARRIERS + SHORELINE-BASED MEASURES**

Project Alternative 4 has measures and features in five of the investigation study regions: Hackensack / Passaic; Lower Hudson / East River; Long Island Sound; Upper Bay / Arthur Kill; and Jamaica Bay (Figure 8.1).

Alternative 4 incorporates SBMs along with the storm surge barriers at Jamaica Bay, Newtown Creek, Gowanus Canal, Flushing Creek, and Hackensack River. These SBMs are located at the New Jersey Upper Bay and along the Hudson River shoreline from Liberty State Park to Hoboken, New York City West Side shoreline from Brooklyn Bridge to Pier 78, Long Island City shoreline, the Red Hook shoreline and the East Harlem Shoreline from Carl Schurz Park to Washington Heights. To mitigate the residual flood risk, RRFs are proposed along the shorelines of Jamaica Bay. Induced flooding is expected to occur in Newark Bay and portions of the Arthur Kill and Kill van Kull, and on the flood side of the Jamaica Bay storm surge barrier, and thus, IFFs are suggested to be placed in these regions.

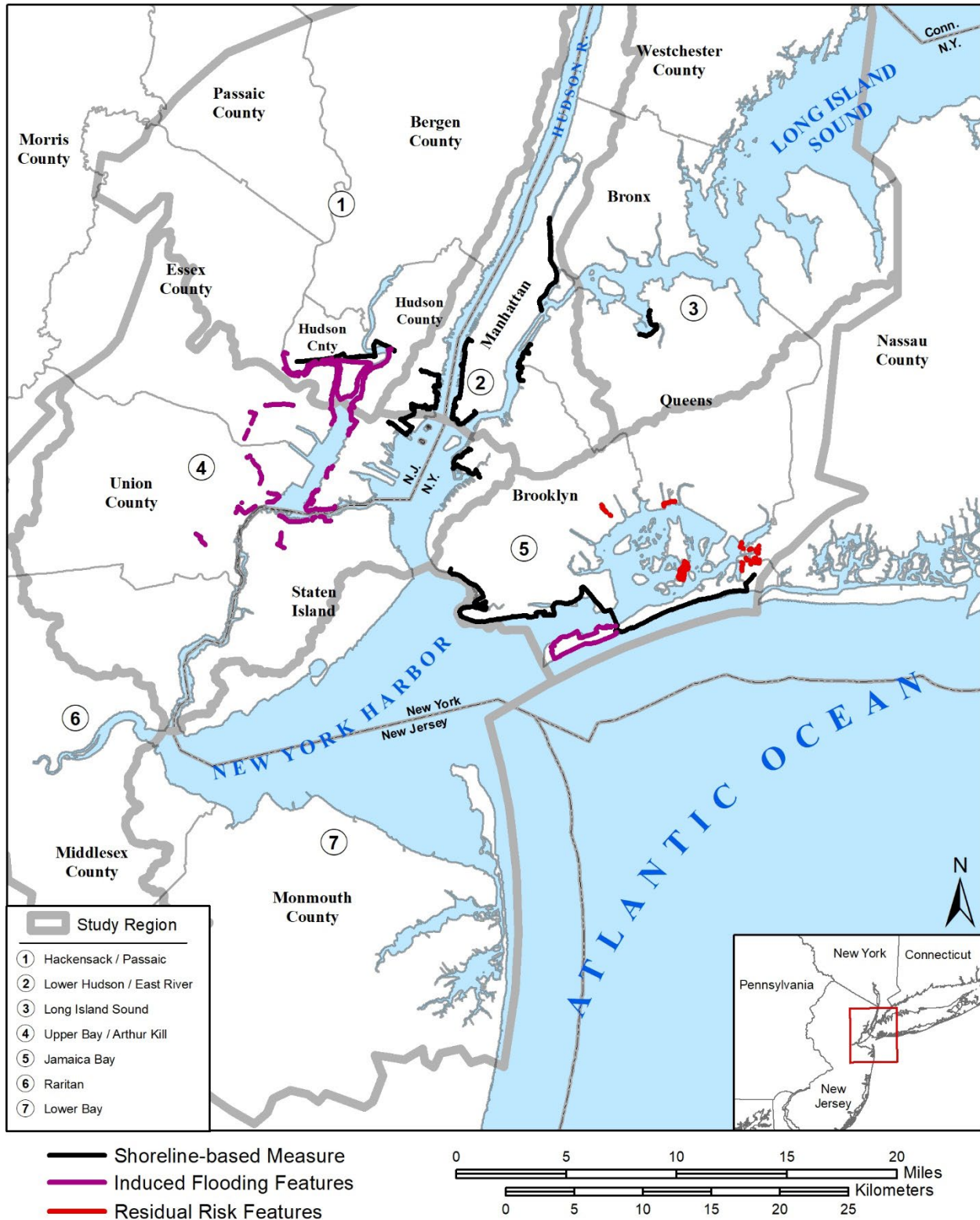
The current design for the alternative includes 106.1 linear miles (170.8 km) of measures, of which 61.8 linear miles (99.5 km) are in New York and 44.3 miles (71.3 km) are in New Jersey. Among the measures are:

- SBMs: 56.2 linear miles (90.4 km) (of which 42.5 linear miles [68.4 km] are in New York and 13.7 miles [22 km] are in New Jersey)
- IFFs: 41.4 linear miles (66.6 km) (10.8 miles [17.4 km] in New York and 30.6 miles [49.2 km] in New Jersey)
- RRFs: 8.5 linear miles (13.7 km), all of which is in New York

Alternative 4 includes storm surge barriers with potential lengths of 10,000 feet (Pelham Bay), 15,000 feet (Flushing Bay), 27,000 feet (Westchester Creek/Bronx River), 32,000 feet (Hackensack) and 125,000 feet (Jamaica Bay) respectively (including shore-based measures tying into high ground).

The area of potential effect for this alternative includes the physical footprint of each measure as well as the viewsheds of the historic properties within one mile. This alternative has the potential for adverse effects to the Holland Tunnel National Historic Landmark, Castle Clinton National Monument, the Hudson River bulkhead, and other historic properties, including archaeological sites.





**Figure 8.1. Alternative 4 SBMs and IFFs in New York and New Jersey (ESRI 2010).**

## 8.1 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 4: CULTURAL RESOURCES WITHIN THE ALTERNATIVE DIRECT APE

The Direct APE for this alternative consists of the physical footprint of individual measures and a 100 m (328 ft) buffer around each measure which consists of a total area of 12.95 sq mi (33.5 sq km). Alternative 4 has the potential for adverse effects to historic properties in and adjacent to the 100-m (328 ft) Direct APE. This section provides the results of a preliminary review of cultural resources data available in the NYS OPRHP and NJ HPO databases, as well as the NOAA ENC database and the NYC Landmarks Preservation Commission's internet-accessible geographic information system, for proposed measures in Alternative 4. To protect archaeological sites, in compliance with federal and state laws, their locations and names are not provided in this Draft Tier 1 EIS report.

The features proposed for Alternative 4 could involve the construction of structures that have a potential to affect directly historic properties and cultural resources in both terrestrial and submerged environments (Table 8.1). The proposed alternative is in an area that would be considered to have a moderate to high probability for terrestrial and submerged cultural resources to occur. At the most general level, Native American archaeological sites are most likely to be located near water; by definition, submerged resources are in water; and early non-Native American settlements clustered near water, particularly in the time before plumbing and sanitary sewer systems.

**New York.** The Direct APE in New York is approximately 7.4 sq mi (19.2 sq km). The Direct APE intersects: 15 SHPO-cataloged archaeological sites (of which four are listed in the NRHP, two are NRHP-eligible; and nine have not been investigated sufficiently to determine their NR-eligibility); 15 NYSM archaeological areas; 100 above-ground historic properties that are NR eligible (of which 90 are individual properties and 10 are historic districts); 212 NR-listed individual properties; eight NR-listed historic districts; 19 LPC landmarks (of which 17 are individual properties and 2 are districts); and a National Recreation Area (the Jamaica Bay Unit of the Gateway National Recreation Area) (see Table 8.1; Figure 8.2). The NOAA ENC database lists 14 shipwrecks in the New York portion of the Direct APE. The SHPO data does not indicate there are any cemeteries in the APE.

**New Jersey.** The Direct APE in New Jersey is approximately 5.56 sq mi (14.4 sq km). This area overlaps with: 43 NJSHPO archaeological grids (of which two contain NR-listed sites, 14 have eligible sites, and 27 have sites that have not been investigated to determine their NR-eligibility); 61 National Register-eligible aboveground properties (of which 25 are individual properties and 36 are districts); six NR-listed individual properties; 11 NR-listed historic districts; two identified cohesive areas (the Elizabethport Cohesive Area and the Kellogg Park Cohesive Area); and one National Historic Landmark (the Holland Tunnel) (see Table 8.1; Figure 8.2). The NOAA ENC database shows eight shipwrecks in the New Jersey portion of the Direct APE.

**Table 8.1. Preliminary Totals of Cultural Resources within 100 meters (328 ft) of Alternative 4 Measures (Direct APE) (after data from the NYSHPO, NYSM, NJSHPO, NPS, NOAA, and the NYC LPC).**

<b>Historic Property Type</b>	<b>Number of properties in New York Direct APE</b>	<b>Number of properties in New Jersey Direct APE</b>
National Historic Landmark	0	1
Historic District, NR-listed	8	11
Historic District, NR-eligible	10	36
Individual aboveground property, NR-listed	212	6
Individual aboveground property, NR-eligible	90	25
NYC LPC individual landmarks	17	-
NYC LPC landmark districts	2	-
Archaeological site, NR-listed*	4	2
Archaeological site, NR-eligible*	2	14
Archaeological site, undetermined eligibility*	9	27
NYSM archaeological site	0	-
NYSM archaeological area	15	-
Shipwreck	14	8
National Recreation Area	1	0
Cemeteries	0	-

\*Totals for New Jersey refer to LUCY archaeological grids, which may contain more than one archaeological site.



**Figure 8.2. Location of Units in the Gateway National Recreation Area** (*NPS Brochure Map, Gateway National Recreation Area*).

#### **ALTERNATIVE 4: GATES, BARRIERS, AND SHORELINE-BASED MEASURES**

**New York City: Jamaica Bay barrier and associated SBMs.** The Jamaica Bay barrier and its associated SBMs are all in the Jamaica Bay study region.

The measure involves a combination of SBMs along with multiple surge gate structures in the southern part of Brooklyn to the mouth of Jamaica Bay and then to Rockaway Peninsula. The 5,505 ft (1,678 m) Jamaica Bay Gate is proposed east of Marine Parkway Bridge. On land, this feature involves approximately 118,029 ft (25,975 m) of floodwall, levees, seawalls, operable flood gates, elevated promenades, buried seawall/dunes, and tide gates to connect the surge gate structures and to tie-in to high ground at the feature terminuses. On Rockaway Peninsula this feature includes a buried seawall/dune that extends across the ocean shoreline from the proposed levee in Jacob Riis Park east to a point between Beach 33<sup>rd</sup> St and Beach 34<sup>th</sup> St. From which point, a 1,244-ft (379-m) long levee extends

north to the southeast side of the Rockaway Freeway and parallels the freeway north-northeasterly to Cornaga Ave. in Far Rockaway.

In Brooklyn, features proposed on Barren Island include a system of buried seawall/dune, flood walls, and levees which follow the south shore of the island, the west side of Flatbush Ave and the Belt Parkway to Gerritsen Inlet. From the inlet, the line of protection for this feature continues west through Plumb Island and Plumb Beach. A 3,615.49-ft (1102-m) long levee terminates at Lew Fidler Park at Bringham St in Sheepshead Bay, the north land location for the storm surge barrier. The south land location is on the northwest corner of Manhattan Beach at Seawall Ave. Seawalls are proposed along proposed for the east end of Manhattan Beach, along Seawall Ave and John Berry Blvd. Ave. A floodwall is proposed around the perimeter of Manhattan Beach Park. SBMs continue west along the Atlantic shoreline to the west end of Coney Island. Seawalls are proposed for the western end of Coney Island at Seagate. The line of protection for this measure continues with SBMs proposed along the northwest shoreline of Coney Island through Coney Island Creek Park and Kaiser Park to the tide gate across Coney Island Creek to West 23<sup>rd</sup> St. The north location landing for the tide gate is in Calvert Vaux Park. SBMs are proposed along the entire shoreline of park and the park's northwest boundary. From the park, SBMs are proposed along shoreline to Dyker Beach Park at to the eastern boundary of U.S. Army Garrison Fort Hamilton.

The APE includes portions of the Jamaica Bay Unit of Gateway NRA which includes two S/NRHP- listed properties, Jacob Riis Park Historic District on the Rockaway Peninsula and Floyd Bennet Field Historic District in Brooklyn. Fort Tilden is adjacent to the west boundary of Jacob Riis Park. A 1,538-ft (469-m) long levee is proposed for the western portion of Jacob Riis Park which will span from the Jamaica Bay to the Atlantic Ocean shoreline. Plumb Island Beach is also in the Gateway NRA.

**Barrier structures in Brooklyn.** Four archaeologically sensitive areas are partially in the Brooklyn direct APE. The NOAA ENC database indicates there are nine shipwrecks in the APE.

Historic properties in the direct Brooklyn APE include: S/NRHP-listed Coney Island Fire Station Pumping Station at 2301 Neptune Ave in Coney Island; Floyd Bennet Field, State Register listed only, in the Gateway NRA on Barren Island; S/NRHP-eligible Coney Island Historic District: S/NRHP individually eligible properties: residence at 921 Oriental Blvd in Manhattan Beach, Saint Margaret Mary Roman Catholic Church at 4256 Ocean Ave in Manhattan Beach, Building at 4200 Atlantic Ave in Seagate, U. S. Coast Guard Coney Island Light at 4750 Beach 47<sup>th</sup> St in Seagate, and Mark Twain IS 239 for the Gifted and Talented at 2401 Neptune Ave in Coney Island.

Coney Island (Riegelmann) Boardwalk is a NYC Scenic Landmark in the direct APE. One other LPC Scenic Landmark is adjacent to the APE, Ocean Parkway. Six LPC Individual Landmarks are in the direct APE: The Cyclone at 834 Surf Ave, Wonder Wheel at 3059 West 12<sup>th</sup> St, Parachute Jump on Riegelmann Boardwalk at West 16<sup>th</sup> St, Child's Restaurant Building at 2101 Boardwalk at West 21<sup>st</sup> St, and two Historic Street Lampposts at South Side Pedestrian Bridge (Belt Parkway Exit 4 & Exit 5).

**Barrier structures in Queens.** An archaeologically sensitive area for an unknown site type is in Jacob Riis Park (Gateway NRA) and partially in the Rockaway Direct APE.

This feature is proposed in the S/NRHP listed Jacob Riis Park Historic District. The National Register eligible St. Rose of Lima Roman Catholic Church complex at 130 Beach 34th Street is in the project APE. The S/NRHP-eligible former Neponsit Beach Hospital for Children on Rockaway Beach Blvd is adjacent to the APE.

There are no designated New York City Landmarks in the Queens APE. One locally significant landmark, Flight 587 Memorial Park, is in the APE at Beach 116<sup>th</sup> St. The memorial is part of the NYC Parks system.

**New York City: Flushing Creek Gate.** The Flushing Creek Gate is in the Long Island Sound study region. The 480-ft (146-m) long Flushing Creek storm surge barrier is proposed approximately 1,000 ft (305 m) west of the west side of the Whitestone Expressway. SBMs, floodwalls and seawalls are proposed along Flushing Creek and the east shoreline of Flushing Bay. The north section of the measure begins at the surge barrier and extends west along the creek and north along the bay to the intersection of 25<sup>th</sup> St and 120<sup>th</sup> St. From the surge barrier, the south section of the measure runs southwesterly along Marina Road through the World's Fair Marina in Flushing Meadows Corona Park, a NYC Parks unit.

One previously identified archaeological site without an S/NRHP eligibility evaluation is in the direct APE. The boundaries of three archaeologically sensitive areas are partially in the direct APE.

The S/NRHP-eligible World's Fair Marina Pavilions, or the 'Candela' structures, on the Flushing Bay Promenade are in the APE. The World's Fair Marina area is partially in the APE. This resource was recently determined to be not individually eligible or eligible as a noncontiguous element of the S/NRHP-eligible Flushing Meadows Corona Park Historic District, which is to the south of the measure.

**New York City: SBM on the Queens East River shoreline at Newton Creek.** The Newton Creek SBM is in the Lower Hudson / East River study region. This measure consists of a system of large floodwalls, a seawall, and a large levee in Long Island City, Queens. The south end begins in Gantry Plaza State Park opposite 49<sup>th</sup> St Ave. It extends north through the park to the 11<sup>th</sup> St Basin wraps around the basin and continues north along the river to 43<sup>rd</sup> Ave.

There are no known archaeological sites in the APE. Overlapping archaeologically sensitive areas are partially in the APE.

The LPC landmark Pepsi Cola Sign in Gantry Plaza State Park is in the APE. The sign and park have not been evaluated for S/NRHP eligibility.

**New York City: SBM (Gowanus Canal Barrier Tie-in) in Brooklyn along the East River.** The Gowanus Canal Barrier Tie-in is in the Upper Bay / Arthur Kill study region. The measure consists of a system of large floodwalls, seawalls, and deployable flood barrier-vehicle gates in the Red Hook neighborhood of Brooklyn. The south end begins on the west side of the warehouse pier at 499 Van Brunt St. It continues northwesterly along Conover St and wraps around to Pier 44 Waterfront Garden, a NYC Parks unit. From the park, SBMs are proposed inland to the north along Ferris St to the Atlantic Basin. It continues northeasterly along Bowne, Imlay, and Van Brunt streets. At the intersection of Van Brunt and Union streets, a flood wall extends southeast along Union St to Columbia St.

There are no known archaeological sites in or adjacent to the APE.

One S/NRHP-listed resource is in the APE, Lehigh Valley Railroad Barge 79 (290 Conover St). Seven individual S/NRHP-eligible resources are partially in the APE, Beard Store and Warehouse Pier (21 connected brick warehouses, 421-573 Beard St) and Red Hook Stores (480-500 Van Brunt St), Pier 41 (175 Van Dyke St), German-American Mutual Warehousing and Security Company warehouse (106 Ferris St), Wittemann Brothers Bottlers Supplies & Machinery Co. (49 Ferris St), 151 Sullivan St, 153 Sullivan St, 155 Sullivan St.

**New York City: SBM at Gowanus Canal Basin.** The Gowanus Canal SBM is in the Upper Bay / Arthur Kill study region. It consists of a system of large floodwalls, medium levees, deployable flood barrier-vehicle gates, and a seawall in Red Hook neighborhood of Brooklyn. The west end begins at Erie Basin at the south end of warehouse pier at 499 Van Brunt St and extends northeasterly to Beard St. It continues easterly on Beard and Halleck streets and crosses Red Hook Park. At Henry Basin, a floodwall is proposed along the east side of the basin to Bryant St where it runs east to the Gowanus Canal. The east end terminates at on the west side of the canal at the Gowanus Expy/BQE (I-478/I-278).

There are no known archaeological sites in or adjacent to the APE.

Approximately six contributing resources of the S/NRHP-eligible Gowanus Canal Historic District are partially in the APE. Three individual S/NRHP-eligible resources are partially in the project area: Beard Store and Warehouse Pier (21 connected brick warehouses; 421-573 Beard St); Red Hook Stores (480-500 Van Brunt St); and Red Hook Grain Elevator (Columbia St).

**New York City: East Harlem Shoreline SBMs.** The SBMs along the East Harlem shoreline are all in the Lower Hudson / East River study region. This measure involves 17,153 ft (5,228 m) of SBMs along the west shoreline of the East River and Harlem River. The south end of this measure begins at the north end of Carl Schurz Park, a NYC Parks unit, in the Yorkville neighborhood of Manhattan. The APE extends north along the East River Esplanade (a NYC Parks unit), which forms the edge of Manhattan as it meets the East River. Sections of the esplanade feature various designs and resources. From the Ferry Dock at East 90th St, the APE follows Bobby Wagner Walk along the East River and continues north along the Harlem River in the East Harlem neighborhood. At the Harlem River Lift Bridge, the APE extends through Harlem River Drive Greenway to 145<sup>th</sup> St. The measure continues north through Harlem River Park Bikeway, a NYC Parks Unit. Near West 150<sup>th</sup> St a flood wall is proposed to cross under Harlem River Drive and continue north on the west side of the thoroughfare. It runs along the eastern edge of two NYC Parks playgrounds Frederick Johnson Playground Percy E. Sutton Playground and then crosses under Harlem River Drive from the east edge of Brigadier General Charles Playground at 153<sup>rd</sup> St. The measure continues north along the river and cross under Harlem Drive where it terminates at point at the south end of Highbridge Park, opposite West 164th and West 165<sup>th</sup> streets in Washington Heights. The measure passes under eight bridges, Hart Island Bridge, Robert F. Kennedy Bridge, Willis Ave Bridge (PATH), Third Ave Bridge, Park Ave Bridge, Madison Ave Bridge, 145<sup>th</sup> St Bridge, and Macombs Dam Bridge.

Two S/NRHP listed archaeological sites are partially in or adjacent to the APE. The NOAA ENC database indicates two shipwrecks are in the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

Three S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: Archibald Gracie Mansion in Carl Schurz Park (East End Ave at East

88<sup>th</sup> St), Municipal Asphalt Plant at East 91<sup>st</sup> St, and 369th Regiment Armory (2367 5<sup>th</sup> Ave). The S/NRHP listed East Harlem Historic District is partially in the APE. This district is not a LPC Landmark, but it contains two NYC Individual Landmarks that are adjacent and partially in the APE: Thomas Jefferson Play Center (First Ave between East 111<sup>th</sup> and East 114<sup>th</sup> streets) and Benjamin Franklin High School (now the Manhattan Center for Science and Mathematics, 260 Pleasant Ave).

Nine S/NRHP eligible resources are partially in or adjacent to the APE: Wards Island Pedestrian Bridge at 103<sup>rd</sup> St; East River Houses (NYCHA complex) at 416 East 105<sup>th</sup> St; 107<sup>th</sup> St Recreational Pier; Manhattan Grit Chamber Building (Art Deco) East 110<sup>th</sup> St; RFK Bridge-Harlem River (formerly Triborough Bridge) East 125<sup>th</sup> St; Willis Ave Bridge (First Ave); Metro-North Harlem River Lift Bridge (aka Park Avenue Railroad Bridge); Madison Avenue Bridge (at 138<sup>th</sup> St); and Riverbend Houses (1968) at 138<sup>th</sup> and 142<sup>nd</sup> streets, Harlem River Drive, and Fifth Ave.

**New York City: New York City West Side SBMs on the Manhattan shoreline along the Hudson River.** The West Side SBMs on the Manhattan shoreline are in the Lower Hudson / East River study region. The measure's APE begins in Battery Park and extends west to the river at Battery Park Esplanade. It then continues north along the west side of Manhattan through Battery Park City, Tribeca, Hudson Square (Greenwich Village), West Village, Meatpacking District, and Chelsea neighborhoods. The north end of the measure terminates at Hudson Yards (34<sup>th</sup> St). The measure is proposed on a section of Hudson River Park, which was built on the remnants of New York's industrial waterfront.

The Hudson River APE stretches across portions of several archaeologically sensitive areas. Two unevaluated historic sites are in or adjacent to the APE.

Castle Clinton National Monument is partially in the APE. Two S/NRHP listed historic districts and NYC Landmarks are partially in or adjacent to the APE: Wall Street Historic District and Gansevoort Market Historic District. Several contributing resources of the Gansevoort Market Historic District on West Street and Tenth Ave are in the APE. Two S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: City Pier A (Battery PI) and Westbeth / former Bell Telephone Laboratories (463 West St).

Eight individual S/NRHP-listed resources are partially in or adjacent to the APE. Shearwater, sloop (North Cove Marina); Machigonne (Yankee) Ferryboat North Moore St; Holland Tunnel; LILAC (United States Lighthouse Tender, Pier 40); Pier 57; Merchants Refrigerating Company Warehouse (501 West 16<sup>th</sup> St); Frying Pan Shoals Lightship No. 115; and John J. Harvey, fireboat.

One NYC Historic District Landmark, Weehawken Street Historic District is partially in the APE. Two individual S/NRHP eligible properties in the district are in the APE, Old Oyster House (Munson House/392 West St) and former Holland Hotel (396-397 West St). One S/NRHP-eligible individual resource and LPC Individual Landmark is partially in the APE: American Seamen's Friend Society Sailors' Home and Institute (113 Jane St). Two S/NRHP-eligible historic districts and NYC Landmarks are partially in or adjacent to the APE, Tribeca North Historic District and West Chelsea Historic District. Contributing resources in the district in the APE include the buildings at 250-253 and 254-255 West St.

Seven individual S/NRHP-eligible resources are partially in or adjacent to the APE:



Brooklyn-Battery Tunnel - Vent/Blower Building; Whitehall Building (17 Battery Pl) Wagner Park (Battery Pl); Piers 59-62 (Pier sheds of Piers 60 & 61, West St); Seamen's House YMCA/Now Bayview Correctional Facility (West 20<sup>th</sup> St); Baltimore & Ohio Railroad Float Transfer Bridge (Pier 66a, West 26<sup>th</sup> Street at West ); High Line Freight Railroad (New York Central, Tenth Ave); and New York Improvements & Tunnel Extension of the Pennsylvania Railroad (beneath Hudson River).

**New York City: New York City West Side SBMs on the Manhattan shoreline along the East River.** The East River West Side SBMs are in the Lower Hudson / East River study region. The East River Section APE begins on the north side of the Brooklyn Bridge along Robert F. Wagner Sr. Place in Two Bridges neighborhood. It continues west under the Brooklyn Bridge and turns southwest along the west shoreline of the East River. The measure extends through South Street Seaport area and the Financial District neighborhood to the Staten Island Ferry Terminal where it turns inland around the edge of The Battery along State St. It connects with the New York City West Side SBM near Battery Pl and State St.

The East River Section APE is partially in three overlapping archaeologically sensitive areas. Two archaeological sites are in the South Street Historic District. One S/NRHP-eligible historic site and one unevaluated site are partially in the APE.

Castle Clinton National Monument is partially in the APE. Two S/NRHP listed and LPC Landmark historic districts, South Street Seaport Historic District and Wall Street Historic District, are partially in the APE. Contributing resources to both districts are partially in and adjacent net to the APE. These include the many maritime related resources in South Street Seaport and the US Customhouse (Bowling Green) United States Lines Building in the Wall Street Historic District.

Five S/NRHP listed individual resources are partially in or adjacent to the APE: Brooklyn Bridge; First Police Precinct Station House; Municipal Ferry Pier (a.k.a Battery Maritime Bldg. or Whitehall Ferry Terminal) 11 South Street; Joralemon Street Tunnel (IRT); James Watson House (7 State St); and Battery Park Control House (State St). Five of the six resources are LPC Individual Landmarks, excludes Joralemon Street Tunnel (IRT).

Three S/NRHP eligible resources are partially in or adjacent to the APE: Governor Alfred E. Smith Houses (along Robert F. Wagner Sr. Place); 20 Wall Street Offices (former American Sug); and Old South Ferry Station (State St). One lamppost on the corner of State and Bridge streets is a LPC Landmark (Historic Street Lamppost).

**New Jersey: Hackensack River Barrier Tie-in.** The Hackensack River Barrier Tie-in is in the Hackensack / Passaic study region. The barrier is a surge gate system at the southern mouth of the Hackensack River which extends through sections of Jersey City and the Towns of Kearny and Harrison in Hudson County. The navigational and auxiliary surge gate structures at this location is estimated to have a total length of 1,460 feet with an associated 30,369 feet of SBMs comprising floodwalls, levees, operable flood gates and tide gates to tie-in to high ground. The east end of this feature begins at point near the northeast of the SE&G Hudson Power Station along the railroad. It continues northwesterly along the railroad right of way into the Town of Kearney and turns south just east of the Amtrak Northeast Corridor railroad line and crosses the Hackensack River. From the land location on the south side of the river, the feature continues west on the north side of New Jersey Transit Meadows yard. At the southwest corner of the USPS Dominick V Daniels Processing & Distribution Center in Kearney, the feature continues northwesterly to the north side of the Amtrak Northeast Corridor railroad line. It continues west

along the Amtrak corridor and terminates at point near the intersection of 5<sup>th</sup> Street and Essex Fwy (US 280) in the Town of Harrison. This feature spans industrial areas and is enclosed by major railroad and highway infrastructure systems.

One S/NRHP eligible archaeological grid and three identified archaeological grids are partially in the APE.

Four S/NRHP eligible historic districts are partially in or adjacent to the APE: Delaware, Lackawanna and Western Railroad Boonton Line Historic District (contributing resource DL&WBB/Erie Railroad New York and Greenwood Lake Branch Bridge); Pennsylvania Railroad New York to Philadelphia Historic District Northeast Corridor, Jersey City Waterworks Historic District; and Old Main Delaware, Lackawanna and Western Railroad Historic District.

Four individual S/NRHP eligible resources are partially in or adjacent to the APE: Substation No.41; Amtrak Northeast Corridor; Substation No.4, Amtrak Northeast Corridor Line, Milepost 7.06; New Jersey Rail Road and Transportation Company Corridor At-Grade Segment (Railroad Ave and Spur Line); and Worthington Pump and Machinery Corporation (214, 500, 608-610, 770 Supor Blvd).

Two identified individual resources are partially in or adjacent to the APE, Erie Lackawanna-New York and Greenwood Lake Branch right of way and Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection, Hudson Generating Station.

**New Jersey: Barriers and SBMs in Hackensack/Meadowlands RBDM, Hackensack River Vicinity.** These measures are in the Hackensack / Passaic and Upper Bay Arthur Kill study regions. They include a storm surge barrier, levees, and floodwalls in Jersey City. The northeast section begins on the north shoreline of the Hackensack River near the PSE&G Hudson Power Station in Jersey City. It follows the south side of the NJ Transit Rail Operations line and turns south to cross the river into Kearny Township. It then extends west along the north side of the NJ Transit Morris-Essex line under to the southwest corner of USPS Dominick V. Daniels Processing & Distribution Center where it turns north and terminates at NJ Transit Morris-Essex line.

One S/NRHP-eligible archaeological grid is partially in the APE.

Two S/NRHP-eligible historic districts are partially in the APE: Delaware, Lackawanna and Western Railroad Boonton Line Historic District [Eastern segment]; Old Main Delaware, Lackawanna and Western Railroad Historic District and Jersey City Waterworks Historic District.

One individual S/NRHP-eligible is partially in the APE, Owens-Corning Trumbull Kearny Plant. Four previously identified individual resources are partially in the APE: Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection Hudson Generating Station; Erie Lackawanna-New York and Greenwood Lake Branch right of way; Owens-Corning Trumbull Kearny Plant; Public Service Electric and Gas Company (PSE&G); and Northern Inner Ring Transmission Line [Athenia to Kearny; not eligible].

**New Jersey: Hudson River SBMs.** The New Jersey Hudson River SBMs are in the Lower Hudson / East River and Upper Bay / Arthur Kill study regions. They include a system of SBMs measuring 142,111 ft (43,315 m) in length along the Hudson River shoreline in New Jersey, primarily in Jersey City. The southern terminus begins at a point on Bayview Ave, east of Garfield

Ave, and extends southeasterly through Liberty State Park. The park is opposite both Liberty Island and Ellis Island. This feature then turns northward around the park's edge following Freedom Way, Thomas McGovern Dr, and Phillip St until the Morris Basin Canal. The measure continues east to the mouth of the canal where it turns north at the Colgate Clock and runs along the west shoreline of the Hudson River to 18<sup>th</sup> St near the New Jersey Transit Hoboken Yard. It continues west to a point just north Hoboken Ave near Monmouth St.

Four S/NRHP-eligible archaeological grids are partially in the APE. The APE extends through portions of six identified archaeological grids.

The west land location of the Holland Tunnel, a National Historic Landmark, is in the APE (also S/NRHP listed). Two S/NRHP-eligible listed historic districts are partially in the APE, Morris Canal Historic District (Morris Canal Tidewater Basin) and Paulus Hook Historic District. One individual National Register listed is in the APE, the Central Railroad of New Jersey Terminal (CRRNJ Terminal Museum) on Johnston Ave. Several S/NRHP-eligible historic districts and individual historic properties are partially in the APE. Historic districts include Morris Canal Historic District Boundary Increase (Sugar House), Hudson and Manhattan Railroad Transit System Historic District (PATH Railroad), Hoboken Historic District, Old Main Delaware, Lackawanna and Western Railroad Historic District, and Hoboken Freight Terminal Rail Yard Historic District (includes Long Slip).

Individually S/NRHP-eligible properties include Black Tom Site Morris on Pesin Dr. in Liberty State Park, Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, Early Jersey City Brick Sewers at multiple locations, Erie Lackawanna Railroad and Ferry Yard Hoisting Engine House and Steam Engines, Lackawanna Warehouse and Viaduct 16th St between Jersey Ave and Grove St, Grove St Bridge, Holbrook Manufacturing Company at 319 Coles St, Old and New Bergen Tunnels NJ Transit Morristown Line at Milepost 1.46, and Belvedere Court at 364-270 Palisade Ave.

One identified historic property is in the APE, Harborside Terminal Morgan St at Hudson River.

#### **ALTERNATIVE 4: INDUCED FLOODING FEATURES**

**New Jersey: Bergen Point IFF on the Shoreline along Kill Van Kull.** The Bergen Point IFF is in the Upper Bay / Arthur Kill study area. The feature consists of a system of IFFs along Bergen Point shoreline in Bayonne, Hudson County. It extends extend west along the Kill Van Kull shoreline from Ingham Ave to Newark Bay where it proceeds northeasterly along the shoreline to W. 4<sup>th</sup> St.

One S/NRHP-eligible archaeological and two identified archaeological grids are partially in the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

One individual S/NRHP-eligible resource is partially in the APE, Bayonne Bridge (Route 440 over Kill van Kull).

**New Jersey: IFFs on Newark Bay.** The Newark Bay IFFs are in the Hackensack / Passaic and Upper Bay / Arthur Kill study areas.

**Bergen Point IFF.** This feature consists of two discontinuous a system of IFFs along Bergen Point shoreline in Bayonne, Hudson County. The first IFF north along the Newark Bay from west of W 3<sup>rd</sup> St to W 8<sup>th</sup> St. The second IFF stretches from W 21<sup>st</sup> St to W 30<sup>th</sup> St.

Two S/NRHP-eligible archaeological grids and four identified archaeological grids are partially in the APE. The NOAA ENC database shows a shipwreck in the APE.

The locations of two individual S/NRHP-eligible submerged resources are in or partially in the APE. One S/NRHP-eligible district, the Electro Dynamic Motor Company (ELCO) Historic District, is partially in the APE. One individual S/NRHP-eligible resource is partially in the APE, Newark Bay Bridge (Central Railroad of New Jersey over Newark Bay).

**Elizabeth IFFs.** This feature consists of a system of IFFs along the City of Elizabeth shoreline from Marciante Jackson Millet Park to the industrial complex at Trumball St. It extends west along the north edge of the industrial complex to just west of 2<sup>nd</sup> St.

One identified archaeological grid is partially in the APE.

The S/NRHP-listed Singer Factory Historic District and one S/NRHP-eligible historic district, Central Railroad of New Jersey Main Line Corridor Historic District, are partially in the APE.

**Hackensack-Jersey City IFFs.** This feature consists of a system of IFFs beginning at its south end on the east side of the Hackensack River from a point on the north side of the Consolidated Rail Crop ROW in Bayonne in Hudson County, near the NJ Route 440 interchange at W. 63<sup>rd</sup> St. It extends north through residential, recreational, industrial, commercial, and transportation-related properties.

One identified archaeological grid is partially in the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

The S/NRHP-listed Morris Canal Historic District is partially in the APE. Two S/NRHP eligible historic districts are partially in the APE: Lehigh Valley Railroad Historic District and Pennsylvania Railroad New York Bay Branch Historic District.

**Elizabeth IFFs.** This measures consists of two large floodwalls and three deployable flood barrier—vehicle gates in Elizabeth near the southwest edge of Newark Liberty International Airport. A deployable flood barrier—vehicle gate is proposed across Spring St just south of Fanny St. Other features are located under the Interchange of US Route 9 Route 80 at Spring Street.

There are no known archaeological sites in or adjacent to the APE.

S/NRHP-eligible US Routes 1 & 9 Historic District along Spring St is partially in the APE. The previously identified Kellogg Park Cohesive Area is partially in the APE.

**Newark IFFs.** This feature consists of a 4,509-ft floodwall along the west shoreline of Newark Bay and other IFFs in Newark. The floodwall begins at the railroad bridge and extends north along the Shell Oil Company plant. Three other IFFs are located off Frelinghuysen Ave near Empire St at the Philipsburg -Newark (II-78) and US Route 22. One of which extends along the Northeast Corridor Line.

One S/NRHP-eligible archaeological grid is partially in the APE.

Three S/NRHP eligible historic districts are partially in the APE: Lehigh Valley Railroad Historic District; Pennsylvania Railroad New York Bay Branch Historic District, and Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District.

**New Jersey: Hackensack-Jersey City IFFs on the Passaic River Tidal Basin.** The Hackensack-Jersey City IFFs are in the Hackensack / Passaic and Upper Bay / Arthur Kill study areas. They are a system of IFFs beginning at its south end on the east side of the Hackensack River northwest of Kellogg St. They extend north through residential, recreational, industrial, commercial, and transportation-related properties. The northern end terminates at PSE&G Hudson Power Station in Jersey City.

Two identified archaeological grids are partially in the APE.

Three S/NRHP-listed historic districts are partially in the APE: Morris Canal Historic District and contributing resource Canal Lock 21 (south of Rt. 1 & 9 truck route bridge East at Hackensack River Tributary Jersey City); Pulaski Skyway (Structure Nos. 0704-150 & 0901-150) Historic District; and Old Main Delaware, Lackawanna and Western Railroad Historic District.

Four S/NRHP eligible historic districts are partially in the APE: Lincoln Park (West Side Park) Historic District (Jersey City); Hackensack River Lift Bridges Historic District; New Jersey Railroad Bergen Cut Historic District; and Jersey City Waterworks Historic District. Two S/NRHP-eligible individual resources are partially in the APE, Wittpenn Bridge (NJ Route 7 over Hackensack River) and Lower Hack Draw Bridge.

Four previously identified individual resources in or partially in the APE: Asphalt and Paving Company Office, 35 Duffield Ave, Jersey City; Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection; Hudson Generating Station; and Erie Lackawanna-New York and Greenwood Lake Branch right of way.

**New Jersey: Kearny Point IFF in the Passaic River Tidal Basin.** The Kearny Point IFF is the Hackensack / Passaic study region. This feature consists of a 31,5789 ft. long floodwall around Kearney Point peninsula in Kearny Township, Hudson County. CSX North & South Kearny railroad corridor borders the north section of the feature.

Two S/NRHP-eligible archaeological grids and one identified archaeological grid are partially in the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

The S/NRHP-listed Morris Canal Historic District is partially in the APE. Four S/NRHP-eligible historic districts are partially in the APE: Federal Shipbuilding and Dry Dock Company, Kearny Shipyard Historic District; Pennsylvania Railroad New York to Philadelphia Historic District; PSE&G Kearny Generating Station; and Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection.

Three Individual S/NRHP-listed resources are adjacent to or in the APE: US Routes 1 & 9 Truck Bridge (SI&A #0705151); Pulaski Skyway (Structure Nos. 0704-150 & 0901-150; and US Routes 1 & 9 over the Passaic River and the Hackensack River). One individual S/NRHP eligible resource is partially in the APE, Point-No-Point Bridge (Conrail U.G. Bridge No. 4.22)

over Passaic River. Several previously identified properties on Kearny Point are in or adjacent to the APE.

**New Jersey: IFFs at the Passaic River Tidal Basin in Newark.** The Passaic River Tidal Basin IFFs are in the Hackensack / Passaic study region. This feature consists of a system of IFFs along the south and west shorelines of the Passaic River in the City of Newark. The northwest end begins at City Dock St and Centre Place just north of Dock Street Bridge. From the bridge, the feature extends east to where the river bends to the south near Route I-95. It extends south to the Shell Oil Company shoreline.

Two S/NRHP listed archaeological grids, two S/NRHP eligible archaeological grids, and seven identified archaeological grids are partially in the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

Three S/NRHP-listed historic districts are partially in the APE: Morris Canal Historic District, including the contributing Morris Canal Lock 18 East and Morris Canal Lock 20 East; Pulaski Skyway Structure Nos. 0704-150 & 0901-150; and US Routes 1 & 9 over the Passaic River and the Hackensack River.

Six S/NRHP eligible historic districts are partially in the APE: Pennsylvania Railroad New York to Philadelphia Historic District–Northeast Corridor; Newark City Subway Historic District; Pennsylvania Railroad New York Bay Branch Historic District, Public Service Electric and Gas Company (PSE&G) Kearny-Essex-Marion Interconnection, Essex Generating Station; Passaic Valley Sewerage Commission Newark Bay Outfall Sewerage Works Historic District; and Lehigh Valley Railroad Oak Island Yard Historic District.

Four individual S/NRHP listed resources are partially in or adjacent to the APE: Dock Bridge (Amtrak Northeast Corridor Line over Passaic River)/ Newark Penn Station and Dock Bridge (Boundary Increase and Additional Documentation); Diamond Alkali Superfund Site (80 and 120 Lister Ave); and Pennsylvania Railroad (PRR) Bridge No. 0.13. One individual S/NRHP eligible resources is partially in or adjacent to the APE, the City of Newark Sewers-Combined Sewer Outfall 16 at Jackson St Bridge.

Seven individual identified resources are in or adjacent to the APE: 86-126 Doremus Ave; Central Railroad of NJ (Newark and New York Railroad) PD Draw Bridge; Millard E. Terrell Homes (59-97 Chapel Street), Benjamin Moore & Company (122-152 Lister Ave); and New Jersey Turnpike Bridges (Chaplain Washington and Harry Laderman Bridges).

**New Jersey: Elizabeth IFFs on the Shoreline along Arthur Kill.** The Elizabeth IFFs are in the Upper Bay / Arthur Kill study area. They include two noncontiguous IFFs. The first is a 3,993-ft long flood wall in Linden, NJ. It is located between East Edgar Rd (Route 1) and Moses Mill Rd. The west end extends along the south edge of Rosehill Cemetery and Crematory which borders residential properties fronting Woodlawn Ave. It continues southeasterly and terminates at the Linden Generating station property. The other SBMs are along the Elizabeth River, between NJ Turnpike and S. 1<sup>st</sup> St in the City of Elizabeth, Union County. It extends northwest along the south side of S. 1<sup>st</sup> St and 1<sup>st</sup> St to Franklin St.

There are no archaeological grids in or partially in the APE.

The S/NRHP-eligible Perth Amboy and Elizabethport Branch of the Central Railroad of New Jersey Historic District and two individual S/NRHP eligible resources, Elizabeth River Bridge

South and First Street Bridge (Str. #2004002), are partially in the APE. Elizabethport Cohesive Area is a previously identified area partially in the APE.

**New York City: IFF at Breezy Point along Queens shoreline.** The Breezy Point IFF is in the Jamaica Bay study area. It consists of 7.5 miles of measures including a deployable flood barrier, reinforced dunes, floodwalls, and levees around the Roxbury and Breezy Point neighborhoods at the west end of the Rockaway Peninsula, just east of Marine Parkway Bridge.

One archaeologically sensitive area is partially in the APE. It contains the NR-listed Fort Tilden Bulkhead site and the Life-Saving Station site, about which not enough is known to determine its NR-eligibility. The NOAA ENC database indicates there is a shipwreck in the APE.

It overlaps the NR-eligible Silver Gull Beach Club Historic District, the NR-listed Fort Tilden Historic District, four individually NR-listed properties (Battery Kessler, Battery HS-315, the telephone pit at HS324, and the HS 324 pistol range), and 14 NR-eligible properties.

#### **ALTERNATIVE 4: RESIDUAL RISK FEATURES**

**New York City: Brooklyn RRFs in Canarsie.** The Canarsie RRFs are in the Jamaica Bay study region. They include revetments and floodwalls totaling 2,670 ft (814 m) in length to be built along Fresh Creek northeast of East 108<sup>th</sup> Street.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

The measures will be at the Fresh Creek Nature Preserve.

**New York City: Queens RRFs along the Jamaica Bay and nearby shorelines.** All the Jamaica Bay shoreline RRFs are in the Jamaica Bay study region.

**Old Howard Beach RRF.** The RRFs at Old Howard beach include a floodwall, berms, and navigable gates that total 3,675 linear ft (1,120 m) along the north edge of Jamaica Bay at Charles Memorial Park and Hamilton Beach Park.

There are no known archaeological sites in or adjacent to the APE. A NYSM archaeological area is partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Broad Channel RRF.** The Broad Channel RRF surrounds the Broad Channel neighborhood in the center of Jamaica Bay. Its measures include a series of bulkheads, berms, and road raisings that total 24,518 linear ft (7,473 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. The RRF is inside the Gateway National Recreation Area.

**Head of Bay RRF.** The Head of Bay RRF includes a navigable gate, floodwall, and a series of berms, at the southwest end of Head of Bay, an inlet southeast of John F. Kennedy International Airport. The measures total 2,948 linear ft (899 m).

There are no known archaeological sites in or adjacent to the APE. The easternmost berm in the feature is inside a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Inwood Marina RRF.** The Inwood Marina RRF is a deployable flood barrier with related floodwalls, a berm, and a bulkhead near the Inwood Marina south of the Inwood Country Club. The measures total 2,628 linear ft (801 M).

There are no known archaeological sites in or adjacent to the APE. The 100-m APE overlaps a NYSM archaeological area.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Norton Basin RRF.** The Norton Basin RRF is a 2,400-ft-(730-m)-long floodwall to be constructed along the west shore of Bayswater, straddling the Bayswater Avenue pump station.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Bayswater Park RRF.** The Bayswater Park RRF is a berm that will be located on the southwest side of Motts Basin near the northwest end of that channel. It totals 1,462 linear ft (446 m).

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin South RRF.** The Motts Basin South RRF is a deployable flood barrier and a series of bulkheads and floodwalls at the south and southeast edges of Mott Basin. The measures total 3,771 linear ft (1,150 m).

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database shows a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.

**Motts Basin North RRF.** The Motts Basin North RRF is a 662-ft-(202-m)-long floodwall along the north edge of Motts Basin.

There are no known archaeological sites in or adjacent to the APE. The NOAA ENC database indicates there is a shipwreck in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE.



## 8.2 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 4: CULTURAL RESOURCES WITHIN VISUAL IMPACT AREA (INDIRECT EFFECTS)

Measures proposed for Alternative 4 will involve the construction of structures that have a potential to indirectly affect historic properties, most prominently by altering the visible environment (i.e., setting) of those resources. For this study, the visual impact study area (Indirect APE) includes those places within one mile (1.6 km) of proposed facilities for the alternative that are in the potential viewshed (based on topography). The total area within one mile of Alternative 4 is 181.9 sq miles (471.1 sq km), within which project measures are potentially visible from 144.7 sq miles (374.8 sq km). This Visual Impact Area, or Zone of Visual Influence (ZVI), encompasses parts of northeast New Jersey, all New York City counties, and northwest Nassau County on Long Island. As of this writing, spatial data is available only for resources in New York, so this preliminary visual impact analysis for Alternative 4 only addresses historic properties in the New York ZVI. The largest ZVI study area occurs in New York.

**Preliminary Viewshed Analysis: New York.** Of the two states where Alternative 4 measures will be constructed, the largest visual effect will be in New York. The total area within one mile of Alternative 4 structures in New York is 115.4 sq miles (298.9 sq km), 63.4 percent of the total area within a mile in both states. Within that area in New York, alternative structures will be potentially visible from 98.8 sq miles (255.9 sq km), 85.6 percent of the total area within a mile of the project in New York. According to the NYSHPO data, this area where the alternative will potentially be visible contains: 12,085 NR-listed aboveground individual properties; 51 NR-listed historic districts; 3,005 NR-eligible aboveground individual properties; 46 NR-eligible districts; and 14 cemeteries (Table 8.2).

**Table 8.2. Summary of historic properties in New York within one mile of Alternative 4 structures, and the total historic properties within that area from which project structures will potentially be visible (after data from the NY SHPO).**

Historic property type	Total within one mile	Total in topographic viewshed within one mile
NR-listed individual building	14,242	12,085
NR-listed historic district	51	51
NR-eligible individual building	3,518	3,005
NR-eligible historic district	47	46
Cemetery	19	14

**Preliminary Viewshed Analysis: New Jersey.** The total area within one mile of Alternative 4 measures in New Jersey is 66.5 sq miles (172.2 sq km), 36.6 percent of the total area within a mile in both project states. In the New Jersey area, Alternative 4 structures will potentially be visible from 45.95 sq miles (119 sq km), 69.1 percent of the total terrain within a mile of the project in that state. A preliminary visual impact analysis of historic properties in New Jersey is not presented in this Tier I Draft EIS because cultural resources spatial data from the state unavailable as of this writing. The New Jersey visual impact analysis is anticipated to be included in the next phase of cultural resources and environmental investigations for the NYNJHAT Study.

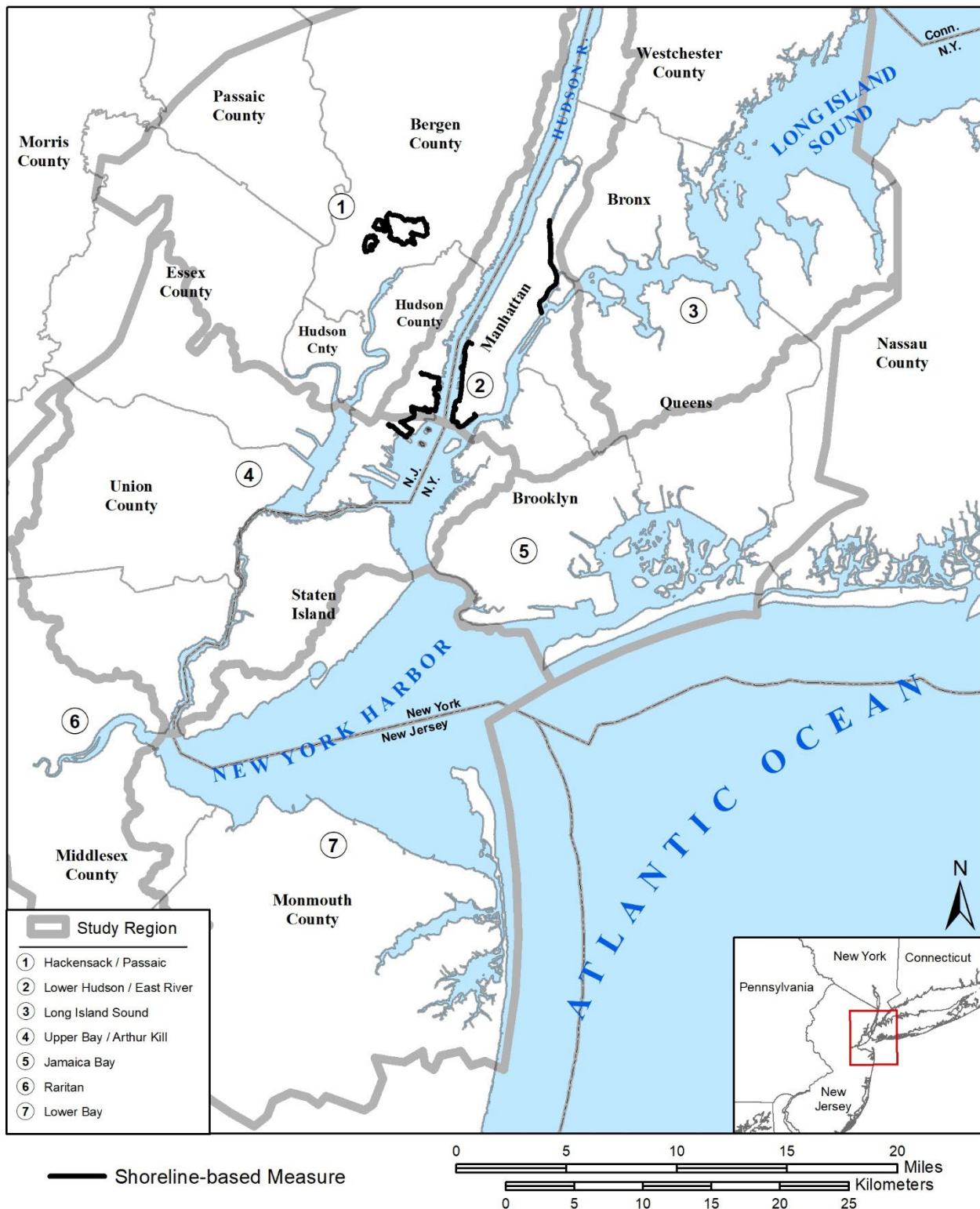
## **9.0 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 5: SHORELINE-BASED MEASURES (SBMs) ONLY**

Alternative 5 has shoreline-based measures and features in three of the investigation study regions: Hackensack / Passaic; Lower Hudson / East River; and Upper Bay / Arthur Kill (Figure 9.1). It embodies a perimeter risk reduction concept which excludes storm surge barriers that traverse waterways or waterbodies. SBMs would be implemented at the New Jersey Upper Bay and Hudson River shoreline, New York City West Side shoreline, East Harlem shoreline, and the Hackensack Perimeter Lower, Middle and Upper Areas. Due to the absence of storm surge barriers, IFFs and RRFs are not part of this alternative.

Preliminary dimensions for the alternative total 31.1 linear miles (50.1 km), of which 10.7 miles (17.2 km) is in New York and 20.4 miles (32.8 km) is in New Jersey.

Alternative 5 includes 14 features. Eight features are proposed in the lower Hudson River estuary, the Hackensack Meadowlands, and along the East and Harlem Rivers. They cover the following shorelines: three features are perimeter shoreline-based measures in the Hackensack Meadowlands, New Jersey shoreline along the Hudson River (primarily located in Jersey City, lower West Side of Manhattan, East Harlem in Manhattan along the East and Harlem Rivers, and Long Island City and Astoria in Queens. Respectively, they involve approximately 39,714 ft (12,105 m), 9,719 ft (2,962 m), 11,525 ft (3,513 m), 46,590 ft (14,201 m), 32,282 ft (9,840 m), 24,881 ft (7,584 m), 17,153 ft (5,228 m), and 21,205 ft (6,463 m) of SBMs. These include floodwalls, levees, seawalls, operable flood gates, and elevated promenades.

The area of potential effect for this alternative includes the physical footprint of each measure as well as the viewsheds of the historic properties within one mile.



**Figure 9.1. Alternative 5 SBMs in New York and New Jersey (ESRI 2010).**

## **9.1 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 5: CULTURAL RESOURCES WITHIN THE ALTERNATIVE DIRECT APE**

The Direct APE for this alternative consists of the physical footprint of individual measures and a 100 m (328 ft) buffer around each measure which consists of a total area of 3.69 sq mi (9.6 sq km). Alternative 5 has the potential for adverse effects to historic properties in and adjacent to the 100-m (328 ft) Direct APE. This section provides the results of a preliminary review of cultural resources data available in the NYS OPRHP and NJ HPO databases, as well as the NOAA ENC database and the NYC Landmarks Preservation Commission's internet-accessible geographic information system, for proposed measures in Alternative 5. To protect archaeological sites, in compliance with federal and state laws, their locations and names are not provided in this Draft Tier 1 EIS report.

The features proposed for Alternative 5 could involve the construction of structures that have a potential to affect directly historic properties and cultural resources in both terrestrial and submerged environments (Table 9.1). The proposed alternative is in an area that would be considered to have a moderate to high probability for terrestrial and submerged cultural resources to occur. At the most general level, Native American archaeological sites are most likely to be located near water; by definition, submerged resources are in water; and early non-Native American settlements clustered near water, particularly in the time before plumbing and sanitary sewer systems.

**New York.** The Direct APE in New York is approximately 1.33 sq mi (3.4 sq km). This APE intersects: 10 SHPO-cataloged archaeological sites (of which three are listed in the NRHP, two are NRHP-eligible; and five have not been investigated sufficiently to determine their NR-eligibility); five NYSM archaeological areas; 27 above-ground historic properties that are NR eligible (of which 23 are individual properties and four are historic districts); 133 NR-listed individual properties; four NR-listed historic districts; and three LPC landmarks (all individual properties) (see Table 9.1). The NOAA ENC database lists two shipwrecks in the New York portion of the Direct APE. The SHPO data does not indicate there are any cemeteries in the APE.

**New Jersey.** The Direct APE in New Jersey is approximately 2.36 sq mi. This area overlaps with: 13 NJSHPO archaeological grids (of which four have eligible sites and nine have sites that have not been investigated to determine their NR-eligibility); 16 National Register-eligible aboveground properties (of which 11 are individual properties and five are districts); one NR-listed individual property; two NR-listed historic districts; and one National Historic Landmark (the Holland Tunnel) (see Table 9.1). The NOAA ENC database does not indicate there are any shipwrecks in the Direct APE.

**Table 9.1. Preliminary Totals of Cultural Resources within 100 meters (328 ft) of Alternative 5 Measures (Direct APE)** (after data from the NYSHPO, NYSM, NJSHPO, NPS, NOAA, and the NYC LPC).

Historic Property Type	Number of properties in New York Direct APE	Number of properties in New Jersey Direct APE
National Historic Landmark	0	1
Historic District, NR-listed	4	2
Historic District, NR-eligible	4	5
Individual aboveground property, NR-listed	133	1
Individual aboveground property, NR-eligible	23	11
NYC LPC individual landmarks	3	-
NYC LPC landmark districts	0	-
Archaeological site, NR-listed*	3	0
Archaeological site, NR-eligible*	2	4
Archaeological site, undetermined eligibility*	5	9
NYSM archaeological site	0	-
NYSM archaeological area	5	-
Shipwreck	2	0
National Recreation Area	0	0
Cemeteries	0	-

\*Totals for New Jersey refer to LUCY archaeological grids, which may contain more than one archaeological site.

## ALTERNATIVE 5: SHORELINE-BASED MEASURES

**New Jersey: Hackensack Perimeter Lower Area.** The Hackensack Perimeter Lower area SBMs are in the Hackensack / Passaic study region. A levee system is proposed on the west side of Berry's Creek Canal in the central portion of the Borough of East Rutherford. This feature is roughly bound by Berry's Creek Canal to the east, Madison Circle Dr to the south, rail line to the west, and Manor Rd to the northeast. It encompasses numerous commercial and manufacturing buildings

No known archaeological sites are in or adjacent to the APE.

One S/NRHP Eligible historic district, NJ Transit Bergen County Line, is partially in the APE.

**New Jersey: Hackensack Perimeter Middle Area.** The Hackensack Perimeter middle area SBMs are in the Hackensack / Passaic study region. A levee system is proposed in the west side of Berry's Creek Canal in the Borough of Carlstadt in Bergen County. This feature is roughly bound by Berry's Creek Canal to the east, Paterson Plank Rd/Route 120 to the south, NJ Transit Rail Pascack Valley Line and Norfolk Southern railroad to the west, and the northern terminus of 16<sup>th</sup> St to the north. This area consists of commercial and industrial complexes.

There are no known archaeological sites in or adjacent to the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. One previously identified historic property is in the APE, 300-310 16<sup>th</sup> St.

**New Jersey: Hackensack Perimeter Upper Area.** The Hackensack Perimeter upper area SBMs

are in the Hackensack / Passaic study region. A levee system is proposed between Berry's Creek Canal and the Hackensack River in the Boroughs of Carlstadt and Moonachie, and Township of South Hackensack in Bergen County. This feature is roughly bound by the Hackensack River to the east, Paterson Plank Rd/Route 120 to the south, Berry's Creek Canal to the west, and Moonachie Ave to the north. Teterboro Airport is to the north. The levee encompasses commercial and industrial complexes. Two mobile home parks are in the Moonachie section of the feature.

Three identified archaeological grids are partially in the APE.

No S/NRHP-listed or-eligible historic properties were identified in or adjacent to the APE. Four identified individual resource is in the APE: the Outwater Cemetery (Third Reformed Ch. Cemetery, west side of Washington Avenue between Kero and Commerce roads (Carlstadt); the Losen Slote Tide Gate; Bind Rite Services (20 Horizon Blvd HM, South Hackensack); Vanguard Associates Mobile Home Park (Moonachie); and the Rail Bridge over East Riser Ditch (Carlstadt).

**New Jersey: SBMs along the Hudson River.** The New Jersey Hudson SBMs are in the Hackensack / Passaic and Upper Bay / Arthur Kill study regions. They include a system of SBMs measuring 142,111 ft (43,315 m) in length along the Hudson River shoreline in New Jersey, primarily in Jersey City. The southern terminus begins at a point on Bayview Ave, east of Garfield Ave, and extends southeasterly through Liberty State Park. The park is opposite both Liberty Island and Ellis Island. This feature then turns northward around the park's edge following Freedom Way, Thomas McGovern Dr, and Phillip St until the Morris Basin Canal. The measure continues east to the mouth of the canal where it turns north at the Colgate Clock and runs along the west shoreline of the Hudson River to 18<sup>th</sup> St near the New Jersey Transit Hoboken Yard. It continues west to a point just north Hoboken Ave near Monmouth St.

Four S/NRHP-eligible archaeological grids are partially in the APE. The APE extends through portions of six identified archaeological grids.

The west land location of the Holland Tunnel, a National Historic Landmark, is in the APE (also S/NRHP listed). Two S/NRHP-eligible listed historic districts are partially in the APE, Morris Canal Historic District (Morris Canal Tidewater Basin) and Paulus Hook Historic District. One individual National Register listed is in the APE, the Central Railroad of New Jersey Terminal (CRRNJ Terminal Museum) on Johnston Ave. Several S/NRHP-eligible historic districts and individual historic properties are partially in the APE. Historic districts include Morris Canal Historic District Boundary Increase (Sugar House), Hudson and Manhattan Railroad Transit System Historic District (PATH Railroad), Hoboken Historic District, Old Main Delaware, Lackawanna and Western Railroad Historic District, and Hoboken Freight Terminal Rail Yard Historic District (includes Long Slip).

Individually S/NRHP-eligible properties include Black Tom Site Morris on Pesin Dr. in Liberty State Park, Commercial Trust Company Bank (15 Exchange Pl), One Exchange Place (Bank Building) at 1 Exchange Place, Early Jersey City Brick Sewers at multiple locations, Erie Lackawanna Railroad and Ferry Yard Hoisting Engine House and Steam Engines, Lackawanna Warehouse and Viaduct 16th St between Jersey Ave and Grove St, Grove St Bridge, Holbrook Manufacturing Company at 319 Coles St, Old and New Bergen Tunnels NJ Transit Morristown Line at Milepost 1.46, and Belvedere Court at 364-270 Palisade Ave.

One identified historic property is in the APE, Harborside Terminal Morgan St at Hudson River.

**New York City: East Harlem Shoreline SBMs.** The SBMs along the East Harlem shoreline are all in the Lower Hudson / East River study region. This measure involves 17,153 ft (5,228 m) of SBMs along the west shoreline of the East River and Harlem River. The south end of this measure begins at the north end of Carl Schurz Park, a NYC Parks unit, in the Yorkville neighborhood of Manhattan. The APE extends north along the East River Esplanade (a NYC Parks unit), which forms the edge of Manhattan as it meets the East River. Sections of the esplanade feature various designs and resources. From the Ferry Dock at East 90th St, the APE follows Bobby Wagner Walk along the East River and continues north along the Harlem River in the East Harlem neighborhood. At the Harlem River Lift Bridge, the APE extends through Harlem River Drive Greenway to 145<sup>th</sup> St. The measure continues north through Harlem River Park Bikeway, a NYC Parks Unit. Near West 150<sup>th</sup> St a flood wall is proposed to cross under Harlem River Drive and continue north on the west side of the thoroughfare. It runs along the eastern edge of two NYC Parks playgrounds Frederick Johnson Playground Percy E. Sutton Playground and then crosses under Harlem River Drive from the east edge of Brigadier General Charles Playground at 153<sup>rd</sup> St. The measure continues north along the river and cross under Harlem Drive where it terminates at point at the south end of Highbridge Park, opposite West 164th and West 165<sup>th</sup> streets in Washington Heights. The measure passes under eight bridges, Hart Island Bridge, Robert F. Kennedy Bridge, Willis Ave Bridge (PATH), Third Ave Bridge, Park Ave Bridge, Madison Ave Bridge, 145<sup>th</sup> St Bridge, and Macombs Dam Bridge.

Two S/NRHP listed archaeological sites are partially in or adjacent to the APE. The NOAA ENC database indicates two shipwrecks are in the APE. The NOAA ENC database indicates there are two shipwrecks in the APE.

Three S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: Archibald Gracie Mansion in Carl Schurz Park (East End Ave at East 88<sup>th</sup> St), Municipal Asphalt Plant at East 91<sup>st</sup> St, and 369th Regiment Armory (2367 5<sup>th</sup> Ave). The S/NRHP listed East Harlem Historic District is partially in the APE. This district is not a LPC Landmark, but it contains two NYC Individual Landmarks that are adjacent and partially in the APE: Thomas Jefferson Play Center (First Ave between East 111<sup>th</sup> and East 114<sup>th</sup> streets) and Benjamin Franklin High School (now the Manhattan Center for Science and Mathematics, 260 Pleasant Ave).

Nine S/NRHP eligible resources are partially in or adjacent to the APE: Wards Island Pedestrian Bridge at 103<sup>rd</sup> St; East River Houses (NYCHA complex) at 416 East 105<sup>th</sup> St; 107<sup>th</sup> St Recreational Pier; Manhattan Grit Chamber Building (Art Deco) East 110<sup>th</sup> St; RFK Bridge-Harlem River (formerly Triborough Bridge) East 125<sup>th</sup> St; Willis Ave Bridge (First Ave); Metro-North Harlem River Lift Bridge (aka Park Avenue Railroad Bridge); Madison Avenue Bridge (at 138<sup>th</sup> St); and Riverbend Houses (1968) at 138<sup>th</sup> and 142<sup>nd</sup> streets, Harlem River Drive, and Fifth Ave.

**New York City: New York City West Side SBMs on the Manhattan shoreline along the Hudson River.** The West Side SBMs on the Manhattan shoreline are in the Lower Hudson / East River study region. The measure's APE begins in Battery Park and extends west to the river at Battery Park Esplanade. It then continues north along the west side of Manhattan through Battery Park City, Tribeca, Hudson Square (Greenwich Village), West Village, Meatpacking District, and Chelsea neighborhoods. The north end of the measure terminates at Hudson Yards (34<sup>th</sup> St). The measure is proposed on a section of Hudson River Park, which was built on the remnants of New York's industrial waterfront.

The Hudson River APE stretches across portions of several archaeologically sensitive areas. Two unevaluated historic sites are in or adjacent to the APE.

Castle Clinton National Monument is partially in the APE. Two S/NRHP listed historic districts and NYC Landmarks are partially in or adjacent to the APE: Wall Street Historic District and Gansevoort Market Historic District. Several contributing resources of the Gansevoort Market Historic District on West Street and Tenth Ave are in the APE. Two S/NRHP-listed individual resources and NYC Individual Landmarks are partially in or adjacent to the APE: City Pier A (Battery Pl) and Westbeth / former Bell Telephone Laboratories (463 West St).

Eight individual S/NRHP-listed resources are partially in or adjacent to the APE. Shearwater, sloop (North Cove Marina); Machigonne (Yankee) Ferryboat North Moore St; Holland Tunnel; LILAC (United States Lighthouse Tender, Pier 40); Pier 57; Merchants Refrigerating Company Warehouse (501 West 16<sup>th</sup> St); Frying Pan Shoals Lightship No. 115; and John J. Harvey, fireboat.

One NYC Historic District Landmark, Weehawken Street Historic District is partially in the APE. Two individual S/NRHP eligible properties in the district are in the APE, Old Oyster House (Munson House/392 West St) and former Holland Hotel (396-397 West St). One S/NRHP-eligible individual resource and LPC Individual Landmark is partially in the APE: American Seamen's Friend Society Sailors' Home and Institute (113 Jane St). Two S/NRHP-eligible historic districts and NYC Landmarks are partially in or adjacent to the APE, Tribeca North Historic District and West Chelsea Historic District. Contributing resources in the district in the APE include the buildings at 250-253 and 254-255 West St.

Seven individual S/NRHP-eligible resources are partially in or adjacent to the APE: Brooklyn-Battery Tunnel - Vent/Blower Building; Whitehall Building (17 Battery Pl) Wagner Park (Battery Pl); Piers 59-62 (Pier sheds of Piers 60 & 61, West St); Seamen's House YMCA/Now Bayview Correctional Facility (West 20<sup>th</sup> St); Baltimore & Ohio Railroad Float Transfer Bridge (Pier 66a, West 26<sup>th</sup> Street at West ); High Line Freight Railroad (New York Central, Tenth Ave); and New York Improvements & Tunnel Extension of the Pennsylvania Railroad (beneath Hudson River).

## **9.2 ENVIRONMENTAL CONSEQUENCES: ALTERNATIVE 5: CULTURAL RESOURCES WITHIN VISUAL IMPACT AREA (INDIRECT EFFECTS)**

Measures proposed for Alternative 5 will involve the construction of structures that have a potential to indirectly affect historic properties, most prominently by altering the visible environment (i.e., setting) of those resources. For this study, the visual impact study area (Indirect APE) includes those places within one mile (1.6 km) of proposed facilities for the alternative that are in the potential viewshed (based on topography). The total area within one mile of Alternative 5 is 49.4 sq miles (127.9 sq km), within which project measures are potentially visible from 144.7 sq miles (35.4 sq km). This Visual Impact Area, or Zone of Visual Influence (ZVI), encompasses parts of northeast New Jersey, all New York City counties, and northwest Nassau County on Long Island. As of this writing, spatial data is available only for resources in New York, so this preliminary visual impact analysis for Alternative 4 only addresses historic properties in the New York ZVI. The largest ZVI study area occurs in New York.



**Preliminary Viewshed Analysis: New York.** The visual effect of Alternative 5 measures will be roughly equivalent in New York and New Jersey. The measures will be visible across a larger area in New Jersey, but across a larger portion of the area within a mile of measures in New York. The total area within one mile of Alternative 5 structures in New York is 22.1 sq miles (57.2 sq km), 44.7 percent of the total area within a mile in both states. Within that area in New York, alternative structures will be potentially visible from 16.7 sq miles (43.3 sq km), 75.5 percent of the total area within a mile of the project in New York. According to the NYSHPO data, this area where the alternative will potentially be visible contains: 8,382 NR-listed aboveground individual properties; 33 NR-listed historic districts; 2,096 NR-eligible aboveground individual properties; 21 NR-eligible districts; and six cemeteries (Table 8.2).

**Table 9.2. Summary of historic properties in New York within one mile of Alternative 5 structures, and the total historic properties within that area from which project structures will potentially be visible (*after data from the NY SHPO*).**

<b>Historic property type</b>	<b>Total within one mile</b>	<b>Total in topographic viewshed within one mile</b>
NR-listed individual building	10,900	8,382
NR-listed historic district	34	33
NR-eligible individual building	2,523	2,096
NR-eligible historic district	21	21
Cemetery	9	6

**Preliminary Viewshed Analysis: New Jersey.** The total area within one mile of Alternative 5 measures in New Jersey is 27.3 sq miles (70.7 sq km), 53.3 percent of the total area within a mile in both project states. In the New Jersey area, Alternative 5 structures will potentially be visible from 18.7 sq miles (48.4 sq km), 68.4 percent of the total terrain within a mile of the project in that state. A preliminary visual impact analysis of historic properties in New Jersey is not presented in this Tier I Draft EIS because cultural resources spatial data from the state unavailable as of this writing. The New Jersey visual impact analysis is anticipated to be included in the next phase of cultural resources and environmental investigations for the NYNJHAT Study.

## 10. SUMMARY OF POTENTIAL EFFECTS ON CULTURAL RESOURCES

Adverse effects are anticipated for historic and cultural resources within the NYNJHAT study area. Depending on the final project features, ground disturbing activities have the potential to adversely affect the integrity of archaeological sites and installation of above-ground features has the potential to diminish the characteristics of historic structures that make them eligible for inclusion in the S/NRHP.

### 10.1 Project Direct Effects on Cultural Resources in New York.

**10.1.1 Archaeological sites.** All of the project alternatives have the potential to affect archaeological resources in New York (Table 10.1). The no-action alternative (Alternative 1) potentially will have the greatest effect on archaeological sites; there are 160 known sites in the area that would likely be flooded within the next century should the project not be built. The build alternatives will potentially affect roughly similar numbers of sites, relative to each other; of those alternatives, Alternative 3B is within 100 meters of the most sites (N = 19), and Alternative 5 is within 100 meters of the fewest (N = 10).

**Table 10.1. Total archaeological sites in alternative Direct APEs in New York.**

Alternative	Total Archaeological Sites in Direct APE*			
	NR-listed	NR-eligible	Undetermined NR eligibility	Total
Alternative 1	12	20	128	160
Alternative 2	3	3	8	14
Alternative 3A	3	3	11	17
Alternative 3B	4	4	11	19
Alternative 4	4	2	9	15
Alternative 5	3	2	5	10

\*Does not include NYSM data; many NYSM sites may also be represented in the SHPO CRIS data.

**10.1.2 Aboveground resources.** All the project alternatives have the potential to directly affect aboveground cultural resources in New York (Table 10.2). As was the case with archaeological sites, the no-action alternative (Alternative 1) potentially will have the greatest effect on aboveground resources; there are over 2,500 known aboveground resources in the area that would likely be flooded within the next century should the project not be built. The build alternatives will potentially affect roughly similar numbers of sites, relative to each other; of those alternatives, Alternative 4 is within 100 meters of the most aboveground resources (N = 340), and Alternative 5 is within 100 meters of the fewest (N = 167). Portions of the Jamaica Bay Unit of the Gateway National Recreational Area (NRA) will be affected by Alternatives 2, 3A, 3B, and 4.

**10.1.3 Submerged resources.** NY SHPO CRIS data records no submerged archaeological sites not related to shipwrecks within the Direct APE for any of the build alternatives in New York. NOAA ENC data indicates the build alternative Direct APEs overlap with the locations of between two and 43 shipwrecks in New York (Table 10.3). The Direct APE for Alternative 2 overlaps with the most shipwrecks (N = 43) and Alternative 5 overlaps with the fewest (N = 2).

**Table 10.2. Total aboveground historic properties in alternative Direct APEs in New York.**

Alternative	Total Properties in Direct APE							
	NR-listed Individual	NR-listed district	NR-eligible individual	NR-eligible district	NHL	LPC landmark	NRA	Total
Alternative 1	1,651	31	1,030	40				2,752
Alternative 2	200	5	76	9	0	8	1	299
Alternative 3A	174	6	62	10	0	7	1	260
Alternative 3B	212	8	83	11	0	21	1	336
Alternative 4	212	8	90	10	0	19	1	340
Alternative 5	133	4	23	4	0	3	0	167

**Table 10.3. Shipwrecks in the Direct APEs of project alternatives in New York.**

Alternative	Total shipwrecks (NOAA ENC database)
Alternative 2	43
Alternative 3A	23
Alternative 3B	21
Alternative 4	14
Alternative 5	2

## 10.2 Project Direct Effects on Cultural Resources in New Jersey.

**10.2.1 Archaeological sites.** All of the project alternatives have the potential to affect archaeological resources in New Jersey (Table 10.4). Assessment of the precise number of sites that will be affected by the no-build alternative is beyond the scope of this investigation. The build alternatives will potentially affect roughly similar numbers of sites; of those alternatives, Alternative 4 is within 100 meters of the most archaeological grids with identified, NR-listed, or NR-eligible sites (N = 43), and Alternative 5 is within 100 meters of the fewest (N = 13). For Alternatives 2 to 4 in New Jersey, the total number of grids that are within 100 meters of measures are roughly double the corresponding totals for alternatives in New York. This perhaps reflects differences in the amounts of post ca. AD1800 urban development that have occurred near the undertaking APEs in the respective states.

**Table 10.4. Total archaeological LUCY grids with NR-listed, NR-eligible, or identified in alternative Direct APEs in New Jersey.**

Alternative	Total LUCY grids with archaeological sites			
	NR-listed	NR-eligible	Undetermined NR eligibility	Total
Alternative 2	3	9	15	27
Alternative 3A	2	17	11	30
Alternative 3B	3	13	15	31
Alternative 4	2	14	27	43
Alternative 5	0	4	9	13

**10.1.2 Aboveground resources.** All the project alternatives have the potential to directly affect aboveground cultural resources in New Jersey (Table 10.5). The number of historic properties within the build alternative Direct APEs varies significantly: Alternative 4 will potentially affect 79 properties, while the Alternative 5 Direct APE intersects only 20 properties. Portions of the Sandy Hook Unit of the Gateway National Recreational Area (NRA) will be affected by Alternatives 2 and 3A. Parts of three National Historic Landmarks are also within the Direct APEs for the build alternatives: the Fort Hancock Sandy Hook Proving Ground Historic District National Historic Landmark is within 100 meters of Alternative 2; the Clark Thread Company Historic District is in the Direct APE for Alternatives 3A and 3B; and the Holland Tunnel is within 100 meters of Alternatives 3B, 4, and 5.

**Table 10.5. Total aboveground historic properties in alternative APEs in New Jersey.**

Alternative	Total Properties in Direct APE						
	NR-listed Individual	NR-listed district	NR-eligible individual	NR-eligible district	NHL	NRA	Total
Alternative 2	5	3	13	10	1	1	33
Alternative 3A	6	3	15	18	2	1	45
Alternative 3B	7	9	20	11	2	0	49
Alternative 4	6	11	25	36	1	0	79
Alternative 5	1	2	11	5	1	0	20

**10.2.3 Submerged resources.** The NJ LUCY data does not have a dedicated layer for submerged archaeological resources, although offshore sites may be indicated by the system's archaeological grids. In this case, some of the archaeological sites noted above could be submerged resources. NOAA ENC data indicates the build alternative Direct APEs overlap with the locations of up to eight shipwrecks in New Jersey (Table 10.6). The Direct APE for Alternative 4 overlaps with the most shipwrecks (N = 8) and Alternative 5 overlaps with the fewest (none).

**Table 10.6. Shipwrecks in the Direct APEs of project alternatives in New Jersey.**

Alternative	Total shipwrecks (NOAA ENC database)
Alternative 2	4
Alternative 3A	6
Alternative 3B	5
Alternative 4	8
Alternative 5	0

### 10.3 Project Indirect / Visual Effects on Cultural Resources in New York.

All the project alternatives have the potential to affect the setting of aboveground cultural resources in New York (Table 10.7). Based solely on topography, the areas within which alternative measures will be visible within a mile of the project vary between 75.5 and 85.6 percent of that terrain (Table 10.8). Alternative 4 would be visible from the largest proportion of its surroundings (85.6 percent), and Alternative 5 from the smallest relative area (75.5 percent). There are a large number of aboveground properties in the viewsheds of all the build alternatives:

Alternative 3B would be visible from the most historic properties (N = 15,716), while Alternative 5 would be visible from the fewest (N = 10,532). Undoubtedly, these numbers will be somewhat attenuated when vegetation and the built environment are factored into the viewshed calculations. However, they will likely remain somewhat high, given the density of historic properties in New York City.

**Table 10.7. Aboveground historic properties within project alternative viewsheds in New York.**

Alternative	Total Properties in Indirect APE				Total
	NR-listed Individual	NR-listed district	NR-eligible individual	NR-eligible district	
Alternative 2	8,193	47	2,280	48	10,568
Alternative 3A	9,016	48	2,459	51	11,574
Alternative 3B	12,302	51	3,316	47	15,716
Alternative 4	12,085	51	3,005	46	15,187
Alternative 5	8,382	33	2,096	21	10,532

**Table 10.8. Comparison of alternative viewsheds in New York.**

Alternative	Total Area within a mile of project (sq mi)	Total area within 1 mile of project where undertaking structures are visible (sq mi)	Percentage of total area within 1 mile of project where undertaking structures are visible
Alternative 2	165.9	126.5	76.2
Alternative 3A	195.1	152.3	78
Alternative 3B	127.7	100.7	78.8
Alternative 4	115.4	98.8	85.6
Alternative 5	22.1	16.7	75.5

Another (and perhaps more effective) way to express the alternatives' potential overall effects on aboveground resources is to explore the number of historic properties from which project alternatives would be visible as a ratio of the number of properties in the viewsheds to the total viewshed area: i.e., the number of properties in the viewsheds per viewshed square mile (Table 10.9). The values of the ratio vary significantly among the alternatives: Alternative 3A has the lowest ratio – it would be visible from 76 historic properties per viewshed square mile; Alternative 5 has, by far, the highest ratio – it would be visible from 630.7 historic properties per viewshed square mile.

**Table 10.9. Aboveground historic properties in New York within project alternative viewsheds, per square mile of terrain where the project is visible.**

Alternative	Total Properties in viewshed, per square mile				
	NR-listed Individual	NR-listed district	NR-eligible individual	NR-eligible district	Total
Alternative 2	64.8	0.4	18	0.4	83.5
Alternative 3A	59.2	0.3	16.1	0.3	76
Alternative 3B	122.2	0.5	32.9	0.5	156.1
Alternative 4	122.3	0.5	30.4	0.5	153.7
Alternative 5	501.9	2	125.5	1.3	630.7

#### **10.4 Project Indirect / Visual Effects on Cultural Resources in New Jersey.**

All the project alternatives have the potential to affect the setting of aboveground cultural resources in New Jersey. Based solely on topography, the areas within which alternative measures will be visible within a mile of the project vary between 47.8 and 69.1 percent of that terrain (Table 10.9). Alternative 4 would be visible from the largest proportion of its surroundings, and Alternative 3B from the smallest relative area.

**Table 10.10. Comparison of alternative viewsheds in New Jersey.**

Alternative	Total Area within a mile of project (sq mi)	Total area within 1 mile of project where undertaking structures are visible (sq mi)	Percentage of total area within 1 mile of project where undertaking structures are visible
Alternative 2	102.3	62.8	61.4
Alternative 3A	98.1	56.4	57.5
Alternative 3B	61.7	29.5	47.8
Alternative 4	66.5	46	69.1
Alternative 5	27.3	18.7	68.4

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**US Army Corps  
of Engineers®**  
New York District

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# **NEW YORK-NEW JERSEY HARBOR AND TRIBUTARIES**

**COASTAL STORM RISK MANAGEMENT PROJECT**

## **Programmatic Agreement**

**September 2022**

PROGRAMMATIC AGREEMENT  
AMONG  
THE U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT AND  
THE NEW YORK STATE HISTORIC PRESERVATION OFFICE AND  
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE AND  
THE NATIONAL PARK SERVICE  
  
REGARDING  
THE NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES  
COASTAL STORM RISK STUDY

WHEREAS, the US Army Corps of Engineers, New York District (District) is proposing to undertake measures to reduce coastal storm damages and minimize impact throughout the New York Metropolitan Area, including the most populous and densely populated city in the United States, and the six most populated cities in New Jersey. The shorelines of some of the New York New Jersey Harbor and Tributaries Coastal Storm Risk (NYNJHAT) study area are characterized by low elevation areas, developed with residential and commercial infrastructure and are subject to tidal flooding during storms. The study area covers more than 2,150 square miles and comprises parts of 25 counties in New Jersey and New York including Bergen, Passaic, Morris, Essex, Hudson, Union, Somerset, Middlesex, and Monmouth Counties in New Jersey; and Rensselaer, Albany, Columbia, Greene, Dutchess, Ulster, Putnam, Orange, Westchester, Rockland, Bronx, New York, Queens, Kings, Richmond, and Nassau Counties in New York, while the Capital District region extends from Kingston, NY upstream to the location of the Federal Lock and Dam in Troy, NY (Project); and

WHEREAS, the NYNJHAT study effort was authorized by the River and Harbor Act of 14 July 1960, and subsequently modified in accordance with Section 31 of the Water Resources Development Act of 1974 and Sections 103, 502 and 934 of the Water Resources Development Act of 1986 (P.L. 99-662), and Public Law 113-2; and

WHEREAS, in January 2015, USACE completed the North Atlantic Coast Comprehensive Study (NACCS), which identified high-risk areas on the Atlantic Coast for warranting further investigation of flood risk management solutions, and the NYNJHAT focus area was one of the three focus areas, along with the Nassau County Back Bays and the New Jersey Back Bays studies, identified to investigate coastal flood risk within the New York-New Jersey Harbor region; and

WHEREAS, the National Environmental Policy Act (NEPA) of 1969 requires federal agencies, including the District, to consider the potential environmental impacts of their proposed actions and any reasonable alternatives before undertaking a major federal action, as defined by 40 CFR 1508.18, therefore the District has drafted an integrated Feasibility Report and Environmental Impact Statement (FR/EIS) which will be conducted in two stages or tiers; Tiering, which is defined in 40 CFR 1508.28, is a means of making the environmental review process more efficient by allowing parties

to “eliminate repetitive discussions of the same issues and to focus on the actual issues suitable for decision at each level of environmental review” (40 CFR 1502.20) with Tier 1 as a broad-level review, and Tier 2 consisting of subsequent specific detailed reviews; and

WHEREAS, the draft FR/EIS presents the formal Recommended Plan (considered the Project following authorization) which consists of: integrated shoreline based measures (SBMs) along with the Arthur Kill, Kill Van Kull, Jamaica Bay, Newtown Creek, Gowanus Canal, and Flushing Creek storm surge barriers. The required SBMs include risk reduction of the New Jersey Upper Bay and Hudson River shoreline from Liberty State Park to Hoboken, New York City West Side shoreline from Brooklyn Bridge to Pier 78, East Harlem shoreline from Carl Schurz Park to Washington Heights, the Red Hook shoreline and the Long Island City-Astoria shoreline from Astoria Park to Ed Koch Queensboro Bridge. To mitigate the residual flood risk, residual risk features (RRFs) are proposed along the shorelines of the Upper Bay, the Arthur Kill region, Jamaica Bay, and the Hackensack and Passaic Rivers. Induced flooding is expected to occur in portions of the East River and Harlem River and on the flood side of the Jamaica Bay storm surge as a result of the presence of the above stated storm surge barriers, thus, induced flooding features (IFFs) are suggested to be placed in these regions. A schematic concept for the TSP and the referenced reaches is shown in Appendix A.

WHEREAS, the District has determined that the Project constitutes an undertaking, as defined in 36 C.F.R. § 800.16(y), and therefore, is subject to Section 106 of the National Historic Preservation Act of 1966 (NHPA), 54 U.S.C. § 306108; and

WHEREAS, the District is the Lead Federal Agency for compliance with Section 106 of the NHPA for this Project pursuant to 36 C.F.R. § 800.2(a)(2); and

WHEREAS, the non-federal sponsors are the New Jersey Department of Environmental Protection (NJDEP) and New York State Department of Environmental Conservation (NYSDEC), in partnership with the New York City Office of Recovery and Resiliency (NYCORR); and

WHEREAS, the Project minimizes exacerbating riverine/fluviat flooding, covered under the Flood Risk Management (FRM) mission of USACE, and includes measures to alleviate any induced flooding with measures like levees, floodwalls, and non-structural (TBD) and natural and nature-based features (TBD) which are also included in the focused array of alternatives; storm surge barriers are included as an integral part of the coastal storm risk management strategy of each alternative due to the need for the impediment of storm surge and reduction of the risk of flooding for the area behind it; and

WHEREAS, the District has determined that the undertaking’s APE includes the area of construction, non-structural measures, and indirect impacts on the viewshed during the feasibility level analysis of the Project (see depiction in **Attachment A** to this Agreement); the APE considers the following impacts: 1) construction effects, to include

demolition, vibration, and auditory effects, will be considered within a coordinated buffer of either side of proposed storm surge gates, the living shoreline, and other constructed features (e.g. pump stations and surge gates); 2) effects of non-structural measures will be considered at each location; and, due to location of the surge gates on the periphery and the nature of the city layout, potential visual impacts will be considered from the perspective of at least two different viewsheds consisting of 3) the exterior viewshed (historic properties that view a surge gate), and 4) the interior viewshed (historic properties located with a view of a surge gate); and

WHEREAS, numerous archaeological and/or architectural resource surveys have been conducted within the APE, based on background research conducted through New York's and New Jersey's online cultural resources information system (CRIS, LUCY respectively) and the National Park Service's (NPS) National Register Database, documenting the presence of approximately 476 previously identified historic properties within 100 meters of the Project, while the preliminary viewshed analysis documented approximately 19,126 previously identified historic properties within 1 mile of the Project where Project structures will potentially be visible, detailed in **Attachment B** to this Agreement; and

WHEREAS, the District has determined that the undertaking will have an adverse effect on historic properties which are listed or eligible for listing in the National Register of Historic Places (NRHP), which the agency is required to take into account pursuant to Section 106 of the NHPA; and

WHEREAS, the District has determined that the undertaking may have a direct and adverse effect on one or more National Historic Landmarks (NHLs) and the agency is required pursuant to Section 110(f) of the NHPA (54 U.S.C. § 306107) and 36 C.F.R. § 800.10 to the maximum extent possible undertake such planning and actions as may be necessary to minimize harm to any affected NHLs; and

WHEREAS, schedule and budgetary constraints, including Section 1001 of the Water Resources Reform and Development Act (WRRDA) of 2014 (Public Law 113-121) (limiting duration and cost of Corps of Engineers final feasibility reports), limit the detailed engineering design of the Project features during the feasibility phase such that the District cannot conduct all of the necessary surveys to fully identify and evaluate historic and cultural resources, fully determine adverse effects of the Project on historic properties, or fully avoid, minimize or mitigate those adverse effects, prior to completing the appropriate NEPA documentation for the feasibility phase; and

WHEREAS, because implementation of the Preconstruction, Engineering and Design (PED) phase (where detailed engineering design will occur) is contingent on either authorization by Congress or the Secretary of the Army's determination that the Project is justified, appropriation of funds by Congress, and execution of a Design Agreement (DA) between the NJDEP and NYSDEC, in partnership with NYCORR, the District may implement PED in phases to the extent that design and/or construction authority is phased and funds are appropriated, so that efforts to identify and evaluate historic properties, determine effects from Project features, identify appropriate avoidance, minimization or mitigation, and conduct related consultation may occur over a period of

multiple years as the design for each Project construction phase and/or feature is finalized; and

WHEREAS, as it is unknown during development of this Agreement if the Project will be funded to be designed and constructed during a single phase or multiple phases; therefore, within six (6) months of receiving funding at the District level to initiate PED, the District shall assign a Project cultural resources specialist to develop a detailed consultation and document delivery schedule to be appended to the Agreement in **Attachment C**; and

WHEREAS, the District recognizes its responsibilities under Section 110(f) of the NHPA (54 U.S.C. 306107), which requires the agency, through its planning and actions, minimize harm to the eight identified NHLs within the APEs (detailed in **Attachment B**) to the maximum extent possible; the District is consulting with consulting parties during the planning phase of the Project and in the development of this Programmatic Agreement (PA) to prioritize the avoidance and minimization of adverse effects to the known and previously unidentified NHLs; such avoidance and minimization measures include the design of the storm surge wall, gate placement, and other Project features that will be incorporated during the PED phase of the Project; and

WHEREAS, the District recognizes that significant historic districts and properties in and around the Hudson Harbor are an integral part of the community's life and character; and preservation of this irreplaceable heritage is in the public interest. The knowledge and identification of New York and New Jersey's historic resources, together with the goal of preserving the integrity of these resources, will improve the planning and execution of the Project. The District commits to considering the avoidance and minimization of adverse effects to historic properties in its design of the storm surge wall and other Project features; and

WHEREAS, the District has determined that as Project features are further designed during the PED phase of the Project, the APEs may be further refined, cultural resources surveys to be conducted may identify additional historic properties within the APEs, and effects on historic properties and NHLs may be further identified; and

WHEREAS, the District intends to comply with Sections 106 and 110(f) of the NHPA for the undertaking, and while it has complied to the extent practicable in an effort to avoid, minimize, or mitigate adverse effects on historic properties and minimize harm to NHLs during the feasibility phase of the Project, recognizes that there are potential effects on historic properties and NHLs which cannot be fully determined prior to approval of this complex undertaking; and

WHEREAS, the District intends to ensure compliance for all Project phases and features with Sections 106 and 110(f) of the NHPA for the undertaking through the execution and implementation of this Programmatic Agreement (PA) pursuant to 36 C.F.R. § 800.14(b)(3); and

WHEREAS, in accordance with 36 C.F.R. § 800.6(a)(1) and § 800.10(a), the District has notified the Advisory Council on Historic Preservation (ACHP) of its intention to develop this Agreement, and the ACHP **has chosen to participate/ declined to participate and will**

remain a Consulting Party, in the consultation pursuant to 36 C.F.R. § 800.6(a)(1)(iii); and

WHEREAS, the New York State Historic Preservation Office (NYSHPO), has concurred in the use of a Programmatic Agreement and in being a Signatory to this Agreement; and

WHEREAS, the New Jersey Historic Preservation Office (NJHPO), has/has not concurred in the use of a Programmatic Agreement and in being a Signatory to this Agreement; and

WHEREAS, the New Jersey Department of Environmental Protection (NJDEP) and New York State Department of Environmental Conservation (NYSDEC), in partnership with the New York City Office of Recovery and Resiliency (NYCORR) are the non-Federal sponsors for this project, and the District has invited them to sign this Agreement as an Invited Signatory and has/has not elected to participate; and

WHEREAS, pursuant to 36 C.F.R. § 800.10(c), the District has notified the Secretary of the Interior (SOI), invited the Secretary to participate, consulted with the NPS Interior Region 1 Office regarding the effects of the undertaking on historic properties and NHLs, and has invited them to sign this Agreement as an Signatory and the NPS has elected/not elected to participate; and

WHEREAS, in accordance with 36 C.F.R. § 800.6(c)(3), the District is consulting with the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation regarding the effects of the undertaking on historic properties, and has invited these Tribes to sign this Agreement as Invited Signatories, and the Delaware Nation as well as the Stockbridge Munsee have responded and elected to participate as a Concurring Party in this Agreement; and

WHEREAS, the District has consulted with the NYC Landmarks Preservation Commission (LPC) regarding the effects of the undertaking on historic properties and the District has invited them to sign this Agreement as an Invited Signatory and they have/ have not elected to participate; and

WHEREAS, the District has consulted with local, county and state historical societies regarding the effects of the undertaking on historic properties and NHLs and has invited them to each sign this Agreement as a Concurring Party and they have/ not have elected to participate each as a Concurring Party; and

WHEREAS, the District has consulted and will continue to consult with the NYSHPO, NJHPO, the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation, the NPS, and municipal and county historic societies, and other appropriate consulting parties to define and implement process for taking into consideration the effects of the Project on historic properties; and



WHEREAS, the NYSHPO, NJHPO, NPS, ACHP, in partnership with NJDEP and NYSDEC, NYCORR, Interested Tribes, the LPC, and other interested parties are hereinafter collectively referred to as Consulting Parties; and

WHEREAS, the District has, and will continue to, consult with the NJSHPO, the NYSHPO and LCP in regard to portions of the APE within their relevant areas of responsibility and jurisdiction: and

WHEREAS, in accordance with 36 C.F.R. § 800.2(d) the District is soliciting public comment on the Project through the release of the draft Feasibility Report/Environmental Assessment (EA) for a period of 106 days, and through a series of in person and virtual informational meetings with stakeholders to share information about the project and to discuss the District's ongoing efforts to evaluate the project's potential to affect cultural resources; and

WHEREAS, any measure to be constructed within NPS Land, mutual acceptability between the Department of Interior and the Department of Army is required; the Gateway National Recreation Area (GATE) enabling legislation (P.L. 92-592, 1972) states: "The authority of the Secretary of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements (including the deepening of the shipping channel from the Atlantic Ocean to the New York harbor) on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary of the Interior and the Secretary of the Army and which are consistent with both the purpose of this subchapter and the purpose of existing statutes dealing with water and related land resource development."

WHEREAS, a mutually acceptable plan between NPS and the District must meet the Project objectives, minimize impacts to NPS cultural, natural and recreational resources, and mitigate for all unavoidable impacts to NPS resources; and

NOW, THEREFORE, the District, New York SHPO, New Jersey HPO, and NPS (hereinafter collectively referred to as Signatories) agree that the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the Project on cultural resources and undertake appropriate planning and actions with regard to resources and NHLs associated with GATE.

## STIPULATIONS

### I. IDENTIFICATION AND EVALUATION

The District shall ensure that the following measures are carried out:

- A. The New York District shall carry out cultural resources surveys for Project features that are advanced past feasibility phase to identify significant cultural resources within the APE. Survey methodology shall be tailored to the unique environment of the restoration site to identify resources and will consider previous survey results and consultation comments when designing the surveys. Consultation shall be carried out with the appropriate SHPOs

depending on whether the site or site(s) are within the State of New York or New Jersey. If a survey is addressing multiple sites located within both states, both the NYSHPO and the NJSHPO shall be consulted. The NPS and the LPC shall be copied on all consultation carried out for sites within their areas of responsibility.

- B. Prior to the initiation of construction-related activities which may affect historic properties, the District, in consultation with the appropriate SHPO(s), and other interested parties as appropriate, shall identify and evaluate:

1. Archaeological Sites

- a. The District shall ensure that archaeological surveys within the uninvestigated portions of the APE are conducted in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23) and guidelines set forth by the SHPOs including the New Jersey Historic Preservation Office Requirements for Archaeological Survey Reports - Standards for Report Sufficiency (N.J.A.C. 7:4-8.5) and the New York Archaeological Council's Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State (1994, adopted by NYSHPO in 1995), the NYSHPO's 2005 Phase I Archaeological Format Requirements, and take into account the National Park Service publication The Archaeological Survey: Methods and Uses (1978) and the statewide historic contexts developed by the SHPOs.
- b. The scopes of work and survey reports shall be submitted to the appropriate SHPO(s), and other consulting parties, as appropriate, for review and comment.

2. Traditional Cultural Properties.

- a. The District shall ensure that future surveys within the uninvestigated portions of the APE include procedures to identify traditional cultural properties and to consult with federally recognized tribes and other affected parties in accordance with the guidelines provided by National Park Service Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties and the U.S. Army Corps of Engineers Tribal Consultation Policy (2013).
- b. In the event that a federally recognized tribe or affected group contacts the District regarding its recognition of a traditional cultural property, located within the APE, the District shall notify the appropriate SHPO and the

ACHP to initiate discussions to consider whether the property is a traditional cultural property that meets the Criteria.

3. Buildings and Structures

- a. The District shall ensure that surveys are conducted for buildings and structures in the APE in a manner consistent with the Secretary of the Interior's Standards and Guidelines for Identification (48 FR 44720-23), and in New Jersey, the New Jersey Historic Preservation Office's 1999 *Guidelines for Architectural Survey*, and take into account the statewide historic contexts developed by the SHPO(s). The Scope of Work and survey report will be consistent with the guidelines set forth by the SHPOs and shall be submitted to the appropriate SHPO(s), the ACHP, and other consulting parties for review.
- b. The District, in consultation with the appropriate SHPO(s), the ACHP, and other consulting parties, shall identify and evaluate buildings and structures that are located adjacent to listed or eligible NRHP historic districts to determine whether such properties should be considered as part of the historic district or an expanded district.

4. Historic Landscapes and View Sheds

- a. The District shall consult with the appropriate SHPO(s) and other consulting parties, including local historical societies, to identify and evaluate historic landscapes and viewsheds located within the APE. The District shall consult National Park Service Bulletins 18, How to Evaluate and Nominate Designed Historic Landscapes, and 30 Guidelines for Evaluating and Documenting Rural Historic Landscapes, National Park Service Preservation Brief 36, Protecting Cultural Landscapes, and other publications and materials made available by the SHPO(s) to assist in defining the criteria that should be applied to such properties.
  - b. The objective in conducting the surveys is to identify NRHP-listed or eligible historic landscapes and affected viewsheds within the project area that may be adversely affected by the Project, and to determine whether they meet the NRHP criteria set forth in 36 CFR Part 60.4.
- C. The District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic

Preservation (48 FR 44738-39)] are used to complete all identification and evaluation plans related to this undertaking, to include geomorphological, palynological, and archaeological surveys and testing, and documentation.

- D. The District, the SHPO(s), and all other consulting parties shall consider the views of the public and interested parties, including local historic preservation groups, in completing its identification and evaluation responsibilities.
- E. The District shall maintain records of all decisions it makes related to the NRHP eligibility of properties.
- F. Application of Criteria:
  - 1. The District, in consultation with the appropriate SHPO, and other consulting parties, shall evaluate historic properties using the Criteria established for the NRHP [36 CFR 800.4(c)(1)]:
    - a. If the District, the SHPO(s), and the other consulting parties agree that the Criteria apply or do not apply, in evaluating the NRHP eligibility of a property, the property shall be treated accordingly for purposes of this PA.
    - b. If the District, the SHPO(s), and other consulting parties disagree regarding NRHP eligibility, prior to the start of any project-related work at the site or in the vicinity of the property, the District shall obtain a formal Determination of Eligibility (DOE) from the Keeper of the National Register (Keeper), National Park Service, whose determination shall be final.
  - 2. The District shall ensure that the identification and evaluation of historic properties that may be affected by each phase of the Undertaking is completed prior to the initiation of any formal action by the District including rehabilitation, relocation, demolition, etc.
  - 3. Any changes to the project design that may have the potential to affect historic properties or extends beyond the current APE will be submitted to the consulting parties for review and comment.
  - 4. If a property is determined to be eligible for the National Register, the District will consult with the NJSHPO, NYSHPO, NPS, LPC, and the appropriate consulting parties to resolve the adverse effects in accordance with Stipulation II below.

## II. RESOLUTION OF ADVERSE EFFECTS

- A. If the District, in consultation with the appropriate SHPO(s), and other consulting parties, as appropriate, determines that the Project will have an adverse effect on historic properties, the District shall consult with the appropriate consulting parties and signatories, pursuant to 36 CFR Part 800.6, to determine how best to resolve adverse effects and document the proposed resolution.
- B. The District shall invite the ACHP to participate in consultation when:
  - 1. The District and SHPO determine that an agreement or treatment plan cannot be reached;
  - 2. A National Historic Landmark is involved;
  - 3. Human remains have been identified; or
  - 4. There is widespread public interest in a historic property or properties.
- C. Once there is agreement on how adverse effects will be resolved, the District will develop treatment plans that will identify the activities to be implemented to resolve adverse effects. The SHPO(s) and the appropriate signatories and other consulting parties, if identified, will be provided with copies of each treatment plan for review and comment. The District shall revise plans to address comments and recommendations provided by the consulting parties. The District shall ensure that treatment plans are implemented by the District or its representative(s).
  - i. Treatment plans will include a description of the historic property, the adverse effect to the historic property, and the treatment to mitigate the adverse effect to the historic property.
  - ii. Draft treatment plans will be reviewed by the signatories and the applicable invited signatories. The signatories will have 30 calendar days to review the draft treatment plan and provide comments to the District.
  - iii. The District will resolve all comments received. Once all comments have been agreed upon, a final treatment plan will be sent for signature to the signatories and applicable invited signatories.

## II. PUBLIC INVOLVEMENT AND OUTREACH

- A. The District shall inform the public of the existence of this PA and the District's plan for meeting the stipulations of the PA. Copies of this agreement and relevant documentation prepared pursuant to the terms of this PA shall be made available

for public inspection via the District's website. Information regarding the specific locations of terrestrial and submerged archaeological sites, including potential wreck areas, will be withheld in accordance with the Freedom of Information Act and National Register Bulletin No. 29, if it appears that this information could jeopardize archaeological sites. Any comments received from the public related to the activities identified by this PA shall be taken into account by the District.

- B. The District shall develop publically accessible information about the cultural resources and historic properties investigations for the Undertaking in the form of brief publication(s), exhibit(s), or website.

### III. CURATION

- A. Any collection resulting from the investigations undertaken as part of the agreement are the property of the landowner at the time the collection was made. The District does not retain ownership of any collection removed from land(s) it does not own.
- B. The District shall ensure that all collections resulting from the identification and evaluation of surveys, data recovery operations, or other investigations pursuant to this PA are maintained in accordance with 36 CFR Part 79 until the collection is turned over to the landowner or other entity. Minimally, the District will ensure that analysis is complete and the final report(s) are produced and accepted by the New York and NJHPO before the collection is provided to the landowner.
- C. The District shall be responsible for consulting with landowners regarding the curation of collections resulting from archaeological surveys, data recovery operations, or other studies and activities pursuant to this agreement. The District shall coordinate the return of collections to non-federal landowners. If landowners wish to donate the collection, the District, in coordination with the New York SHPO and NJHPO, determine an appropriate entity to take control of the collection.
- D. The District shall be responsible for the preparation of federally-owned collections and the associated records and non-federal collections donated for curation in accordance with the standards of the curation facility.

### IV. UNANTICIPATED DISCOVERY

- A. The following language shall be included in construction plans and specifications:

“When a previously identified cultural resource, including but not limited to archaeological sites, shipwrecks and the remains of ships and/or boats, standing structures, and properties of traditional religious and cultural significance to the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation

are discovered during the execution of the Project, the individual(s) who made the discovery shall immediately secure the vicinity and make a reasonable effort to avoid or minimize harm to the resource, and notify the Project's Contracting Officer's Representative (COR) and the District. All activities shall cease within a minimum of 50 feet from the inadvertent discovery (50-foot radius 'no work' buffer) until authorized by the District and the Project COR.

- B. If previously unidentified and unanticipated properties are discovered during Project activities, the District shall cease all work in the vicinity of the discovery until it can be evaluated in accordance with 36 CFR Part 800.13 "Post Review Discoveries". Upon notification of an unanticipated discovery, the District shall implement any additional reasonable measures to avoid or minimize effects to the resource. Any previously unidentified cultural resource will be treated as though it is eligible for the NRHP until such other determination may be made.
- C. The District shall immediately notify the New York SHPO, NJHPO, the LPC where relevant, and the NPS for unanticipated discoveries within its boundaries, and the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation, within 48 hours of the finding and request consultation to determine the nature of the find, the National Register eligibility and the assessment and resolution adverse effects, if identified.
- D. If it is determined the unanticipated discovery is not eligible for the National Register, then the suspension of work in the area of the discovery will end.
- E. If it is determined that the cultural resource is eligible for the National Register, then the suspension of work will continue, and the District, in consultation with the NYSHPO, NJHPO, the LPC where relevant, the National Park Service for unanticipated discoveries within NPS Lands, the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation, will determine the actions to avoid, minimize, or mitigate adverse effects to the historic property and will ensure that the appropriate actions are carried out.
- F. If there is a disagreement on the appropriate course of action to address an unanticipated discovery or effects to an unanticipated discovery, then the District shall initiate the dispute resolution process set forth in Stipulation XII below.

## V. DISCOVERY OF HUMAN REMAINS

- A. If any human remains and/or grave-associated artifacts are encountered during any of the investigations, including data recovery, the District shall follow the NYSHPO Human Remains Discovery Protocol (2018; see Appendix D) and, as appropriate, develop a treatment plan for human remains that is responsive to the

ACHP's Policy Statement on Human Remains" (September 27, 1988), the Native American Graves Protection and Repatriation Act (PL 101-601) and , US Army Corps of Engineers, Policy Guidance Letter No. 57 (1998) Indian Sovereignty and Government-to-Government Relations with Indian Tribes.

- B. The following language shall be included in the construction plans and specifications:

"In the event that human remains as burials or fragmentary remains are found, the following actions should be taken:

1. The Contractor will stop work in the general area of the discovery immediately and report the discovery to the Contracting Officer/Contracting Officer Representative (KO/COR), who will call the appropriate New York or New Jersey Police Department at 911 and the NY Office of the Chief Medical Examiner and direct the call to the Forensic Anthropology Unit or the NJ Office of the Chief State Medical Examiner.
2. The KO/COR will inform the District archaeologist who, as appropriate, will call the New York Landmarks Preservation Commission, the New York State Historic Preservation Office, the New Jersey State Historic Preservation Office and the relevant federally-recognized Tribes.
3. At all times, the Contractor will treat human remains with the utmost dignity and respect.
4. The Contractor will secure and protect the general area of the discovery (not less than fifty feet in all directions from the location of the discovery) from damage, vandalism, and disturbance until released by the KO/COR.
5. The Contractor will leave human remains and/or associated artifacts in place and not disturb them. The Contractor will not collect skeletal remains or materials associated with the remains. Any displaced remains or those found after excavation will be turned over to the KO/COR immediately.
6. The Contractor will not conduct any activities in the vicinity of the site until these steps have been completed and the site has been released by the KO/COR.
7. The Contractor will continue to protect and secure the area until the site is released by the KO/COR."

## VI. PROFESSIONAL QUALIFICATIONS AND STANDARDS

- A. The District shall ensure that qualified professionals meeting the National Park Service professional qualifications for the appropriate discipline [National Park Service Professional Qualification Standards, Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44738-39)] are used to complete all identification and evaluation plans related to this undertaking, to include remote sensing surveys, underwater investigations, historic structure inventory and documentation.



- B. All historic structures surveys carried out pursuant to this PA will be undertaken in accordance with the standards and guidelines of the NYSHPO, NJHPO, the LPC and the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR Part 68) which takes into account the statewide historic contexts developed by the NJHPO and NY SHPO. The survey will be conducted following consultation with the NJHPO, NY SHPO, LPC and relevant historic and preservation groups and will be consistent with the appropriate guidelines for architectural surveys as identified by the Consulting Parties.
- C. All archaeological investigations carried out pursuant to this PA will be undertaken in accordance with the New York State Archaeological ACHP's Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State (1994) and Cultural Resources Standards Handbook (2000), the NYSHPO Archaeological Report Format Requirements (2005), and the Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR Part 68), and the New Jersey Historic Preservation Office Guidelines for Phase I Archaeological Investigations: Identification of Archaeological Resources (N.J.A.C. 7:4-8.4), the New Jersey Historic Preservation Office Requirements for Archaeological Reports – Standards for Report Sufficiency (N.J.A.C. 7:4-8.5)
- D. For submerged portions of the APE, the archaeological survey should be designed with input from a qualified marine archaeologist and specialists in other fields as appropriate (e.g., geology and geomorphology), in a manner that is capable of identifying the precontact and historic period site types that are present offshore New Jersey and New York. The Report and analyses presented therein should be prepared by a qualified marine archaeologist and specialists in other fields as appropriate (e.g., geology, geomorphology). A qualified marine archaeologist must meet the Secretary of the Interior's Professional Qualification Standards (48 F.R. 44738-44739) and have experience in conducting high-resolution geophysical surveys of submerged environments and processing and interpreting the resulting data for archaeological potential.

## VII. ADMINISTRATIVE TERMS

### A. REPORTING

1. Each year following the execution of this PA until it expires or is terminated, the District shall provide the New York SHPO, NJHPO, the LPC, NPS, the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation, and local historical societies and organizations (Appendix E), a summary report detailing work undertaken pursuant to this PA. This report will include any scheduling changes, problems encountered, project work completed, PA activities completed, and any objections and/or disputes received by the District in its efforts to carry out the terms

of this PA. Copies of the summary report will be posted in the District project website.

2. Following authorization and appropriation, the District shall coordinate a meeting or equivalent with the signatories to be held annually on a mutually agreed upon date to evaluate the effectiveness of this PA and discuss activities carried out pursuant to this PA during the preceding year and activities scheduled for the upcoming year.

#### B. COORDINATION, CONSULTATION, AND REVIEW PERIODS

1. The District will consult with the NJSHPO, the NYSHPO, the LPC and all other relevant Consulting Parties in regard to portions of the APE within their relevant areas of responsibility and jurisdiction unless otherwise formally requested by the Consulting Party.
2. National Park Service Land,
  - a. For all activities involving properties and/or investigations within the bounds of land held by the National Park Service, the District will obtain the required National Park Service permits to complete investigations.
  - b. The District will provide the draft and final reports pertaining to the investigations within the bounds of National Park Service Land, the New York SHPO, NJHPO, NPS, the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation, for review.
  - c. Coordination and consultation on eligibility determinations, the need for additional investigations within National Park Service Land based on results of completed investigations will include the New York SHPO, NJHPO, NPS, the Shinnecock Indian Nation, the Delaware Nation, the Stockbridge Munsee, the Delaware Tribe of Indians (federally-recognized tribes), and the Unkechaug Nation,
3. Borrow Areas
  - a. All draft and final reports pertaining to investigations of Project borrow areas will be provided to the New York SHPO, NJHPO, the LPC NPS, and the Interested Tribes for review.
  - b. Coordination and consultation on eligibility determinations, the need for additional investigations for targets and anomalies will include the New York SHPO, NJHPO, NPS, and Interested Tribes.
4. Nearshore Sand Placement, Coastal Process Features, Measures for Residential and Non-Residential Structures, and Ringwalls
  - a. All draft and final reports pertaining to investigations of the nearshore, the coastal process features, the measures for residential and non-residential

structure Areas of Potential Effect outside of National Park Service Land will be provided to the New York SHPO, NJHPO, the LPC, NPS, Interested Tribes, the relevant municipality(ies) and local historical society(ies) or historic preservation group(s) for review (see Appendix E).

- b. Coordination and consultation on eligibility determinations, the need for additional investigations, etc., resulting from the reviews completed in Stipulation XI.B.3.a above will include the New York SHPO, NJHPO, the LPC, Interested Tribes, the relevant municipality, its local historical society or historic preservation group(s) (see Appendix E), and the landowner(s).
5. Unless otherwise stated, all review periods will be 30 calendar days and any comments resulting from those reviews must be submitted to the District in writing (via electronic or regular mail).
6. With the submission of final reports, the District will respond to comments, identifying how comments were/were not taken into account as part of report revisions or recommendation for additional action.
7. If a response is not received by the end of the review period, the District will assume concurrence with the subject determination, evaluation, plan, report or other document submitted.
8. Activities On New York City Lands
  - a. For those portions of the Undertaking which take place on New York City (NYC) owned property, the District will fully engage the LPC in all consultations and secure LPC concurrence for all decisions related to identification, evaluation, effect determinations, and treatment of adverse effects. The District will submit all documentation and determination findings for properties on NYC land to the LPC for review and concurrence prior to submission to NYSHPO or ACHP. If the District, and NYSHPO cannot come to agreement on any such matters, the provisions of Stipulations V or XII will apply, as most appropriate.

## **XII. DISPUTE RESOLUTION**

- A. Should any Signatory object in writing to the District at any time to any actions proposed or the manner in which the terms of this PA are implemented, the District and the signatories shall attempt to resolve any disagreement arising from implementation of this PA.
- B. If there is a determination that the disagreement cannot be resolved, the District shall forward all documentation relevant to the dispute to the ACHP and request the ACHP's recommendations or request the comments of the ACHP in accordance with 36 CFR Part 800.7(c).

- C. The ACHP shall provide the District with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Any ACHP recommendations or comments provided in response will be considered in accordance with 36 CFR Part 800.7(c), with reference only to the subject of the dispute. The District shall respond to ACHP recommendations or comments indicating how the District has taken the ACHP's recommendations or comments into account and complied with the ACHP's recommendations or comments prior to proceeding with the Undertaking activities that are the subject to dispute. Responsibility to carry out all other actions under this PA that are not the subject of the dispute will remain unchanged.
- D. If the ACHP does not provide its advice regarding the dispute within the thirty (30) calendar day time period, the District may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the District shall prepare a written response that takes into account any timely comments regarding the dispute from the signatories to the PA, and provide them and the ACHP with a copy of such written response.

### XIII. WITHDRAWAL AND TERMINATION

- A. Any signatory may withdraw its participation in this PA by providing thirty (30) days advance written notification to all other signatories. In the event of withdrawal, any signatory to this PA may terminate it by providing 30 calendar days, written notice to the signatories. In the event of withdrawal, this PA will remain in effect for the remaining signatories.
- B. This agreement may be terminated in accordance with 36 CFR Part 800, provided that the signatories consult during the period prior to termination to seek agreement on amendments or other actions that would avoid termination. Any signatory requesting termination of this PA will provide thirty (30) days advance written notification to all other signatories.
- C. In the event of termination, the District will comply with 36 CFR 800.4 through 800.6 with regard to individual undertakings covered by this Agreement.

### XIV. DURATION AND SUNSET CLAUSE

- A. This PA shall take effect upon execution by the District, the New York SHPO, NJHPO, NPS with the date of the final signature.
- B. This PA will continue in full force and effect until the construction of the Undertaking is complete and all terms of this PA are met, unless the Undertaking is terminated or authorization is rescinded or a period of five years from execution of the PA has passed, at which time the agreement may be extended as written provided all

signatories concur.

XV. AMENDMENT

- A. This PA may be amended upon agreement in writing by all Signatories. Within thirty (30) days of a written request to the District, the District will facilitate consultation between the signatories regarding the proposed amendment.
- B. Any amendments will be in writing and will be in effect on the date the amended PA is filed with the ACHP.

XVI. ANTI-DEFICIENCY ACT

All requirements set forth in this PA requiring expenditure of funds by the District are expressly subject to the availability of appropriations and the requirements of the Anti-Deficiency Act (31 U.S.C. 1341). No obligation undertaken by the District under the terms of this PA shall require or be interpreted to require a commitment to extend funds not appropriated for a particular purpose. If the District cannot perform any obligation set forth in this PA because of unavailability of funds that obligation must be renegotiated among the District and the signatories as necessary.

PROGRAMMATIC AGREEMENT  
AMONG  
THE U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT AND  
THE NEW YORK STATE HISTORIC PRESERVATION OFFICE AND  
THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE AND  
THE NATIONAL PARK SERVICE  
  
REGARDING  
THE NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES  
COASTAL STORM RISK STUDY

Execution and implementation of this PA evidences that the District has satisfied its Section 106 responsibilities 36 CFR 800.6(b)(1)(iv) for all individual undertakings of the Project, and has afforded the New York , NJHPO, NPS and the ACHP an opportunity to comment on the undertaking and its effects on historic properties.

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Matthew W. Luzzatto  
Colonel, U.S. Army  
New York District  
Army Corps of Engineers

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Date

PROGRAMMATIC AGREEMENT  
AMONG  
THE U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT AND  
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Jennifer T. Nersesian  
Superintendent  
Gateway National Recreation Area

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Date

PROGRAMMATIC AGREEMENT  
AMONG  
THE U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT AND  
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Katherine J. Marcopul, PhD  
Deputy State Historic Preservation Officer  
New Jersey State Historic Preservation Office

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Date



PROGRAMMATIC AGREEMENT  
AMONG  
THE U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT AND  
THE NEW YORK STATE HISTORIC PRESERVATION OFFICE AND  
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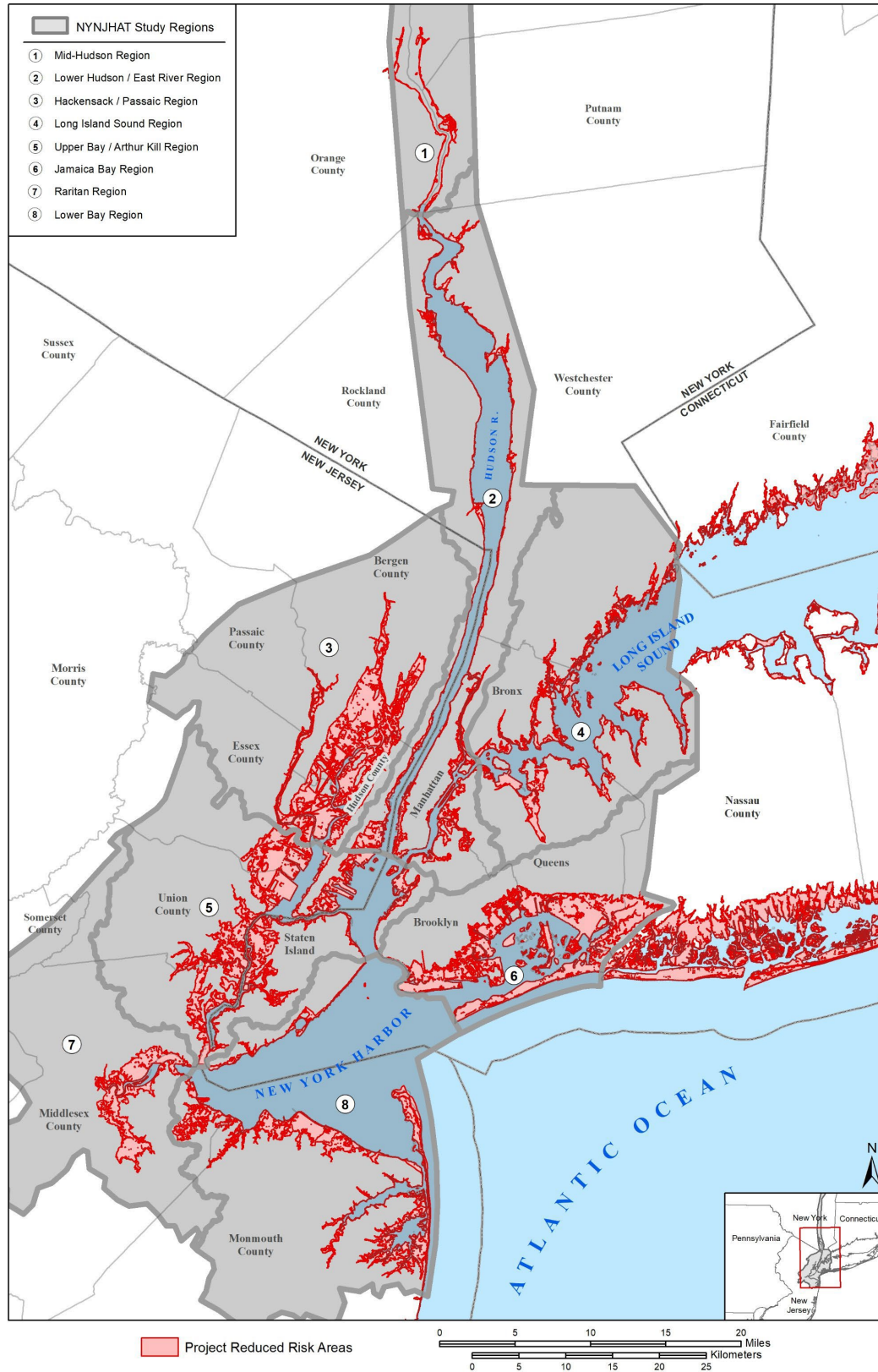
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R. Daniel Mackay  
Deputy Commissioner for Historic Preservation/Deputy SHPO  
New York State Historic Preservation Office

\_\_\_\_\_  
Date

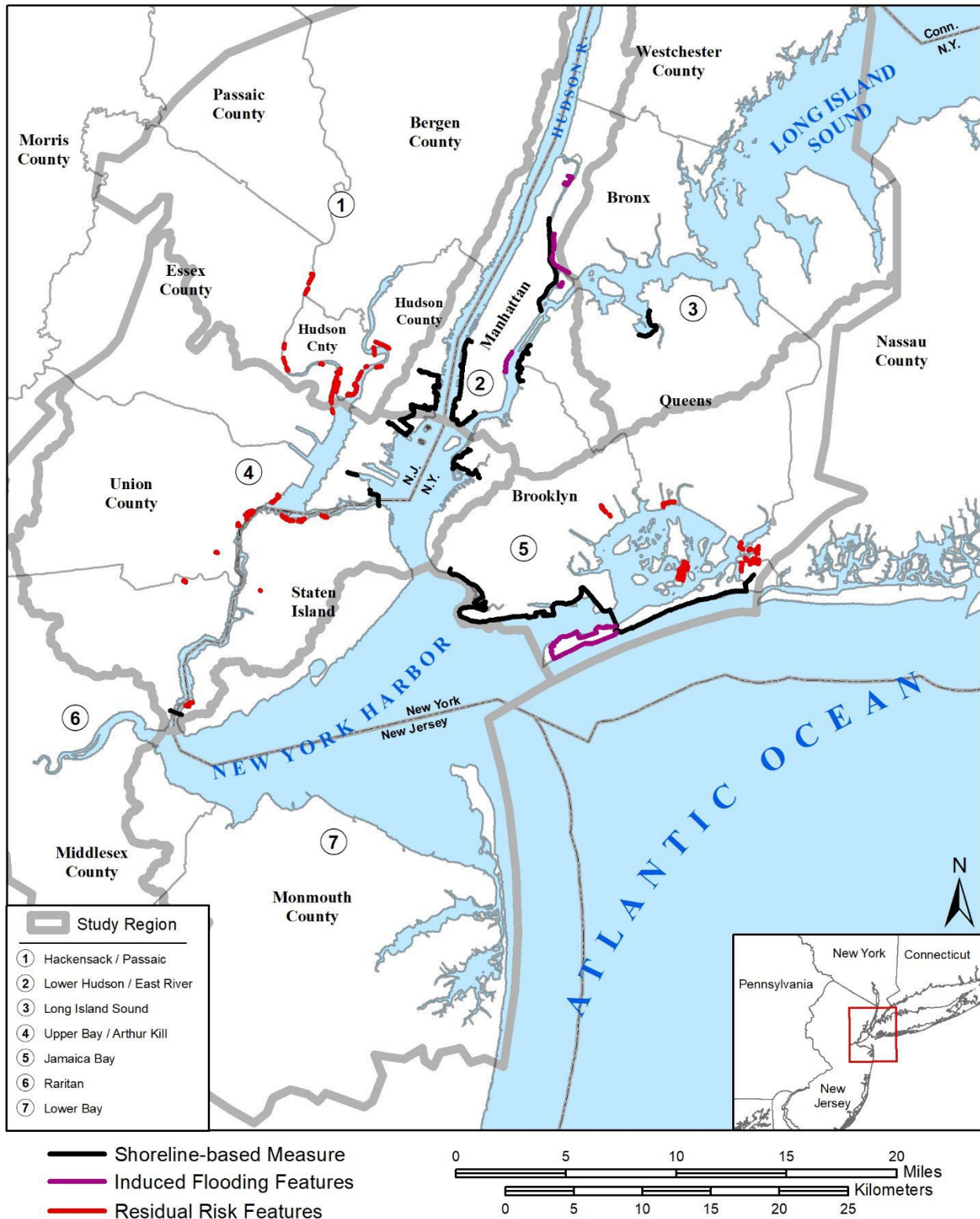
**PROGRAMMATIC AGREEMENT - APPENDIX A**

THE NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES  
COASTAL STORM RISK STUDY MAPS

## New York – New Jersey Harbor and Tributaries Coastal Storm Risk Study



NYNJHATS Study area of potential effect for the no-action alternative



Alternative 3B SBMs, IFFs, and RRfs in New York and New Jersey

**PROGRAMMATIC AGREEMENT - APPENDIX B**

THE NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES  
COASTAL STORM RISK STUDY EIS CULTURAL APPENDIX

**PROGRAMMATIC AGREEMENT- APPENDIX C**

THE NEW YORK – NEW JERSEY HARBOR AND TRIBUTARIES  
COASTAL STORM RISK STUDY CONSULTATION AND  
DOCUMENT DELIVERY SCHEDULE