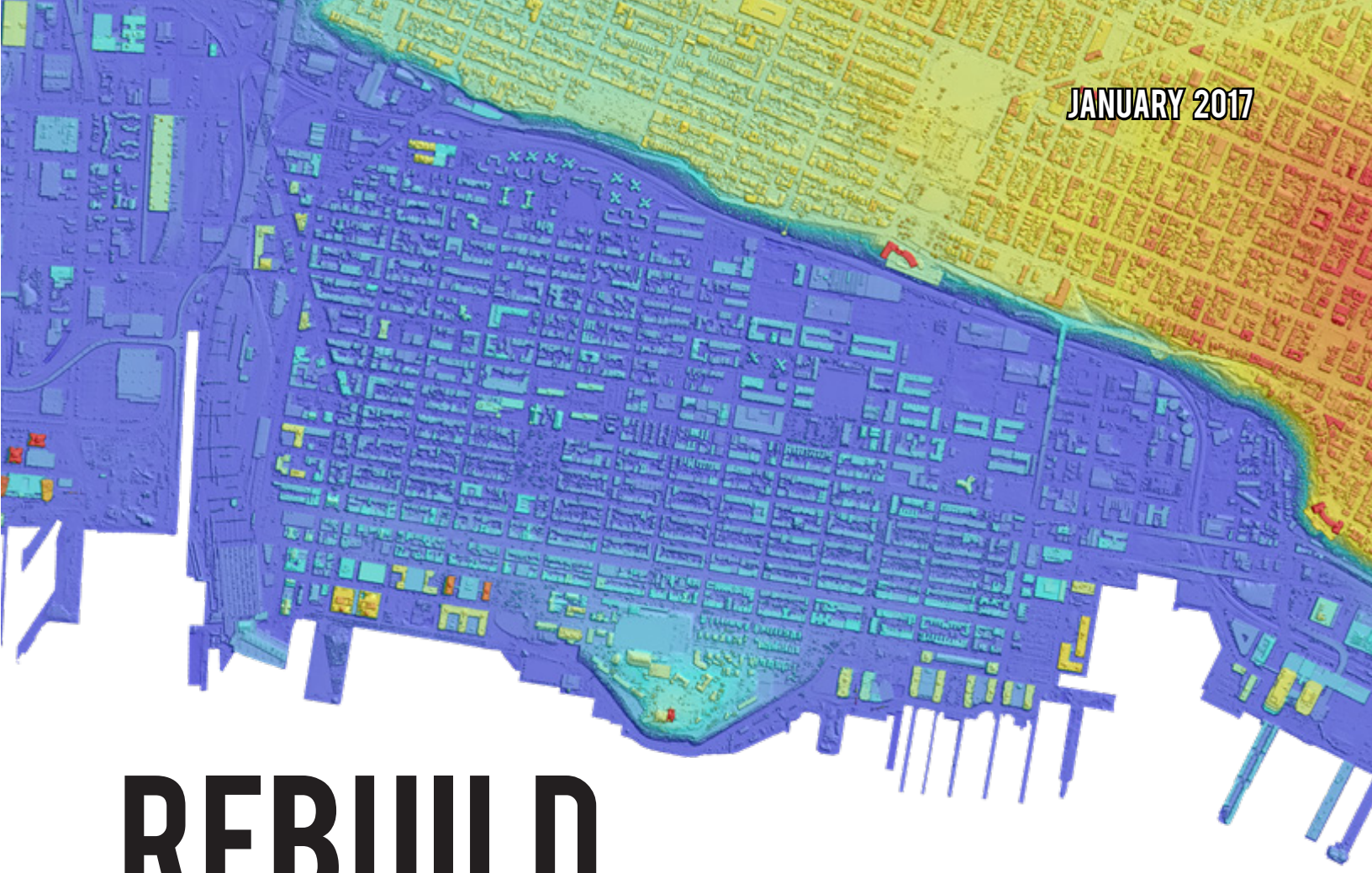

JANUARY 2017

REBUILD BY DESIGN

▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

HUDSON RIVER

Hoboken | Weehawken | Jersey City | New Jersey

NATURAL ECOSYSTEMS TECHNICAL ENVIRONMENTAL STUDY

Natural Ecosystems
Technical Environmental Study

Rebuild By Design: Resist, Delay, Store, Discharge Project
Cities of Hoboken, Weehawken, and Jersey City
Hudson County, New Jersey

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EXECUTIVE SUMMARY

This Natural Ecosystems Technical Environmental Study (TES) describes the existing natural resources within the Study Area, which is comprised of the entire City of Hoboken, the northern portion of Jersey City and the southern portion of Weehawken, as shown on Figures 1 and 2. The land and water resources within the Study Area include geology, soils, groundwater, surface waters/water quality, aquatic ecology, floodplains, wetlands, vegetation and wildlife, and threatened and endangered (T&E) species. This TES also discusses the regulations that are in place to conserve and manage these natural resources, and the permitting effort that would be required for each proposed alternative.

No significant impacts would result from the proposed project build alternatives on geology, soils, groundwater, surface water/water quality, aquatic ecology, freshwater wetlands, upland vegetation and wildlife or T&E species. The various build alternatives would result in a temporary disturbance of approximately 27 to 29 acres within the 100-year floodplain, based on the project footprint plus an added 50-foot buffer. However, the permanent impacts to the floodplain arising from new construction (waterfront structures-bulkhead replacement) would range from approximately 5 to 8 acres. There are no alternatives that avoid this impact to the floodplain except for the No Action Alternative, but this alternative does not address the project's purpose and need to alleviate the impacts to lives and property that would result from future flooding events.

Analysis of existing geologic conditions has indicated that impacts on geology from the build alternatives are expected to be negligible. A discharge of soil to the Hudson River could occur during rainfall events, during construction of waterfront structures associated with Alternative 1. This risk will be addressed in the Stormwater Pollution Prevention Plan (SWPPP). Under Alternatives 2 and 3, the risk of off-site discharge of soils during rainfall events during construction also exists, and this would also be addressed in the SWPPP. The potential for off-site soil impacts arising from Project construction activities is expected to be short-term and minor in magnitude with the use of proper containment measures.

Construction of all of the build alternatives may require de-watering of shallow groundwater and this may cause groundwater to flow toward the excavations. This water would be sampled and handled/disposed of properly, in accordance with a New Jersey Pollutant Discharge Elimination System (NJPDES) General Permit. These effects would be expected to be temporary and would not extend significantly beyond the project boundaries. No impacts to groundwater quality are anticipated. Furthermore, since there are no drinking water wells in the Study Area, no adverse impacts to groundwater or water supplies are anticipated.

There is the potential for impacts to surface water quality under all alternatives. Under Alternative 1, there is potential for temporary and minor impacts to water quality of the Hudson River due to the replacement of bulkheads along the waterfront as part of the Resist structure. No other surface waters besides the Hudson River are present in the Study Area, other than in stormwater drainage areas. Other potential impacts to surface water quality under all alternatives are related to the proposed discharge of collected stormwater to the Hudson River. Some of the collected stormwater will infiltrate in large collection basins, and other collected stormwater would be treated in the

North Hudson Wastewater Treatment Plant prior to discharge in the Hudson River. Given the large volume of water in the Hudson River, and the current water quality of the Hudson River, any impacts from the discharge of stormwater from the project is expected to be minor, both in terms of quantity and quality.

Alternatives 2 and 3 also would have stormwater discharge to the Hudson River from the "High Level" storm sewers proposed as an element of the Resist infrastructure. This option would be designed to prevent additional sewer backflow that could cause flooding issues within Alternatives 2 and 3 protected areas during a storm surge event. Treatment of this stormwater would be similar to treatment of stormwater collected at the three large stormwater collection sites and the discharge from the "High Level" storm sewer system on water quality of the Hudson River would be negligible. In addition, the new DSD system is anticipated to reduce the number of Combined Sewer Overflow (CSO) discharges from the existing system into the Hudson River, thereby reducing the impacts of CSO discharges on Hudson River water quality. For all build alternatives, a Soil Erosion and Sediment Control Plan (SESCP) would be prepared and implemented to address temporary surface water impacts during construction.

Under Alternative 1, short-term stress to fish could occur due to noise, turbidity, runoff, and shading. Fish may be temporarily disturbed by the construction of the waterfront structures; however, the fish would migrate away from the work area during construction, and return when construction is completed. Runoff may increase turbidity and introduce potential contaminants to the area during construction, but implementation of a SESCP would minimize impacts. Construction timing restrictions (i.e., periods of time when construction activities could not take place) would minimize impacts on fish spawning activity, and will be determined based on the species present in the work and impact areas. Impacts from Alternatives 2 and 3 are expected to be negligible since the majority of construction is not in the area of the waterfront.

All three of the build alternatives would impact approximately 230 SF (0.005 acres) of palustrine emergent wetlands (PEM), associated with a proposed Resist structure located in the southwestern portion of Hoboken. Alternative 1 would additionally impact (temporarily) approximately 0.73 acres of open water area, related to the construction of new bulkheads along the Hudson River waterfront, with an assumed 10-foot wide work corridor for cofferdams. The impacts would not be significant to wetland/open water resources. There are no feasible build alternatives that would avoid impacts to wetlands.

Upland vegetation impacts (urban landscaping, including trees) would result for all of the build alternatives. The greatest upland vegetation impact would result from Alternative 1, impacting approximately 25 acres, and the least impact would result from Alternative 3, at approximately 22 acres. Most of the upland impacts would be in areas that have been previously disturbed, areas now landscaped with street trees or lawn/landscaped areas. All planted trees and landscaped areas would be replanted under all of the build alternatives, and in addition, portions of the DSD areas would be planted, so that the loss of upland vegetation would be negligible.

Local, state and/or federal permits and approvals would be required under all of the build alternatives. In addition to the state and federal permits and approvals identified, the project must be reviewed and approved by the City Planning/Zoning Boards in Hoboken, Jersey City and Weehawken.

Under Alternative 1 (both Options 1 and 2), a SESCP approved by the Hudson-Essex-Passaic Soil Conservation District (HEPSCD) would be necessary. The Resist waterfront structures, including bulkhead repairs/replacements and new outfalls would require United States Army Corps of Engineers (USACE) Sections 10/404 Individual Permits, a New Jersey Department of Environmental Protection (NJDEP) Individual Waterfront Development Permit, an NJDEP Individual Flood Hazard Area Permit, an NJDEP Individual Freshwater Wetland Permit, an NJDEP Division of Water Quality NJPDES Individual Permit for SWPPP, and tidelands grants, leases, or licenses from the NJDEP Bureau of Tidelands Management, as applicable.

Alternative 1 would require consultations during the USACE and NJDEP Individual Permit review process with NMFS regarding the Section 7 consultation (endangered/ threatened species) and EFH, as well as with the USCG regarding review of navigation issues associated with in-water work.

The permitting and consultation requirements under Alternatives 2 and 3 would be similar to the permitting and consultation requirements described in Alternative 1, with the exception of the NJDEP Individual Freshwater Wetland Permit and the USACE Sections 10/404 Individual Permit – these would not be required and instead NJDEP Freshwater Wetland Permits GP-7 (human-made ditches) and GP-11 (outfall structures) and a USACE Nationwide Permit (NW) 7 (outfall structures) would be required. This is due to the fact that construction under Alternative 1 would have open water impacts, resulting in the necessary Individual Permits, while Alternatives 2 and 3 would have minimal wetland and/or open water impacts and therefore meet the standards for GP-7, GP-11, and NW-7. In addition, USCG review of navigation issues associated with in-water work would not be required under Alternatives 2 or 3.

1.0 INTRODUCTION

In order to address the need for flood risk reduction within the Superstorm Sandy-affected region, the United States Department of Housing and Urban Development (HUD) launched the Rebuild by Design (RBD) competition in 2013 inviting interdisciplinary design teams to craft pioneering resiliency solutions. During the course of this competition, a comprehensive urban storm water management strategy was developed for the Hoboken, Jersey City and Weehawken area that included hard infrastructure and soft landscape for coastal defense (Resist), policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay), green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store), and water pumps and alternative routes to support drainage (Discharge). This proposal was selected as a winner of the RBD competition, and HUD subsequently awarded the State of New Jersey $230 million for the implementation of the first phase of the "Hudson River Project: Resist, Delay, Store, Discharge" (the Project).

This Natural Ecosystems Technical Environmental Study (TES) was prepared by Dewberry Engineers Inc. (Dewberry), on behalf of the New Jersey Department of Environmental Protection (NJDEP), to evaluate the flood reduction improvements proposed for the RBD project. A summary of this TES will be provided in the Environmental Impact Statement (EIS) for the Project.

1.1 Project Location and Topography

The Project's Study Area encompasses the City of Hoboken and includes the southern portion of the Township of Weehawken and the northern portion of Jersey City. The Study Area has the following approximate boundaries: the portion of the Hudson River which encompasses piers within the Study Area to the east; Baldwin Avenue (in Weehawken) to the north; the Palisades to the west; and 18th Street, Washington Boulevard and 14th Street (in Jersey City) to the south. See Figures 1 and 2, Project Location and Study Area. The Study Area includes the entire comprehensive stormwater management approach which consists of the four components—Resist, Store, Delay and Discharge.

The Study Area is located along the banks of the Hudson River, beneath the Palisades, which rise to the west. Formerly an industrial waterfront community, over the past several decades the Study Area has become increasingly developed with multi-family residential and mid- and high-rise commercial development. Unobstructed views of Manhattan across the Hudson River have led much of this development to be located along the waterfront, but areas in the north and central interior portions of the Study Area have also seen an influx in residential development over the past decade.

The upland area within the Study Area is the land area above mean high tide, and is approximately 1,020 acres. The Study Area encompasses approximately 233 acres of the Hudson River. Figure 3 shows the Preliminary Flood Insurance Rate Map (FIRM) for the Study Area. The Base Flood Elevation (BFE) is the computed elevation to which floodwater is anticipated to rise during a one-percent chance annual flood. This area is also known as the 100-year floodplain. The BFE is the regulatory requirement for the elevation or flood proofing of structures. The relationship

between the BFE and a structure's elevation determines the flood insurance premium. Approximately 73 percent, or 16,800 parcels of land, within the Study Area are within the Hudson River's one-percent annual-chance floodplain (Zone AE/VE). The AE and VE zones are both 1% annual-chance floodplains, but the VE zone, which is usually along coastlines and typically does not extend beyond the waterfront (the streets, parks and esplanade directly bordering the Hudson River), is also subject to storm-induced velocity wave actions. About 4% of the land within the Study Area is within the VE zone and has base flood elevations (BFEs) of between 16 and 17 feet North American Vertical Datum (NAVD) 88 (the base flood elevation is the anticipated water level during a flood event). The majority of the Study Area (69%) is within the AE flood zone, with BFEs of between 10 and 12 feet NAVD 88. Within this area, there is a 1 percent probability of flooding in any given year. The area depicted in Figure 3 as having a 0.2 percent annual chance of flooding is also known as the 500-year floodplain. The area depicted in white on Figure 3 has an elevation higher than the estimated 500-year flood level.

Within the Study Area, there are two main entry points of floodwater during coastal storm surge events, such as Superstorm Sandy, the area around Long Slip Canal and Hoboken Terminal, and Weehawken Cove (see Figure 4). Flood waters enter at these points because they are the lowest areas of topography. Following a storm event, low-lying topography prevents water from receding. For reference, Figure 4 also displays the ground surface elevation in 5 foot contour intervals.

The topography of the Study Area is highest along the east-central portion abutting the coastline of the Hudson River at Castle Point. From here, the land slopes gently downward to the north (towards Weehawken Cove), south (towards the Hoboken Terminal and Jersey City) and to the west (towards the foot of the Palisades). This topography reflects the Study Area's history; when originally settled, Castle Point was an island surrounded to the north, south and west by wetlands. These wetlands were gradually filled in as the area grew. Today, these areas - in particular those to the west - are still extremely low-lying, in some places no more than three feet above mean sea level.

1.2 Project Background

The municipalities of Hoboken, Weehawken, and Jersey City were inundated by flood waters during Superstorm Sandy in October 2012. With half of Hoboken flooded for several days, most emergency services were unavailable, many residents were evacuated, and the National Guard was deployed to rescue those who could not evacuate. The magnitude of Superstorm Sandy's devastation, primarily attributed to a record-breaking storm surge during high tide, has overshadowed the fact that little precipitation fell during that storm. Had Superstorm Sandy been accompanied by a more typical heavy rainfall event, the Study Area's past history suggests that flooding levels and property damage could have been even higher.

The Study Area is vulnerable to two interconnected types of flooding: coastal flooding (both from storm surges as well as high tides) and systemic inland flooding (rainfall) which occurs during rainfall events that typically coincide with high tide. These flooding problems are attributed to several factors, including naturally low topography and proximity to waterways; impervious surface coverage and associated runoff; existing, relatively old, sewer

infrastructure with interconnected storm and sanitary sewer lines and insufficient discharge capability particularly during high tide.

As seen with Superstorm Sandy, coastal flooding can devastate widespread areas of the Study Area and cause significant economic damage and safety concerns. In addition, systemic inland flooding associated with rainfall tends to be more localized to inland areas of lower elevation, but happens with much greater frequency than coastal surges. The systemic inland flooding typically occurs when high volumes of water are brought into the combined storm-sewer system from rainfall events which coincide with an approaching high tide and/or storm surge. During a high tide or storm surge, the water level of the Hudson River can rise above the level of the combined storm-sewer outfalls; as a result, the river traps the water inside the combined storm-sewer system. Water then backs up within the system, flooding low-lying elevation inland areas with storm water and at times sanitary sewage.

1.2.1 Coastal Flooding

The coastal communities of Hudson County historically have been vulnerable to coastal flood events. This can be in the form of abnormally high tides that occur roughly twice a month (coinciding with full or new moons), or from storm surges brought on by coastal storms. According to FEMA's Preliminary Flood Insurance Study of Hudson County, New Jersey (FEMA, 2013), the most severe flooding for the coastal communities of Hudson County occurs from coastal storm surges during hurricanes. Coastal storm surge water is brought into the area from the Upper New York Bay, New York Bay and the Kill Van Kull, where it is then driven by winds upriver along the Hackensack, Passaic and Hudson Rivers, eventually overflowing onto the shoreline communities. The duration of coastal surges can be increased if the storm also brings about high amounts of rainfall. For example, in 2011, Hurricane Irene brought a five-foot storm surge to the Hudson River, flooding parts of Jersey City and Hoboken, along with 10 inches of rainfall. After the storm passed, flooding conditions remained because the vast amount of rainfall from the storm was draining through tributaries to the Hudson River, which was already swollen by the storm surge.

The coastal surge can be further exacerbated if it coincides with a high tide. For example, a strong storm surge on the Hackensack River on November 25, 1950 resulted in flood waters of 6.5 feet (nine feet above the low-tide level). If this coastal storm surge had occurred during high tide, flood levels would have reached 12 feet. A situation like this occurred during Superstorm Sandy; the storm surge coincided with a full moon, which caused an abnormally high tide. This factor significantly contributed to Superstorm Sandy's devastating flooding of the Study Area.

Superstorm Sandy exposed the vulnerabilities within the Study Area by flooding the coastal areas of Jersey City, Weehawken and Hoboken, as well as over two thirds of the City of Hoboken's low-lying elevation interior areas. Coastal storm surge waters flooded electric utility substations and transformers; power was not restored to many Jersey City and Hoboken residents for nearly two weeks. In addition, the storm surge flooded critical transportation infrastructure, including the Port Authority Trans Hudson (PATH) line at the Hoboken Terminal. Service on this line was not restored for several months, impacting 10,000-15,000 commuters on a daily basis

Studies conducted by the Stevens Institute of Technology Davidson Laboratory (Davidson Laboratory Technical Report TR-2933, October 2014) found that approximately 466 million gallons of water inundated the interior areas of Hoboken. The water entered at the lowest areas of elevation. Within the Study Area, there were two main entry points: the area around Long Slip Canal and Hoboken Terminal in the south of Hoboken, and Weehawken Cove in the north. In the south, the surface elevation ranges between two and five feet above sea level in and around Warrington Plaza and the Hoboken Terminal. Superstorm Sandy brought approximately 11 feet of coastal storm surge water into Warrington Plaza and Hoboken Terminal, resulting in flood waters of between six to nine feet above ground elevation In the area around Weehawken Cove, the elevations range between six and seven feet above sea level. When these elevations are compared to the storm surge levels caused by Superstorm Sandy, the degree of flooding becomes apparent.

The southern and northern low-lying elevation areas of the Study Area, along the Hudson River, acted as an inlet for flood waters into western Hoboken (see Figure 4). During Superstorm Sandy, according to the Stevens Study, approximately 232 million gallons of water entered at the southern breach point, to the south of the Hoboken Terminal. Approximately 78 million gallons of this water remained within the NJ TRANSIT rail yard, the balance of the water (154 million gallons) entered the western portion of the Study Area. Of the portion that entered from the south, 98 million gallons flowed across the rail yard before entering Hoboken along Observer Highway at Park and Willow Avenues, and 56 million gallons moved through Long Slip Canal towards Marin Boulevard. Some water passed from southwest Hoboken into Jersey City via Marin Boulevard, Grove Street and Jersey Avenue, which run beneath the Hudson Bergen Light Rail and NJ TRANSIT rail crossings. In addition, 191 million gallons of coastal storm surge water entered through northern Hoboken, in and around Weehawken Cove. This water flowed to the west into Weehawken, and then south, into the H7, H5, and ultimately H1 sewersheds, respectively (for reference of the combined sewer system, please see Figure 5).

The ground elevation in western Hoboken is low-lying; the H1 sewershed (the southwestern area of Hoboken; see Figure 5) in particular is on average about three feet above sea level. Floodwaters were funneled in from the north and south, inundating this portion of Hoboken, as well as the western areas of the H4, H5 and H7 sewersheds. Because the coastal storm surge prevented outflow from the combined storm-sewer system (the surge water elevation was above the outflow level), the surge waters had nowhere to flow and persistent inland flooding resulted. Ultimately, the outflows were underwater and the combined storm-sewer system was unable to discharge. In addition, because the storm surge prevented sewer outflow, domestic sanitary sewage backed up in residences and businesses, posing a public health risk. Overall, Superstorm Sandy caused approximately $100 million in damages to private property and $10 million in damages to City-owned property in Hoboken. Notably, Hoboken University Medical Center (the only hospital within the Study Area, located in south-central Hoboken) suffered significant flood damage; the hospital was forced to evacuate all patients the day prior to the storm, and was not able to fully reopen until November 14, over two weeks after the storm hit. In the interim, patients were redirected to other nearby hospitals - many of which were also damaged by Superstorm Sandy.

Sea-level rise and high tides also represent distinct coastal flooding concerns. The National Oceanic and Atmospheric Administration (NOAA) estimates sea levels may rise from between 0.5 to 3.5 feet by the year 2075.

Based on these projections of sea level rise, the associated base flood elevations along the Study Area's coastline will likewise increase, further compounding the risk of flooding. High tides will increasingly overtop the existing bulkheads, particularly during storm surges, thereby inundating the low-lying areas of the community with much greater frequency. Studies have shown that in the mid-1800s, there was a 1 percent annual chance of a bulkhead being overtopped by a storm surge within the New York Harbor area; today there is a 20 to 25 percent annual chance of bulkhead overtopping (Blumberg et al, 2015). Rising sea level also means that the North Hudson Sewerage Authority (NHSA) outfalls and other critical infrastructure will be closer to mean sea level, and will be inundated more frequently during high tides. As the vertical distance between the elevation of the water and the elevation of the outfalls decreases, less intense storm surge (which happen with greater frequency than stronger storms) will have the ability to inundate the outfalls, thereby reducing the ability of the system to properly drain storm waters. This means that over time, coastal flood events are expected to occur with greater frequency, which will increase the urgency for flood risk reduction measures.

1.2.2 Systemic Inland Flooding

The NHSA, which provides storm and sanitary sewer utility service to the Study Area, has a combined sewer system that was built in two periods, during the 1850s, and from the 1920s to the 1940s. The combined sewer system handles both sanitary sewerage and storm water runoff. Hoboken is divided into seven main drainage areas (H1-H7, see Figure 5). Sewerage is conveyed through the system by gravity from its source (e.g., a residence or business) through combined sewer mains beneath street beds to the system's main interceptor pipelines. During dry conditions, a system of pump stations located within the NHSA's service area pumps the sewerage to the NHSA's Adam's Street Wastewater Treatment Plant (WWTP). This WWTP serves Hoboken, Weehawken and Union City. During rainstorms, storm water (i.e., rainfall runoff) flows into the combined sewer mains via street and curb inlets, and combines with the sanitary sewerage. If the combined sewer-flow volume exceeds the treatment volume capacity (between 32 and 36 million gallons per day) of the WWTP, a portion of the combined sewer overflow volume is pumped into the Hudson River through the various outfalls located along Hoboken's waterfront.

Inland flooding occurs when the combined sewer system is unable to outflow excess water into the Hudson River. This typically occurs when high volumes of water are brought into the combined sewer system during a high tide and/or storm surge and the outfalls are closed and are unable to discharge. Rainfall events of greater than two inches, combined with a high tide of four feet or greater, occurred 26 times in Hoboken from 2002 to 2012. This is expected to increase in frequency over time based on projections of sea levels rising. As a result, high tides and storm surges are expected to block or obstruct the outfalls for increasingly longer periods of time.

Potential flooding can be further exacerbated if rainfall occurs during high tide and during the daytime hours, when sanitary flows are highest. During a high tide or storm surge, the water level of the Hudson River can rise above the level of the combined sewer outfalls; as a result, the river traps the water inside the combined sewer system. Raw sewage and storm water then backs up through curb inlets and domestic interior plumbing, and floods streets as well as basements of homes and businesses. After flood waters recede, sewage residue (as well as residues from

diesel, gasoline and other common roadside chemicals and contaminants) coats roadways, sidewalks, homes and businesses, representing a public health risk, and necessitating cleanup subsequent to the storms.

The most significant inland flooding typically occurs in the H1 sewershed (see Figure 5). A sewershed is a division of a drainage area that is managed by a stormwater utility. The H1 sewershed is located in the southwest area of Hoboken and is bounded generally by Observer Highway to the south, Clinton Street to the east, 7th Street to the north and the NJ TRANSIT Hudson-Bergen Light Rail to the west. This sewershed is extremely low-lying, generally less than three feet above sea level. The most frequent flooding in this sewershed occurs typically around Patterson Avenue and 1st Street (in the vicinity of the 2nd Street Light Rail Station) and Jackson Street and 4th Street. This part of the Study Area is also home to several of the Hoboken Housing Authority's communities, including the Andrew Jackson Gardens and the Monroe Gardens senior housing center, whose residents (i.e., low income and/or elderly) are particularly vulnerable to the impacts from flooding.

The NHSA installed a 50-million gallon-per-day (MGD) wet-weather pump for the H1 sewershed in 2012; however, analysis in 2013 by EmNet indicated that flooding still occurs in severe storms. The pump was activated 36 times between December 2012 and August 2013; of these activations, four storm events led to flooding. In addition to the H1 sewershed, the western areas of sewersheds H4 and H5 (just to the north of H1) also experience significant flooding, notably along 9th Street between Monroe Street and Madison Street.

The Study Area's flooding is greatly exacerbated by its high degree of impervious surface coverage: the Study Area is approximately 94 percent impervious, from building footprints or paved areas such as streets, sidewalks and parking lots. This is a product of the area's population density; with a population per square mile of 39,066, Hoboken is the nation's fourth densest municipality. The area's high impervious cover means that almost all the rainfall that reaches the ground is funneled rapidly into the combined sewer system through building downspouts and street-level storm drains, instead of being discharged onto permeable ground for gradual infiltration, as would be the case in areas with lower impervious coverage. This, coupled with the inability of the system to discharge during a high tide or storm surge, results in inundation of the combined sewer system during a rainfall event and backing up of the sewer system. Ultimately, this leads to the flooding events in low-lying areas, resulting in damage to buildings, residences, cars and infrastructure.

These various factors all contribute to the need to develop a comprehensive flood risk reduction strategy to safeguard against damage to people, property and infrastructure.

1.3 Project Authorization and Regulatory Framework

This Project is funded by HUD Community Development Block Grant - Disaster Relief (CDBG-DR) funds and compliance with a full range of federal, state and local environmental laws is required, as provided in FR notice 79 FR 62182, published October 16, 2014 [Docket No. FR-5696-N-11]. The Project's compliance with all applicable environmental laws and authorities as stated in HUD regulations (24 CFR 58.5 and 58.6), will be demonstrated.

In accordance with 24 CFR 58.1(b)(1), the State of New Jersey, acting through the New Jersey Department of Community Affairs (NJDCA), has assumed environmental compliance responsibilities for the Superstorm Sandy CDBG-DR programs on behalf of HUD. The NJDCA has designated the New Jersey Department of Environmental Protection (NJDEP) to assist with the environmental review. The NJDEP has prepared this DEIS in accordance with HUD's procedures for NEPA found at 24 CFR Part 58, et al. An NOI to prepare the EIS (as defined at 40 CFR 1508.22) was published on September 4, 2015. Simultaneously, the Draft Scoping Document was made available for a 30-day public comment period, and a public meeting was held to discuss scoping on September 24, 2015, followed by drop-in sessions open to the public on September 29 and October 1, 2015. The Final Scoping Document was published on the Project website (http://www.nj.gov/dep/floodhazard/rbd-hudsonriver.htm) in November 2015.

This DEIS is being made available to the general public for comment, as well as circulated to stakeholders, organizations and government agencies that have jurisdiction by law or special expertise with respect to the proposed action. Three agencies/organizations have been identified as being cooperating agencies: U.S. Environmental Protection Agency (EPA), NJ TRANSIT and the Port Authority of New York/New Jersey (PANYNJ). Additionally, three agencies/organizations have been identified as participating agencies: Federal Transit Agency (FTA), National Marine Fisheries Service (NMFS) and Amtrak.

A Notice of Availability of this DEIS has been published in the Federal Register and local media outlets in accordance with HUD and the Council on Environmental Quality (CEQ) regulations. After a 45-day public comment period has elapsed, public comments will be addressed in a Final EIS (FEIS) The FEIS will be circulated in the same manner as the DEIS (including the publication of a Notice of Availability) and will have a comment period of 30 days. If, after the completion of the FEIS comment period, no additional significant comments are received, the NJDEP will complete a Record of Decision (ROD). The ROD designates the selected action, and provides the basis for its selection. It identifies environmental impacts as well as any required mitigation measures that were developed during the EIS process.

1.4 Funding

The Disaster Relief Appropriations Act of 2013 (Public Law 113-2, approved January 29, 2013) was enacted to assist New Jersey's and other disaster-impacted states' recovery efforts for disasters that occurred between 2011 and 2013, including Superstorm Sandy. It appropriates monies targeted for disaster recovery to various federal agencies. Among those monies, the federal government appropriated $16 billion in CDBG-DR funds to be split among states that experienced natural disasters from 2011 to 2013, which the President declared to be Major Disasters. These CDBG-DR funds are administered by HUD and are to be used to address unmet disaster recovery needs, including funding needs not satisfied by other public or private funding sources like Federal Emergency Management Agency (FEMA) Individual Assistance, Small Business Administration Disaster Loans or private insurance. And, as a precondition to receiving CDBG-DR funds, New Jersey was required to submit a comprehensive Action Plan that detailed its unmet needs and described the proposed uses of CDBG-DR funds to address those needs.

The CDBG-DR Action Plan was developed by the NJDCA and approved on April 29, 2013. The Action Plan proposes a range of programs to provide relief following the extensive devastation caused by the storm to the affected residential/business communities and infrastructure. The Action Plan is updated periodically, and Amendment 12 "Substantial Amendment for the Third Allocation of CDBG-DR Funds" was approved on April 20, 2015. Amendment 12 was prepared pursuant to FR-5696-N-11, in order to access the third round of CDBG-DR funds allocated for the New Jersey RBD projects. Amendment 12 provides details on funding, timeline and citizen participation with regard to the Project. Another amendment to the Action Plan will be required to finalize the allocation of funding towards the Preferred Alternative that will be identified through this NEPA process.

In the Federal Register notice announcing award of this funding (79 Federal Register 62182), HUD provided the following direction, “CDBG-DR funds are provided to assist in the implementation of the first phase (“Phase 1”) of the proposal titled “Resist, Delay, Store, Discharge.” Page 14 of the April 2014 Resist, Delay, Store, Discharge final proposal states that Phase 1 includes: (1) a master plan for the entire strategy, (2) studies and pilot projects on various aspects of the overall strategy and (3) the following catalytic projects: coastal defense at Hoboken Station and surroundings, coastal defense at Weehawken Cove, pump station and greenbelt CSO wetland pilot project. Therefore, the current HUD funding will be provided for the implementation of Phase 1 elements only. This includes the environmental impact analysis of the overall comprehensive master plan of the entire project (including Resist and Delay, Store, Discharge), and the construction of the Resist components. The Delay, Store, Discharge (DSD) elements would be implemented separately by the City of Hoboken or other partners as funding becomes available.

2.0 PURPOSE AND NEED

The purpose and need statement for the Project was developed through a comprehensive process that began with the development of the original Rebuild by Design proposal submitted to HUD for funding, continued through the public scoping process and concept and alternative development for the EIS. Key stakeholders, including elected officials, agencies with regulatory authority, community leaders and the general public were involved at each stage.

2.1 Purpose

The Study Area, comprising the entire City of Hoboken, and adjacent areas of Weehawken and Jersey City (see Section 1.1), is vulnerable to flooding from both coastal storm surge and inland rainfall events. The purpose of the Project is to reduce the flood risk to flooding areas within the Study Area. The Project intends to minimize the impacts from surge and rainfall flood events on the community, including adverse impacts to public health, while providing benefits that will enhance the urban condition, recognizing the unique challenges that exist within a highly developed urban area.

2.2 Need

The historic flooding, and the high likelihood of future flood events from both rainfall and coastal surge flooding, has a tremendous impact on the lives of Study Area residents from a health and safety and economic perspective. When critical infrastructure, including fire stations, hospitals, and a waste water treatment plant (Figure 6) is impacted, it affects the welfare of the entire community. The economic livelihood of the community is diminished by the business disruptions caused by flooding and continual costs to repair and restore homes and businesses, with costs often exceeding the average National Flood Insurance claim award. The future potential for flooding is significant based on Hoboken's topography and the need for a project that minimizes flooding is critical to the health and safety and economic vitality of Hoboken and its affected neighbors in Weehawken and Jersey City.

The Study Area is a very dense urban area of Hudson County that is situated along the Hudson River directly west of Manhattan, New York. The Study Area is vulnerable to two interconnected types of flooding: coastal flooding from storm surge and high tide, as well as systemic inland (rainfall) flooding from medium (generally a 5-year, 24-hour) to high (generally over 10-year, 24 hour) rainfall events.

- Coastal flooding happens with much less frequency than rainfall flooding events, but can devastate widespread areas of the Study Area and cause significant economic damage and safety concerns.
- Rainfall-induced flooding occurs with significantly greater frequency than coastal flooding, but causes less severe economic damage and safety concerns.

The flooding problems for both coastal flooding and rainfall-induced flooding can be attributed to several factors, including naturally low topography and proximity to waterways; significant areas impervious ground coverage which

causes surface runoff; existing combined storm sewer infrastructure which cannot handle the volume of water during significant rainfall events and insufficient storm sewer discharge capability, particularly during high tide.

The topography of the Study Area is highest along the east-central portion abutting the coastline of the Hudson River at Castle Point. From here, the land slopes gently downward to the north (towards Weehawken Cove), south (towards the Hoboken Terminal and Jersey City) and to the west (towards the foot of the Palisades). This topography reflects the Study Area's history; when originally settled, Castle Point was an island surrounded to the north, south and west by wetlands. These wetlands were gradually filled in as the area was developed. Today, these areas – in particular those to the west – are still extremely low-lying, in some places no more than three feet above sea level.

The City of Hoboken's exposure to flood hazard risks is evident by the number of properties included in the FEMA National Flood Insurance Program (NFIP). The NFIP is intended to reduce the financial and recurring impact of flooding on private and public structures by providing affordable insurance to property owners and encouraging adoption of floodplain management regulations. Mortgage lenders for properties within the Special Flood Hazard Area (SFHA) (areas with a 1 percent annual chance of flooding, also referred to as the base floodplain or the 100-year floodplain) require owners to obtain flood insurance from the NFIP. In addition, property owners receiving awards following presidentially-declared disasters (such as Superstorm Sandy) are also often required to obtain NFIP insurance. According to NFIP statistics (https://www.fema.gov/policy-claim-statistics-flood-insurance), as of August 31, 2016, the City of Hoboken had 9,446 NFIP policies in place (the highest in Hudson County), with premiums totaling $7,213,754 (the highest in Hudson County and fifth highest in New Jersey). In addition, the overall liability to the NFIP from property owners in Hoboken was over $2 billion (third highest in New Jersey) with an average claim amount of $26,733.

The need for the Project that minimizes the impacts from coastal and rainfall flooding is necessary and essential to protect public health and safety, and the economic vitality of the community of Hoboken and its neighbors in Weehawken and Jersey City.

2.3 Goals and Objectives

A Project is intended to create a resilient community that is able to resist and rapidly recover from disasters or other shocks with minimal outside assistance. The Project is a comprehensive urban water strategy whose overall purpose is to reduce flood hazard risks, and which seeks to leverage resiliency investment to enhance the urban condition. The ability to meet this purpose will be measured in terms of Goals and Objectives. Goals (in italics below) are overarching principles that guide decision-making. Goals are measured in terms of Objectives, which are measurable steps to meet the Goal. The Goals and Objectives for the Project are:

- Goal: Contribute to Community Resiliency:
- Objective: The Project will seek to integrate flood hazard risk reduction strategies with emergency, civic, and cultural assets. The Project will reduce flood risks within the Study Area, leading to improved resiliency and the protection of accessibility and on-going operations of services (including protecting physical

infrastructure such as hospitals, fire stations and police department buildings as well as roadways and transit resources). This would allow these key assets to support emergency preparedness and community resiliency during and after flood events.

- Goal: Reduce Risks to Public Health:
- Objective: In addition to providing protection to critical healthcare infrastructure (such as local hospitals and emergency preparedness services), the Project will aim to reduce the adverse health impacts that result from combined sewage backups onto streets, and within businesses and residences, through a reduction in storm water infiltration into the existing combined sewer collection system.

- Goal: Contribute to On-going Community Efforts to Reduce FEMA Flood Insurance Rates:
- Objective: The City of Hoboken's exposure to flood risks has resulted in some of the highest insurance premiums in the state. The City has long had a goal of reducing those rates through a number of comprehensive flood risk reduction programs, such as those identified in the City's Green Infrastructure Plan. The NFIP's Community Rating System (CRS) allows municipalities to reduce their flood insurance rates through implementation of comprehensive floodplain management. The Project will propose concepts and alternatives that are consistent with Hoboken's overall effort of reducing FEMA Flood Insurance Rates.

- Goal: Delivery of Co-Benefits:
- Objective: Where possible, the Project will seek to integrate the flood hazard risk reduction strategy with civic, cultural and recreational values. The Project will look to incorporate active and passive recreational uses, multi-use facilities, and other design elements that integrate the Project into the fabric of the community. In this way, the Project will complement local strategies for future growth.

- Goal: Connectivity to the Waterfront:
- Objective: The Study Area's waterfront is currently the location of a vast length of interconnected parks and public walkways which contribute to the vibrancy of the community. The Project will aim to incorporate features that do not restrict access to the waterfront. Where feasible, the Project will build upon, and enhance, existing waterfront access points while providing flood risk reduction.

- Goal: Activation of Public Space:
- Objective: The Project will develop concepts that reduce risks to private and public property from flood impacts while also incorporating design elements that activate public and recreational spaces, thereby enhancing quality of life for the community.

- Goal: Consider Impacts from Climate Change:
- Objective: The Project will take into account the projected impacts from climate change, particularly as it relates to sea-level rise and its impacts on the frequency and degree of flooding.

3.0 BUILD ALTERNATIVES

NEPA documents must evaluate all reasonable alternatives (40 CFR 1502.14). The alternatives to be considered in any NEPA document are driven by the purpose and need for the action. The purpose and need for the Project is to reduce the potential for and magnitude of flooding impacts arising from both coastal storm surge and rainfall events (see Chapter 2.0 Purpose and Need). The success of constructing a reliable and permanent comprehensive flood risk reduction system relies upon designing Project approaches that consider existing infrastructure and environmental constraints, while also designing a flood risk reduction system in accordance with the regulatory standards (such as FEMA flood elevation standards, the NJDEP Flood Hazard Area Control Act, and local floodplain ordinances).

The following three Build Alternatives were developed through a year-long concept development process that considered engineering and environmental constraints while meeting the project's stated purpose and need. The project team met with stakeholders – public and private – as well as the community at-large to develop these project concepts. Concepts were eliminated from further consideration if they were determined to be infeasible, either due to engineering constraints or due to excessive time required to obtain permits. The concepts that were not eliminated were further refined into the following three Build Alternatives. The EIS will evaluate these as well as a No Action Alternative.

All resist structure heights described in this section are approximate. Structure heights will be finalized as part of the project's final design process.

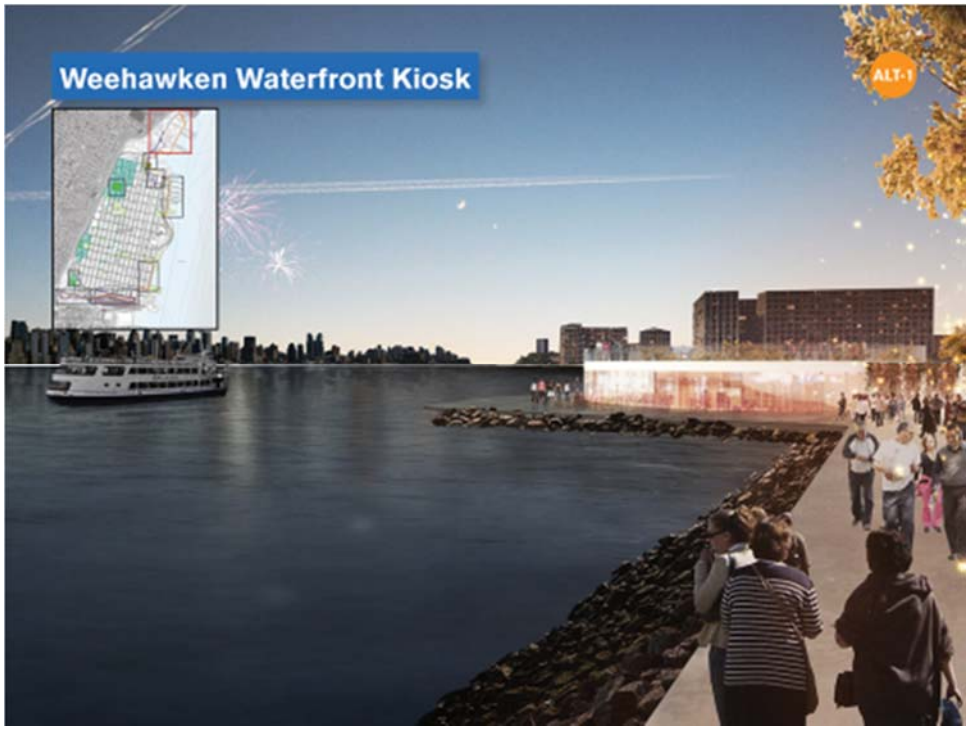
3.1 Alternative 1

Resist Alignment

Alternative 1 (which was developed from the earlier Concept B and components of the southern alignment of Concept E) provides coastal flood risk reduction to approximately 98 percent of the population within the Study Area 100-year floodplain.

Alternative 1 provides the greatest level of flood risk reduction by locating the resist structures primarily along the waterfront. This alternative's resist structure generally follows the waterfront from the Lincoln Tunnel in Weehawken south to Weehawken Cove where it is envisioned that a boathouse will be incorporated into the structure. The resist structure at Lincoln Harbor ranges from 7.5 to 15.5 feet above ground level (note that all references to resist infrastructure height are in relation to height above ground level) and nine feet along the Cove. Urban placemaking amenities under consideration in this area include a new Lincoln Harbor ferry stop (see Photograph 1) and an improved park space along the north of Weehawken Cove (in the area of the existing park adjacent to Harbor Boulevard). In addition, a bermed and terraced Cove Park will be incorporated into the southwest corner of Weehawken Cove. This would include existing undeveloped land as well as the currently-developed Cove Park

(adjacent to Harborside Lofts at 1500 Garden Street). Potential amenities at this park may include playgrounds, lawn areas, game courts, and a viewing deck overlooking Weehawken Cove (see Photograph 2).



Photograph 1: Lincoln Harbor Ferry Stop

Photograph 2: Cove Park

The alignment continues around the waterside of the Tea Building, at a height of between nine and 12.5 feet, and heads south in front of Maxwell Place at about nine feet in height. The resist structure continues south along the waterfront to the intersection of Sinatra Drive North and Frank Sinatra Drive, just south of Maxwell Place Park where the ground elevation begins to rise, and the wall tapers down to meet it at height of one foot. There will be a series of gates along the waterfront to allow access onto piers and across road intersections during non-flood conditions. Possible designs for the resist structure in this area include an elevated promenade north of the Tea Building, raised terraced parks adjacent to Shipyard Park, and bermed/terraced park areas at the location of the existing Maxwell Place Park (see Photograph 3).

Photograph 3: Maxwell Place Park

The resist structure also has a component along Sinatra Drive from 4th Street to 1st Street, in South Hoboken, where the design may consist of an elevated walkway and park space (between 2.5 feet and one foot in height along Sinatra Drive) that ties into a deployable system running east/west on 1st Street (up to 7.5 feet high). In the southern portion of the Study Area, two options will be analyzed: Option 1 features an alignment south of Observer Highway, within the rail yard (south of the proposed Hoboken Yard Redevelopment Area) at approximately five to 11 feet in height. Option 2 includes an alignment along Observer Highway from Washington Street to Marin Boulevard, on an alignment that runs behind NJ TRANSIT offices at a height of about 11 feet. The alignment includes gates for access at various locations including the Marin Boulevard, Grove Street and Newark Avenue underpasses beneath the rail lines, as well as protection where HBLR tracks pass below the NJ TRANSIT overpass in the southwest corner of the Study Area. Urban amenities in these areas include lighting, murals, seating, plantings and wayfinding/signage. Steel sheeting will also be installed along the NJ TRANSIT railroad embankment.

Delay, Store, Discharge

The DSD elements of the Project consist of three large stormwater detention facilities and approximately 61 small tanks (ROW sites) that will include new and/or improved stormwater management techniques designed to complement other efforts by the City of Hoboken as part of the Green Infrastructure Strategic Plan and multiple redevelopment plans (discussed further under Land Use). Details on individual sites and specific plans have been developed as part of the feasibility design. The text below describes the major components that comprise this element of the Project. The location of the proposed facilities are based on studies of the existing flooding "hotspots" in Hoboken. Additionally, two new outfalls are proposed associated with the DSD sites.

BASF Site

The northwest corner of Hoboken south from the NHSA Treatment Plan is a natural topographical low point and catchment area where collection and delay/storage of stormwater can be enhanced by the development of the Northwest Park (BASF Property). The 4.3-acre property was acquired by the City of Hoboken and includes the property at Block 107, Lot 1. The City has recently conducted an Environmental Assessment for the acquisition of this property. The site, which is currently paved and impermeable, is planned for conversion to green park space with an underground stormwater storage/holding tank. A new pump and outfall would be linked to this facility to provide a discharge from the overall catchment area. Amenities under consideration for this park follow three themes: destination, recreational and ecological. A destination park provides for trails and urban landscape features, a recreational park provides for developed recreational uses such as ball fields and skateboard areas and an ecological park provides an opportunity for the public to engage with native vegetation and wildlife.

NJ TRANSIT Site

The area surrounded by the Hoboken Housing Authority (HHA) at Jackson and Harrison Streets from 2nd Street to 6th Street also serves as a natural low-lying catchment area. A high level storm sewer collection system will be added in this 17-acre development to support the discharge component of the Site and direct the stormwater overflow towards the west. On the west side of this neighborhood, a stormwater tank will be incorporated along the light rail line to provide storage of the water drained from the HHA area. A pump station would be incorporated to discharge overflows from the stormwater tank into the existing ditch located at the west side of the NJ TRANSIT Light Rail. NJ TRANSIT ditch currently conveys runoff from the Light Rail property and the Palisades Hill slope to an existing discharge at the Hudson River. Urban amenities under consideration include active and passive recreational options, such as playgrounds, green space and planted areas.

Block 10 Site

The site is located in the southwestern corner of Hoboken adjacent to Academy Bus facility and south of Paterson Avenue. Portions of this currently-paved parcel will be converted to a permeable park space allowing water to infiltrate into the ground. A high level storm sewer collection system will be added to this 8.0 acre watershed, stormwater runoff will be conveyed to a proposed underground detention facility where peak flows will be controlled and delayed before discharging into the existing NHSA combined sewer. Urban amenities under consideration include active and passive recreational options such as playgrounds, green space and game courts. The City of Hoboken intends to proceed with acquisition of this property after the Record of Decision (ROD) is issued for the Project.

Pump Stations

Three pump stations will be required as part of the discharge component. One pump station is proposed to discharge the overflow from the proposed NJ TRANSIT site detention facility, a force main from the pump station will cross under the HBLR and discharge to the existing ditch located at the west side of the HBLR tracks. A second pump station is required to discharge overflows from the BASF site detention tank. A 2,700 foot long force main will convey the runoff to a new discharge proposed at Weehawken Cove; and a third pump is proposed to the north of Clinton Street (north end of the existing NJ TRANSIT ditch) in the vicinity of the NHSA treatment plant. The purpose of the

Clinton Street pump station is to release flows from the ditch to compensate the additional flow discharged from the NJ TRANSIT site, and to prevent surcharge of the existing ditch during backflow conditions. A 720-foot long force main will convey the runoff to a new discharge proposed at Weehawken Cove.

Two new outfall pipes in northern Weehawken Cove are proposed as the discharge component of the Project. One outfall would drain the flow of the existing ditch running along the western side of the HBLR line. This outfall is proposed to be located in the northern part of the Cove near Lincoln Harbor. The second outfall is proposed to be located north of Cove Park to drain the BASF site's catchment area via force main discharge.

Construction and Implementation

Construction for resist infrastructure of this alternative would last approximately 44 months and need to be completed by September 2022. The construction would occur concurrently for the northern and southern resist features. Equipment required for this project includes: dump trucks, back hoes, pile drivers, concrete trucks and other assorted delivery trucks. Some street closures will be required, in particular for gate construction. Pile driving will be required over a 10 month period. A total of 8-9,000 crew days will be required to complete this construction.

Recognizing funding limitations, the DSD portion under Alternative 1 is anticipated to be constructed over the next 15 to 20 years. DSD represent the framework for a future storm water strategy that will need to be implemented by the City of Hoboken and other partners, and can be integrated into the city's existing plans.

Due to the project being in the early stages of planning and design, there are many unknown variables. Modifications to design may arise from obtaining more accurate existing information or other unforeseen deviations from the feasibility study brought about by outside sources (such as more accurate information regarding location of utilities). As a result, the contingency is approximately 25% of the construction and engineering cost.

The construction and final design costs of Resist and DSD are estimated as follows.

Table 3-1 – Alternative 1 Construction Costs

	ESTIMATED COST (MILLIONS)
Estimated Resist Cost	$433.1 to $485.5
Estimated Resist Contingency Cost	$98.4 to $111.6
Estimated Total Resist Cost	$531.5 to $597.1
Estimated DSD Cost	$126.4 and $148

Source: Dewberry 2015-2017

These amounts are estimates of the cost to construct Resist and DSD, as well as estimated cost factors for construction and engineering project contingencies.

3.2 Alternative 2

Resist Alignment

Alternative 2 was developed from the earlier Concept E with two modifications. First, the northern Hoboken portion of the alignment along the Tea Building waterfront walkway was moved to 15th Street (south of the Tea Building) to maintain a distinction from Alternative 1. Second, because of the length and height of structure required along Hudson Street or Shipyard Lane, as well as the significant number of gates required for each, the alignment was moved to Washington Street. Washington Street was chosen due to the width of the street to accommodate the necessary structure and potential to blend structural amenities into the commercial nature of the area. This alternative provides coastal flood risk reduction to approximately 86 percent of the population residing within the Study Area 100-year floodplain.

This alternative's resist structure begins near the HBLR Lincoln Harbor station at Waterfront Terrace at an initial height of about 6.5 feet, traveling south towards Harbor Boulevard at a height of between9.5 to 11.5 feet. Opportunities for urban enhancement in the northern portion of the Study Area under Alternative 2 are limited due to siting conditions and include lighting, murals and seating. The resist features then run south along Weehawken Cove at nine feet where it is envisioned that a boathouse will be incorporated into the structure. In addition, a bermed and terraced Cove Park will be incorporated into the southwest corner of the Weehawken Cove. This would include existing undeveloped land as well as the currently-developed Cove Park (adjacent to Harborside Lofts at 1500 Garden Street). Potential amenities at this park may include playgrounds, lawn areas, game courts, and a viewing deck overlooking Weehawken Cove (see Photograph 2).

The structure continues to 15th Street, and travels east along 15th Street from the northern end of Garden to Washington Streets where it will be about seven to eight feet high. Urban amenities in this area may include a bermed park long 15th Street in front of the Tea Building. The resist feature then continues south along Washington Street, tapering to grade level at 13th Street. Street crossings will feature gates to allow for access during non-flood conditions. Consideration will be given to adapting the use of structures in a way to provide urban amenities and landscape enhancements, including elevated walkways and pocket parks, plantings and/or seating areas along Washington Street (see Photograph 4).

Photograph 4: Washington Street from 15th Street, facing south

There will then be two options in the south, along the Hoboken Terminal rail yard: Option 1 will feature an alignment south of Observer Highway, within the rail yard (south of the proposed Hoboken Yard Redevelopment Area) at approximately five to 11 feet in height. Option 2 will include an alignment along Observer Highway from Washington Street directly to Marin Boulevard. The alignment includes gates for access at various locations including the Marin Boulevard, Grove Street and Newark Avenue underpasses beneath the rail lines, as well as protection where HBLR tracks pass below the NJ TRANSIT overpass in the southwest corner of the Study Area. Urban amenities in these areas include lighting, murals, seating, plantings and wayfinding/signage. Steel sheeting will also be installed along the NJ TRANSIT railroad embankment.

During a coastal storm surge event, water from the Hudson River is expected to inundate unprotected areas of the Hoboken waterfront. If the river water overtops the waterfront bulkhead during a storm event, water can enter into the storm sewer system through existing inlets and unsealed manhole covers. While Alternative 1 would prevent a storm surge from entering the city streets, Alternative 2 leaves portions of the city streets and sewer system unprotected. To prevent water intrusion into the existing sewers under Alternative 2, a separation of the sanitary/storm water collection system is proposed by the construction of a “High Level" storm sewer collection system. In addition to the installation of this new storm sewer system, the existing NHSA combined sewer inlets and manholes would be sealed and lined. This proposed drainage would be designed to prevent additional sewer backflow that could cause major flooding issues within the Alternative 2 protected areas during a storm surge event. Storm water collected in this “High Level” storm sewer system would gravity flow into the Hudson River.

Delay, Store, Discharge

See above description under Alternative 1.

Construction and Implementation

Construction for resist infrastructure under this alternative would last approximately 44 months and need to be completed by September 2022. The construction would occur concurrently for the northern and southern resist features. Equipment required for this project includes: dump trucks, back hoes, pile drivers, concrete trucks and other assorted delivery trucks. Some street closures will be required, in particular for gate construction. Pile driving will be required over 12 months. A total of 6-7,000 crew days will be required to complete this construction.

Recognizing funding limitations, the DSD portion under Alternative 2 is anticipated to be constructed over the next 15 to 20 years. DSD represent the framework for a future storm water strategy that will need to be implemented by the City of Hoboken and other partners, and can be integrated into the city's existing plans.

Due to the project being in the early stages of planning and design, there are many unknown variables. Modifications to design may arise from obtaining more accurate existing information or other unforeseen deviations from the feasibility study brought about by outside sources (such as more accurate information regarding location of utilities). As a result, the contingency is approximately 25% of the construction and engineering cost.

The construction and final design costs of Resist and DSD are estimated as follows.

Table 3-2: Alternative 2 Construction Costs

	ESTIMATED COST (MILLIONS)
Estimated Resist Cost	$193.8 to $224.7
Estimated Resist Contingency Cost	$44.4 to $52.2
Estimated Total Resist Cost	$238.2 and $276.9
Estimated DSD Cost	$126.4 and $148

Source: Dewberry, 2015-2017

These amounts are estimates of the cost to construct Resist and DSD, as well as estimated cost factors for construction and engineering project contingencies.

3.3 Alternative 3

Resist Alignment

Alternative 3 was developed from the earlier Concept A, which was revised to relocate portions of the resist alignment to areas that would minimize impacts on the community. The alternative utilizes a private alleyway that

parallels 14th Street to extend to Washington Street to meet the same flood resist goals. Washington Street was again chosen due to the width of the street to accommodate the necessary structure and potential to blend structural amenities into the commercial nature of the area. This alternative provides coastal flood risk reduction to approximately 85 percent of the population residing within the Study Area 100-year floodplain.

This alternative's resist structure begins at 6.5 feet in height near the HBLR Lincoln Harbor station at Waterfront Terrace, traveling south along HBLR rising to about 11 feet in height, and then continuing south along Weehawken Cove towards Garden Street at nine feet in height. Opportunities for urban enhancement in the northern portion of the Study Area under Alternative 3 are limited due to siting conditions and include lighting, murals and seating. It is envisioned that a boathouse will be incorporated into the structure. In addition, a bermed and terraced Cove Park will be incorporated into the southwest corner of the Weehawken Cove. This would include existing undeveloped land as well as the currently-developed Cove Park (adjacent to Harborside Lofts at 1500 Garden Street). Potential amenities at this park may include playgrounds, lawn areas, game courts, and a viewing deck overlooking Weehawken Cove (see Photograph 2).

A structure would then down the east side of Garden Street adjacent to the west of the Hudson Tea Parking Garage, starting at eight feet in height and tapering down to five feet in height. The structure along Garden Street may consist of an elevated planter with seating. The structure would then continue down the alleyway midway between 15th and 14th Streets from Garden to Washington Streets at four feet in height. Urban amenities within the alleyway could include planters (see Photograph 5). The structure would then travel south along Washington Street at 3.5 feet in height, tapering down to grade level at 13th Street. Street crossings will feature gates to allow for access during non-flood conditions. Consideration will be given to adapting the use of structures in a way to provide urban amenities such as seating and landscape enhancements.

Photograph 5: Resist Feature along the West Alleyway

There will then be two options: Option 1 will include an alignment south of Observer Highway, within the rail yard (south of the proposed Hoboken Yard Redevelopment Area) at approximately five to 11 feet in height. Option 2 will feature an alignment along Observer Highway from Washington Street directly to Marin Boulevard. The alignment includes gates for access at various locations including at the Marin Boulevard, Grove Street and Newark Avenue underpasses beneath the rail lines, as well as protection where HBLR tracks pass below the NJ TRANSIT overpass in the southwest corner of the Study Area. Urban amenities in these areas include lighting, murals, seating, plantings and wayfinding/signage. Steel sheeting will also be installed along the NJ TRANSIT railroad embankment.

During a coastal storm surge event, water from the Hudson River is expected to inundate unprotected areas of the Hoboken waterfront. If the river water overtops the waterfront bulkhead during a storm event, water can enter into the storm sewer system through existing inlets and unsealed manhole covers. While Alternative 1 would prevent a storm surge from entering the city streets, Alternative 3 leaves portions of the city streets and sewer system unprotected. To prevent water intrusion into the existing sewers under Alternative 3, a separation of the sanitary/storm water collection system is proposed by the construction of a “High Level" storm sewer collection system. In addition to the installation of this new storm sewer system, the existing NHSA combined sewer inlets and manholes would be sealed and lined. This proposed drainage would be designed to prevent additional sewer backflow that could cause major flooding issues within the Alternative 3 protected areas during a storm surge event. Storm water collected in this “High Level” storm sewer system would gravity flow into the Hudson River.

Delay, Store, Discharge

See above description under Alternative 1.

Construction and Implementation

Construction for resist infrastructure in Alternative 3 would last approximately 44 months and need to be completed by September 2022. The construction would occur concurrently for the northern and southern resist features. Equipment required for this project includes: dump trucks, back hoes, pile drivers, concrete trucks and other assorted delivery trucks. Some street closures will be required, in particular for gate construction. Pile driving will be required over nine months. A total of 6,000 crew days will be required to complete this construction.

Recognizing funding limitations, the DSD portion under Alternative 3 is anticipated to be constructed over the next 15 to 20 years. DSD represent the framework for a future storm water strategy that will need to be implemented by the City of Hoboken and other partners, and can be integrated into the city's existing plans.

Due to the project being in the early stages of planning and design, there are many unknown variables. Modifications to design may arise from obtaining more accurate existing information or other unforeseen deviations from the feasibility study brought about by outside sources (such as more accurate information regarding location of utilities). As a result, the contingency is approximately 25% of the construction and engineering cost.

The construction and final design costs of Resist and DSD are estimated as follows.

Table 3-3: Alternative 3 Construction Costs

	ESTIMATED COST (MILLIONS)
Estimated Resist Cost	$185.4 to $220.6
Estimated Resist Contingency Cost	$39.1 to $47.9
Estimated Total Resist Cost	$224.5 and $268.5
Estimated DSD Cost	$126.4 and $148

Source: Dewberry, 2015-2017

These amounts are estimates of the cost to construct Resist and DSD, as well as estimated cost factors for construction and engineering project contingencies.

3.4 No Action Alternative

The No Action Alternative provides a baseline condition that allows a comparison between proposed actions and the act of doing nothing. Under this alternative, no Resist structure would be constructed. While the City of Hoboken may continue with plans to develop the BASF and Block 10 sites, a comprehensive DSD system would not be built. The No Action Alternative also includes other ongoing or planned projects in the Study Area that are proposed to be completed by 2022. This included the following projects:

1. Long Slip Fill and Rail Enhancement Project (NJ TRANSIT)
2. Property Development between Long Slip Canal and 14th Street, Jersey City (Newport Associates)
3. H1 and H5 Wet Weather Pump Stations (NHSA)
4. Southwest Resiliency Park (City of Hoboken)
5. City Hall Green Infrastructure Improvements (City of Hoboken)
6. Washington Street Rain Gardens (City of Hoboken)

4.0 METHODOLOGY

The methodology for the TES involved three major tasks: data collection and review, site reconnaissance, and assessment of potential impacts. Available information regarding existing conditions was assembled and reviewed to describe the Study Area relative to geology, soils, groundwater, surface water quality, aquatic ecology, floodplains, tidelands, wetlands and upland vegetation and wildlife. For purposes of this analysis, the Study Area is defined as a 1,253-acre area which includes 1,020 acres of uplands and 233 acres of the Hudson River (see Figure 2). A "Natural Ecosystems Analysis Area" (see Figure 10) was also defined to include a 150-foot buffer around the Study Area in order to evaluate impacts to natural resources. For example, noise generated from construction activities along the Project boundary could travel up to 150 feet beyond the Study Area potentially affecting any sensitive wildlife in this buffer zone. The Project Area, which is defined as the potential area of disturbance during construction activities, is also depicted on Figure 10.

Section 5.0, Existing Conditions, presents the information obtained from the Natural Ecosystems Analysis Area reconnaissance, review of federal and state studies and mapping, wetland delineation, and agency coordination. Resources that were reviewed, but which yielded no pertinent information, are not cited in this report.

Existing information identified in literature and obtained from governmental and non-governmental agencies, included documents such as: studies conducted within the Lower Hudson River Estuary/Hudson River; New York/New Jersey Harbor Estuary Program; New York City Department of Environmental Protection (NYCDEP) Harbor Water Quality Survey (NYCDEP 2010b); US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps; US Environmental Protection Agency (EPA) Regional Environmental Monitoring and Assessment Program (R-EMAP); Federal Emergency Management Agency (FEMA) flood insurance rate maps; and United States Army Corps of Engineers (USACE) studies conducted as part of the New York and New Jersey Harbor Navigation Project.

The wetland study and delineation of wetlands in the Study Area was conducted in accordance with the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands - Federal Interagency Committee for Wetland Delineation. A summary of findings is provided in Section 5.8.

Federal and state regulatory agencies were contacted regarding environmental resources with potential to occur within and around the Study Area that may be affected by the proposed project activities. Requests for information on rare, threatened, or endangered species in the vicinity of the Study Area were submitted to the National Marine Fisheries Service (NMFS) and the NJDEP Natural Heritage Program (NHP). The NMFS regulates the federally-listed threatened or endangered marine species. The NHP identifies state-listed plant and animal species as well as representative habitats and ecological communities. The presence of threatened or endangered species also was reviewed using the NJDEP Landscape Project Version 3.1 data via the NJDEP GeoWeb mapping application. The federally-listed threatened and endangered freshwater and terrestrial species information, under the jurisdiction

of the USFWS, was collected from the generation of an Information for Planning and Conservation (IPaC) Trust Resource Report and Official Endangered Species List for the Study Area.

5.0 EXISTING CONDITIONS

5.1 Geology

Several different geologic units underlie the Study Area. The eastern portion of the Study Area from a point west of Clinton Street to the shoreline and from south of Observer Highway to 10th Street is underlain by Cambrian and Late Proterozoic-age Serpentinite (Czs). In New Jersey, these deposits of light yellow green to dark green stone have been exposed only along the Hudson River waterfront in Hoboken. The western portion of the Study Area, west of the Serpentinite deposits, and along the majority of the northern Study Area from 10th Street northward, is associated with the Stockton Formation (Trs). The Stockton Formation dates to the Upper Triassic and consists of primarily sandstone deposits with lesser amounts of mudstone, siltstone, and shale. A narrow swath of the Study Area, a triangular area from a point west of the intersection of Clinton and 3rd Streets, and which extends to the northeast towards the intersection of 14th Street and Frank Sinatra Drive on its northern extent and the intersection of 12th Street and Sinatra Drive on its southern extent, consists of Manhattan Schist (CZm) deposits dating to the Late Cambrian and/or Late Proterozoic. Manhattan Schist consists of medium-dark gray, medium to coarse-grained schist and gneiss deposits. Narrow swaths of the Lockatong Formation (Trl) and the Jurassic diabase (Jd) also are located along the western border of Hoboken.

In the 1700s, the area which is today the City of Hoboken was an island surrounded by water and tide marsh, in the area of Castle Point in what is now the east-central portion of the City, generally between 4th and 11th Streets. The outcroppings of serpentine rock near the Stevens Institute of Technology campus and along Sinatra Drive are remnants of this island. Much of the area to the south, west, and north of Hoboken “Island” was marsh land that over time was filled and developed. As a result, Hoboken’s topography varies from a high elevation of approximately 100 feet above sea level at Castle Point to less than five feet above sea level in a few areas in the western half of the City.

A geology map of the Study Area is provided in Figure 11.

5.2 Soils

According to the Natural Resource Conservation Service (NRCS) Web Soil Survey, a total of eight distinct soil types has been mapped within the project area (Figure 12; Table 5-1). Six of these soil types consist of urban land complex soils or composite urban land complex soils. The remaining two soil types - Greenbelt Loam (GtbA) and Laguardia Artifactual Coarse Sand (LagA) are both associated with modified landscapes in urbanized areas. Greenbelt Loam soils consist of very deep, well drained soils which formed in a mantle of human transported materials. Laguardia Artifactual Coarse Sand soils formed in a thick mantle of construction debris intermingled with human transported soil materials. The majority of the project area, the western and northern portions of Hoboken and the extreme northern portion of the project area in Weehawken, is associated with Urban Land, wet substratum soils. The majority of the eastern portion of the city consists of Urban Land, till substratum soils. The Laguardia-type soils have

been mapped in a few locations along the eastern shoreline, to the west of Weehawken Cove, and to the south and west of the Hoboken Terminal. Greenbelt-type soils have been mapped in a few small locations within the central portion of Hoboken. The soil types mapped in the Study Area are depicted on Figure 12.

Table 5-1: Soil Types Mapped within the Study Area

SOIL TYPE	HORIZON	DEPTH (INCHES)	SOIL COLOR	SOIL TEXTURE	SLOPE (%)	DRAINAGE
Greenbelt Loam (GtbA)	A	0-5	Dark Reddish Brown	Loam	0-3	Well-drained
	Bw1	5-16	Dark Reddish Brown	Loam		
	Bw2	16-30	Dark Reddish Brown	Loam		
	C	30-79	Dark Reddish Brown	Sandy Loam		
Laguardia Artifactual Coarse Sand (LagA)	A	0-8	Brown	Cobbly-artifactual coarse sandy loam	0-3	Well-drained
	BCu	8-26	Brown	Very cobbly-artifactual coarse sandy loam		
	Cu	26-79	Brown	Very cobbly-artifactual coarse sandy loam		
Urban Land, bedrock substratum (URBEDB)	M1	0-6	Not provided	Material	0-8	Not provided
	M2	6-20	Not provided	Material		
	2R	20-79	Not provided	Bedrock		
Urban Land, till substratum (URTILB)	M	0-15	Not provided	Material	0-8	Not provided
	2C	15-79	Not provided	Gravelly Sandy Loam		
Urban Land, wet substratum (URWETB)	M1	0-6	Not provided	Material	0-8	Not provided
	M2	6-20	Not provided	Material		
	2Cu	20-79	Not provided	Very Artifactual Coarse Sandy Loam		
Urban Land-Greenbelt Complex (USGRTA)	M	0-15	Not provided	Cemented Material	0-3	Not provided
	2C	15-79	Not provided	Gravelly Sandy Loam		
Urban Land-Greenbelt Complex (USGRTB)	M	0-15	Not provided	Cemented Material	3-8	Not provided
	2C	15-79	Not provided	Gravelly Sandy Loam		
Urban Land-Greenbelt Complex (USGRTC)	M	0-15	Not provided	Cemented Material	8-15	Not provided
	2C	15-79	Not provided	Gravelly Sandy Loam		

Source: USDA's Web Soil Survey software

A geotechnical investigation was completed for the Study Area. Soil borings were completed as part of this investigation, and based on the information that was collected, no problematic soil conditions were found along the proposed Resist barrier (waterfront structures) alignment. A hard stratum below a five to 45 feet thick soft clay layer was detected. This hard stratum layer would serve as a deep foundation bearing layer. The following description of soil conditions summarizes the findings in the geotechnical studies and report.

Subsurface conditions encountered throughout the Project Area are generally in agreement with the soil descriptions published in the Surficial Geology of the Jersey City (1995) and Surficial Geology of Weehawken and Central Park Quadrangle, Hudson and Essex Counties, New Jersey (1993).

The typical soil profile consists of a loose to medium-dense sand and gravel fill stratum from 15 to 50 feet deep, underlain by a cohesive soil stratum extending to depths ranging from 30 to 70 feet. This cohesive soil stratum occasionally contains interbedded silt and sand layers of varying thickness with a plasticity range from silty-clay to silt, and Standard Penetration Test (SPT-N) values ranging from 0 to 37. Thickness of the cohesive layer varied from five to 45 feet. In general, the consistency of the cohesive soil varies from very soft to very stiff. This cohesive stratum is underlain by a loose to very dense sandy glacial till stratum with N values ranging from four to greater than 100 blows per foot (bpf).

Laboratory test results from available historic borings were used for this study. The test results include grain size, specific gravity, unit weight, moisture content and Atterberg Liquid and Plastic Limits. Also, one-dimensional consolidation and triaxial compression strength tests results were available for undisturbed Shelby Tube samples.

The following generalized descriptions of the subsurface conditions in the Study Area are primarily based on interpretation of the available historic borings, laboratory test results, and the results of the additional preliminary subsurface investigation.

Stratum 1: Fill

Fill material was encountered in all test boring locations; the thickness ranged between 15 and 50 feet. The fill encountered typically consisted of loose to very dense, black, brown sand and/or gravel, with varying amounts of silt, gravel, organics, brick, coal, ash, wood, glass, refractory brick, cinder, porcelain, etc. Generally, the SPT N-values within this stratum ranged from three bpf to greater than 100 bpf indicative of a loose to very dense material. Note that gravel to boulder sized obstructions were encountered in borings along the Hudson River shorefront.

Stratum 2: Silty Clay

Below the Fill stratum, a layer of silty clay consisting of varying amounts of clayey silt, and silt was encountered in most of the test borings. This layer extended to the ranges from five to 45 feet below the Fill stratum. The relatively thinner layer ranges from five to 20 feet in thickness and was observed along the Hudson River shoreline and the north side of Hoboken. The layer thickness varies from 20 to 45 feet along the Hoboken yard and NJ TRANSIT Rail Road Embankment. The relative density of this material was very soft to very stiff with SPT N-values between weight-of-rod (WOR) or weight-of-hammer (WOH) and 37 bpf.

Stratum 3: Glacial Till

The Glacial Till layer was encountered in most of the test borings below the Fill and Silty Clay stratum. The Glacial Till typically consisted of loose to very dense reddish-brown gravel and/or sand with variable amounts of fines. The Glacial Till layer ranged between four and 50 feet in thickness. The SPT N-values ranged from four to greater than 100 bfp.

Stratum 4: Rock

Rock was encountered within the range of 50 to 100 feet below ground surface (bgs). Mostly hard sandstone or siltstone was encountered to the north of Castle Point. To the south of Castle Point, soft serpentine was encountered. Available serpentine rock core indicates highly decomposed status. Recoveries of 20 percent, 45 percent, 28 percent and 93 percent were obtained in each five-foot run length in one of the historic rock core borings at Hoboken Yard Rail. The rock quality designations (RQD), determined as a ratio of sum of rock pieces of four-inch and longer to the total run length, were found to be 0 percent, seven percent, seven percent, and 55 percent, respectively in this same core.

5.3 Groundwater

5.3.1 Regulatory Setting

Groundwater quality in New Jersey is regulated under the Safe Drinking Water Act (SDWA), which includes regulations protecting those areas identified as Sole Source Aquifers (SSA). Based on a review of SSA mapped in New Jersey, it has been determined that the Study Area is not located within or immediately adjacent to a SSA. A map of the SSA located in and adjacent to the Study Area is provided in Figure 13.

The Safe Water Drinking Act

Enacted in 1974, the SDWA is the main federal law that sets national standards to ensure the quality of Americans' drinking water, protecting Americans from health risks associated with naturally-occurring and man-made contaminants (USEPA). Because of the potential impact to groundwater due to construction activities, the potential presence of SSAs within the Study Area must be assessed. Sole-source aquifers (SSA) are those aquifers that contribute more than 50% of the drinking water to a specific area and the water would be impossible to replace if the aquifer were contaminated. Under Section 1424(e) of the Safe Drinking Water Act of 1974 (Public Law 93-523, 42 U.S.C. 300 et seq.), no project is to receive commitment for federal financial assistance if the area has an aquifer which is the sole source of drinking water for that area and if that project may contaminate the aquifer through a recharge zone so as to create a significant hazard to public health.

No water supply wells are located in Hudson County. In addition, there are no sole source aquifers located in the vicinity of the Study Area (see Figure 13). Hoboken Water Services provides the potable water supply to the Study Area. The Study Area's water supply comes from the Jersey City Reservoir in the Town of Boonton and the Split Rock Reservoir in Rockaway Township. It is then treated at the Jersey City Water Treatment Plant to meet safe drinking water standards.

5.3.2 Groundwater Levels

To evaluate groundwater levels, 10 observation wells were installed at selected locations across the Study Area. Groundwater levels were periodically monitored between October 2015 and May 2016 (Figure 14). A total of 22 field permeability tests was performed in the Study Area. The depths of soil borings were either 10 feet bgs or eight feet bgs. Permeability tests were performed in accordance with Procedures Governing Limited Geotechnical Investigations for Green Infrastructure Practices by the New York City Department of Environmental Protection (NYCDEP), Office of Green Infrastructure. The permeability tests were conducted in separate holes no closer than five feet from the borings. Groundwater was encountered less than eight feet bgs in most locations. The permeability tests were conducted at three and six feet bgs. These observation wells confirmed that groundwater is less than 10 feet bgs in many locations within the Study Area. In addition, due to past industrial uses within the Study Area, and the nature of fill used across the Study Area, it is anticipated that the near surface groundwater would be contaminated with a variety of potential pollutants, including potentially hazardous materials. This groundwater would likely be encountered during Project construction activities.

5.4 Surface Water

5.4.1 Regulatory Setting

Surface water in New Jersey is protected under both state and federal regulations. Applicable regulations for surface water in the Natural Resources Ecosystems Analysis Area are the Clean Water Act (CWA), the Water Pollution Control Act, and the Rivers and Harbors Act of 1899.

The objective of the Clean Water Act (CWA), also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, and stormwater, as well as the discharge of dredged or fill material, into navigable waters and other waters including wetlands and non-point source pollution such as atmospheric deposition and runoff.

Under Section 401 of the CWA, any applicant for a federal permit or license for an activity that may result in a discharge to navigable waters must provide to the federal agency issuing a permit, a certificate, either from the state where the discharge would occur or from an interstate water pollution control agency, that the discharge would comply with Sections 301, 302, 303, 306, 307, and 316 (b) of the CWA. Applicants for discharges to navigable waters in New Jersey must obtain a Water Quality Certification from the NJDEP as part of the permit approval process.

Section 404 (b)(1) of the Clean Water Act

The Project must comply with USACE guidelines for discharges of dredged or fill material in the waters of the United States (40 CFR Part 230). The guidelines require that no discharge shall be permitted if there is a practicable

alternative "which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."

The guidelines also require that appropriate and practicable steps be taken "which would minimize potential adverse impacts on the aquatic ecosystem." To comply with this minimization requirement, the Project alternatives have been evaluated in detail with the objective of reducing impacts to aquatic resources to the maximum extent practicable.

Most of the New Jersey laws and regulatory programs that would apply to the potential project activities fall under the regulatory responsibility of the NJDEP Division of Land Use Regulation (DLUR). DLUR reviews applications for permits to build or develop on environmentally sensitive lands such as freshwater wetlands, coastal areas, and floodplains. DLUR implements the laws through regulations or rules found in the New Jersey Administrative Code (NJAC). Stormwater management is an important part of the application review process.

Rivers and Harbors Act of 1899

For the purpose of protecting navigation and navigable channels, Section 10 of the Rivers and Harbor Act of 1899 requires authorization from the Secretary of the Army, acting through the USACE, for the construction of any structure in or over any navigable waters of the United States, the excavation from or deposition of material in these waters, or any obstruction or alteration in navigable waters of the United States. Any structures placed in navigable waters (such as pilings, piers, or bridge abutments) up to the mean high water line would be regulated pursuant to this Act. The USACE must evaluate the probable impacts, including cumulative impacts of the proposed activity, on the public interest. This statute would apply to any of the proposed build alternatives that include impacts at or below the mean high water line, including the replacement of bulkhead along the waterfront.

Water Pollution Control Act, NJSA 13:19, and Rules at NJAC 7:14A, NJAC 7:8, NJAC 7:9B, and NJAC 7:9C

The Water Pollution Control Act sets forth the state's policy to restore, enhance, and maintain the chemical, physical, and biological integrity of the State's waters; to protect public health; to safeguard fish and aquatic life and scenic and ecological values; and to enhance the domestic, municipal, recreational, industrial, and other uses of the State's waters. This Act includes responsibilities for administering the New Jersey Pollutant Discharge Elimination System (NJPDES). NJPDES applies to any discharge of a pollutant into the waters of the state or onto land or into wells from which it might flow or drain into state waters, as well as the discharge of stormwater. Under this Act, all projects requiring a federal permit for the discharge of dredged or fill material into state waters and/or adjacent wetlands require a state Water Quality Certification (pursuant to Section 401 of the Federal Clean Water Act) that ensures consistency with the New Jersey State Water Quality Standards (NJAC 7:9B). In addition, compliance with New Jersey State Ground Water Quality Standards (NJAC 7:9C) is required when discharges to groundwater subsequently discharge into surface waters; compliance with New Jersey's Stormwater Management Regulations (NJAC 7:8) is required for those projects involving greater than 0.25 acre of new impervious surface coverage or greater than one acre of land disturbance. There also are federal and state requirements for implementation of new

municipal separate storm sewer systems (MS4s), and compliance will be managed upon the selection of the preferred alternative.

The Study Area is generally level at an elevation less than 10 feet above sea level. The topography rises to the east around Garden Street and steadily increases towards a crest at Castle Point situated approximately 100 feet above sea level. The higher terrain along the eastern portion of the city represents the original highlands, the first portions of the Study Area to be historically settled. The remaining segments of the Study Area were tidal marshlands in the eighteenth and for much of the nineteenth centuries. Speilmann and Brush's Sanitary and Topographical Map of Hudson County of 1880 reflects the presence of undeveloped marshland in the majority of the Study Area from Bloomfield Street to the west, extending from Newark Street to north of 17th Street. These marshlands were fed by tidal watercourses located in the southwestern and northwestern portions of the city, Hoboken Creek and Sluice Creek, respectively. Hoboken Creek was formerly connected to the Hudson River in the area of present-day Long Slip Canal, while Sluice Creek had a tidal connection via Weehawken Cove. A third tidal watercourse, Ahasimus Creek, was located in the far southwestern portion of the Study Area, in Jersey City, and was also connected to the Hudson River near the location of Long Slip Canal. The sinuous courses of these former tidal creeks are depicted on nineteenth century maps of Hoboken, showing the creeks running from the Hudson River to the base of the Palisades (Figure 15). By the turn of the twentieth century, the creeks appear to have been filled. A discussion of potential tideland claims associated with these former tidal watercourses is provided in Section 5.7 Coastal Resources/Tidelands.

5.4.2 New Jersey Surface Water Quality Classifications

The only surface water in the Natural Ecosystems Analysis Area is the Lower Hudson River, which borders the entire eastern side of the Study Area. Seventy three percent of the Study Area upland is located within the floodplain of the Lower Hudson River, a tidally-influenced portion of the Hudson River that is part of the larger New York/New Jersey Harbor Estuary.

The Lower Hudson River Estuary is a part of NJDEP Watershed Management Area 5 – Hackensack, Hudson, Pascack. The Lower Hudson River Estuary (Hydrologic Unit Code (HUC) NJ020-30-101-170-030-01) supports a diverse community of aquatic biota; however, it is an urban estuary that has been impacted by development and stormwater/combined sewer discharges into the waters, resulting in degraded water and habitat quality, including sediment contamination.

In New Jersey, surface waters are classified based on the type of waterbody and the designated use of the waterbody. New Jersey saline waters are classified as saline estuarine (SE) and saline coastal (SC). SE waters are further classified into SE1, SE2, and SE3 based on their designated uses. The Lower Hudson River Estuary is classified by NJDEP as a Class SE2 (fishing/fish propagation) saline/estuarine surface water. The recommended best uses of Class SE2 waters are secondary contact recreation and fishing. The water quality should be sufficient for maintenance, migration and propagation of the natural and established biota; migration of diadromous fish;

maintenance of wildlife; and any other reasonable uses. Additionally, SE2 waters possess an anti-degradation designation under the classification of Category Two waters, which are protected from any measurable change in existing water quality. However, some lowering of existing water quality may be allowed by the NJDEP based on a social or economic justification.

The NJDEP is responsible for conducting and coordinating water quality assessments for all waters of the state. These assessments are reported through the New Jersey Integrated Water Quality Monitoring and Assessment Report (Integrated Report). The Integrated Reports provide effective tools for maintaining high quality waters and improving the quality of waters that do not attain their designated uses (i.e., contain impaired water bodies). The Integrated Reports describe progress toward attainment of the designated uses of surface waters of the State, as specified in the New Jersey Surface Water Quality Standards (NJAC 7:9B). These include: aquatic life, recreation, drinking water, fish/shellfish consumption, industrial and agricultural uses.

Water quality monitoring data used for the 2012 Integrated Report was generally collected between January 1, 2006 and December 31, 2010, and was used to identify high-quality waters that are fully supporting applicable designated uses, low-quality waters that are not supporting designated uses, and waters for which insufficient information is available to assess water quality. The Integrated Report also identified causes and sources of water quality problems so that appropriate strategies may be implemented by the State to maintain high quality waters, improve lower water quality waters, and gather sufficient information to assess all waters of the state.

The information provided in the Integrated Report is used by Congress, USEPA, and the State of New Jersey to establish program priorities and funding for federal and state water resource management programs for maintaining and restoring water quality, including the development of Total Maximum Daily Loads (TMDLs) for waters that do not meet surface water quality standards, despite the implementation of technology-based effluent limits, as identified on the List of Water Quality Limited Waters (303(d) List). A TMDL is a pollution budget and includes a calculation of the maximum amount of a pollutant that can occur in a waterbody; it also allocates the necessary reductions to one or more pollutant sources. A TMDL serves as a planning tool and potential starting point for restoration or protection activities with the ultimate goal of attaining or maintaining water quality standards.

Table 5-2, below, summarizes the NJDEP's 2012 water quality findings for the Lower Hudson River Estuary.

Table 5-2: Surface Water Quality Assessment
Reporting Year 2012 Lower Hudson River Estuary
HUC NJ02030101170030-01 (USEPA, 2015)

DESIGNATED USE	DESIGNATED USE GROUP	STATUS
Aquatic Life	Fish, Shellfish, and Wildlife Protection and Propagation	Impaired
Fish Consumption	Aquatic Life Harvesting	Impaired
Secondary Contact Recreation	Recreation	Not Assessed

Source: NJDEP, 2014. Division of Water Monitoring and Standards, Bureau of Water Quality Standards and Assessment. 2012 New Jersey Integrated Report Appendix A: 2012 Final Integrated List of Waters (Assessment Unit Summary List). Available online at: http://www.state.nj.us/dep/wms/bears/docs/2012_final_integrated_list.pdf.

5.4.3 Surface Water Chemistry

As discussed above, the Lower Hudson River Estuary is an urban estuary that has been impacted by runoff from development and stormwater/combined sewer discharges into the waters. This has resulted in degraded water quality and sediment contamination.

Table 5-3, below, summarizes the NJDEP's findings in its 2012 causes of surface water quality impairment studies for the Lower Hudson River Estuary.

Table 5-3: Water Quality Causes of Impairment
Reporting Year 2012 Lower Hudson River Estuary
HUC NJ02030101170030-01

CAUSE OF IMPAIRMENT	CAUSE OF IMPAIRMENT GROUP	DESIGNATED USE(S)	STATE TMDL DEVELOPMENT STATUS
Benzo[a]pyrene (PAHs)	Toxic Organics	Fish Consumption	TMDL needed
Cause Unknown	Cause Unknown	Aquatic Life	TMDL needed
Chlordane in Fish Tissue	Pesticides	Fish Consumption	TMDL needed
DDT in Fish Tissue	Pesticides	Fish Consumption	Non-pollutant impairment
Dieldrin	Pesticides	Fish Consumption	TMDL needed
Dioxin (Including 2,3,7,8-TCDD)	Dioxins	Fish Consumption	TMDL needed
Hexachlorobenzene	Pesticides	Fish Consumption	TMDL needed
Mercury in Fish Tissue	Mercury	Fish Consumption	TMDL needed
PCB(s) in Fish Tissue	Polychlorinated Biphenyls (PCBs)	Fish Consumption	TMDL needed

Source: NJDEP, 2014. Division of Water Monitoring and Standards, Bureau of Water Quality Standards and Assessment. 2012 New Jersey Integrated Report Appendix B: Final 2012 303(d) List of Water Quality Limited Waters. Available online at http://www.nj.gov/dep/wms/bears/docs/2012_final_303(d)_list.pdf

5.4.4 Tides and Tidal Datum

Representative tide data for the Study Area is provided by the National Oceanic and Atmospheric Administration (NOAA) tide station for Union City, New Jersey, located near Baldwin Avenue. This tide station (No. 8530645) is approximately 1,000 feet to the north of the Study Area. The mean tidal range at this site is approximately 4.5 feet. The astronomical spring tidal range is approximately 5.29 feet, which is the difference between the mean high water spring (MHWS) elevation and the mean low water spring (MLWS) elevation.

Tidal data for the Study Area (latitude 40.7316; longitude -74.0310) were obtained using NOAA's VDATUM software. Results are summarized in Table 5-4, below, and are similar to NOAA's Battery Station (No. 8518750) datum (NOAA Tide Datum). The MHWS line at the site corresponds to the 2.3 foot (NAVD88) topographic elevation contour.

Table 5-4: Local Tidal Datum

DATUM	NOAA BATTERY STATION (COMPLETE 1983-2001 EPOCH) (FEET, STND*)	NOAA BATTERY STATION(COMPLETE 1983-2001 EPOCH) (FEET, MLLW*)	PROJECT SITE (FEET, MLLW***)	PROJECT SITE (FEET, NAVD-88***)
MHWS****	-	5.23	5.11	2.34
MHHW	8.34	5.05	4.99	2.31
MHW	8.02	4.73	4.69	2.00
NAVD-88**	6.06	2.77	2.69	0.00
MSL	5.86	2.57	-	-
MTL	5.76	2.47	2.45	-0.24
MLW	3.49	0.21	0.22	-2.47
MLLW	3.29	0.00	0.00	-2.69
MLWS****	-	-0.29	-0.17	-2.94
STND*	0.00	--	-	-

* STND = Station Datum

** NAVD-88 is the current topographic survey datum

***Estimated using NOAA's VDATUM software

****Estimated using NOAA Tide Tables (for spring tidal range of 5.29 feet), about MTL.

Source: NOAA's VDatum Software. 2016. Available online at https://vdatum.noaa.gov/

5.5 Floodplains

5.5.1 Regulatory Setting

Floodplains are regulated by a variety of both state and federal rules and regulations. EO 11988 Floodplain Management (1977) requires federal agencies to "avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative."

FEMA has primary federal jurisdiction for administration of EO 11988. FEMA guidance for compliance with EO 11988 is found at 44 CFR 9. HUD has issued additional guidance (24 CFR 55.20) for compliance with EO 11988. HUD guidance establishes an eight-step process for compliance with the executive order, starting with early public notification. The eight-step process will be accomplished through completion of the EIS for the project; this process is summarized in Appendix A of this TES.

EO 13690 Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input: EO 13690, amended EO 11988, established the Federal Flood Risk Management Standard (FFRMS) to improve the Nation's resilience to current and future flood risks, which are anticipated to increase over time due to the effects of climate change and other threats. EO 13690 and the FFRMS reinforce the important tenets and concepts articulated in EO 11988, such as avoiding adverse impacts associated with actions in a floodplain and minimizing potential harm if an action must be located in a floodplain. EO 13690 and the FFRMS expand upon these tenets and concepts by calling for agencies to use a higher vertical flood elevation and corresponding horizontal floodplain than the base flood for federally funded projects to address current and future flood risk and so that projects last as long as intended.

Flood Hazard Area Control Act, NJSA 58:16A, and Rules at NJAC 7:13

The Flood Hazard Area Control Act protects rivers, lakes and streams, including their floodplains and riparian zones, and is regulated by the NJDEP DLUR. The regulated floodplain is the area that would be covered by water during the 100-year storm event, a storm that has a one in 100 chance of occurring in any given year. Most activities regulated under this program include the placement of structures or fill in a floodplain that could block or displace floodwaters. Activities within the riparian zone of regulated watercourses are also covered under this program. Riparian buffers typically extend 50 feet from the top of bank (or mean high water line in the case of a tidal waterbody). For Category 1 waters, the riparian zone extends outward 300 feet and for trout waters and threatened and endangered species habitats, the riparian zone extends 150 feet from top of bank or the mean high water line.

New Jersey's Stormwater Management rules (NJAC 7:8) are implemented by the NJDEP through the review of permits issued by the DLUR (Flood Hazard Area, Freshwater Wetlands, CAFRA, Waterfront Development and Coastal Wetlands). The Stormwater Management rules are also implemented by local authorities through the Municipal Land Use Law (MLUL) and the Residential Site Improvement Standards (RSIS). Per the New Jersey Department of Community Affairs, the RSIS are applicable to any residential application that goes before a local board. Through the RSIS, the stormwater rules are activated whenever a municipality requires the control of runoff from a site that is the subject of a site or subdivision application. Therefore, consistent with its duly adopted ordinances, a municipality may require compliance with the stormwater rules through the RSIS whether or not a development is a "major development" as defined in the stormwater rules; however, local implementation may differ, particularly with regard to municipal jurisdiction. Consequently, municipal ordinances must be examined to determine development thresholds at which the stormwater rules will apply. The rule clarification and interpretation offered herein are consistent with the current application of the stormwater rules by the DLUR, and do not supersede local authority under the MLUL. New Jersey Flood Hazard Area Control Act rules at NJAC 7:13 contain strict

limitations regarding how projects constructed within the floodplain may impact adjacent properties. These limitations are triggered if a project results in an increase greater than 0.1 feet in the design flood elevation on any property.

Seventy three percent of the Study Area is located in the one-percent annual chance floodplain (also known as the 100-year floodplain), which limits the type of development permitted on the ground floor of buildings in these areas.

Before Superstorm Sandy, FEMA's Region II office had begun a coastal flood study to update Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) reports for portions of coastal New York and New Jersey using improved methods and data to better reflect coastal flood risk. After Sandy, FEMA released Advisory Base Flood Elevation (ABFE) maps for certain communities based on the partially-completed flood study, which were designed to help in rebuilding and recovery efforts. After the completion of the ABFE maps, FEMA released (and continues to release) preliminary work maps for certain communities which include the full results of the coastal flood study. Preliminary FIRMs for Hudson County were released on January 30, 2015. The flood hazard areas shown on the preliminary FIRMs are used to determine flood insurance rates and requirements and where floodplain development regulations apply.

5.5.2 Floodplain Zones

Areas susceptible to flooding within the Study Area are primarily identified in two categories: 'AE' and 'VE' zones, with varying base flood elevations. Coastal 'AE' zones include areas where base flood elevations have been determined. These are typically inland areas where the potential for breaking waves is smaller. Coastal high hazard areas, or 'VE' zones, are the areas closest to the shoreline and most susceptible to significant wave action. As a result, properties that fall within a 'VE' zone are most likely to suffer damage due to flooding. Areas depicted as 'X Shaded' are also shown, which indicates areas of 0.2 percent annual chance flood (Figure 3). The "island" effect of Hoboken is evident on the new topographical mapping, showing features of Hoboken's natural landscape, where the highest elevations are found at Castle Point, the location of Stevens Institute of Technology and along Hudson, Washington, and Bloomfield Streets and several adjoining areas having the lowest potential to flood (Figure 5).

5.6 Aquatic Ecology

The New York/New Jersey Harbor Estuary, including the Lower Hudson River Estuary, supports a diverse and productive aquatic community of over 100 species of finfish, more than 100 invertebrate species, and a variety of phytoplankton and zooplankton. Marine mammals and sea turtles also occasionally occur in the New York/New Jersey Harbor estuary. The following sections provide a brief description of the aquatic biota found in the Harbor Estuary, focusing on the Lower Hudson River. The discussion in this section reflects the aquatic biota across the entire Lower Hudson River Estuary and may include a greater number of species than is found in the Study Area or Natural Ecosystems Analysis Area.

5.6.1 Regulatory Setting

Several regulations are applicable to the aquatic ecology within the Study Area, including the Magnuson-Stevens Fishery Conservation and Management Act, the Endangered Species Act, and the Fish and Wildlife Coordination Act.

Magnuson-Stevens Fishery Conservation and Management Act (16 USC 1801 to 1883)

Section 305(b)(2)-(4) of the Magnuson-Stevens Fishery Conservation and Management Act outlines the process for the NMFS and the Regional Fishery Management Councils (in this case, the Mid-Atlantic Fishery Management Council) to comment on activities proposed by federal agencies (issuing permits or funding projects) that may adversely impact areas designated as essential fish habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC §1802(10)).

The Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) protects all marine mammals, including cetaceans (whales, dolphins, and porpoises), pinnipeds (seals and sea lions), sirenians (manatees and dugongs), sea otters, and polar bears within the waters of the United States.

The Endangered Species Act (ESA) of 1973

The ESA recognizes that endangered species of wildlife and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people. The ESA prohibits the importation, exportation, taking, possession, and other activities involving illegally-taken species covered under the ESA, and interstate or foreign commercial activities. The ESA also provides for the protection of critical habitats on which endangered or threatened species depend for survival.

The Fish and Wildlife Coordination Act (16 USC 661-666)

The Fish and Wildlife Coordination Act (FWCA) provides assistance for the cooperation of Federal and State agencies to protect land and waters recognized as vital wildlife resources to the Nation. The FWCA provides NOAA fisheries with recommendations in order to conserve EFH. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources" within the Natural Ecosystems Analysis Area.

5.6.2 Phytoplankton

Phytoplankton are microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Light penetration, turbidity and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Diatoms such as *Skeletonema costatum* and *Thalassiosira* spp. generally dominate the phytoplankton community within the Lower Hudson River Estuary, with lesser contributions from dinoflagellates and green algae (Brosnan and O'Shea 1995). Phytoplankton sampling in the Lower Hudson River

over a ten-year period between 1991 and 2000 resulted in the collection of a total of 71 taxa. The most frequently collected taxa were *Nannochloris atomus* (found in 98 percent of the samples) and *Skeletonema costatum* (52 percent) (NYCDEP 2007a). Phytoplankton sampling near Pier 26 on the Hudson River from 1996 through 2003 indicated that the most dominant species were *Asterionella japonica, Chaetoceros subtilis, Coscinodiscus excentricus, Ditylum brightwelli, Eucampia zodiacus, cf. Gyrosigma* sp.*, Nitzchia reversa, cf. Pseudonitzchia seriata, Rhizosolenia setigera,* and *Ebria tripartite* (Levandowsky and Vaccari 2004). While nutrient concentrations in most areas of New York Harbor are very high, low-light penetration has often precluded the occurrence of phytoplankton blooms.

5.6.3 Zooplankton

Zooplankton are an integral component of aquatic food webs; they are primary grazers on phytoplankton and detritus material, and are themselves used by organisms of higher trophic levels as food. The higher-level consumers of zooplankton typically include forage finfish, such as bay anchovy (*Anchoa mitchilli)*, as well as commercially and recreationally important species, such as striped bass *(Morone saxatilis)* and white perch *(Morone americana)* during their early life stages. Zooplankton sampling in the Hudson River over a 10 year period between 1991 and 2000 resulted in the collection of a total of 16 taxa. The most frequently collected taxa were *Tintinnopsis* spp. (31 percent) and Nauplius (first larval stage) of copepods (25 percent) (NYCDEP 2007a).

5.6.4 Benthic Invertebrates

The major groups of benthic invertebrates collected in the estuary include aquatic worms (oligochaetes), segmented worms (polychaetes), snails (gastropods), bivalves, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp (EEA 1988; EA Engineering Science and Technology 1990; Coastal 1987; PBS&J 1998). Bain et al. (2006) collected a total of 145 benthic invertebrate taxa within Hudson River Park between July 2002 and June 2004. Examples of abundant species include: the polychaetes *Mediomastus* spp.*, Streblospio benedicti, Leitoscoloplos* spp.*, Heteromastus* sp.*, Spio setosa,* and *Tharyx* spp; the bivalves *Mulinia lateralis* and *Tellina agilis;* oligochaetes; the gastropods *Acteocina canaliculata* and *Rictaxis punctostriatus;* and the crustacean *Leucon* sp. (Bain et al. 2006).

5.6.5 Finfish

The Study Area is located near the southern end of the Lower Hudson River Estuary, which is typically defined as running from the tip of Battery Park, Manhattan, generally referred to as River Mile (RM) 0, north to the Stony Point area, RM 41. The Study Area contains just over two miles of shoreline from the northern portion of Jersey City, all of Hoboken, and the southern portion of the Weehawken waterfront (approximately RM 2 to 4). The following information pertains to finfish (fish) found in the entire Lower Hudson River Estuary, or in those areas as defined by the specific studies.

The fish community in the Lower Hudson River is typical of large coastal estuaries and inshore waterways along the Mid-Atlantic Bight. It supports a variety of estuarine, marine, and anadromous fish species. The Hudson River

Estuary acts as a spawning ground, migratory pathway, and a nursery/foraging area for a wide variety of fish species.

Many of the species that are seasonally abundant in the Lower Hudson Estuary are transient or migratory species, moving through the area to upstream spawning grounds or entering the area on a seasonal basis from nearby ocean waters. These include the estuarine migratory species that depend on the Lower Hudson Estuary primarily as a nursery, or as a forage area for juveniles or adults. Striped bass are among those species that rely on the estuary as a nursery and forage area for juveniles and adults. Species that frequent the Lower Hudson Estuary during similar life history stages include both marine and estuarine predators such as winter flounder, bluefish, and summer flounder. These fish migrate in and out of the estuary on a seasonal basis depending on spawning area (estuarine vs. marine) and the period (winter vs. summer).

Estuarine species tolerate the naturally wide-range and abrupt changes in salinity from tidal freshwater to marine environments (0.5 to 30 parts per thousand, or ppt). These species generally begin spawning in late spring and continue through most of the summer, following general onshore and offshore seasonal movement patterns (i.e., onshore in spring and summer, offshore to deeper waters in fall and winter). Most life stages of these species may be found in the Lower Hudson Estuary throughout the year. These species provide an important forage base for larger predatory species.

Previous biological investigations have characterized the seasonal distribution and composition of the fish community in various habitats and areas of the Lower Hudson Estuary. Fish sampling was conducted in the Arthur Kill, Kill Van Kull, and Newark Bay in 1984-1985 (USACE, 1986) and from April 1995 to March 1996 (LMS 1996). Sampling specific to Newark Bay was conducted in 1987-1988 (Will and Houston, 1988) and from May 1993 to April 1994 (NMFS 1994).

The NJDEP conducted fish surveys of the Upper Bay of New York Harbor/Hudson River estuary and collected 23 fish species dominated by five species: bay anchovy *(Anchoa mitchilli),* winter flounder (*Pseudopleuronectes americanus)*, American shad *(Alosa sapidissima)*, Atlantic tomcod *(Microgadus tomcod)*, and alewife *(Alosa pseudoharengus).* Fish were most abundant in the spring and summer. Salinity varied over the year from three to 26 ppt and temperature from 2.0 to 25.5°C (35.6 to 77.9°F). The NJDEP survey area exhibits low dissolved oxygen (DO) concentrations; during the stratified spring and summer periods, bottom DO was 2.8 to 3.8 milligrams per liter (mg/l). It was theorized that fish utilize the area for shelter and reduced current velocities, and that adjacent shoal and pier structures may represent important juvenile feeding areas.

In the New Jersey portion of the Lower Hudson River to Piermont, 40 fish species and 26 invertebrates were collected. The most abundant species collected throughout the area were alewife, American eel (*Anguilla rostrata)*, American shad, Atlantic tomcod, bay anchovy, blueback herring *(Alosa aestivalis),* hogchoker (*Trinectes maculatus),* striped bass, white perch, and winter flounder. The area between Jersey City and Edgewater, RM 1.5 to 8.8 was found to be an important overwintering habitat for striped bass. Salinities ranged from 0 to 26 ppt, and temperature from 2.0 to 28.0°C (35.6 to 82.4°F); DO was stratified throughout the area, with lower values in the

bottom waters. DO levels generally above 4.0 mg/l were observed; however, certain lagoon, interpier, and combined sewer overflow areas caused locally depressed DO.

5.6.6 Submerged Aquatic Vegetation and Benthic Algae

Submerged aquatic vegetation (SAV) are rooted aquatic plants that are often found in shallow areas of estuaries, at water depths of up to six feet at low water (Holochuck 2000). The depth of the water column adjacent to the hardened shoreline in the Natural Ecosystems Analysis Area ranges from six to 18 feet. Limited light penetration restricts the presence of SAV in the vicinity of the Natural Ecosystems Analysis Area (Olson et al. 1996). The extensively-developed shorelines that are present, as well as the swift currents, also severely limit colonization of this area by SAV. The NWI code for rooted, vascular subtidal estuarine vegetation is E1AB3L; it is not mapped by NWI in the Natural Ecosystems Analysis Area. Due to the depth and light-limitations of the Natural Ecosystems Analysis Area, SAV is not mapped by either the NJDEP or NOAA. Discussions with Karen Greene of NOAA confirmed that SAV is not expected to be present in the Natural Ecosystems Analysis Area.

Benthic macroalgae are large multicellular algae that are important primary producers in the aquatic environment. Species of macroalgae that occur in the Harbor Estuary include sea lettuce *(Ulva* spp.*),* green fleece *(Codium fragile)*, and brown algae *(Fucus* spp.*)* (PBS&J 1998).

5.6.7 Essential Fish Habitat

A number of species of interest have been identified by the NMFS within the Natural Ecosystems Analysis Area. This include both species with EFH established pursuant to Section 303(a)(7) of the Magnuson-Stevens Fishery Conservation and Management Act and species identified pursuant to the Fish and Wildlife Coordination Act. EFH provisions are intended to prevent, mitigate or minimize adverse effects of fishing on species of interest. The EFH within the Natural Ecosystem Analysis Area was determined from the NMFS Estuarine Tables and Table 4.4 presents the results from these tables including species life stages. These are species of finfish, mollusks and crustaceans, whose habitats NMFS and the regional fishery management councils have identified and described as necessary to fish for spawning, breeding, feeding, or growth to maturity.

NMFS has identified the following additional species in comments provided pursuant to the Fish and Wildlife Coordination Act: Atlantic tomcod, striped bass, alewife, blueback herring, and American shad (see Appendix B for email communication dated August 25, 2015).

Further consultation with NMFS with respect to these species is anticipated as the project design advances.

Table 5-5 provides a summary of the life stages of fish species of interest to NMFS which may be found in the Natural Resource Analysis Area.

Table 5-5: Life Stages of Fish Species of Interest to NMFS which may be found in the Natural Ecosystems Analysis Area

SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
Atlantic cod *(Gadus morhua)*				
haddock *(Melanogrammus aeglefinus)*				
pollock *(Pollachius virens)*				
whiting *(Merluccius bilinearis)*				
offshore hake *(Merluccius albidus)*				
red hake *(Urophycis chuss)*		X	X	X
white hake *(Urophycis tenuis)*				
redfish *(Sebastes fasciatus)*	n/a			
witch flounder *(Glyptocephalus cynoglossus)*				
winter flounder *(Pseudopleuronectes americanus)*	X	X	X	X
yellowtail flounder *(Limanda ferruginea)*				
windowpane flounder *(Scophthalmus aquosus)*	X	X	X	X
American plaice *(Hippoglossoides platessoides)*				
ocean pout *(Macrozoarces americanus)*				
Atlantic halibut *(Hippoglossus hippoglossus)*				
Atlantic sea scallop *(Placopecten magellanicus)*				
Atlantic sea herring *(Clupea harengus)*		X	X	X
monkfish *(Lophius americanus)*				
bluefish *(Pomatomus saltatrix)*			X	X
long finned squid *(Loligo pealeii)*	n/a	n/a		
short finned squid *(Illex illecebrosus)*	n/a	n/a		
Atlantic butterfish *(Peprilus triacanthus)*		X	X	X
Atlantic mackerel *(Scomber scombrus)*			X	X
summer flounder *(Paralichthys dentatus)*		X	X	X
scup *(Stenotomus chrysops)*	X	X	X	
black sea bass *(Centropristis striata)*	n/a		X	X
surf clam *(Spisula solidissima)*	n/a	n/a		
ocean quahog *(Artica islandica)*	n/a	n/a		

SPECIES	EGGS	LARVAE	JUVENILES	ADULTS
spiny dogfish *(Squalus acanthias)*	n/a	n/a		
tilefish *(Lopholatilus chamaeleonticeps)*				
king mackerel *(Scomberomorus cavalla)*	X	X	X	X
Spanish mackerel *(Scomberomorus maculatus)*	X	X	X	X
cobia *(Rachycentron canadum)*	X	X	X	X
sand tiger shark *(Carcharias taurus)*		X		
sandbar shark *(Carcharhinus plumbeus)*		X		X

x Indicates potential presence within Natural Ecosystems Analysis Area

Sources: NOAA EFH Mapper, NMFS consultation

5.6.8 Life History of Species of Interest to NMFS which may be found in the Natural Ecosystems Analysis Area

Winter Flounder

All life stages of winter flounder are found in the Hudson River. Winter flounder lay up to 3.3 million demersal, adhesive eggs that are retained within their spawning grounds, including estuarine areas of the Hudson River. Depending on temperature, larvae of approximately three mm in length hatch in two to three weeks. These larvae are planktonic at first, but transition to a bottom-oriented lifestyle over time. Around five to six weeks after hatching, the left eye of the larval flounder begins to migrate to the right side of the body. The “flounder-like” juveniles then settle onto the estuary bottom and move into saltwater coves, coastal salt ponds, estuaries, and protected bays, where they may grow up to 100 mm within the first year. Growth varies across their distribution, with northern populations generally growing slower than those at the southern end of their range. Juveniles move seaward as they grow larger. Juveniles and adults can tolerate wide ranges of salinities, temperatures, and DO.

Windowpane Flounder

Windowpane flounder occur in most of the bays and estuaries south of Cape Cod. All life stages of the windowpane flounder are found in the Hudson estuary. Windowpane flounder generally inhabit shallow waters with sand to sand/silt or mud substrates. A typical spawning temperature is 52°F (11°C), the eggs are buoyant and spherical, and hatching occurs in eight days. Windowpane flounder do not appear to undergo seasonal migrations like other fish. They feed on sand shrimp, crabs, small fish, and seaweed.

Summer Flounder

The summer flounder has a range in the western Atlantic from Nova Scotia to Florida. They are most common to the coastal and shelf waters off of the northeast US where they are commonly called fluke. In the spring, fluke leave their winter residence in the deep ocean waters, where spawning occurs and eggs are planktonic, to move into the inshore waters along beaches, inlets, bays, estuaries (including the Hudson River), canals, and creeks where they

will stay until autumn or even early winter. Juveniles are found in salinities ranging from 22 to 32 ppt and maximum growth rates occur in estuarine salinities. Adults are found in salinities of 20 to 32 ppt.

Bluefish

Bluefish spawn in offshore ocean waters. The eggs are planktonic with oil globules. Larval development takes place in outer continental shelf waters. Juveniles are present in outer continental shelf waters of the Middle Atlantic Region from April through June. As inshore waters are warm, the juveniles move shoreward across the continental shelf into estuaries, between Cape May and Long Island, including the Hudson River.

Striped Bass

Striped bass are anadromous fish. They spawn in freshwater rivers but live their adult lives in the ocean. In New York/New Jersey, the Hudson River is the main spawning ground for striped bass. In the spring, mature striped bass swim up the Hudson River to spawn. The fertilized eggs float downstream until hatching a few days after spawning. The bass larvae continue to move downstream until they reach the estuary, in areas such as Haverstraw Bay to the Tappan Zee Bridge. These areas function as nursery areas for the larvae and juvenile fish during the summer. By late summer and into fall, these “young-of-the-year” fish move into the estuaries of New York Harbor and western Long Island bays, where they will live until they are large enough to join the adults off the coast. Adult striped bass follow a seasonal migration pattern. They swim south and offshore from New York waters during the winter and migrate back north and inshore in the spring. In the spring, mature adults once again head upriver to spawn.

American Shad

The shad spends most of its life in the Atlantic Ocean, but swims up freshwater rivers, including the Hudson River, to spawn. Northern populations are iteroparous, and may survive breeding, return to the sea and then return to freshwaters to spawn several more times. The transparent fertilized eggs are carried along by the current. The larvae hatch in four to 12 days. Juvenile shad spend their first summer in freshwater. By autumn, the young shad gather in schools and swim to the ocean. They will live in the ocean from three to six years, until sexually mature, then return to freshwater to complete their life cycle. Like other herring, the American shad is primarily a plankton feeder, but will eat small shrimp and fish eggs. Occasionally they eat small fish, but these are only a minor item in their general diet. The sexually mature fish enter coastal rivers in spring or early summer, usually when the river water has warmed to 50 to 55 °F (10 to 13 °C). Cooler water appears to interrupt the spawn. Spawning occurs in May and June in northern streams, generally from Delaware to Canada.

Atlantic Tomcod

The Atlantic tomcod is strictly found in inshore waters, including the Hudson River. Tomcod spawn in the shoal waters of estuaries, in stream mouths, in either salt or brackish water. The season lasts from November to February with the height of production in January. The eggs sink to the bottom where they stick together in masses, or to seaweeds, stones, or any available support. The fry remain through their first summer in the waters where they are hatched.

Alewife

The alewife is an anadromous species of herring found in North America. The alewife spawns in April and May in shallow freshwaters. They scatter their eggs over sand or gravel substrate and provide no parental care. They feed on a wide variety of plankton.

Blueback Herring

The blueback herring or blueback shad is an anadromous species of herring from the east coast of North America. Blueback herring form schools and are believed to migrate offshore to overwinter near the bottom. It is one of the typical North American shads.

This fish is anadromous, living in marine systems and spawning in deep, swift freshwater rivers with hard substrates. It migrates to spawning grounds in the spring (late-March through mid-May). During spawning, many eggs are deposited over the stream bottom, where they stick to gravel, stones, logs, or other objects. Adults migrate quickly downstream after spawning to the ocean. Juveniles spend three to seven months in fresh water, and then migrate to the ocean. The blueback shad is a planktivorous forage species.

5.6.9 Marine Mammals

Humpback Whales *(Megaptera novaeangliae)* and Fin Whales *(Balaenoptera physalus)* have occasionally made their way into the Lower Hudson River Estuary. In addition, Bottlenose Dolphins *(Tursiops truncatus)*, Harbor Seals *(Phoca vitulina)*, Grey Seals *(Halichoerus gryphus)*, and Harp Seals *(Pagophilus groenlandicus)*, have occasionally been observed in the Lower Hudson River Estuary. Harbor seals sporadically appear in the Hudson River in the vicinity of the Jersey City-Hoboken border.

5.6.10 Marine Species Listed Pursuant to the Endangered Species Act

Within the Natural Ecosystems Analysis Area, there are two marine species which may occur that have been listed pursuant to the ESA. These species are the shortnose sturgeon *(Acipenser brevirostrum)* and the Atlantic sturgeon *(Acipenser oxyrinchus).* The shortnose sturgeon was listed as endangered throughout the species range in 1967. There has been substantial progress toward recovery for this species in the Hudson River. The Distinct Population Segment of the Atlantic sturgeon in the New York Bight was listed as endangered in 2012. In June 2016, NMFS proposed Critical Habitat for the Atlantic sturgeon throughout its range in the New York Bight, including those waters within the Natural Ecosystems Analysis Area. Furthermore, the NJDEP Landscape Project Version 3.1 indicates that the Natural Ecosystems Analysis Area has been used as a migration corridor for the state-listed shortnose sturgeon.

Pursuant to Section 7 of the ESA, federal agencies must consult with respect to all actions authorized and/or funded to be carried out which have the potential to impact listed species. Since certain Project actions may impact these listed species and proposed critical habitat, Section 7 consultation with NMFS may be required.

Shortnose Sturgeon

The shortnose sturgeon is restricted in range to the Atlantic seaboard in North America. It occurs in estuaries and large coastal rivers. In New York State, it is found in the Lower Hudson River Estuary from the southern tip of Manhattan upriver to the Federal Dam at Troy, where it seldom travels beyond. Using their barbels to locate food, shortnose sturgeon eat sludge worms, aquatic insect larvae, plants, snails, shrimp, and crayfish. The shortnose is protected as an endangered species, and must be released without harm whenever taken.

The shortnose sturgeon is semi-anadromous. Each year, between April and May, adult sturgeon migrate up the Lower Hudson River from their mid-Hudson overwintering area to spawn in freshwater sites north of Coxsackie. Males spawn every other year and females every third year. Eggs are deposited and hatch in approximately 13 days. The newly-hatched fry are poor swimmers and drift with the currents along the bottom. As they grow and mature, the fish move downriver into the most brackish waters of the Lower Hudson River Estuary. Smaller than the Atlantic sturgeon, the shortnose sturgeon grows up to four feet long.

Atlantic Sturgeon

Atlantic sturgeon may live more than 60 years, reaching a weight of 800 pounds and a length of fourteen feet. Sturgeon are bottom feeders, using whisker-like barbels on the underside of their snouts to find food - chiefly worms, insects, crustaceans, and small fish - that is sucked up in their tube-like mouths. While they prefer deep water, sturgeons occasionally bask at the surface and leap into the air.

Atlantic sturgeons spend most of their lives in ocean waters near estuaries. Adults spawn in fresh water from May through July, mainly from Hyde Park to Catskill. Spawning sturgeon scatter the eggs across a wide area. The eggs are sticky and attach themselves to stones and vegetation. Young fish may stay in the Hudson River in freshwater for two to seven years before going to sea. As they grow, they feed on a variety of benthic or bottom organisms, including worms, amphipods, isopods, midge larvae, plants, and small fishes. Males return to spawn as early as age 12. Females return closer to age 20.

5.7 Coastal Resources

5.7.1 Regulatory Setting

The coastal resources of the New York/New Jersey Lower Hudson River Estuary include habitats and ecosystems located within coastal zones, waterfront, and tidelands. They are maintained and protected under the following regulations.

Coastal Zone Management Act, 1972

The Coastal Zone Management Act (CZMA) encourages the management of coastal zone areas and provides grants to be used in maintaining coastal zone areas. It requires that federal agencies be consistent in enforcing the policies of state coastal zone management programs when conducting or supporting activities that affect a coastal

zone. It is intended so that federal activities are consistent with state programs for the protection and, where possible, enhancement of the nation's coastal zones.

The CZMA definition of a coastal zone includes coastal waters extending to the outer limit of state submerged land title and ownership, adjacent shorelines and land extending inward to the extent necessary to control shorelines. A coastal zone includes islands, beaches, transitional and intertidal areas, and salt marshes.

Waterfront Development Act, NJSA 12:5-3, and Rules at NJAC 7:7

The Waterfront Development Act regulates activities on lands in or near tidally flowed waters. Activities regulated under this program include placement of structures, fill, or dredging within or over a tidally-flowed waterway, and development adjacent to a tidally-flowed waterway. A Waterfront Development Permit is needed for projects that develop waterfront near or upon any tidal or navigable waterway. Waterfront development can include docks, wharfs, piers, bulkheads, bridges, pipelines, cables, pilings, filling, dredging or removal of sand or other materials from lands under all tidal waters, and limited upland construction within up to 500 feet of tidally flowed waters. The regulated area extends from the mean high water line to the first paved public road, railroad or surveyable property line; at a minimum, the zone extends at least 100 feet, but no more than 500 feet inland, from the tidal water body.

Tidelands Act, NJSA 12:3-1

The Tidelands Act protects all lands owned by the State of New Jersey that are now tidally flowed, or were formerly tidally flowed by the mean high tide. Projects that include building in or near tidal waters may need a grant, lease, or license from the State for portions of the project occurring on State-owned lands. The NJDEP Bureau of Tidelands Management manages this program.

Tidelands, also known as riparian lands, are all lands that currently and formerly flowed by the mean high tide of a natural waterway. The State of New Jersey claims ownership of these tidelands and holds them in trust for the people of the state under the Public Trust Doctrine. Since tidelands are public lands, you must obtain written permission from the state and pay a fee in order to use these lands. Common uses of tidelands include docks, mooring piles, bulkheads and other fill materials. Some tidelands may be sold in the form of a Riparian Grant while others may only be rented through either a Tidelands License or Lease. Current policy is to issue grants only for historic (filled) tidelands. That is, the State of New Jersey no longer sells currently flowed tidelands. Exceptions are sometimes made when the area of the Tidelands Claim is now part of an artificial waterway, such as a lagoon, or in the case of public infrastructure, such as a bridge.

Most of the Hudson River Waterfront is within the 500-foot jurisdictional limit of the Waterfront Development Act. Therefore, approval by the NJDEP DLUR would be required for construction within the regulated area(s). In addition, approval by the NJDEP Bureau of Tidelands Management may be required for project activities on mapped, state-owned tidelands that have not been conveyed to public or private parties.

A review of the NJDEP Tideland Maps (686-2172, 693-2172, 693-2178, 700-2172, 700-2178) that cover the Study Area was conducted at the NJDEP Bureau of Tidelands office. The review revealed that large portions of the Study Area waterfront, as well as former watercourses located within the 100-year floodplain of the Study Area, have been filled in the past. The majority of these former tideland areas have been granted to private and/or public parties by the state of New Jersey, although some former tidelands may still be owned by the state. All of the former tidelands located along the waterfront have been granted in the past to public or private parties. The former tidelands that appear to still remain in state ownership are summarized in Table 5-6, below and depicted on Figure 15.

Table 5-6: Summary of Tideland Map Reviews

TIDELAND MAP NO.	MUNICIPALITY BLOCK/LOT	REASON FOR POTENTIAL TIDELAND CLAIM	PROPOSED STRUCTURE/PUBLIC OR PRIVATE PROPERTY
693-2172	Jersey City Bl 6002, Lot 4 Bl 6002, Lot 5 Bl 6002, Lot 6	Former Ahasimus Creek	Resist structure Private (Lot 4) Public (Lot 5 – NJ TRANSIT) Public (Lot 6 – NJDOT)
	Hoboken Observer Highway	Former shoreline of Hudson River	Resist structure/ Underground stormwater storage tank/piping Public ROW
	Hoboken Marshall Street Paterson Street	Former Hoboken Creek	Underground conveyance or discharge piping Public ROW
	Hoboken Grand Street	Former Hoboken Creek	Underground stormwater storage tanks/piping Public ROW
	Hoboken Bl 35, Lot 6 Bl 45, Lot 1 Bl 46, Lot 1 Bl 55, Lot 1 Bl 64, Lot 1	Former Hoboken Creek	Underground conveyance or discharge piping Public (Hoboken Housing Authority)
700-2172	Hoboken Madison Street	Former Sluice Creek	Underground conveyance or discharge piping Public ROW
	Hoboken Willow Street 17th Street	Former Sluice Creek	Underground conveyance or discharge piping Public ROW
	Hoboken Bl 136, Lot 6.01	Former Sluice Creek	Underground conveyance or discharge piping Public (NJ TRANSIT)
	Hoboken Bl 146, Lot 1	Former Sluice Creek	Underground conveyance or discharge piping Public (NJ TRANSIT)

Source: NJDEP Bureau of Tidelands, Sheet 693-2172, Sheet 686-2172, Sheet 700-2178 and Sheet 693-2178.

The properties/ROWs identified above may still be owned by the state under the tidelands program. To definitively identify ownership, a review of state grants and/or a property title search would be required. However, based on

discussions with the NJDEP Tidelands Office, these former tidelands should not present a significant issue to the project, since a tideland lease or grant could be obtained to provide “clear ownership” to the properties/ROW.

5.8 Wetlands

5.8.1 Regulatory Setting

The term wetlands refers to those areas that are inundated by surface water or groundwater with a frequency sufficient to support vegetative or aquatic life that requires saturated or seasonally saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, wet meadows, river overflows, mud flats, and natural ponds. They are protected under several federal and state regulations including EO 11990, the Federal Clean Water Act, and the New Jersey Freshwater Wetlands Protection Act. Invasive species often colonize disturbed areas, including the wetland areas identified within the Study Area. EO 13112 directs Federal agencies to work together to prevent the introduction of invasive species and provide for their control.

Executive Order 11990 - Protection of Wetlands, 1977

Federal policy recognizes that wetlands have unique and significant public values and calls for the protections of wetlands. Policy directives set forth in EO 11990 are:

(a) Avoid long and short-term adverse impacts associated with the destruction or modification of wetlands;
(b) Avoid direct or indirect support of new construction in wetlands;
(c) Minimize the destruction, loss or degradation of wetlands;
(d) Preserve and enhance the natural and beneficial values served by wetlands; and
(e) Involve the public throughout the wetlands protection decision-making process.

HUD has issued additional guidance (24 CFR 55.20) for compliance with EO 11990. The HUD guidance establishes an eight-step process for compliance with the executive order, starting with early public notification. The eight-step process will be accomplished through completion of the EIS for the project; this process is summarized in Appendix A of this document.

Federal Clean Water Act (33 USC §§ 1251 TO 1387)

The objective of the CWA, also known as the Federal Water Pollution Control Act, is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. It regulates point sources of water pollution, such as discharges of municipal sewage, industrial wastewater, stormwater, the discharge of dredged or fill material into navigable waters and other waters including wetlands, and non-point source pollution such as atmospheric deposition and runoff.

Under Section 401 of the CWA, any applicant for a federal permit or license for an activity that may result in a discharge to navigable waters must provide to the federal agency issuing a permit, a certificate, either from the state

where the discharge would occur or from an interstate water pollution control agency, that the discharge would comply with Sections 301, 302, 303, 306, 307, and 316 (b) of the CWA. Applicants for discharges to navigable waters in New Jersey must obtain a Water Quality Certification from the NJDEP as part of the permit approval process.

Section 404 of the CWA requires authorization from the Secretary of the Army, acting through the USACE, for the permanent or temporary discharge of dredged or fill material into navigable waters and other waters of the United States, including wetlands.

Freshwater Wetlands Protection Act, NJSA 13:9B, and Rules at NJAC 7:7A.

The New Jersey Freshwater Wetlands Protection Act and regulatory program protects freshwater wetlands, the transition areas (buffers) around these wetlands, and other surface waters such as lakes, ponds, rivers, and streams. Most activities that disturb soil or vegetation in freshwater wetlands or in buffers adjacent to freshwater wetlands, and the discharge of dredged or fill material into surface waterbodies are regulated under this program.

Executive Order 13112 – Invasive Species, 1999

EO 13112 was issued to enhance federal coordination and response to the complex and accelerating problem of invasive species. The EO directs Federal agencies to work together [as stated in the Preamble] to"… prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause." (NISC. 2005). The EO defines an invasive species as: "…an alien species (a species that is not native to the region or area) whose introduction does or is likely to cause economic or environmental harm or harm to human health." This definition encompasses all types of invasive species: plants, animals, and microorganisms (NISC. 2005). The EO was designed to encourage Federal agencies to adopt a comprehensive approach to invasive species problems, instead of a less effective and more reactive species-by species approach, which was more commonly used in the past (NISC. 2005).

5.8.2 NJDEP Wetlands Mapping

The State of New Jersey has completed mapping of wetland areas using high-resolution aerial photography, in combination with field studies, to classify wetlands within the state. The NJDEP Wetland Mapping shows no areas of mapped wetlands within the Study Area. The Hudson River in the Study Area is designated as State Open Water (SOW). The NJDEP Wetland Map for the Study Area is provided in Figure 16.

5.8.3 National Wetland Inventory Mapping

National Wetlands Inventory (NWI) maps produced by the USFWS were reviewed as part of the delineation efforts within the Study Area. Wetlands on the NWI maps are classified using the methods described in "A Classification of Wetlands and Deepwater Habitats of the United States" by L. Cowardin. The USFWS Wetland Mapper (accessed on August 22, 2015) indicates that the Jersey City-Hoboken-Weehawken shoreline within the Study Area is

classified as E1UBL, which is defined as estuarine (E), subtidal with an unconsolidated bottom (UB), with a water regime classification (L) which means the substrate is permanently flooded with tidal water. Long Slip Canal, which is located in the southeast portion of the Study Area, is classified as E1UBLx, which is defined as excavated (x). It is also an estuarine, subtidal waterway with an unconsolidated bottom, permanently flooded with tidal water. The NWI Wetland Map for the Study Area is provided in Figure 16.

5.8.4 Wetland Vegetation

Hydrophytic vegetation consists of species that can tolerate anaerobic conditions for at least a portion of the growing season. Wetland areas were delineated and the vegetation was identified and characterized at each of the wetland data points, as well as in the adjacent upland areas. The USACE 2016, National Wetland Plant List, version 3.3 was referenced to determine acceptable common names, scientific names, and wetland indicator categories for the vegetation observed in the Study Area.

Plants identified were classified and placed in one of the following five categories according to The National Wetland Plant List (Lichvar et. al. 2016):

- Obligate (OBL): Almost always occurs in wetlands.
- Facultative Wetland (FACW): Usually occur in wetlands, but may occur in non-wetlands.
- Facultative (FAC): Occur in wetlands and non-wetlands.
- Facultative Upland (FACU): Usually occur in non-wetlands, but may occur in wetlands.
- Upland (UPL): Almost never occurs in wetlands.

In cases where more than 50 percent of the species identified at a location fall into the first three categories, the area can be classified as a wetland as long as the soils and hydrology criteria are met.

Several invasive species were identified within the wetland areas, including common reed, purple loosestrife, and reed canary grass. During the past century, these species have invaded palustrine wetlands throughout New Jersey, particularly in the northeastern area of the state. These species generally dominate the wetland vegetation in freshwater marshes in the project area. Dense stands of these species alter the structure of natural plant communities and reduce biological diversity. These stands also affect wildlife and can change drainage patterns by restricting the flow of water.

5.8.5 Jurisdictional Wetland Delineation Effort Results

Preliminary desktop references including aerial photography, soil maps, NWI and NJDEP wetland mapping, were used to depict general locations within the Study Area that could potentially include areas meeting the criteria for wetlands. Ten potential wetland areas were identified, and a site reconnaissance for the purpose of identifying and delineating wetland areas within the Study Area was completed. Six wetland areas were delineated as a result of this effort, shown in Figure 17.

The wetland identification and delineation of the Study Area was completed on May 5, 9 and 11, 2016, using the 1989 Federal Interagency Wetland Delineation Manual criteria which uses indicators for hydrology, hydric soils and hydrophytic vegetation to determine wetland boundaries. Various areas of potential wetlands were investigated, primarily located in the western portions of the Study Area, and associated with the Hudson-Bergen Light Rail Line (HBLR). The 10 areas investigated and the resulting six delineated wetland areas are described below.

Area 1 is located in the southwest corner of the City of Hoboken, along the HBLR. Area 1 contains a highly disturbed, man-made drainage ditch that is located between the northern and southern HBLR tracks. The drainage ditch is dominated by common reed (*Phragmites australis*, FACW) and purple loosestrife (*Lythrum salicaria*, FACW). Standing water was observed in the ditch at the time of the delineation. Wetland A was delineated with flags A-1 through A-11 (Figure 17).

Wetland A is hydrologically connected to an additional, smaller wetland area, also located in Area 1, to the west of the HBLR tracks. Wetland A (drainage ditch) runs through a piped culvert beneath the western HBLR and connects to Wetland B (flags B-1 through B-6, shown in Figure 17). The bottom of the drainage ditch in this area is lined with concrete, and is dominated by common reed. This area was inundated with standing water at the time of the site visit. A retaining wall bordering the drainage ditch to the west serves as the western boundary of Wetland B.

Area 2 is located to the north of Area 1, east of the HBLR tracks and west of the pedestrian/bike path located in this area. Area 2 consists of a manmade drainage swale surrounded by a wetland area. The drainage swale is dominated by common reed, wax myrtle *(Morella cerifera*, FAC), and eastern cottonwood (*Populus deltoides*, FAC). Standing water was observed at the time of the delineation. This wetland area was flagged as Wetland C (flags C-1 through C-28).

Area 3 is located west of the HBLR tracks and south of the HBLR Second Street Station and is surrounded by a 10-foot high retaining wall. Area 3 consists of a manmade drainage swale surrounded by a wetland area. The wetland area is located on each side of the drainage swale, and is dominated by common reed, seaside goldenrod (*Solidago sempervirens,* FACW), reed canary grass (*Phalaris arundinacea*, FACW), high-tide bush (*Baccharis halimifolia*, FACW), and wrinkleleaf goldenrod *(Solidago rugosa*, FAC) and standing water was observed. This wetland area was flagged as Wetland E (flags E-1 through E-18).

The HBLR tracks run east to west along the northern border of Hoboken. Area 7 is located north of the HBLR tracks in this area. A manmade drainage ditch, with a concrete bottom, is located along the northern side the HBLR tracks, to the north of the North Hudson Sewerage Authority Wastewater Treatment Plant facility. A wetland area dominated by common reed extends north into the adjacent property that is currently vacant and secured by a chain link perimeter fence. During the site visit, standing water was observed in the drainage ditch and wetland area. This wetland area was flagged as Wetland D (flags D-1 through D-10).

Area 10 is located along the northern border of the Study Area, south of the Weehawken Waterfront Park and Recreation Center. A wetland area dominated by common reed and seaside goldenrod extends from the toe of slope located along the park's southernmost driveway south to the rocky shoreline. The wetland line follows the rocky shoreline/bulkhead to the west until the bulkhead turns south along the sidewalk. During the site visit, the wetland area north of the rocky shoreline was holding standing water. This wetland area was flagged as Wetland F (flags F-1 through F-10).

Areas 5, 8, and 9 are adjacent upland areas that were investigated for the presence of wetlands, but they did not meet the wetland criteria. These areas all contain a concrete bottom and serve as manmade drainage swales. Some portions of these concrete swales contained standing water during the site visit. Areas 4 and 6 were eliminated from consideration as potential wetland areas based on the initial site evaluation. Area 4 is located along the east side of the HBLR tracks, to the west of the Hoboken Housing Authority complex. It consists of a gravel-surfaced area, with sparse upland vegetation. Area 6 is located in the northwestern portion of the Study Area, to the north of the HBLR tracks and the NJSA Wastewater Treatment Plant. The area consists of a vacant lot containing patches of asphalt pavement and upland vegetation.

The dominant vegetation in the wetland areas was common reed; no specimen trees or unique plant communities were observed during the wetland delineation effort. Wetland data forms are provided in Appendix C and wetland photographs are provided in Appendix D. The wetland delineation areas are provided in Figure 17.

The functions and values of the wetlands within the Study Area were preliminarily evaluated by field observations and the professional judgment of the wetland scientists who performed the jurisdictional wetland delineation effort. All delineated wetlands are anticipated to have an "Ordinary Resource Value," based on the fact that they serve as stormwater drainage swales/basins and do not contain habitat of any significance. Ordinary Resource Value wetlands do not require a wetland transition area.

5.9 Upland Vegetation and Wildlife

5.9.1 Regulatory Setting

Upland vegetation and wildlife in the Natural Ecosystems Analysis Area are regulated under several federal and state level statutes including the ESA, the Fish and Wildlife Coordination Act, The Marine Mammal Protection Act, the New Jersey Endangered Species Conservation Act, the Migratory Bird Treaty Act, and the New Jersey No Net Loss Reforestation Act.

Endangered Species Act of 1973 (16 USC §§ 1531 TO 1544)

The ESA of 1973 recognizes that endangered species of wildlife and plants are of aesthetic, ecological, educational, historical, recreational, and scientific value to the nation and its people. The ESA prohibits the importation, exportation, taking, possession, and other activities involving illegally taken species covered under the ESA, and

interstate or foreign commercial activities. The ESA also provides for the protection of critical habitats on which endangered or threatened species depend for survival.

The Fish and Wildlife Coordination Act (16 USC 661-666)

The Fish and Wildlife Coordination Act (FWCA) requires that the USFWS be consulted whenever the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified" when a federal permit or license is involved. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources." There are no regulations that implement the FWCA.

The law applies to any project that receives either federal funding or a federal permit and proposes to alter a perennial waterway or water body.

The New Jersey Endangered Species Conservation Act

The New Jersey Endangered Species Conservation Act of 1973 protects species whose continuing inhabitance of New Jersey is jeopardized by loss of habitat, over-exploitation, pollution, or other impacts. The State's threatened and endangered species are classified and listed, and habitat, identification and status and conservation information is available. The list of New Jersey's threatened and endangered wildlife species is maintained by the Division of Fish and Wildlife's Endangered and Nongame Species Program (ENSP).

The Migratory Bird Treaty Act of 1918 (16 USC §§ 703–71)

The Migratory Bird Treaty Act makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to Federal regulations. The migratory bird species protected by the Act are listed in 50 CFR 10.13.

New Jersey No Net Loss Reforestation Act (N.J.S.A. 13:1L-14.1 et seq.)

According to the New Jersey No Net Loss Reforestation Act, any loss of more than one-half acre of forested area would need to be replaced. According to the guidelines under N.J.S.A 13:1L-14.2 et seq. Determination of Existing Forested Area, "areas such as parking lots, courtyards, and other built environments that are primarily impervious surfaces but have tree canopy over them because of engineered planting sites are not forested areas." It has therefore been determined that the Study Area is not a forest, and the New Jersey No Net Loss Reforestation Act is not applicable.

5.9.2 Upland Vegetation

Prior to the early European settlement of Hoboken, the upland portion of the Study Area was likely vegetated by a mixed-hardwood forest dominated by American chestnut *(Castanea dentata)* and various oak species *(Quercus* spp.*)*. American beech *(Fagus grandifolia)*, tulip tree *(Liriodendron tulipifera)* and a variety of maples *(Acer* spp.*)*, ashes *(Fraxinus* spp.*)* and hickories *(Carya* spp.*)* probably occurred as co-dominant species in this community. The undergrowth in these forests often included dogwoods *(Cornus* spp.*)*, sassafras *(Sassafras albidum)*, and ironwood *(Ostrya virginiana)*, in addition to viburnum *(Viburnum* sp.*)* or spicebush shrubs *(Lindera benzoin).* The meadowlands within the western and northern portions of the Study Area would have supported saline-tolerant marsh grasses. These marshes may have also supported the growth of goldenrod *(Solidago spp.)*, sea myrtle *(Baccharis halimifolia)*, and marsh elder *(Iva frutescens)*. Historic and modern development of the Study Area has dramatically altered the environment and removed the predevelopment vegetation.

Ninety four percent of the terrestrial landscape within Hoboken is heavily urbanized and dominated by impervious surfaces. The Study Area includes urban properties, vacant lots, mowed lawns, paved paths and roads, railroad and light railways.

In the Study Area, characteristic species include non-native invasive species such as Norway maple (*Acer platanoides*), tree-of-heaven (*Ailanthus altissima*) and Japanese knotweed (*Polygonum cuspidatum*). Mugwort (*Artemisia vulgaris*), foxtail grasses (*Setaria faberi, Setaria* sp.), and Japanese honeysuckle (*Lonicera japonica*) are commonly found in the herbaceous layer. Asiatic bittersweet *(Celastrus orbiculatus*) and porcelainberry vines (*Ampelopsis brevipedunculata*) were observed to be present in all strata in some locations.

At the foot of the Palisades cliffs to the west of the HBLR, the following species were observed: Norway maple, red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), black oak (*Quercus velutina*), tree-of-heaven, eastern cottonwood, American elm (*Ulmus americana*), Chinese elm (*Ulmus parvifolia*), Japanese knotweed, American pokeweed (*Phytolacca americana*), Virginia creeper *(Parthencissus quinquefolia*), poison ivy (*Toxicodendron radicans*), American bittersweet (*Celastrus scandens*), and bluegrass (*Poa spp.).*

Due to the history of development and disturbance (e.g., clearing, mowing, pedestrian and roadway traffic), areas in the Study Area have little vegetation coverage, or are dominated by non-native invasive vegetation; the results are terrestrial communities of low ecological value.

In the Study Area, there are planted shade trees, surrounded by maintained (mowed) grass areas and other landscaping.

5.9.3 Wildlife

The Study Area is heavily developed and characteristic of an urbanized landscape. Undisturbed habitats are not present, and most of the available habitat to wildlife is constrained to small residential yards, tree-lined streets, and

recreational parks, all in close proximity to people. Terrestrial wildlife communities in the Study Area are largely composed of disturbance-tolerant species that are associated with fragmented habitats and forest edges and that can co-exist with anthropogenic activities in highly disturbed areas.

5.9.4 Birds

Over 200 species of birds occur in the Lower Hudson River Estuary, owing to the region's geographical position and habitat diversity. Some are present year-round, whereas others only nest in, overwinter in, or migrate through the area. Most of the Study Area offers little habitat for species that are intolerant of habitat degradation and disturbance.

Water-dependent birds can be found on or flying over the Lower Hudson River Estuary during the breeding season, including the double-crested cormorant (*Phalacrocorax auritus*), Canada goose (*Branta canadensis*), ring-billed gull (*Larus delawarensis*), great black-backed gull (*Larus marinus*), herring gull (*Larus argentatus*), mallard (*Anas platyrhynchos*), and mute swan *(Cygnus olor).* Most of the Hudson River shoreline in the Study Area consists of bulkhead and/or rip-rap and lacks shallow waters and exposed mudflats, which limit foraging areas for wading birds. Appropriate nesting habitat features for colonial water birds, such as large trees along the water, are not present in the Study Area.

Most of New Jersey is overlain by migration flyways for waterfowl, shorebirds, and birds of prey. Broad-front migrants, such as warblers and other songbirds, which do not follow distinct flyways like many other groups of birds, generally pass through the state in high numbers as well. Large numbers of birds occur in the Lower Hudson River valley during migration periods.

The location of the Study Area, on the Lower Hudson River Estuary, is not in proximity to any significant ecological barriers to birds that would potentially create a funnel or other concentrations of migrating birds through this area. Migrating birds of prey occur in increased abundance along the Palisades to the north, but well above the Study Area, where they ride daytime updrafts coming off the ridgeline. Based on count data from the nearby Hook Mountain Hawk Watch in Nyack, NY (NEHW 2008), birds of prey that may pass over the Study Area during the daytime include the turkey vulture (*Cathartes aura*), black vulture (*Coragyps atratus*), osprey (*Pandion haliaetus*), bald eagle (*Haliaetus leucocephalus*), northern harrier (*Circus cyaneus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk *(Buteo lineatus*), broad-winged hawk (*Buteo platypterus*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), merlin (*Falco columbarius*), and peregrine falcon (*Falco peregrinus*). On relatively rare occasions, the northern goshawk (*Accipiter gentilis*), rough-legged hawk (*Buteo lagopus*), and golden eagle (*Aquila chrysaetos*) may also pass over the Study Area. Migrating waterfowl also occur in the area, but the Lower Hudson River is not a major migration corridor for waterfowl (Bellrose 1968).

Many of the birds that occur in the Study Area during the breeding season are year-round residents that remain during winter. Land bird species expected to occur in the Study Area during winter include mostly urban-adapted species. Waterfowl and other water birds are commonly found on the Lower Hudson River during winter, while bald

eagles also overwinter along the Lower Hudson River Estuary where they often sit on ice floes in areas of open water.

5.9.5 Amphibians and Reptiles

As with the plant and bird communities, the degree of habitat fragmentation and development in the Study Area limits the numbers and diversity of reptile and amphibian species that occur. Species accustomed to disturbed habitats in urban and suburban residential areas have the potential to occur in the Study Area, including the American toad (*Bufo americanus*), snapping turtle (*Chelydra serpentina*), red-eared slider (*Trachemys scripta elegans)*, garter snake (*Thamnophis sirtalis*), and northern brown snake (*Storeria dekayi*).

5.9.6 Mammals

Terrestrial Mammals

Terrestrial mammal communities are limited to primarily disturbance-tolerant and urban-adapted generalists such as gray squirrel (*Sciurus carolinensis*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), striped skunk *(Mephitis mephitis)*, eastern cottontail (*Sylvilagus floridanus*), groundhog (*Marmota monax*), raccoon (Procyon lotor), white-footed mouse (*Peromyscus leucopus*), moles *(Scalopus spp.)*, eastern chipmunk (*Tamias striatus*), and Virginia opossum (*Didelphis virginiana*). White-tailed deer (*Odocoileus virginianus*), eastern coyote (*Canis latrans*), and red fox (*Vulpes vulpes*) may occur occasionally in the lesser-developed parts of the region.

5.9.7 Threatened and Endangered Species

The July 14, 2015 USFWS IPaC Trust Resource Report and Official Species List indicates that there are no federally-listed threatened or endangered species nor critical habitats or refuges identified for the onshore region of the Study Area. It does, however, indicate that many species of migratory birds may use the area. The project sponsors are required to prevent any harm or taking of migratory bird species under the Migratory Bird Treaty Act (MBTA). The IPaC lists 29 bird species of conservation concern. A copy of the IPaC report and Official Species List is provided in Appendix E.

It was noted during a site visit that there were two osprey platforms in the northern portion of the Study Area along the Hudson River, in the vicinity of Weehawken Cove. The presence of ospreys, or nesting materials was not observed; however, the observations were made outside of the nesting season. The observed platforms are not listed on the Conserve Wildlife Foundation website.

The NJDEP NHP was also contacted about state-listed threatened and endangered species in the Study Area, and an additional analysis was conducted using the NJDEP Landscape Project Version 3.1 map. Map analysis and the letter dated July 28, 2015 from the NHP indicated that shortnose sturgeon (federally-listed as endangered) uses the Lower Hudson River as a migration corridor. The NHP and Landscape Project map also reported that foraging habitat occurs in the Study Area for three species of special concern: Glossy Ibis *(Plegadis falcinellus),* Little Blue

Heron *(Egretta caerulea),* and Snowy Egret *(Egretta thula).* A copy of the NHP letter is provided in Appendix B, Agency Correspondence.

6.0 DISCUSSION / IMPACT ANALYSIS

This section presents the potential changes to the natural environment due to implementation of the three build alternatives and the No Action Alternative. The baseline condition of the affected environment (or existing conditions) serves as the basis for analysis of effects and comparison of each alternative. The current conditions and any known trends are described to provide a basis for assessing the consequences of the alternatives. The resources and potential impacts discussed in the following sections are issues identified during public and agency scoping. Effects are quantified where possible, and qualitative discussions are also included.

The following terminology is used throughout the impact analysis section of this document to describe the nature of impacts arising from the three build alternatives and the No Action Alternative.

- Short-term or long-term. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term effects are those that would occur only with respect to a particular activity or for a finite period or only during the time required for construction activities. Long-term effects are those that are more likely to be persistent and chronic.

- Direct or indirect. As stated in CEQ regulations (40 CFR Part 1508.8) direct effect is caused by and occurs contemporaneously at or near the location of the action. An indirect effect is caused by a proposed action and might occur later in time or be farther removed in distance, but still be a reasonably foreseeable outcome of the action. For example, a direct effect of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.

- Negligible, minor, moderate, or major. These relative terms are used to characterize the magnitude or intensity of an impact. Negligible effects are generally those that might be perceptible but are at the lower level of detection. Impacts are considered minor if project-related impacts would occur, but resources would retain existing character and overall baseline conditions. Impacts are considered moderate if project-related impacts would occur, and resources would partially retain existing character. Some baseline conditions would remain unchanged. Finally, project-related impacts considered as major would create a high degree of change within the existing resource character and overall condition of resources.

- Adverse or beneficial. An adverse effect is one having unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial effect is one having positive outcomes on the man-made or natural environment. A single act might result in adverse effects on one environmental resource and beneficial effects on another resource.

- Significant or Intensity. Significant effects are those that, in their context and due to their intensity (severity), meet the thresholds for significance set forth in CEQ regulations (40 CFR Part 1508.27). The intensity of an

effect is determined through consideration of several factors, including whether an alternative might have an adverse impact on the unique characteristics of an area (e.g., historic properties or ecologically-critical areas), public health or safety, or endangered or threatened species or designated critical habitat. Effects are also considered in terms of their potential for violation of federal, state, or local environmental law; their controversial nature; the degree of uncertainty or unknown effects, or unique or unknown risks; if there are precedent-setting effects; and their cumulative effects.

- Context. The context of an effect can be localized or more widespread (e.g., regional).

- Cumulative effects. CEQ has defined these effects (40 CFR 1508.7) as impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

6.1 Geology Impacts

6.1.1 Impacts of Alternative 1

The construction of all of the Resist features and DSD infrastructure would cause disturbance of subsurface materials by excavations, including the deep foundations required for Resist structures and underground water storage tanks. Installation of deep foundation elements, such as piles, may result in vibratory impacts and possibly minor short-term settlement of adjacent loose soils/sediments. The magnitude of vibration impacts would be related to the extent of Resist barrier construction and underlying geology. However, overall impacts from Alternative 1 on geology are expected to be negligible.

6.1.2 Impacts of Alternative 2

Impacts on geology from Alternative 2 are expected to be negligible.

6.1.3 Impacts of Alternative 3

Impacts on geology from Alternative 3 are expected to be negligible.

6.1.4 Impacts of the No Action Alternative

No impacts on geology would result from the No Action Alternative, since there is no ground disturbance.

6.1.5 Mitigation Measures and BMPs Included in Alternatives 1, 2 and 3

As no adverse impacts are anticipated, no mitigation measures or BMPs related to geology are recommended.

6.2 Soil Impacts

6.2.1 Impacts of Alternative 1

Under Alternative 1/Option 1, there would be an estimated total of approximately 29.4 acres of surface disturbance for construction of 16,291 lineal feet of Resist barrier (floodwalls, flood logs and gates) and for DSD infrastructure. Under Alternative 1/Option 2, there would be an estimated total of approximately 29.3 acres of surface disturbance for construction of 15,887 lineal feet of Resist barrier (floodwalls, flood logs and gates) and for DSD infrastructure. Permanent aboveground disturbance is limited to 7.54 acres for Option 1 and 7.57 acres for Option 2. Disturbance of areas mapped as Urban Land, URWETB, LagA, USGRTA, USGRTB, and URTILB would result from Alternative 1. The discharge of soil during rainfall events could pose increased risk for surface water impacts for Alternative 1 as well, since the Alternative 1 limit of disturbance are located adjacent to the Hudson River, for the construction of waterfront structures. The potential for off-site soil impacts arising from Project construction activities is expected to be short-term and minor in magnitude (Figure 18).

Based on the geotechnical investigation that was completed for the Study Area, no problematic soil conditions were found along the proposed Resist barrier (waterfront structures) alignment proposed in Alternative 1. A hard stratum layer below a five to 45 feet thick, soft clay layer was detected. This hard stratum layer would serve as a deep foundation bearing layer.

Alternative 1, Options 1 and 2 would require off-site disposal of 150,993 tons and 150,265 tons of contaminated soil, respectively, based on an assumption that all of the excavated soil will be considered contaminated. This includes soils to be excavated for both Resist and DSD. The balance of the excavated soils will be re-used on site.

6.2.2 Impacts of Alternative 2

Under Alternative 2/Option 1, there would be an estimated total of approximately 30.1 acres of surface disturbance for construction of 9,323 lineal feet of Resist barrier (floodwalls, berms, flood logs and gates) and for DSD infrastructure. Under Alternative 2/Option 2, there would be an estimated total of approximately 30.2 acres of surface disturbance for construction of 9,150 lineal feet of Resist barrier (floodwalls, berms, flood logs and gates) and for DSD infrastructure. Permanent aboveground disturbance is limited to 5.81 acres under Option 1 and 5.85 acres under Option 2. Disturbance of areas mapped as Urban Land, URWETB, URTILB, URBEDB and LagA would result from Alternative 2. The potential for off-site soil impacts arising from Project construction activities is expected to be short-term and minor in magnitude (Figure 19).

Alternative 2, Options 1 and 2 would require off-site disposal of 138,450 tons and 138,139 tons of contaminated soil, respectively, based on an assumption that all of the excavated soil will be considered contaminated. This includes soils to be excavated for both Resist and DSD. The balance of the excavated soils will be re-used on site.

6.2.3 Impacts of Alternative 3

Under Alternative 3/Option 1, there would be an estimated total of approximately 29.8 acres of surface disturbance for construction of 8,913 lineal feet of Resist barrier (floodwalls, berms, flood logs and gates) and for DSD infrastructure. Under Alternative 3/Option 2, there would be an estimated total of approximately 29.9 acres of surface disturbance for construction of 8,757 lineal feet of Resist barrier (floodwalls, berms, flood logs and gates) and for DSD infrastructure. Permanent aboveground disturbance is limited to 5.76 acres under Alternative 3/Option 1 and 5.80 acres under Alternative 3/Option 2. Disturbance of areas mapped as Urban Land, URWETB, URTILB, URBEDB and LagA would result from Alternative 3. The potential for off-site soil impacts arising from Project construction activities is expected to be short-term and minor in magnitude (Figure 20).

Alternative 3, Options 1 and 2 would require off-site disposal of 137,712 tons and 137,431 tons of contaminated soil, respectively, based on an assumption that all of the excavated soil will be considered contaminated. This includes soils to be excavated for both Resist and DSD. The balance of the excavated soils will be re-used on site.

6.2.4 Impacts of the No Action Alternative

Analysis of waterfront structures within the Study Area has identified structural integrity issues along most of the 8,500-foot length of structures examined. Based on this review, it is likely that discharge of sediment into the Hudson River from deteriorating structures is ongoing and would continue under the No Action Alternative. The magnitude of this soil erosion is currently unknown. This soil erosion is anticipated to be a long-term condition which cannot be addressed absent the replacement of these waterfront structures as proposed under the build alternatives.

6.2.5 Mitigation Measures and BMPs Included in Alternatives 1, 2, and 3

The following measures would be implemented in order to minimize Project impacts on soils:

- A SWPPP would be completed in accordance with requirements under NJ code which is expected to substantially reduce the risk of off-site transport of soils;
- Precautions would be taken to minimize spillage and tracking of sand and silt on the road surfaces and prompt clean-up would be initiated should they occur;
- Silt fences, hay bales and stabilized entrances to construction sites would be deployed in accordance with the SWPPP;
- Mulch or other suitable ground cover would be placed on all slopes following grading;
- Slopes would be seeded with plant materials approved by the appropriate local jurisdictions and Soil Conservation District;

- Potential contamination due to construction activities would be assessed and mitigated as outlined in the Hazardous Waste Screening Technical Environmental Study. A soil and groundwater Sampling, Analysis, and Monitoring Plan (SAMP) would be implemented as a Best Management Practice (BMP) to mitigate any potential hazardous waste encountered during soil excavation activities; and
- For Alternative 1, in-water coffer dams and silt curtains would be used in all areas where bulkhead reconstruction or replacement is undertaken.

Pursuant to NJAC 7:8-2.2, the proposed alternatives would be designed to meet the NJDEP goals of stormwater management planning, including:

- reducing flood damage;
- minimizing, to the extent practicable, any increase in stormwater runoff;
- reducing soil erosion;
- maintaining groundwater recharge, as applicable;
- minimizing pollutants in surface waters; and
- protecting public safety.

6.3 Groundwater Impacts

6.3.1 Impacts of Alternative 1

Construction of Alternative 1 may require de-watering of shallow groundwater for construction and repair of Resist feature bulkheads and for excavation associated with the DSD features; this would likely induce flow toward the excavations. This water would be sampled, and handled/disposed of appropriately, in accordance with a NJPDES General Permit. These activities would depress the local groundwater, but these effects would be temporary and localized, and would not extend significantly beyond the project boundaries. No impacts to groundwater quality are anticipated. Furthermore, since there are no potable wells or SSA in the Study Area, no adverse impacts to groundwater or water supplies are anticipated.

6.3.2 Impacts of Alternative 2

Impacts to groundwater under Alternative 2 would be similar to the impacts as described in Alternative 1, but in the locations of the proposed construction under this Alternative.

6.3.3 Impacts of Alternative 3

Impacts to groundwater under Alternative 3 would be similar to the impacts as described in Alternative 1, but in the locations of the proposed construction under this Alternative.

6.3.4 Impacts of the No Action Alternative

No impacts on groundwater would result from the No Action Alternative.

6.3.5 Mitigation Measures and BMPs Included in Alternatives 1, 2, and 3

- Based on the project size and volume of excavation below groundwater in all of the build alternatives, dewatering activities beyond thirty days in a year and 100,000 gallons per day (gpd)are expected. A short-term water use permit-by-rule would be applicable since the dewatering is related to construction activity and cofferdams would be utilized. Conditions of this permit would outline measures designed to avoid any impacts to groundwater.
- A soil and groundwater Sampling, Analysis, and Monitoring Plan (SAMP) would be implemented to identify and address any potentially hazardous materials encountered during groundwater de-watering activities

6.4 Surface Water Quality Impacts

6.4.1 Impacts of Alternative 1

The only surface water in the Natural Ecosystems Analysis Area is the Hudson River. Since Alternative 1 involves reconstruction of approximately 8,500 lineal feet of waterfront structures, this alternative has the greatest risk of soil discharge and subsequent impacts on the surface water quality of the Hudson River. The risk of soil discharge is related to the nature of the proposed construction activities. The current waterfront structures include anchored and cantilevered sheet piles, block or concrete retaining walls, rip-rap, and pile-supported concrete deck. Repair and replacement of some of these Resist structures, such as rip-rap, can be completed from the land side and pose limited risk of sediment discharge into the Hudson River. Repair and replacement of other waterfront structures, such as sheet piles and concrete block, would require in-water work, where risk of soil disturbance and discharge into the Hudson River is much greater. In these areas, it is anticipated that construction techniques would involve the installation of cofferdams approximately 10 feet offshore. Use of these cofferdams is anticipated to confine project impacts to a very narrow area along the shoreline. In addition to the reconstruction of waterfront structures for the Resist infrastructure, an estimated 15 to 20 linear feet of existing waterfront structures may need to be improved at each of the stormwater discharge sites at Weekawken Cove. Current design provides for a pipe up to 24 inches in diameter to discharge stormwater through a perforation in the sheeting. Construction methods at these sites would be similar to construction methods for other waterfront structures.

Based on the proposed BMPs, impacts of sedimentation on the Hudson River are anticipated to be short-term and minor, and are not expected to result in measurable sedimentation impacts within the Hudson River. The total area of open waters to be temporarily impacted along the bulkheads to be replaced is approximately 0.73 acres, in the areas shown on Figure 21.

Other potential impacts to surface water quality under Alternative 1 are related to the proposed discharge of stormwater to be collected in the various underground tanks during storms, then discharged to the Hudson River. There are two different treatment pathways for the surface waters collected and stored under the DSD portion of the Project. Treatment of stormwater collected in the three large storage sites (BASF, NJ TRANSIT and Block 10) would consist of filtration and settling within the collection and storage systems prior to discharge into the Hudson River in the vicinity of Weehawken Cove. Water collected in the approximately 60 smaller stormwater storage sites distributed across the Study Area would be fully treated in the North Hudson Wastewater Treatment Plant prior to discharge in the Hudson River. Most of the estimated seven million gallons of stormwater collected and stored under the Project would be at the three large storage sites. The total volume of stormwater projected to be discharged annually from the three large storage sites is 264 acre-feet. Given the total volume of water in the Hudson River, and current water quality of the Hudson River, any impacts from the discharge of stormwater from this project on the Hudson River is expected to be minor, both in terms of quantity and quality.

In addition, the new DSD system is anticipated to reduce the number of Combined Sewer Overflow (CSO) discharges from the existing system into the Hudson River, thereby reducing the total annual volume of CSO, and reducing the impacts of CSO discharges on Hudson River water quality.

6.4.2 Impacts of Alternative 2

Alternative 2 involves reconstruction of approximately 400 linear feet of shoreline structures along Weehawken Cove and the Hudson River shoreline in the northern portion of the Study Area. This work would be undertaken along the Cove Park shoreline and at three stormwater discharge locations. Current design provides for an estimated 15 to 20 linear feet of existing waterfront structures to be improved at each of the stormwater discharge sites, and approximately 300 linear feet of waterfront structures to be improved at Cove Park. A pipe up to 24 inches in diameter would be used to discharge stormwater through a perforation in the bulkhead sheeting at each of the discharge locations. At the two discharge locations in Weehawken Cove, and at the shoreline along Cove Park, the bulkhead is separated from the water by a rip-rap field ranging from 10 to 15 feet in width. The discharge location for the High Level storm sewer location is a waterfront bulkhead. Impacts to surface waters arising from shoreline construction result from increased sedimentation.

The risk of soil discharge is related to the nature of the proposed construction activities. It is anticipated that the shoreline structures at discharge sites and along Cove Park in Weehawken Cove can be constructed from the landward side, and that no in-water work will be required. Construction proposed at these sites therefore pose limited risk of sediment discharge into the Hudson River. Repair and replacement of the waterfront structure at the High Level storm sewer discharge site would require in-water work, where risk of soil disturbance and discharge into the Hudson River is much greater. In this location, it is anticipated that construction would involve the installation of a cofferdam approximately 10 feet offshore. Use of this cofferdam is anticipated to confine project impacts to a very narrow area along the shoreline. The estimated duration of the in-water work at the High Level storm sewer discharge site is several days.

Based on the proposed BMPs, and limited amount of in-water work, any sedimentation impacts of the project on surface water quality are expected to be short term and negligible.

Since the proposed Resist features in Alternative 2 are set back from the waterfront, water from the Hudson River is expected to inundate unprotected areas of the Study Area waterfront during a storm surge event. If the river water overtops the waterfront bulkhead during a storm event, water can enter into the sewer system through existing inlets and unsealed manhole covers. While Alternative 1 would prevent a storm surge from entering the city streets, Alternative 2 leaves portions of the city streets and sewer system unprotected. To prevent water intrusion into the existing sewers under Alternative 2, a separation of the sanitary/storm water collection system is proposed by the construction of a “High Level” storm sewer collection system. Discharge from this gravity fed “High Level” storm sewer system would be located at the east end of 14th Street into Weehawken Cove.

Treatment of this stormwater collected in the “High Level” storm sewer system would be similar to treatment of stormwater collected at the three large stormwater collection sites. An estimated 48 acre-feet of stormwater is anticipated to be discharged from this “High Level” storm sewer system annually. Based on this estimate of annual discharge, impacts from the “High Level” storm sewer system on surface water quality of the Hudson River are expected to be negligible.

The new DSD system is anticipated to reduce the number of CSO discharges from the existing system into the Hudson River, thereby reducing the total annual volume of CSO and reducing the impacts of CSO discharges on Hudson River water quality. However, given the total volume of water in the Hudson River and current water quality of the Hudson River, any impacts from the discharge of stormwater under Alternative 2 on the Hudson River is expected to be negligible, both in terms of quantity and quality.

6.4.3 Impacts of Alternative 3

Impacts to surface water quality under Alternative 3 would be similar to those described under Alternative 2.

6.4.4 Impacts of the No Action Alternative

Under the No Action Alternative, there would be no reduction in the average annual CSO discharge into the Hudson River; therefore, impacts of this CSO discharge on Hudson River water quality would remain unchanged. There would be no potential for impacts to surface water quality arising from construction.

6.4.5 Mitigation Measures and BMPs Included in Alternatives 1, 2, and 3

The following measures would be implemented in order to minimize Project impacts on surface waters:

- A SWPPP would be completed in accordance with requirements under NJ code;
- Precautions would be taken to minimize spillage and tracking of sand and silt on the road surfaces and prompt clean-up would be initiated should they occur;
- Silt fences, hay bales and stabilized entrances to construction sites, would be deployed in accordance with the SWPPP;
- Mulch or other suitable ground cover would be placed on all slopes following grading;
- Slopes would be seeded with plant materials approved by the appropriate local jurisdictions and the Soil Conservation District;
- For Alternative 1, in-water cofferdams and silt curtains would be used in all areas where bulkhead reconstruction or replacement is undertaken; and
- Timing/construction restrictions may be necessary to avoid spawning periods and sensitive life stage timeframes for various aquatic species.
- The drainage and stormwater management plan for each build alternative would meet NJDEP stormwater management planning requirements and would provide for treatment of contaminants in stormwater runoff from the construction areas. The stormwater management plan developed for each build alternative would meet NJDEP Stormwater Regulation requirements, and provide improvements over existing conditions. A SESCP would be prepared and implemented to address temporary surface water impacts during construction.

6.5 Floodplain Impacts

There are no practicable Build Alternatives that would avoid impacts to floodplains. All of the alternatives evaluated would result in floodplain impacts.

To comply with EO 11988, the Project would be designed to avoid floodplain impacts where practicable, minimize impacts to the greatest extent possible, and adequately mitigate unavoidable impacts. None of the Build Alternatives would completely avoid floodplain impacts. Each build alternative would include measures (floodwalls, berms, gates, green infrastructure features, etc.), that would reduce flooding risk in various portions of the Study Area during the 100-year coastal storm event and the 5-year rainfall event.

6.5.1 Impacts of Alternative 1

Under Table 6-1 and Figure 22 shows the areas of floodplain disturbance for Alternative 1, including Options 1 and 2. Permanent disturbance occurs where above-ground structures are proposed, such as the Resist

infrastructure. Temporary disturbance occurs where disturbance is only required during construction, such as at staging areas, or areas where construction would be required for below-ground infrastructure (including DSD components) but no permanent above-ground structures are proposed. DSD components would be located below-grade; therefore, no permanent impacts to the floodplain are anticipated for DSD. Alternative 1 would result in a minor permanent disturbance to approximately one percent of the 100-year floodplain within the Study Area.

Table 6-1: Floodplain Impacts for Alternative 1, Option 1 and 2

	PERMANENT FLOODPLAIN IMPACTS	TEMPORARY FLOODPLAIN IMPACTS
Alternative 1, Option 1 (Resist infrastructure only)	3.2 Ac.	5.8 Ac
Alternative 1, Option 2 (Resist infrastructure only)	3.2 Ac.	6.1 Ac
Alternative 1 (DSD infrastructure only)	N/A	

Source: Dewberry, 2015-2017

Under Alternative 1, where Resist structures are located along the Study Area waterfront, there would be a minimal increase in floodwater depth during a 100-year storm to two parcels identified in Table 6-2. In order for the Project to be compliant with applicable state laws, either an easement on these properties must be acquired, or written permission must be secured from the affected property owner to authorize the projected increase in flooding.

As depicted on Figure 23, there will be a reduction in flooding within the Study Area during a 100-year coastal storm flood event, except for the properties identified in Table 6-2.

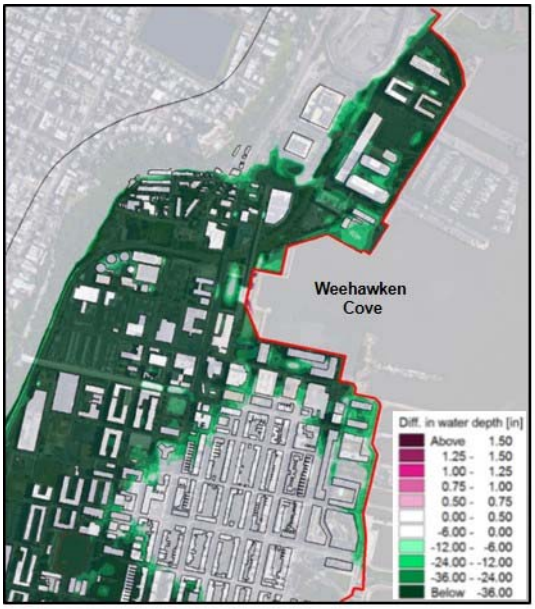
In addition to flood risk reduction benefits observed within the Study Area, flood model results show that for the 100-year coastal storm surge event, additional benefits were observed in the adjacent areas of Jersey City. As shown on Figure 23, areas in northwestern Jersey City (bounded roughly by 18th Street in the north, the HBLR tracks to the east, 12th Street to the south, and the Palisades to the west) will still flood during a coastal surge event, but may see a reduction in flooding of up to three feet. This is because some flood waters would have previously been flowing

into Jersey City from Hoboken, but with the southern Resist alignment in place, these waters are prevented from entering into Hoboken (and thus Jersey City) in the first place.

Table 6-2: Properties Impacted by Modeled Increase in Flood Depths Under Alternative 1

BLOCK	LOT	OWNER	EXISTING CONDITIONS
7302	1	NJ TRANSIT	NJ TRANSIT property near Long Slip Canal containing multiple rail tracks.
210, 210.01	1-6, 26-29	Washington-Hudson Assoc.	Existing parking lot on Observer Hwy. and Washington St.

Source: Dewberry, 2015-2017



GREEN shows decreases in flood depth in inches

PINK shows increases in flood depth in inches

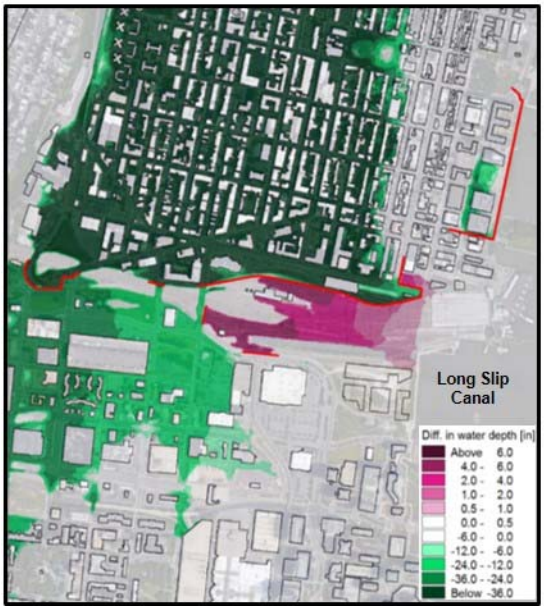


Figure 23: Modeled Increase in Flood Depths – Alternative 1

6.5.2 Impacts of Alternative 2

Under Table 6-3 and Figure 24 shows the areas of floodplain disturbance for Alternative 2, including Options 1 and 2. Permanent disturbance occurs where above-ground structures are proposed, such as the Resist infrastructure. Temporary disturbance occurs where disturbance is only required during construction, such as at

staging areas or areas where construction would be required for below-ground infrastructure (including DSD and High Level Storm Sewer components) but no permanent above-ground structures are proposed. DSD components would be located below-grade; therefore, no permanent impacts to the floodplain are anticipated for DSD. Alternative 2 would result in a minor permanent disturbance to approximately one percent of the 100-year floodplain within the Study Area.

Table 6-3: Floodplain impacts for Alternative 2, Options 1 and 2

	PERMANENT FLOODPLAIN IMPACTS	TEMPORARY FLOODPLAIN IMPACTS
Alternative 2, Option 1 (Resist infrastructure only)	2.8 Ac.	5.5 Ac.
Alternative 2, Option 2 (Resist infrastructure only)	2.8 Ac.	6.4 Ac.
Alternative 2 (DSD infrastructure only)	N/A	

Source: Dewberry, 2015-2017

Under Alternative 2, where Resist barriers are located inland, coastal modeling indicates the potential for a minimal increase in floodwater depth during a 100-year storm at five properties identified in Table 6-4. In order for the Project to be compliant with applicable state laws, either an easement on properties listed in Table 6-4 must be acquired, or written permission must be secured from the affected property owner(s) to authorize the projected increase in flooding.

As depicted on Figures 25, there will be a reduction in flooding within the Study Area during a 100-year coastal storm flood event.

Under Alternative 2, the flood risk reduction benefits to adjoining areas in Jersey City would be the same as Alternative 1.

Table 6-4: Properties Impacted by Modeled Increase in Flood Depths under Alternative 2

BLOCK	LOT	OWNER	EXISTING CONDITIONS
7302	1	NJ TRANSIT	NJ TRANSIT property near Long Slip Canal containing multiple rail tracks.
210, 210.01	1-6, 26-29	Washington-Hudson Assoc.	Existing parking lot on Observer Hwy. and Washington St.
268.01	1	1500 Garden St.	Harborside Lofts. Existing residential building.
34.03	1.01 & 1.02	BDLJ Associates	Vacant properties.
34.03	4.01	HARTZ	Existing parking lot.

Source: Dewberry, 2015-2017

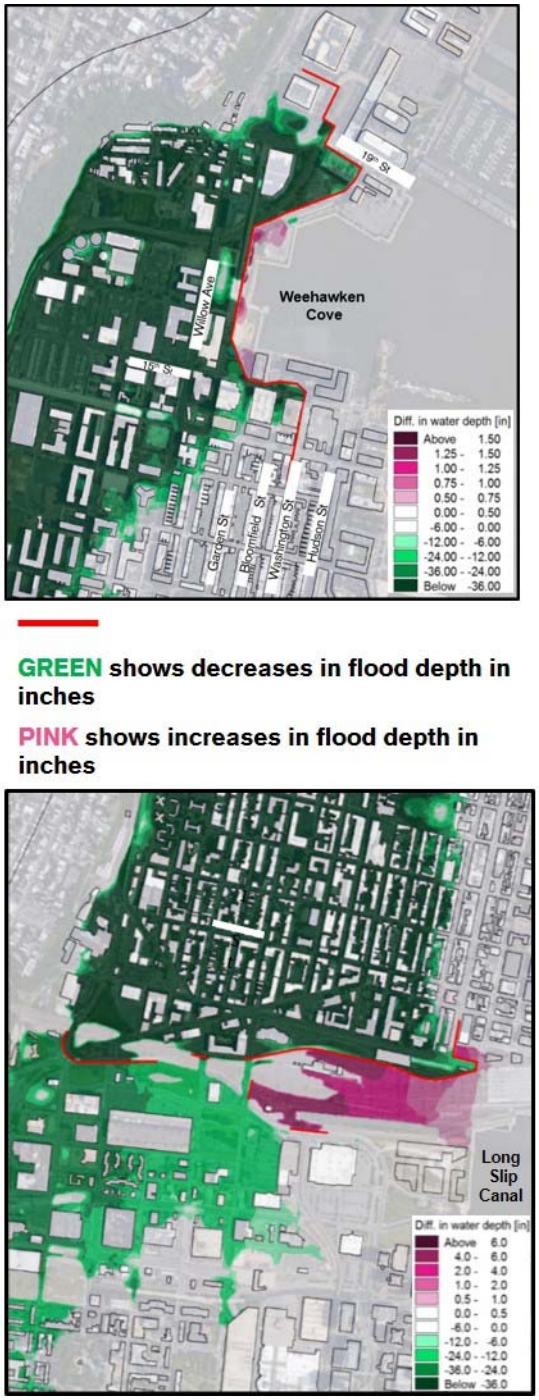


Figure 25: Modeled Increase in Flood Depths – Alternative 2

6.5.3 Impacts of Alternative 3

Under Table 6-5 and Figure 26 shows the areas of floodplain disturbance for Alternative 3, including Options 1 and 2. Permanent disturbance occurs where above-ground structures are proposed, such as the Resist infrastructure. Temporary disturbance occurs where disturbance is only required during construction, such as at

staging areas or areas where construction would be required for below-ground infrastructure (including DSD and High Level Storm Sewer components) but no permanent above-ground structures are proposed. DSD components would be located below-grade; therefore, no permanent impacts to the floodplain are anticipated for DSD. Alternative 3 would result in a minor permanent disturbance to approximately one percent of the 100-year floodplain within the Study Area.

Table 6-5: Floodplain impacts for Alternative 3, Options 1 and 2

	PERMANENT FLOODPLAIN IMPACTS	TEMPORARY FLOODPLAIN IMPACTS
Alternative 3, Option 1 (Resist infrastructure only)	2.8 Ac.	7.5 Ac.
Alternative 3, Option 2 (Resist infrastructure only)	2.8 Ac.	5.9 Ac.
Alternative 3 (DSD infrastructure only)	N/A	

Source: Dewberry, 2015-2017

Under Alternative 3, where Resist barriers are located inland, coastal modeling indicates the potential for a minimal increase in floodwater depth during a 100-year storm at five properties as depicted on Table 6-6. In order for the Project to be compliant with applicable state laws, either an easement on properties listed in Table 6-6 must be acquired, or written permission must be secured from the affected property owner(s) to authorize the projected increase in flooding.

As depicted on Figure 27 there will be a reduction in flooding within the Study Area during a 100-year coastal storm flood event.

Under Alternative 3, the flood risk reduction benefits to adjoining areas in Jersey City would be the same as Alternative 1.

Table 6-6: Properties Impacted by Modeled Increase in Flood Depths Under Alternative 3

BLOCK	LOT	OWNER	EXISTING CONDITIONS
7302	1	NJ TRANSIT	NJ TRANSIT property near Long Slip Canal containing multiple rail tracks.
210, 210.01	1-6, 26-29	Washington-Hudson Assoc.	Existing parking lot on Observer Hwy. and Washington St.
268.01	1	1500 Garden St.	Harborside Lofts. Existing residential building.
34.03	1.01 & 1.02	BDLJ Associates	Vacant properties.
34.03	4.01	HARTZ	Existing parking lot.

Source: Dewberry, 2015-2017

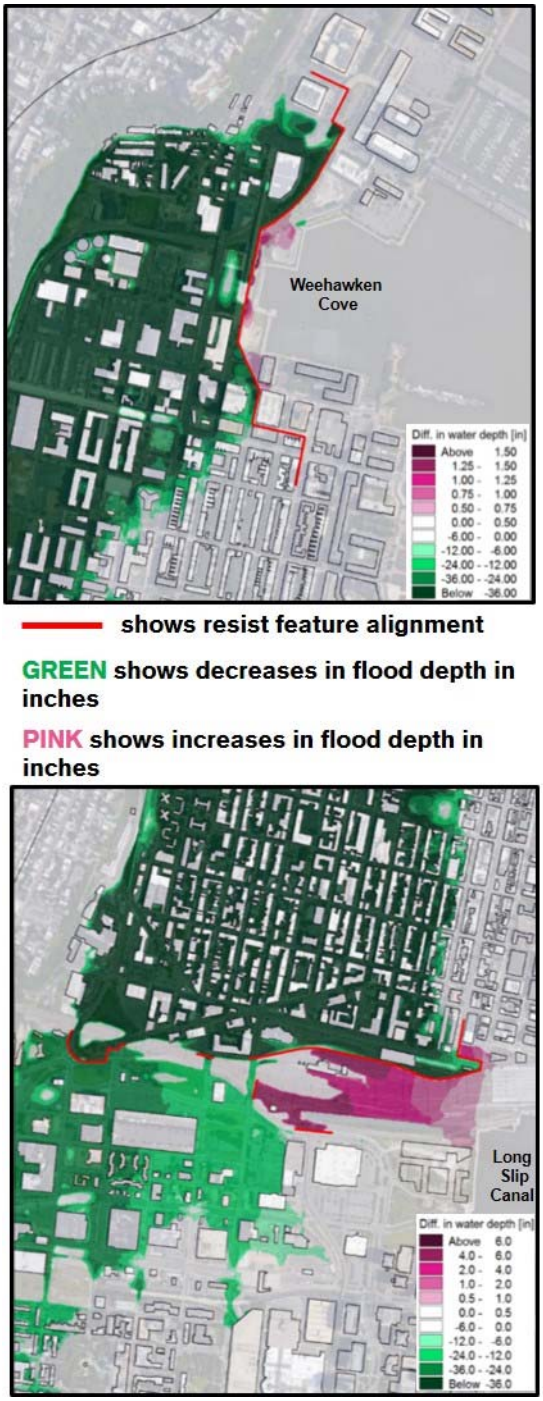


Figure 27: Modeled Increase in Flood Depths – Alternative 3

6.5.4 Impacts of No Action Alternative

No impacts on floodplains would result from the No Action Alternative. The No Action Alternative would not implement any flood risk reduction measures, therefore leaving the potential for future flooding and risk to lives or properties the same as the current condition.

6.5.5 Mitigation Measures and BMPs Included in Alternatives 1, 2 and 3

Since the Study Area is already fully developed, many of the traditional approaches for minimizing and avoiding floodplain impacts identified in the procedures of implementation of EO 11988 are not applicable to this Project. The following measures would be implemented in order to minimize project impacts on floodplains:

- Green infrastructure projects would be implemented in the DSD portion of the Project;
- Vegetation removal would be minimized and all re-vegetation activities would be in accordance with accepted practices, including appropriate species selection;
- Local jurisdictions will pursue opportunities to provide flood risk reduction for infrastructure and buildings that do not receive flood risk reduction benefits from the Project;
- Public access to the urban waterfront would continue to be provided; and
- The Project would be a constant and visible reminder to residents and visitors of the importance of proper floodplain management.

6.6 Aquatic Ecology Impacts

6.6.1 Impacts of Alternative 1

Alternative 1 involves reconstruction of approximately 8,500 lineal feet of waterfront structures; this alternative has the greatest risk of noise/vibration impacts on aquatic species found in the Hudson River. The risk of noise/vibration impacts is related to the nature of the proposed construction activities. The current waterfront structures include anchored and cantilevered sheet piles, block or concrete retaining walls, rip-rap, and pile-supported concrete deck. Repair and replacement of some of these Resist structures, such as rip-rap, can be completed from the land side and pose limited risk of noise/vibration impacts into the Hudson River. Repair and replacement of other waterfront structures, such as sheet piles and concrete block, would require in-water work, where risk of noise/vibration impacts on aquatic species is much greater. In these areas, it is anticipated that construction techniques would involve the construction of cofferdams approximately 10 feet offshore. Use of these cofferdams is anticipated to confine project impacts to a very narrow corridor along the shoreline. Any mobile aquatic species found in this area would be anticipated to temporarily relocate to avoid any disturbance impacts. This includes the two listed fish species, shortnose sturgeon and Atlantic sturgeon, which could pass through the area during seasonal movement patterns. Based on the proposed BMPs, impacts to aquatic ecology including the fish species identified by NMFS, are anticipated to be short-term and minor, and are not expected to result in measurable aquatic ecology impacts within the Hudson River.

The waterfront structures that have been identified as having integrity issues would be repaired/replaced under Alternative 1. These structural improvements would prevent long-term soil erosion and sedimentation release, and therefore any impacts to aquatic species resulting from this ongoing sedimentation would be reduced over the long term under Alternative 1.

Short-term stress to fish and impacts to EFH may occur due to noise, turbidity, runoff, and shading within the Study Area under Alternative 1. Fish and EFH may be temporarily disturbed during construction; however, fish are expected to avoid the work area during construction and return when construction ceases. Shading effects would be minimal since the Study Area has depths that preclude SAV habitat. Runoff may increase turbidity and introduce potential contaminants to the Study Area during construction, but implementation of a Soil Erosion and Sediment Control Plan (SESCP) would minimize such impacts. Potential impacts on phytoplankton, zooplankton, benthic invertebrates and marine mammals are expected to be negligible.

In general, the waterfront areas along Hoboken in the Alternative 1 Project Area are already completely hardened. Alternative 1 would increase resiliency against flooding, but would not generally restore habitat. There may be some new structures that fish may use during the time they spend in this portion of the river. Runoff could potentially adversely affect the water quality; however, the project design and the implementation of BMPs would store stormwater, which would be treated prior to subsequent discharge. BMPs and the use of non-polluting construction materials would minimize runoff and pollutants into the water from the construction of waterfront structures.

6.6.2 Impacts of Alternative 2

Alternative 2 does not propose waterfront construction activities. The proposed construction areas of Alternative 2 are located inland, and a SESCP would be prepared and implemented to address temporary surface water impacts (and in turn aquatic ecology impacts) during construction. Alternative 2 would result in a long-term increase in the amount of stormwater discharge (see Section 6.4 Surface Water Quality Impacts), but this increase is anticipated to be minor, and is not expected to result in measurable aquatic ecology impacts within the Hudson River.

6.6.3 Impacts of Alternative 3

The impacts of Alternative 3 on aquatic ecology are expected to be similar to the impacts of Alternative 2.

6.6.4 Impacts of the No Action Alternative

No additional impacts on aquatic ecology would result from the No Action Alternative. The existing waterfront structures have been identified as having structural integrity issues which are likely resulting in adverse impacts on aquatic ecology from sedimentation. Any adverse impacts would continue for the long term under the No Action Alternative. The No Action Alternative would also continue the current level of CSO discharge within the Hudson River, thereby continuing ongoing impacts of CSO discharge on aquatic ecology.

6.6.5 Mitigation Measures and BMPs Included in Alternative 1, 2 and 3

The following measures would be implemented in order to minimize project impacts on aquatic ecology:

- Peak underwater noise levels would remain below 150 dB to avoid physiological and behavioral impacts to listed aquatic species;
- The zone of passage for this Project would be maintained for 24 hours-a-day. Since the Project is on the NJ shoreline side of the Hudson River, species would have a wide passage to bypass the impacted area and avoid noise and other short-term disturbances; and
- Site-specific restrictions for fish species would be taken into consideration. Consultation with the NMFS would occur throughout the project so that any fish timing restriction periods (generally from January 1 to June 30) would be observed to minimize impacts to estuarine species and methodologies would be implemented to minimize any adverse effects on the life stages.

6.7 Coastal Resource Impacts

6.7.1 Impacts of Alternative 1

Under Alternative 1, the properties/ROWs identified in Table 5-6 may be owned by the state under the Tidelands program. The majority of the former tidelands are located in the area of the waterfront structures included under Alternative 1; however, all of the former tidelands located along the waterfront have been granted in the past to public or private parties. Exceptions to this are the proposed Resist structure located in the ROW of Observer Highway, and an underground stormwater storage tank and piping also located in that ROW. Based on a review of Tideland Grant Maps at the NJDEP, the former tidelands in this area do not appear to have been granted to the City of Hoboken. If a tidelands grant has not already been issued by the NJDEP, one would need to be obtained for these areas of tideland claims.

There are also potential tidelands claims located in the areas of the DSD facilities for each of the alternatives. These are located on public property, public ROW and/or private property, as shown on Figure 15. If a tidelands grant has not already been issued by the NJDEP, one would need to be obtained for these areas of tideland claims.

The project involves work within areas regulated under the Coastal Zone Management Act; therefore, the project would need to demonstrate consistency with the Coastal Zone Management Act. Alternative 1 would involve a significant amount of in-water work for the replacement of bulkheads associated with the Resist structure and DSD outfalls. Therefore, a Waterfront Development Individual Permit would need to be obtained. No other Coastal Zone Management permits would be required.

6.7.2 Impacts of Alternative 2

The potential tidelands claims under Alternative 2 would be identical to those described in Alternative 1. Alternative 2 would involve in-water work for the replacement of bulkheads associated with proposed outfalls. Therefore, a Waterfront Development Individual Permit would need to be obtained. No other Coastal Zone Management permits would be required.

6.7.3 Impacts of Alternative 3

The potential tidelands claims and Coastal Zone Management/Waterfront Development permitting under Alternative 3 would be identical to those described in Alternative 1.

6.7.4 Impacts of the No Action Alternative

The potential tidelands claims shown on Figure 15 would remain under the No Action Alternative, as the tidelands program is unrelated to Project implementation.

6.7.5 Mitigation Measures and BMPs Included in Alternative 1, 2 and 3

The following measures would be implemented in regards to tidelands claims:

- To definitively identify ownership, a review of state Tideland Grants and/or a property title search would be required for all build alternatives; and
- If no Tideland Grants are determined to be present for the potential tideland claims within the Project Area (Table 5-6), Grants would be sought from the Tidelands Resource Council.

6.8 Wetlands Impacts

6.8.1 Impacts of Alternative 1

Under Alternative 1, wetland impacts associated with the build alternatives are related to the installation of a floodwall in the southwestern portion of the Study Area (Figure 28). The wetland that would be impacted by this Resist feature is Wetland B, a man-made drainage ditch, with a concrete lining in the area of the HBLR line. Wetland B is a palustrine emergent wetland (PEM). It is anticipated that Wetland B would be classified as Ordinary Resource Value.

There would be an estimated total of 230 SF (0.005 acres) of PEM impacts under Alternative 1. The loss of the functions and values of the impacted wetlands would be negligible in terms of stormwater conveyance and floodflow alteration, and it provides little in terms of habitat and wildlife values. Its functions would be replaced by the proposed floodwall to be constructed. The wetlands impact resulting from Alternative 1 would be negligible and compensatory mitigation is not anticipated.

6.8.2 Impacts of Alternative 2

The wetland impacts under Alternative 2 would be identical to the impacts described in Alternative 1.

6.8.3 Impacts of Alternative 3

The wetland impacts under Alternative 3 would be identical to the impacts described in Alternative 1.

6.8.4 Impacts of the No Action Alternative

No impacts on wetlands would result from the No Action Alternative, since there is no ground disturbance.

6.8.5 Wetland Mitigation

As required by EO 11990 and in accordance with Section 404(b)1 guidelines, wetland mitigation should include compensation for unavoidable losses. Generally, mitigation must be conducted in concert with the construction of the project to compensate for the loss of wetland functions and values. Under the wetlands rules (NJAC 7:7A-15.8), mitigation is required for the permanent loss of greater than 0.1 acres of freshwater wetlands and may be required for less than 0.1 acres if the application fails to demonstrate that "all activities have been designed to avoid and minimize impacts to wetlands." The method of mitigation and compensation ratio for wetlands permanently disturbed is outlined below:

1. On-site or off-site wetland creation/restoration at a 2:1 ratio.
2. On-site or off-site wetland enhancement-ratio determined on a case-by-case basis.
3. Purchase of credits from a wetlands mitigation bank-determined on a case-by-case basis.
4. Monetary contribution to the Wetlands Mitigation Counsel-formula provided under NJAC 7:7A-15.21(d); the amount of monetary contribution for all property owners, excluding single-family property owners, shall be the acreage of wetlands/open water impacts multiplied by $300,000, adjusted annually using the Consumer Price Index.
5. Land donation to the Wetlands Mitigation Counsel-determined on a case-by-case basis.
6. NJDEP requires that impacted wetlands be mitigated as part of the project plan. Mitigation sites must be identified during the design of the project so that suitable areas are available.

Based on the estimated potential wetland impact resulting from each of the build alternatives (230 SF, 0.005 ac.), mitigation is not anticipated to be required. However, an on-site field search was performed in conjunction with the wetland delineation activities and an area in the southwest portion of the Study Area was identified as a potential wetland creation location, if one is needed. In regards to mitigation bank credits, MRI-3 Mitigation Bank in Carlstadt, Bergen County, New Jersey serves the Hackensack Meadowlands District and HUC 020-30-101-170. As of June 1, 2016, the MRI-3 Mitigation Bank had PEM credits available.

6.8.6 Mitigation Measures and BMPs Included in Alternatives 1, 2 and 3

The following measures would be implemented in order to minimize Project impacts on wetlands and open waters:

- Identified wetland areas that are not included in the build alternatives' limit of disturbance would not be impacted;
- Any potential introduction or spread of invasive species due to ground disturbance in wetlands would be assessed. If it is determined that the spread of invasive species is a risk, preventative measures recommended in the New Jersey Strategic Management Plan for Invasive Species, such as cleaning of boots and tires, and cleaning of equipment prior to arriving at new job sites to remove mud that potentially contains seeds of invasive species will be implemented; and
- Open water impacts along the Hoboken waterfront would be avoided and minimized to the greatest extent practicable; only those areas of bulkhead that need to be replaced for the Resist structure would be replaced, and the design and construction methods would minimize the extent of the impacts to open waters associated with the replacement process.

6.9 Upland Vegetation and Wildlife Impacts

6.9.1 Impacts of Alternative 1

All of the upland vegetation impacts under Alternative 1 would be in previously developed and disturbed areas. As discussed in Section 5.9, since only typical urban plant and animal species were observed in the Study Area, this loss of upland vegetation does not constitute a significant impact. Under Alternative 1, there would be an estimated total of approximately 25.5 acres of upland vegetation disturbed in both Options 1 and 2. The vegetation which would be disturbed outside of developed areas would be replaced following construction activities. As discussed previously, the New Jersey No Net Loss Reforestation Act has been determined not to be applicable to the upland vegetation located within the Study Area.

There would be minimal effects to wildlife and wildlife corridors resulting under Alternative 1 because the majority of animals in and around the Project Area are accustomed to fragmented, urban areas. Any wildlife in the area would temporarily avoid the construction areas and the proposed build alternatives are not expected to affect long-term use of the areas by wildlife (Figure 29).

6.9.2 Impacts of Alternative 2

Impacts on upland vegetation and wildlife under Alternative 2 would be similar to the impacts described under Alternative 1, except that there would be an estimated total of approximately 23.4 acres of upland vegetation disturbed under both Options 1 and 2 (Figure 30).

6.9.3 Impacts of Alternative 3

Impacts on upland vegetation and wildlife under Alternative 3 would be similar to the impacts described under Alternative 1, except that there would be an estimated total of approximately 22.2 acres of upland vegetation disturbed under both Options 1 and 2 (Figure 31).

6.9.4 Impacts of the No Action Alternative

No impacts on upland vegetation would result from the No Action Alternative, since there would be no ground disturbance.

6.9.5 Mitigation Measures and BMPs Included in Alternatives 1, 2 and 3

The following measures would be implemented in order to minimize Project impacts on upland vegetation:

- Prior to any vegetation clearing, a pre-construction nest survey would be completed to identify active nests. If active nests are observed in the Project Area, protective buffer zones around the nest would be established (dependent on species), and construction would be allowed to commence only when the chicks are fully fledged and able to fly;
- Impacts to areas outside of the limits of construction would be avoided; and
- Disturbed areas would be reseeded or landscaped in accord with species lists provided by local jurisdictions and disturbed areas and presence of invasive species would be monitored and controlled as required.

7.0 PERMITTING REQUIREMENTS

Local, state and/or federal permits and approvals would be required under all of the build alternatives. A Pre-Application Meeting with all required jurisdictional agencies should be conducted early in the design process once the preferred alternative is selected. A discussion of the anticipated permits and approvals is provided below. In addition to the permits and approvals identified below, the project must be reviewed and approved by the City Planning/Zoning Boards in Hoboken, Jersey City and Weehawken.

7.1 Alternative 1 Permitting Requirements

7.1.1 Soil

An application for certification of a SESCP must be approved by the Hudson-Essex-Passaic Soil Conservation District (HEPSCD).

7.1.2 Surface Water

Pursuant to the New Jersey Water Pollution Control Act and the Federal Clean Water Act, the following permits would be required for construction of the Resist waterfront structures, including the proposed bulkhead repairs/replacements and new outfalls:

- USACE Sections 10/404 Individual Permit
- NJDEP Individual Waterfront Development Permit
- NJDEP Individual Flood Hazard Area Permit
- NJDEP Individual Freshwater Wetland Permit
- NJDEP Division of Water Quality NJPDES Individual Permit for SWPPP

The following consultations would be required during the USACE and NJDEP Individual Permit review process:

- Section 7 consultation (endangered/threatened species) with NOAA-NMFS
- Essential Fish Habitat consultation with NOAA-NMFS
- USCG review of navigation issues associated with in-water work

7.1.3 Coastal Resources/Tidelands

Construction in areas now or formerly flowed by the Mean High Tide, if not already granted, must be authorized by a grant, lease, or license from the NJDEP Bureau of Tidelands Management, and the Tidelands Resource Council.

7.1.4 Floodplains

Construction in floodplains throughout Hoboken, Jersey City and Weehawken must be authorized by an NJDEP Individual Flood Hazard Area Permit.

7.1.5 Wetlands

An NJDEP Letter of Interpretation (LOI) would be needed to verify wetlands delineated in the Study Area. Impacts to Wetland B would be authorized via the NJDEP Individual Freshwater Wetland Permit.

7.1.6 Vegetation

Approvals to impact vegetation regulated by the NJDEP and/or the USACE would be included the Individual Permit applications identified above.

7.2 Alternative 2 Permitting Requirements

The permitting and consultation requirements under Alternative 2 would be similar to the permitting and consultation requirements described in Alternative 1, with the exception of the NJDEP Individual Freshwater Wetland Permit and the USACE Sections 10/404 Individual Permit – these would not be required and instead NJDEP Freshwater Wetland Permits GP-7 (human-made ditches) and GP-11 (outfall structures) and a USACE Nationwide Permit 7 (outfall structures) would be applicable. USCG review of navigation issues associated with in-water work would not apply to Alternative 2.

7.3 Alternative 3 Permitting Requirements

The permitting and consultation requirements under Alternative 3 would be similar to the permitting and consultation requirements described in Alternative 2.

8.0 SUMMARY OF IMPACTS

No significant impacts were identified from the proposed project build alternatives on geology, soils, groundwater, surface water/water quality, aquatic ecology, coastal resources (tidelands), wetlands, or upland vegetation and wildlife. The various build alternatives would result in a temporary disturbance of approximately 27 to 29 acres within the 100-year floodplain, based on the project footprint. . However, the permanent impacts to the floodplain arising from new infrastructure constructed above the current grade would range from approximately 5 to 8 acres. There are no alternatives to this disturbance within the floodplain which would meet the project purpose and need. In addition, these floodplain impacts would be offset by a reduction in the potential for and magnitude of impacts to lives and property during future coastal storm and rainfall flooding events.

Geology

Impacts on geology from all of the build alternatives are expected to be negligible.

Soils

The risk of off-site discharge of soils during rainfall events during construction exists under all three build alternatives; however, under Alternative 1, an increased risk for surface water pollution exists since the limit of disturbance is located adjacent to the Hudson River, for the proposed waterfront structures. Alternative 2, Option 2 proposes the most soil disturbance for construction with a total of 30.2 acres. Alternative 1, Option 2 has the least impact on soils at 29.3 acres of surface disturbance for construction.

Groundwater

No impacts to groundwater quality are anticipated under all three build alternatives. However, as outlined in the Hazardous Waste Screening Technical Environmental Study, a soil and groundwater Sampling, Analysis, and Monitoring Plan (SAMP) would be implemented as a Best Management Practice (BMP) to mitigate any potentially hazardous materials encountered during groundwater de-watering activities.

Surface Water/Water Quality

The only surface water in the Study Area is the Hudson River. Under Alternative 1, approximately 8,500 linear feet of shoreline construction would be undertaken and the total area of surface waters to be temporarily impacted along the bulkheads to be replaced is approximately 0.73 aces. Under Alternatives 2 and 3, in-water work would be limited to the High Level storm sewer discharge site.

Other potential impacts to surface water quality under all three build alternatives are related to the proposed discharge of stormwater to be collected in the various underground tanks during storms, then discharged to the

Hudson River. Based on the magnitude of stormwater to be discharged under all three alternatives in comparison to the water volume in the Hudson River, impacts on water quality are expected to be negligible.

Aquatic Ecology

Under Alternative 1, short-term impacts to aquatic ecology can occur due to noise, turbidity, runoff, and shading during construction. Alternatives 2 and 3 do not propose waterfront construction activities and therefore would not have construction impacts on aquatic ecology. Impacts to aquatic animals will be negligible under all alternatives.

Floodplains

There are no practicable Build Alternatives that would avoid impacts to floodplains. All of the alternatives evaluated would result in floodplain impacts. Each build alternative would include measures (floodwalls, berms, gates, green infrastructure features, etc.), that would reduce flood risk for a majority of persons in the Study Area during the 100-year coastal storm event and the 5-year rainfall event. Permanent floodplain disturbance would range from 5.76 to 7.87 acres. Depending on the alternative selected, there were be in a minor increase in floodwater depth at two to five properties during a 100-year storm.

Coastal Resources (Tidelands)

Research shows that under all build alternatives, a review of state Tideland Grants is required. If no Tidelands Grants are determined to be present for the potential tidelands claims, grants will be sought from the Tidelands Resource Council.

Wetlands

All of the build alternatives would impact approximately 230 SF (0.005 acres) of PEM, associated with a proposed Resist structure located in the southwestern portion of the city. Alternative 1 would additionally impact approximately 0.73 acres of open water area, related to the construction of new bulkheads along the Hudson River waterfront, presenting the greatest wetland (including open water) impact of the build alternatives. Alternatives 2 and 3 present the least wetland disturbance with 230 SF (0.005 acres).

Upland Vegetation and Wildlife

Upland vegetation impacts (urban landscaping, including trees) would result for all of the build alternatives. The greatest upland vegetation impact would result from Alternative 1, Options 1 and 2, having an impact of approximately 25.5 acres. Alternative 3 presents the least impact to upland vegetation at approximately 22.2 acres.

Alternative 2 would have a total of 23.4 acres of upland vegetation disturbed. Impacts to terrestrial wildlife will be negligible under all alternatives.

Permitting Requirements

Local, state and/or federal permits and approvals would be required under all of the build alternatives.

Under Alternative 1 (both Options 1 and 2), a SESCP approved by the HEPSCD would be necessary. The Resist waterfront structures, including bulkhead repairs/replacements and new outfalls would require USACE Sections 10/404 Individual Permits, an NJDEP Individual Waterfront Development Permit, an NJDEP Individual Flood Hazard Area Permit, an NJDEP Individual Freshwater Wetland Permit, an NJDEP Division of Water Quality NJPDES Individual Permit for SWPPP, and tidelands grants, leases, or licenses from the NJDEP Bureau of Tidelands Management, as applicable.

Alternative 1 would also require consultations during the USACE and NJDEP Individual Permit review process with NMFS regarding the Section 7 consultation (endangered/ threatened species) and EFH, as well as with the USCG regarding review of navigation issues associated with in-water work. Alternative 1 would require the most permitting effort and regulatory agency review time of the build alternatives.

The permitting and consultation requirements under Alternatives 2 and 3 would be identical to the permitting and consultation requirements described in Alternative 1, with the exception of the NJDEP Individual Freshwater Wetland Permit and the USACE Sections 10/404 Individual Permit – these would not be required and instead NJDEP Freshwater Wetland Permits GP-7 (human-made ditches) and GP-11 (outfall structures) and a USACE Nationwide Permit 7 (outfall structures) would be applicable. Alternatives 2 and 3 would require the least permitting effort of the build alternatives.

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10.0 REFERENCES

Atlantic States Marine Fisheries Commission (ASMFC). Available online at http://www.asmfc.org/about-us/program-overview

Bain, M.B., M.S. Meixler, and G.E. Eckerlin. 2006. Biological Status of Sanctuary Waters of the Hudson River Park in New York. Final Project Report for the Hudson River Park Trust. Cornell University.

Bellrose, F.C. 1968. Waterfowl Migration Corridors East of the Rocky Mountains in the United States. Biol. Notes, No. 61. Nat. Hist. Surv., Urbana, Illinois.

Beryl, R. and M.F. Buell, Vegetation of New Jersey (New Brunswick: Rutgers University Press) 1973, 123, 169; RGA, Inc. (RGA), Stage IA Cultural Resources Survey: Washington Street Water Main Replacement and Complete Street Redesign, City of Hoboken, Hudson County, New Jersey, (On file, Trenton: NJHPO), 2015a.

Blumberg et al. 2015. Street Scale Modeling of Storm Surge Inundation along the New Jersey Hudson River Waterfront. Journal of Atmospheric and Oceanic Technology.

Brosnan, T.M. and M.L. O'Shea. 1995. New York Harbor water quality survey: 1994. New York City Department of Environmental Protection, Marine Sciences Section, Wards Island, NY.

Coastal Environmental Services. 1987. Television City Project: Characterization of the Aquatic Eclogy of the Site and Assessment of Potential Impacts of the Project on the Aquatic Biota. Prepared for Berle, Kass, and Case, New York, NY; McKeown and Franz, Inc., New York, NY; and The Trump Organization, New York, NY.

City of Hoboken. Available online at http://www.hobokennj.org/visit/history/

Dalton et al, Bedrock Geology and Topographic Base Maps of New Jersey, accessed March 21, 2016, http://mrdata.usgs.gov/geology/state/state.php?state=NJ

EA Engineering Science and Technology. 1990. Phase I Feasibility Study of the Aquatic Ecology along the Hudson River in Manhattan. Final Report. Prepared for New York City Public Development Corporation, New York, NY. Newburgh, NY.

EEA. 1988. Hudson River Center Site Aquatic Environmental Study. Final Report. Garden City, NY.

Final Report: An Evaluation of I/I and Illicit Flow in West New York, NJ and Flood Mitigation in Hoboken, NJ, EmNet, LLC, December 2013.

Flood Hazard Risk and Compliance Concerning Development on Piers and Platforms October 2013, Princeton Hydro, LLC. Ringoes NJ.

Flood Insurance Study, Hudson County, New Jersey December 20, 2013 (Draft), Federal Emergency Management Agency-Region II, 26 Federal Plaza, New York City, NY.

Hoboken Green Infrastructure Strategic Plan October 2013. Together North Jersey. Available online at http://www.hobokennj.org/docs/communitydev/Hoboken-Green-Infrastructure-Strategic-Plan.pdf

Hoboken Resiliency and Readiness Plan, August 2013, City of Hoboken, Hudson County NJ

Holochuck, N. 2000. Hudson River Submerged Aquatic Vegetation. New York Sea Grant Extension Program, Kingston, NY

Hudson River Foundation. Available online at www.hudsonriver.org

Levandowsky, M. and D. Vaccari. 2004. Analysis of Phytoplankton Data from Two Lower Manhattan Sites. Final Report of a Grant from the Hudson River Foundation

Lichvar, R.W., D.L. Banks, W.N. Kirchner, and N.C. Melvin. 2016. The National Wetland Plant List: 2016 wetland ratings. Phytoneuron 2016-30: 1-17. Published 28 April 2016. ISSN 2153 733X.

Mid-Atlantic Fisheries Council (MAMFC). Available online at http://www.mafmc.org/

National Marine Fisheries Service (NMFS). Summary of Essential Fish Habitat (EFH) Designation. Available online at: http://www.noaa.gov/index.html

National Resource Conservation Service, Web Soil Survey. Accessed March 21, 2016, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

New Jersey Forest Service. New Jersey No Net Loss Reforestation Act. P.L. 1993, c106 (C.13:1L-14.2). 2007. Available online at: http://www.nj.gov/dep/workgroups/docs/forestry_20111205_programguidelines.pdf

New York-New Jersey Harbor & Estuary Program. The State of the Estuary 2012. Available online at www.harborestuary.ogr

NISC. 2005. Five-Year Review of Executive Order 13112 on Invasive Species. National Invasive Species Council Department of the Interior Office of the Secretary (OS/SIO/NISC),1849 C Street, NW. Washington, DC 20240

NJDEP Bureau of Geographic Information & Analysis and Natural Resources Conservation, 2002. New Jersey Department of Environmental Protection, Trenton NJ.

NJDEP Bureau of GIS, NJDEP Division of Fish & Wildlife, Endangered & Nongame Species Program. New Jersey Department of Environmental Protection. 2014. Landscape Project Version 3.1, accessed via NJDEP GeoWeb. Available online at http://www.nj.gov/dep/gis/geowebsplash.htm.

NJDEP Bureau of Tidelands, Sheet 693-2172, Sheet 686-2172, Sheet 700-2178 and Sheet 693-2178. Copies available at the Bureau of Tidelands Management, 501 East State Street, Trenton, NJ. Review was conducted with: Richard Castagna, Supervisor, Technical Analysis Section, Bureau of Tidelands Management.

NJDEP 1987. Freshwater Wetlands Protection Act. New Jersey Department of Environmental Protection, Trenton NJ. Available online at http://www.nj.gov/dep/landuse/download/13_9b.pdf

NJDEP, 1986. Wetlands Map for Hudson County. NJ New Jersey Department of Environmental Protection, Trenton NJ Available online at http://www.state.nj.us/dep/gis/wetshp.html#HUD

NJDEP Geographic Information System geospatial data. New Jersey Department of Environmental Protection, Trenton NJ.

NJDEP, 1986. Wetlands Map for Hudson Co. N.J New Jersey Department of Environmental Protection, Trenton NJ Available online at http://www.state.nj.us/dep/gis/wetshp.html#HUD

NJDEP, 2014. Division of Water Monitoring and Standards, Bureau of Water Quality Standards and Assessment. 2012 New Jersey Integrated Report Appendix A: 2012 Final Integrated List of Waters (Assessment Unit Summary List). Available online at: http://www.state.nj.us/dep/wms/bears/docs/2012_final_integrated_list.pdf

NJDEP, 2014. Division of Water Monitoring and Standards, Bureau of Water Quality Standards and Assessment. 2012 New Jersey Integrated Report Appendix B: Final 2012 303(d) List of Water Quality Limited Waters. Available online at http://www.nj.gov/dep/wms/bears/docs/2012_final_303(d)_list.pdf

NJ TRANSIT January 2012. New Jersey Transit Corporation 1 Penn Plaza East, Newark NJ.

NOAA Tide Datum. Available online at https://tidesandcurrents.noaa.gov/ datums.html?id=8518750

NOAA's Essential Fish Habitat (EFH) Mapper. Available online at http://www.habitat.noaa.gov/protection/efh/efhmapper/index.html

NOAA's VDatum Software. 2016. Available online at https://vdatum.noaa.gov/.

NorthEast Hawk Watch (NEHW). 2008. A Guide for Hawks Seen in the Northeast

Olson, A.M., E.G., Doyle, and S.D. Visconty. 1996. Light Requirements of Eelgrass: A Literature Survey

PBS&J. 1998. The Hudson Park. Natural Resources Appendix to Final Environmental Impact Statement. Prepared for the Empire State Development Corporation and the Hudson River Park Conservancy.

Priority Wetlands for the State of New Jersey, 1989. USEPA Region II: Marine and Wetlands Protection Branch Federal Plaza, New York, NY.

Resist, Delay, Store, Discharge: A Comprehensive Water Strategy. RBD OMA Team. March 2014. Available online at https://vimeo.com/90759469

Sanborn 1935 Jamboree Drive, Suite 100 Colorado Springs, CO 80920, 2007.

Sewer Monitoring Program Observations and Data November 15, 2011. EmNet, LLC.
121 S. Niles Ave, Suite 22, South Bend, IN 46617.

Street Scale Modeling of Storm Surge Inundation along the New Jersey Hudson River Waterfront. Stevens Institute of Technology Davidson Laboratory. October 2014.

Surficial Geology of the Jersey City (1995) and Surficial Geology of Weehawken and Central Park Quadrangle, Hudson and Essex Counties, New Jersey (1993).

Steven's Institute of Technology Urban Ocean Observatory: http://hudson.dl.stevens-tech.edu/maritimeforecast/maincontrol.shtml

USACE, 2005-2011 Aquatic Biological Sampling Reports. Available online at http://www.nan.usace.army.mil/Portals/37/docs/harbor/Biological%20and%20Physical%20Monitoring/Aquatic%20Biological%20Survey/2011_ABS%20Report.pdf

USACE, New York District. October 2014. 2013 Migratory Finfish Report

USACE. 1987. Waterways Experimentation Station; Environmental Laboratory. Wetland Delineation Manual. Technical Report Y-87-1. Vicksburg, Mississippi.

USACE et al. 1989. Federal Interagency Committee for Wetland Delineation. Manual for the Identification and Delineation of Jurisdictional Wetlands

USACE. 1986. Feasibility Report, Navigation Study Improvements to Existing Navigational Channel, Arthur Kill – Howland Hook Marine Terminal Study

USDA/SCS. 2016. Web Soil Survey of New Jersey. Available online at http://www.nrcs.usda.gov/wps/portal/nrcs/surveylist/soils/survey/state/?stateId=NJ

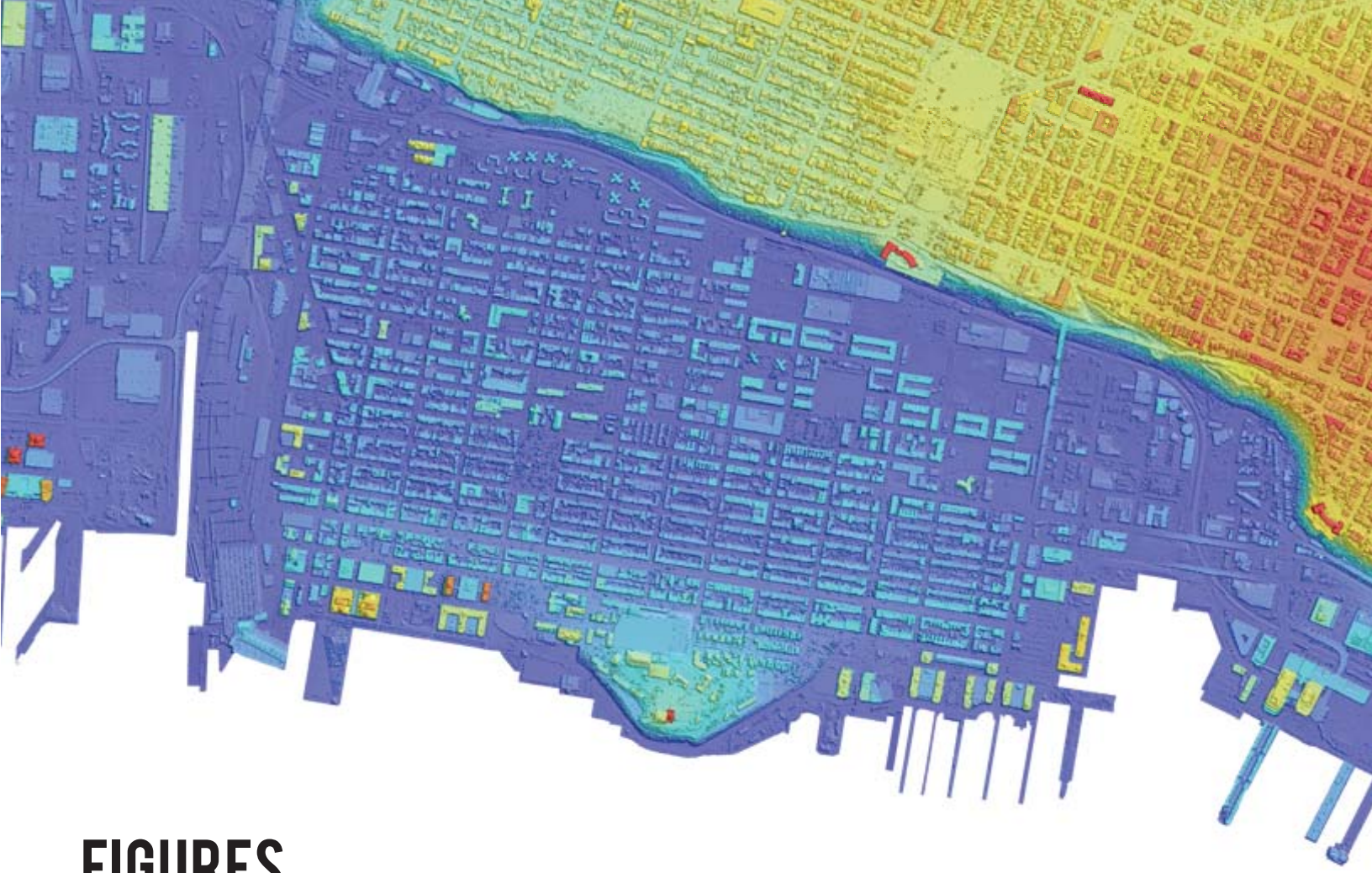
USFWS IPaC. http://ecos.fws.gov/ipac/gettingStarted/map

USFWS National Wetland Inventory, 1982. U. S. Fish and Wildlife Service. Mapper. Available online at http://www.fws.gov/wetlands/Data/Mapper.html

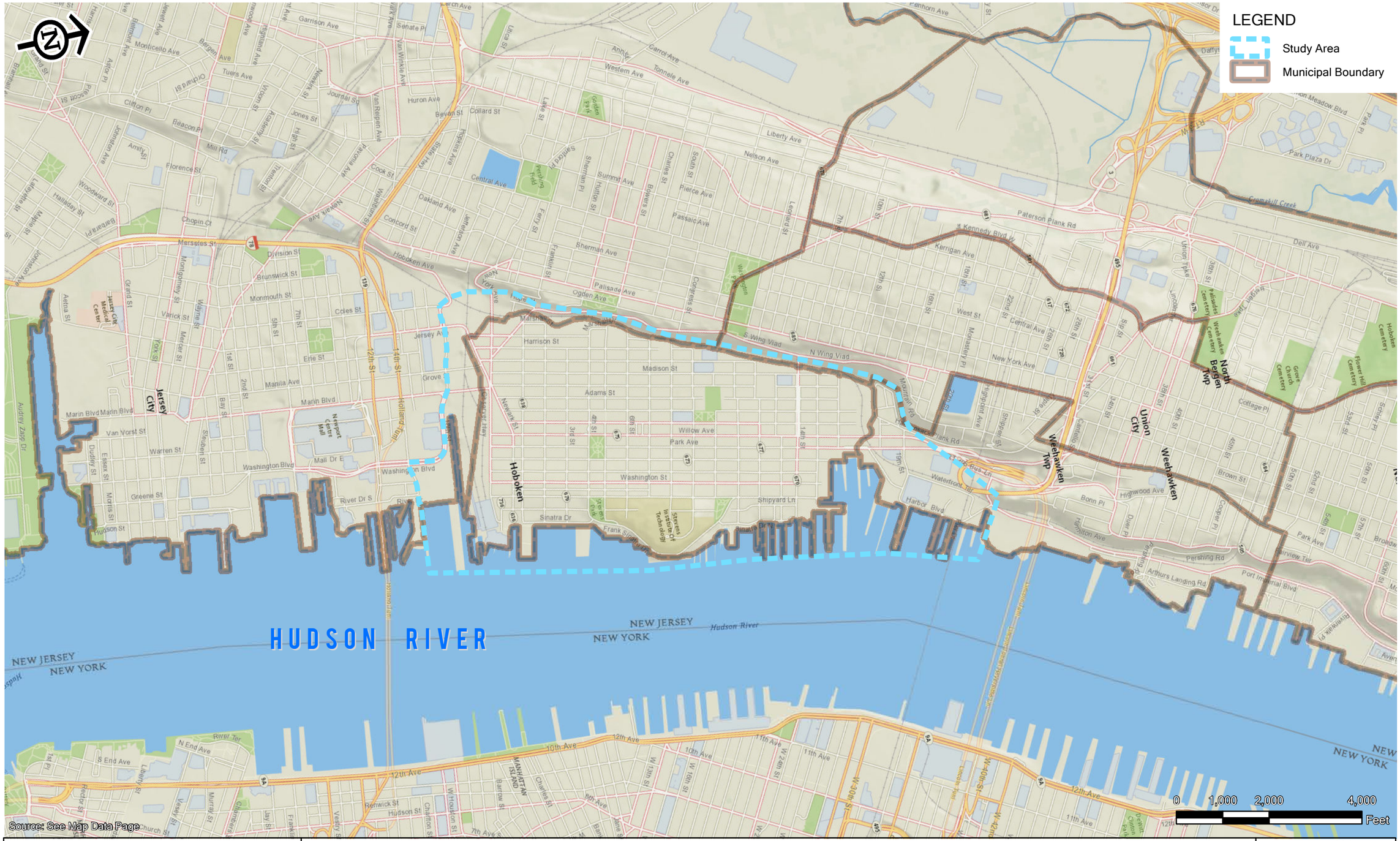
USGPO. 1980. 40 CFR Pt. 230: Sect. 404(b) (1) guidelines for the Specifications of Disposal Sites for Dredged or Fill Material. In Federal Register. 1980. pp 85352 – 85353 Available online at https://www.law.cornell.edu/cfr/text/40/part-230/subpart-A

USGS, Jersey City NJ-NY (1967 photorevised 1981) and Weehawken NJ (1967 photorevised 1981) Topographical Quadrangles. US Department of the Interior US Geological Survey National Geospatial Technical Operations Center (NGTOC)

Will, R. and L.J. Houston. 1988. Fish distribution Survey of Newark Bay, New Jersey, May 1987-April 1988.



FIGURES



REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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Project Location Map

January 2017

FIGURE 1

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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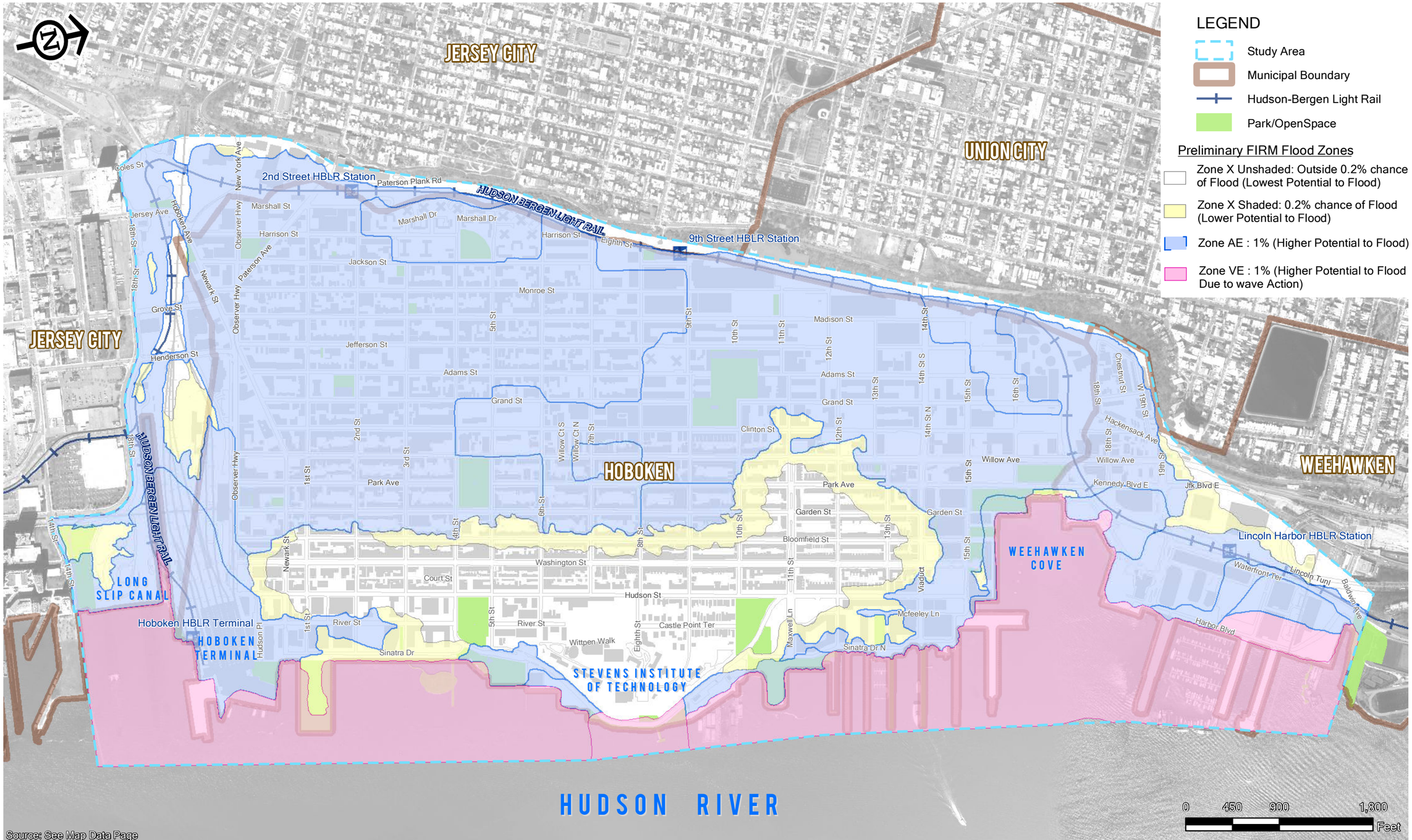
Study Area Map

January 2017

FIGURE 2



Source: See Map Data Page

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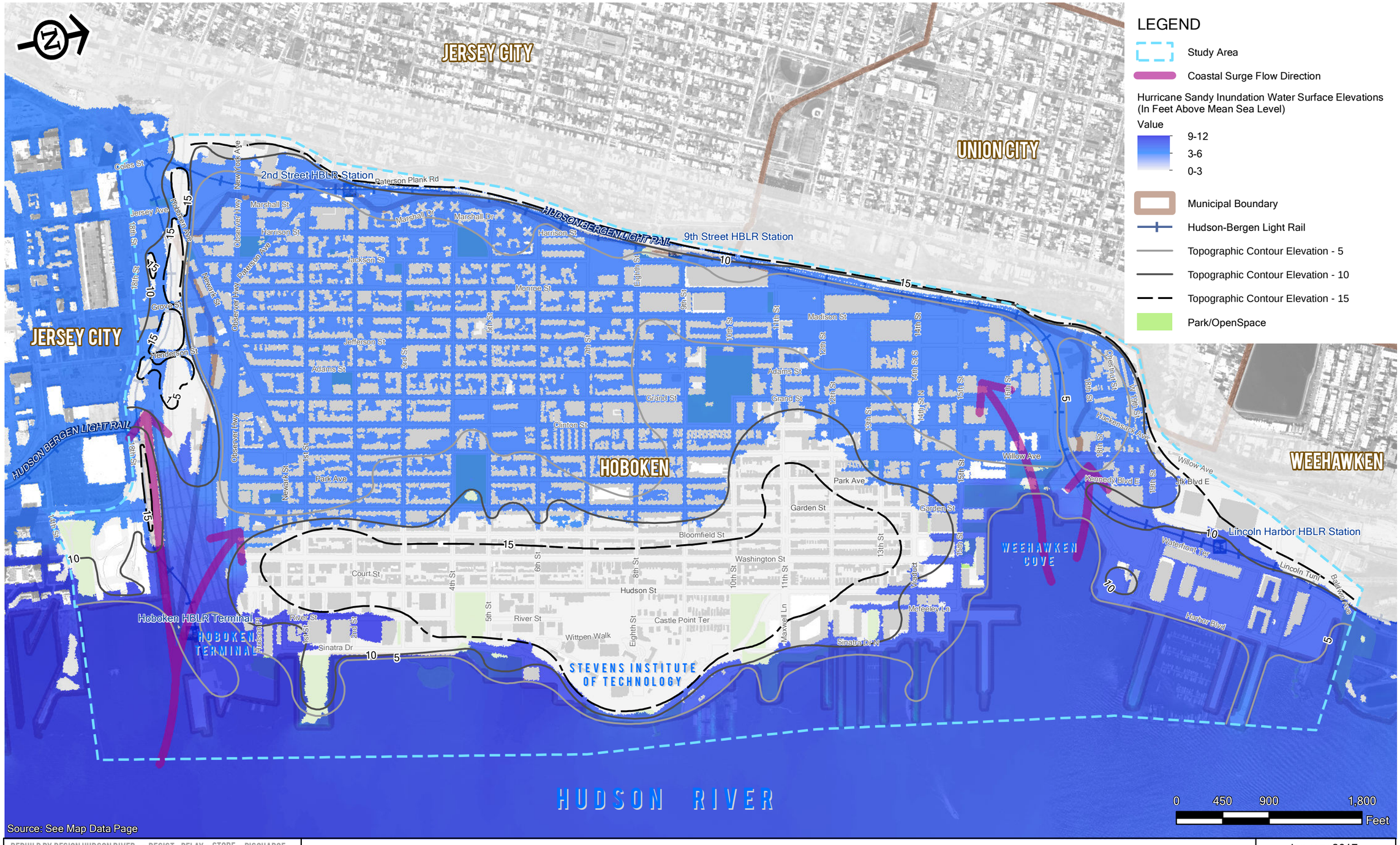
Preliminary FIRM Flood Zone Map

January 2017

FIGURE 3



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REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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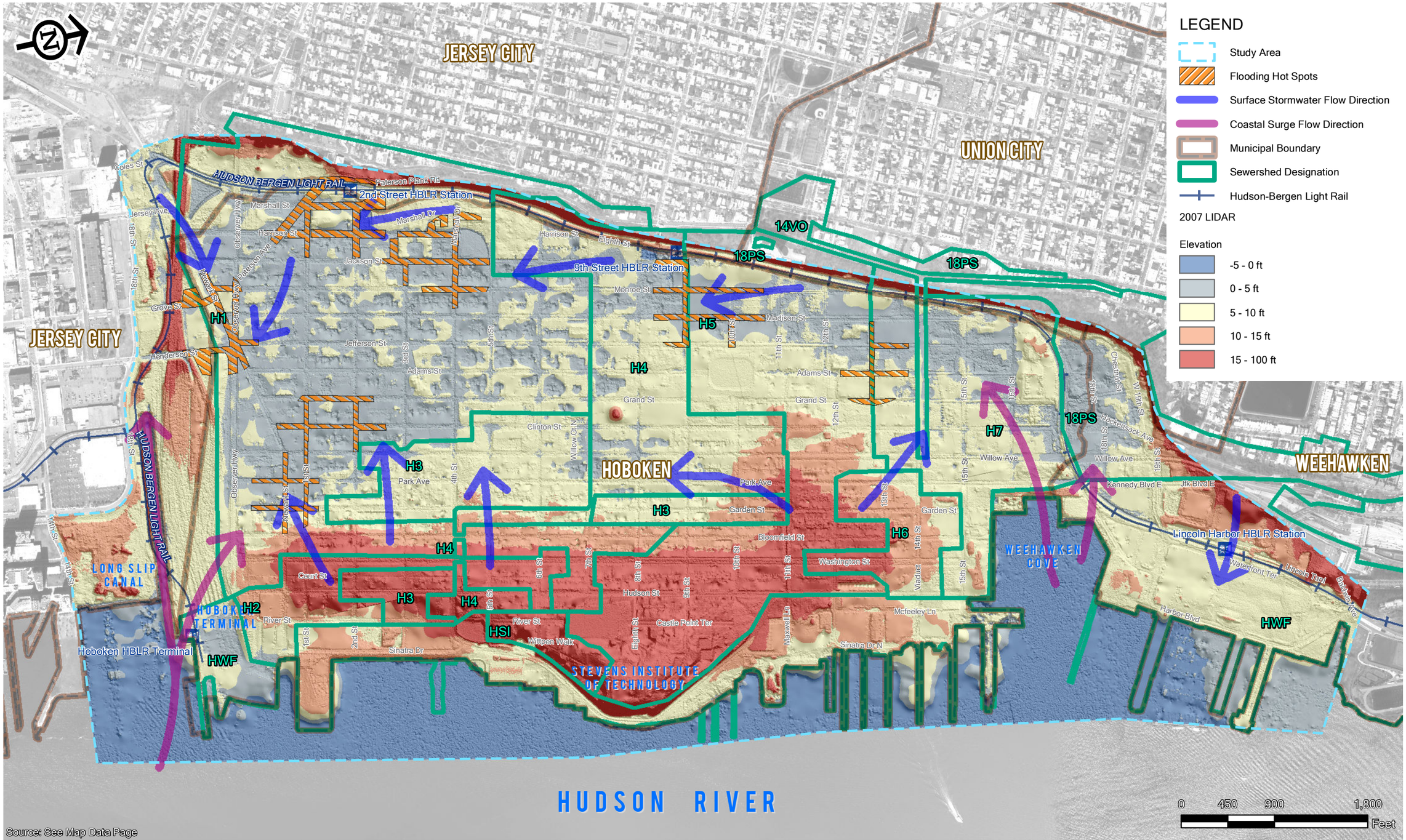
Study Area Inundation during Superstorm Sandy

January 2017

FIGURE 4



Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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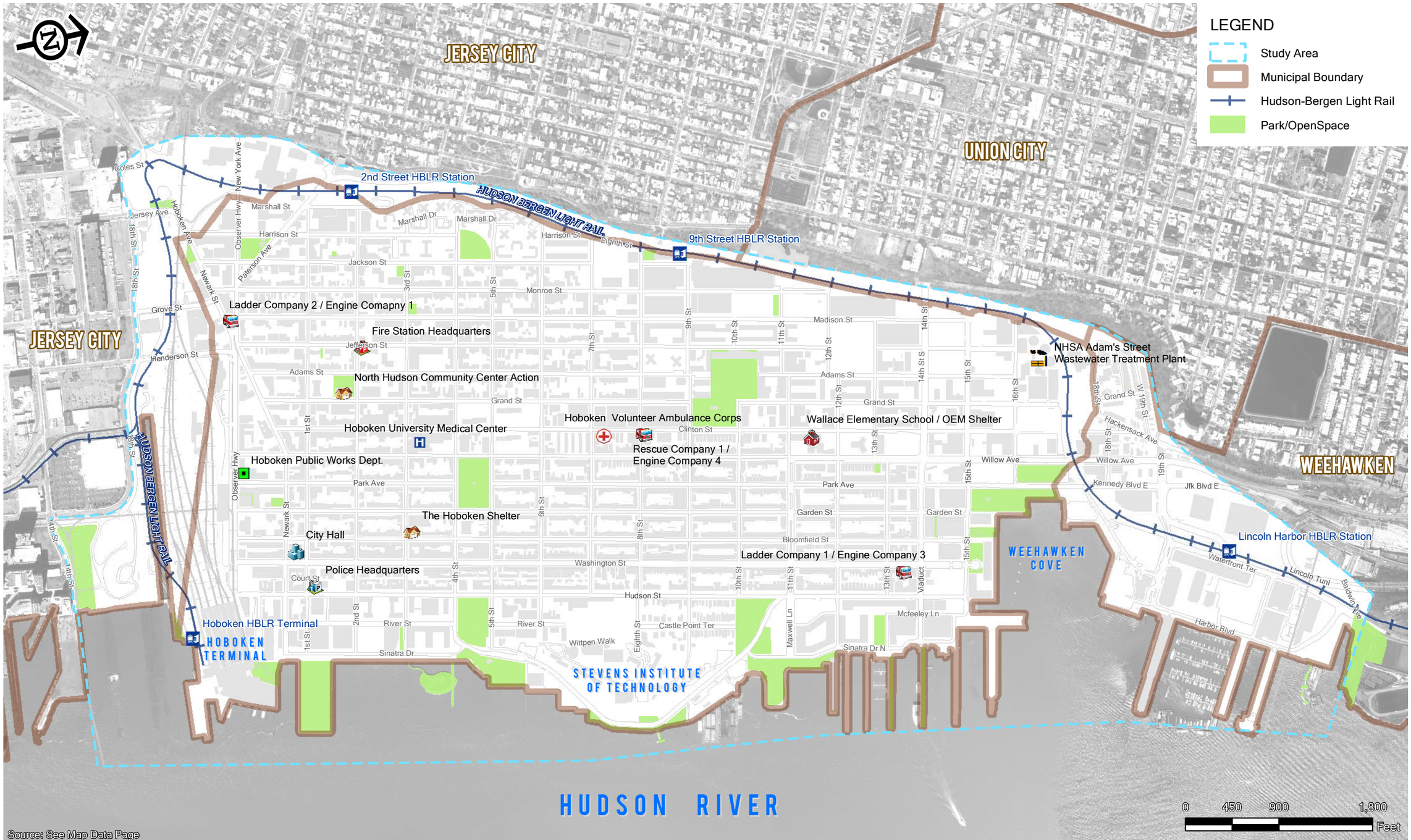
Topography / NHSA Sewershed / Flooding Hot Spots Map

January 2017

FIGURE 5



Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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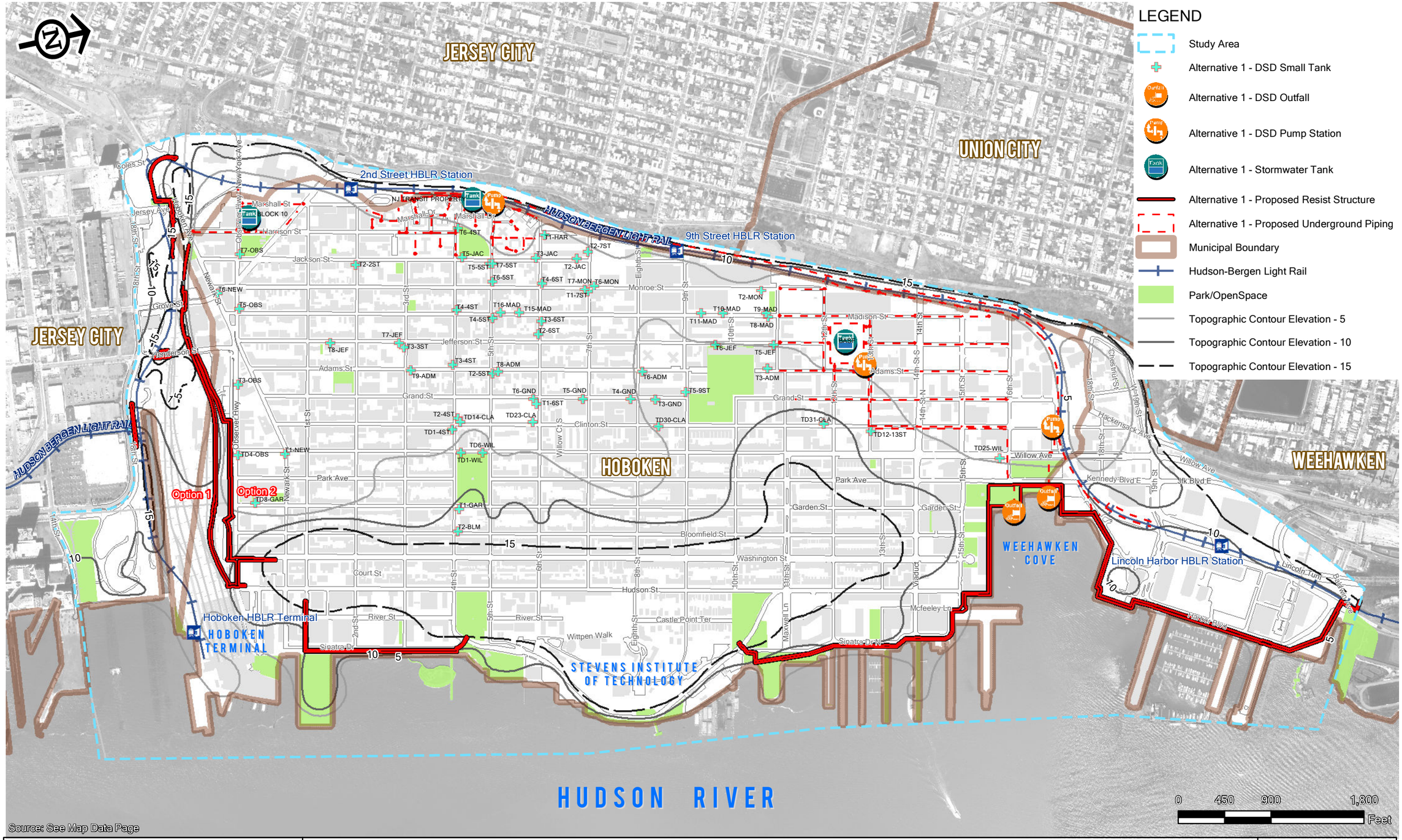
Critical Infrastructure Map

January 2017

FIGURE 6



Source: See Map Data Page

LEGEND

- Study Area
- Alternative 1 - DSD Small Tank
- Alternative 1 - DSD Outfall
- Alternative 1 - DSD Pump Station
- Alternative 1 - Stormwater Tank
- Alternative 1 - Proposed Resist Structure
- Alternative 1 - Proposed Underground Piping
- Municipal Boundary
- Hudson-Bergen Light Rail
- Park/OpenSpace
- Topographic Contour Elevation - 5
- Topographic Contour Elevation - 10
- Topographic Contour Elevation - 15

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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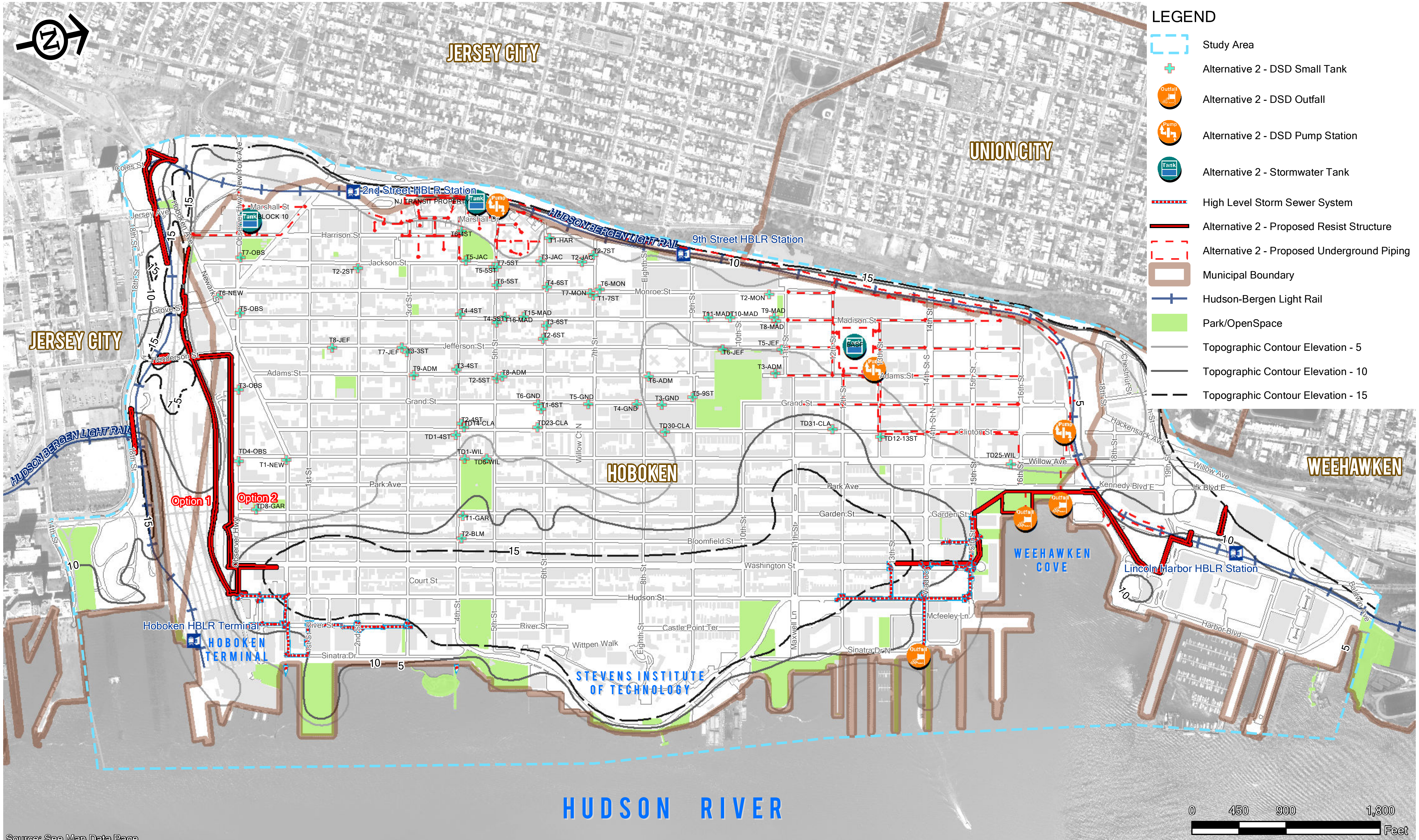
Alternative 1

January 2017

FIGURE 7



REBUILD BY DESIGN HUDSON RIVER • RESIST • DELAY • STORE • DISCHARGE

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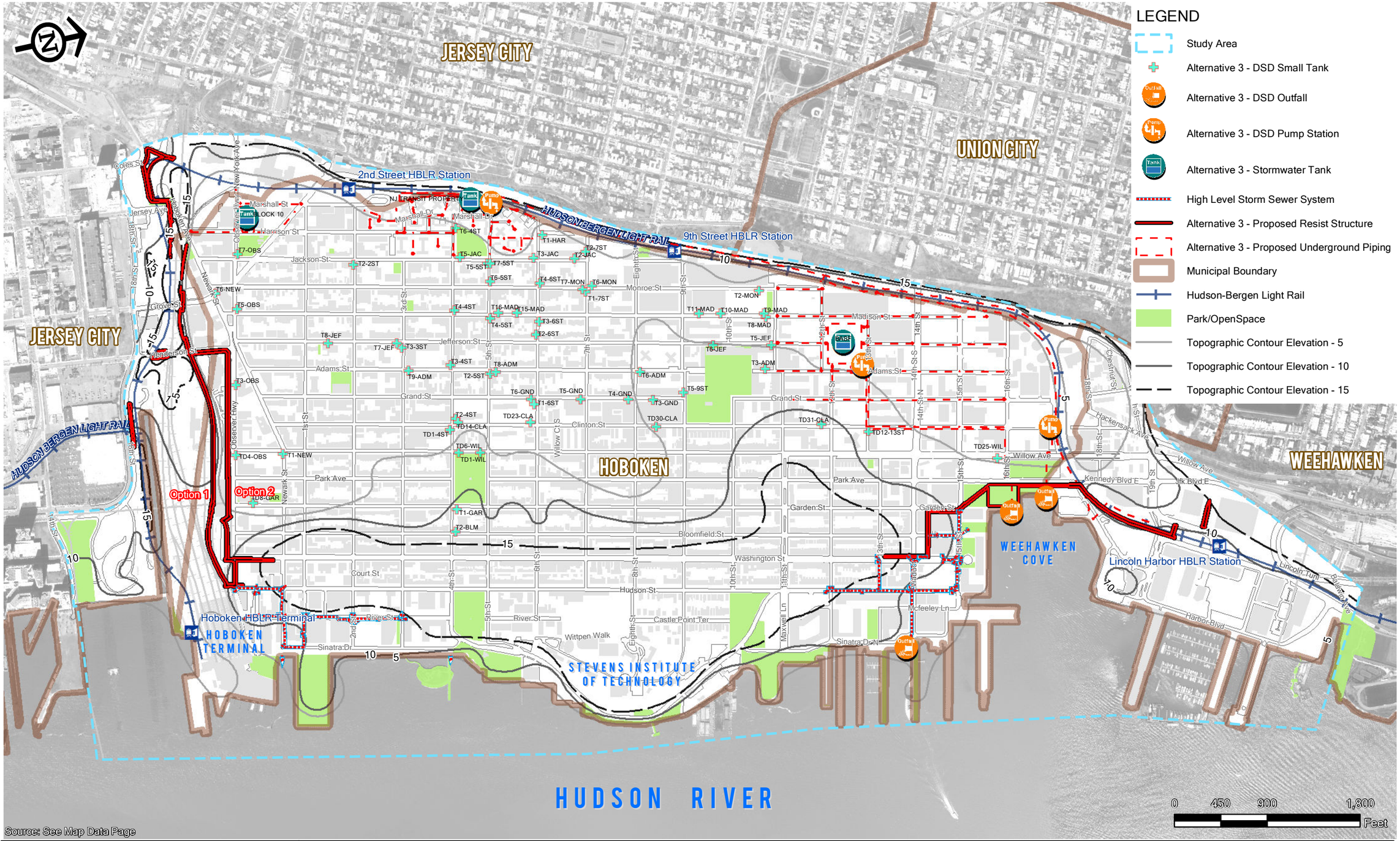
Alternative 2

January 2017

FIGURE 8



Source: See Map Data Page

LEGEND

- Study Area
- Alternative 3 - DSD Small Tank
- Alternative 3 - DSD Outfall
- Alternative 3 - DSD Pump Station
- Alternative 3 - Stormwater Tank
- High Level Storm Sewer System
- Alternative 3 - Proposed Resist Structure
- Alternative 3 - Proposed Underground Piping
- Municipal Boundary
- Hudson-Bergen Light Rail
- Park/OpenSpace
- Topographic Contour Elevation - 5
- Topographic Contour Elevation - 10
- Topographic Contour Elevation - 15

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

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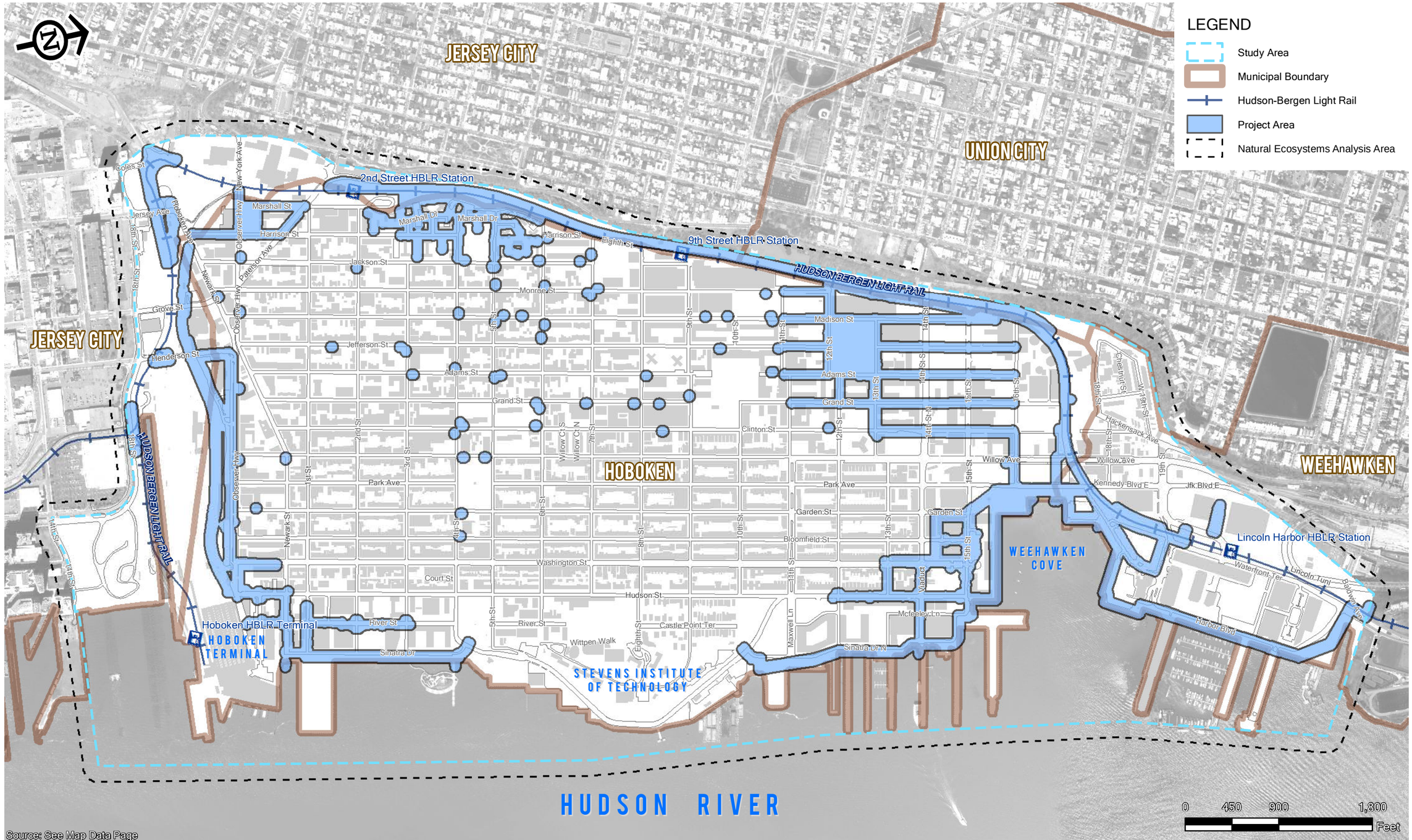
Alternative 3

January 2017

FIGURE 9



Source: See Map Data Page

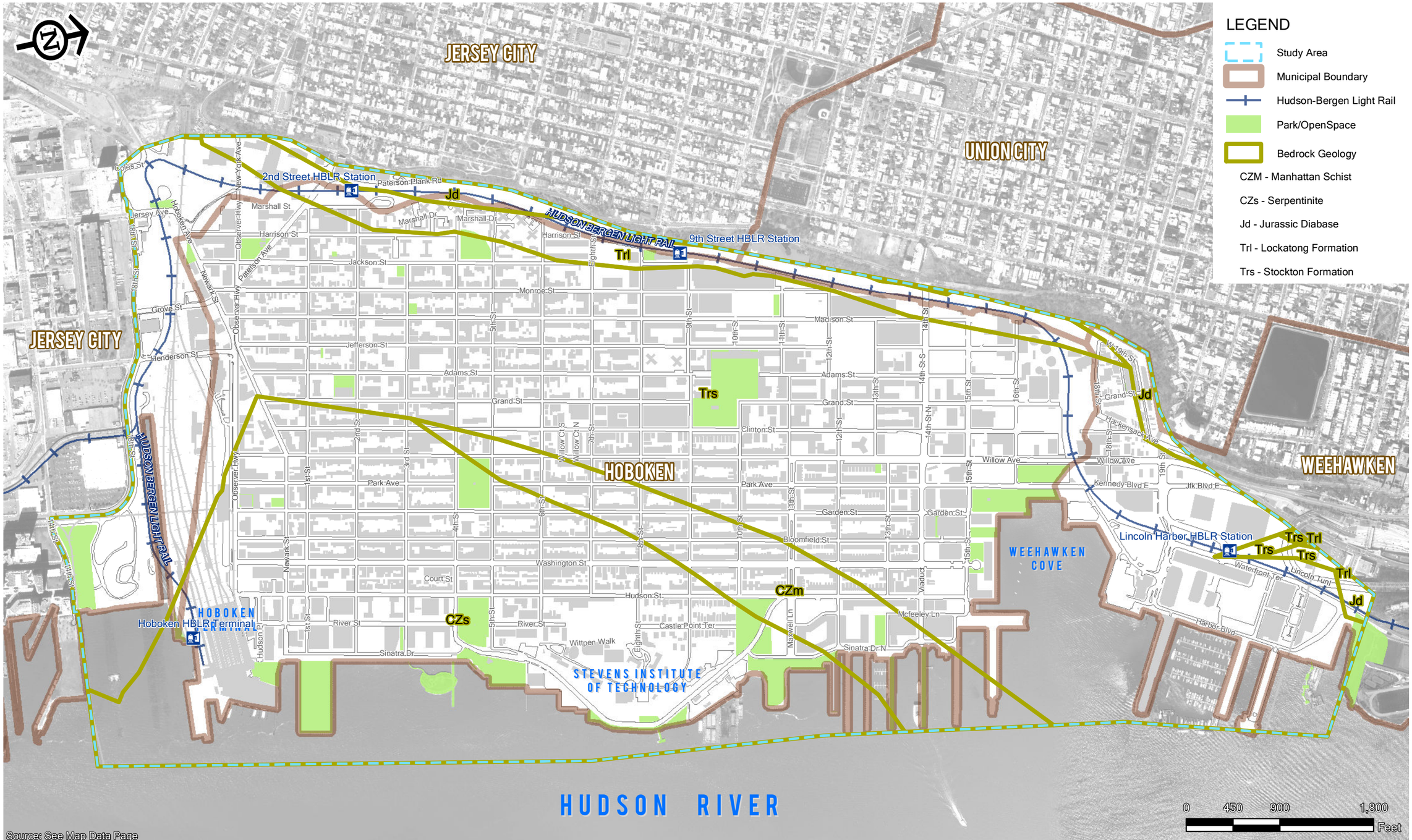
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Natural Ecosystems Analysis Area

January 2017

FIGURE 10



Source: See Map Data Page

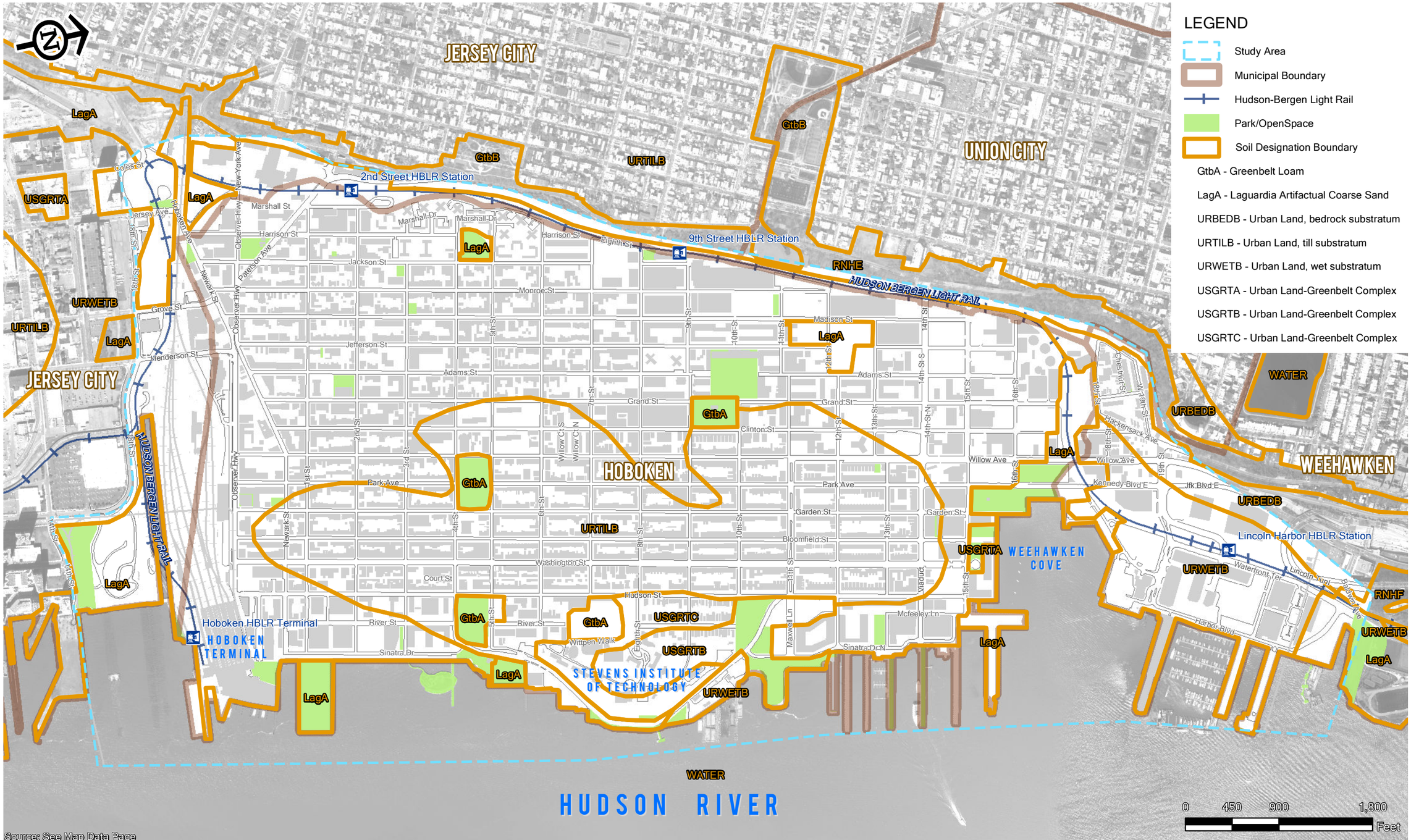
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Geology Map

January 2017

FIGURE 11



REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Soils Map

January 2017

FIGURE 12

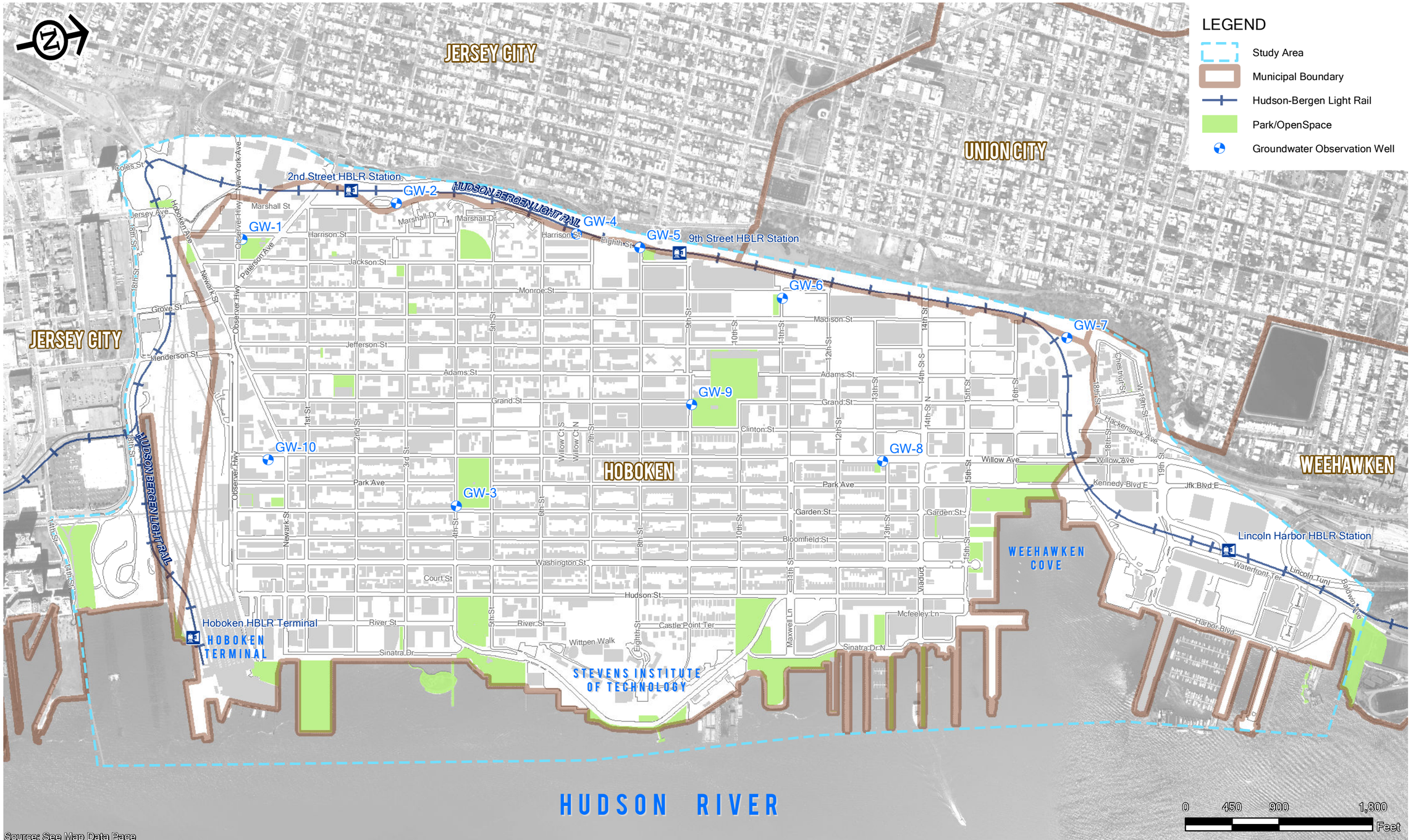
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | Department of Environmental Protection

Sole Source Aquifer Map

October 2016

FIGURE 13



Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Groundwater Observation Well Locations

January 2017

FIGURE 14

LEGEND

- Study Area
- Alternative 1 - Resist Structure
- Alternative 1 - Limit of Disturbance
- Alternative 2 - Resist Structure
- Alternative 2 - Limit of Disturbance
- Alternative 3 - Resist Structure
- Alternative 3 - Limit of Disturbance
- Delay, Store, Discharge Element
- Potential Tideland Claim within Public ROW
- Potential Tideland Claim within Private Property
- Potential Tideland Claim within Public Property
- NJDEP Claimed Tidelands Claim Line

693-2172

700-2172

686-2172

693-2178

700-2178

Former Hoboken Creek

Former Sluice Creek

Former Shoreline of Hudson River

Former Ahasimus Creek

0 900 1,800

Feet

Source: See Map Data Page

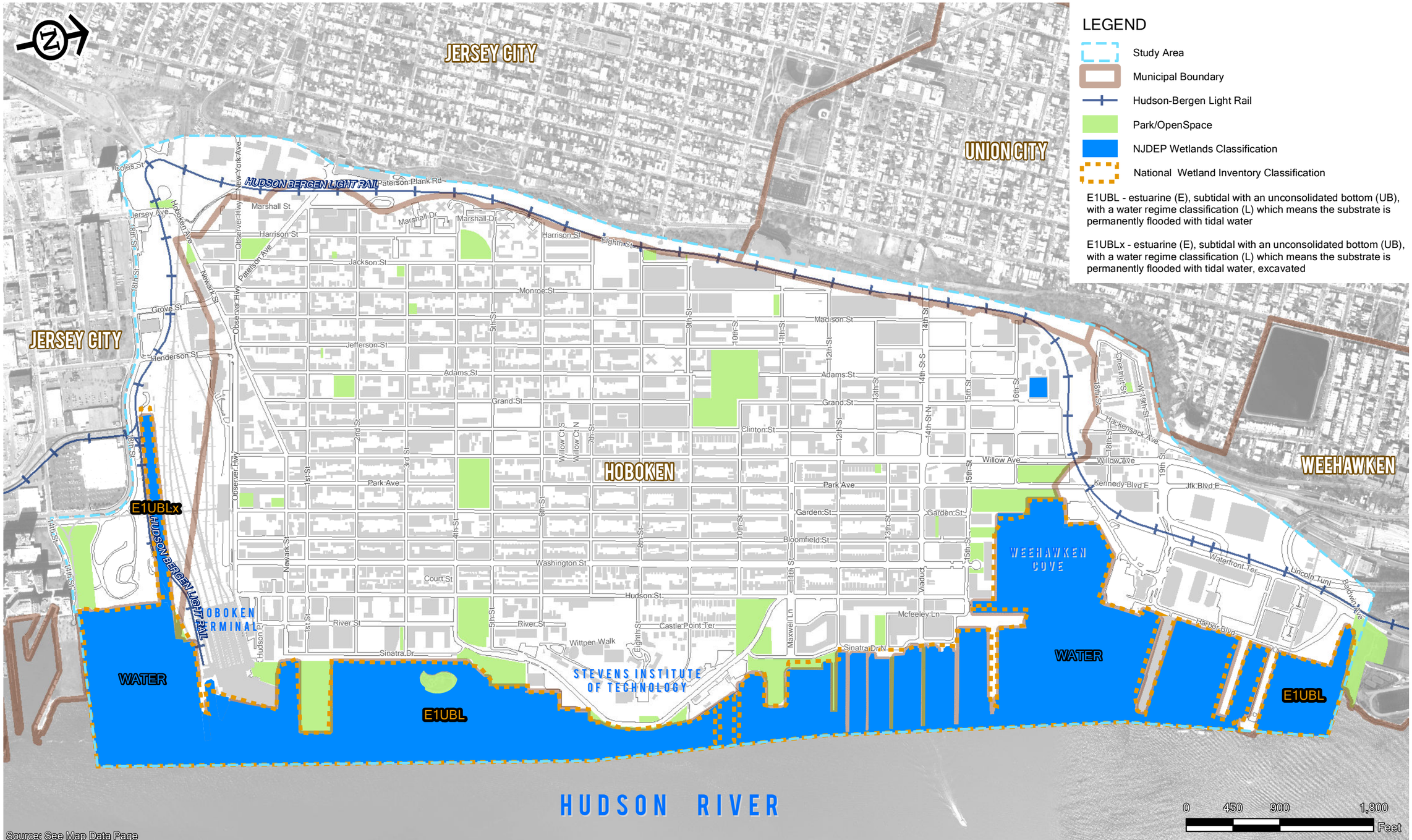
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Tideland Claims Map

January 2017

FIGURE 15



Source: See Map Data Page

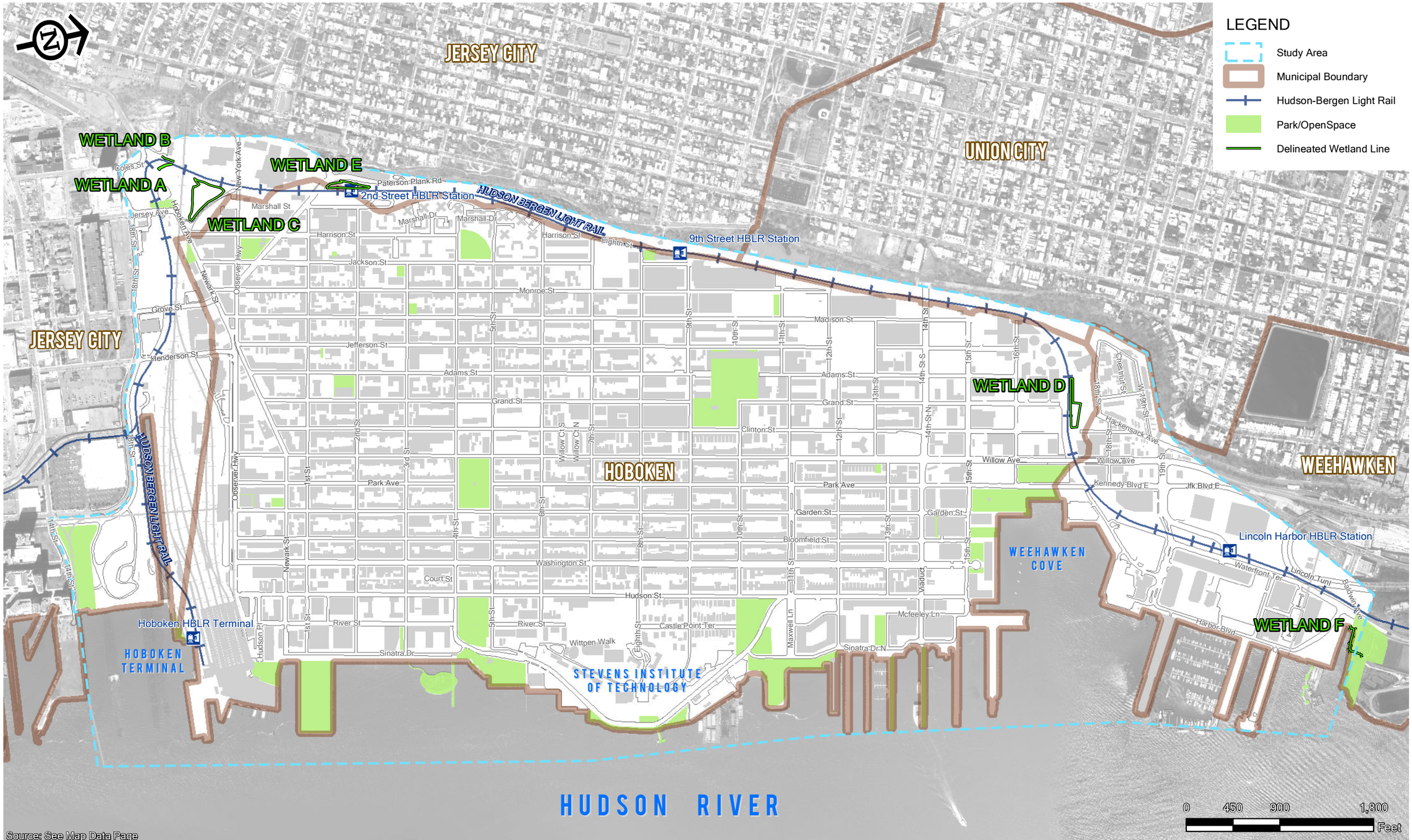
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

NJDEP Wetlands / National Wetland Inventory (NWI) Map

January 2017

FIGURE 16



Source: See Map Data Page

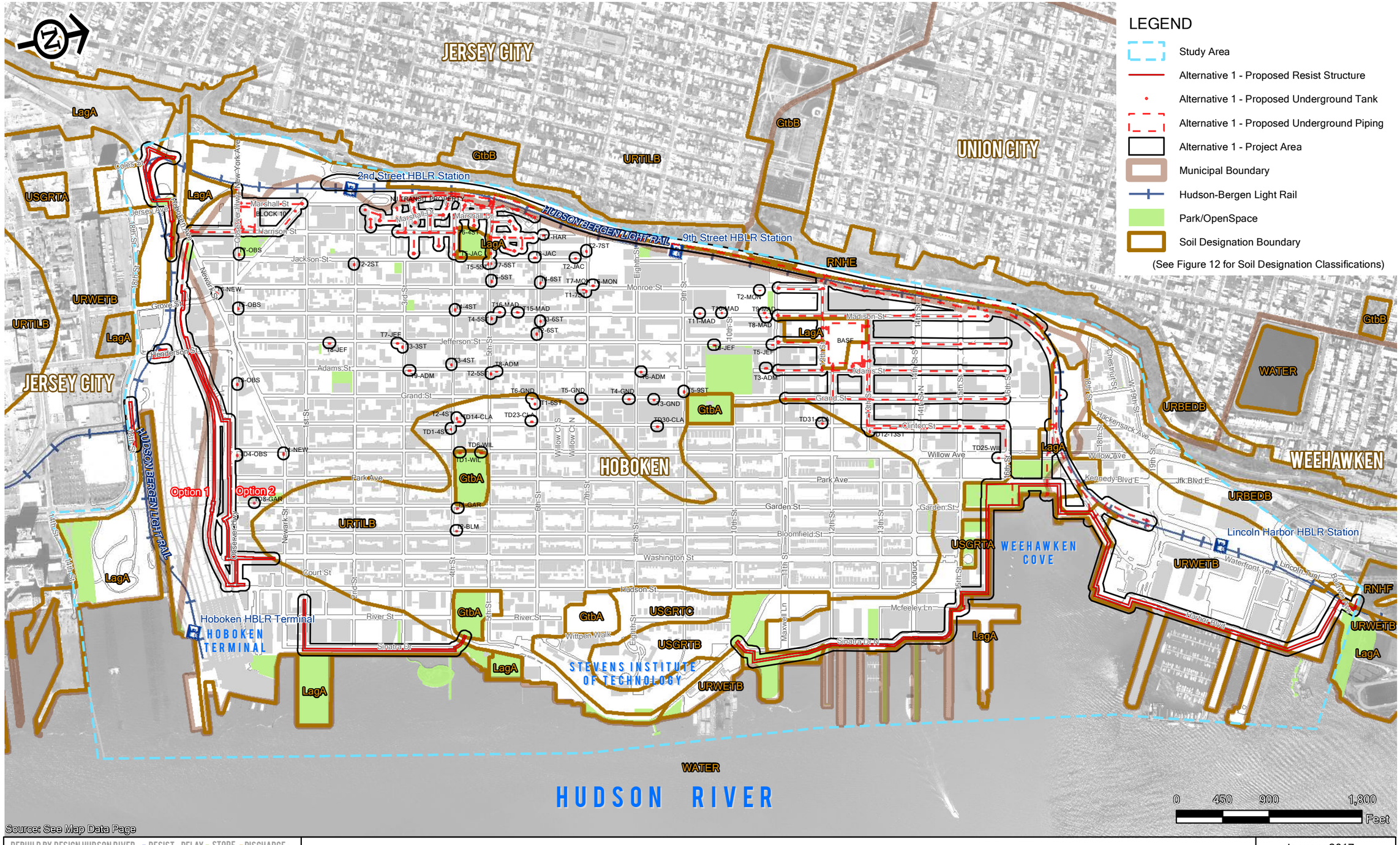
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Delineated Wetlands Map

January 2017

FIGURE 17



Source: See Map Data Page

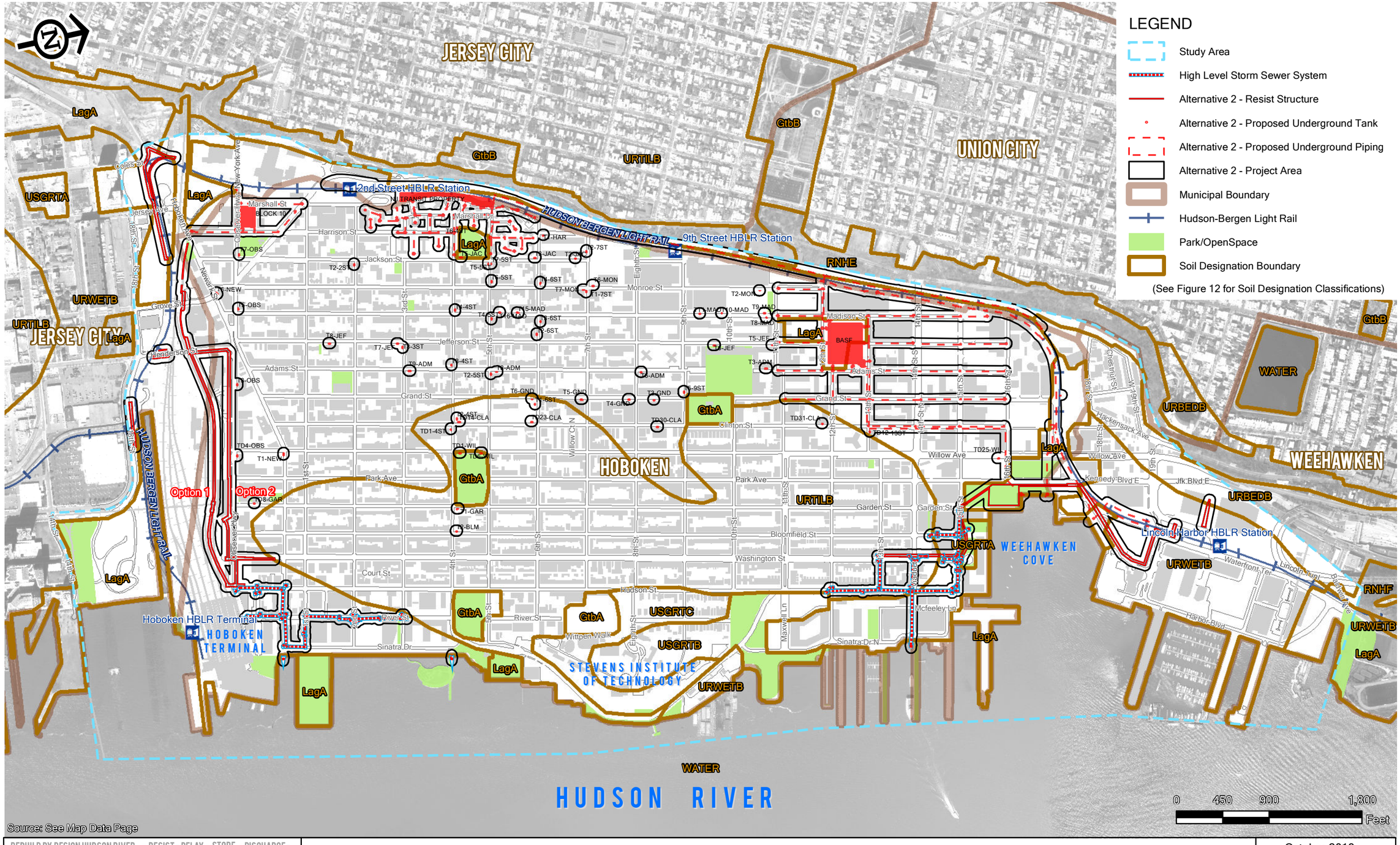
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Soils Impacts Map - Alternative 1

January 2017

FIGURE 18



REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Soils Impacts Map - Alternative 2

October 2016

FIGURE 19

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Soils Impacts Map - Alternative 3

January 2017

FIGURE 20

Source: See Map Data Page

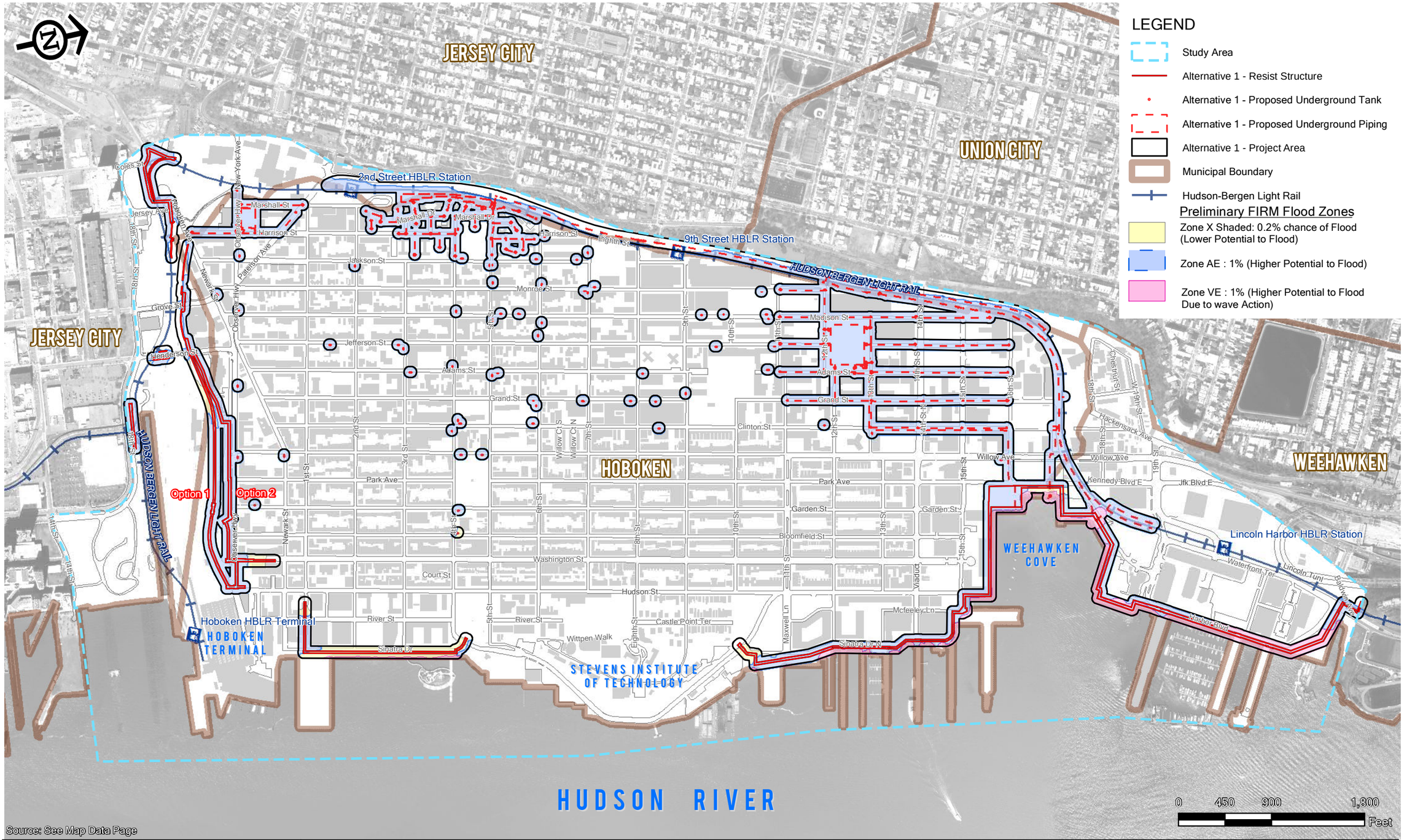
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | Department of Environmental Protection

Bulkhead Replacement - Alternative 1

January 2017

FIGURE 21



Source: See Map Data Page

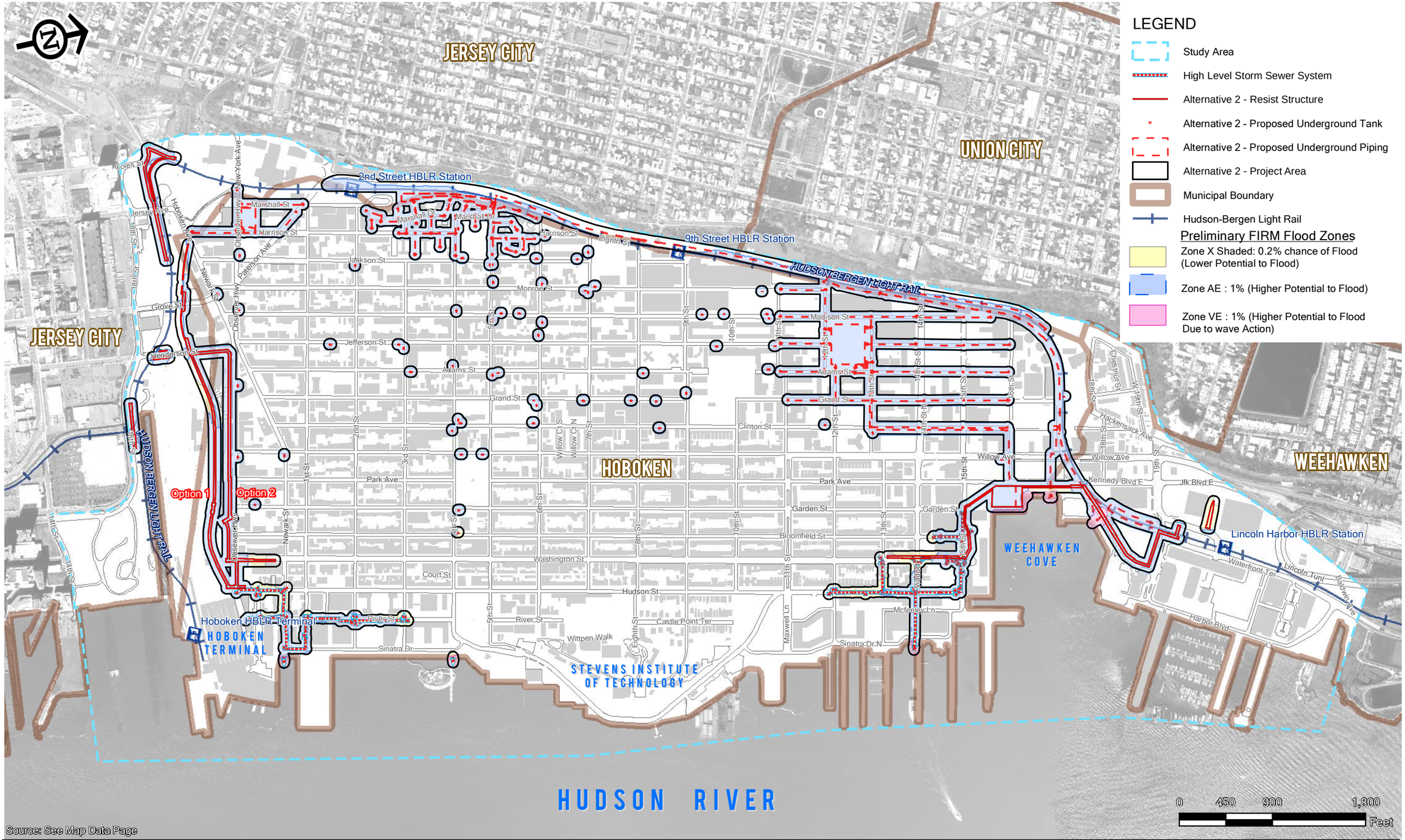
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Floodplain Impacts Map - Alternative 1

January 2017

FIGURE 22



LEGEND

- Study Area
- High Level Storm Sewer System
- Alternative 2 - Resist Structure
- Alternative 2 - Proposed Underground Tank
- Alternative 2 - Proposed Underground Piping
- Alternative 2 - Project Area
- Municipal Boundary
- Hudson-Bergen Light Rail

Preliminary FIRM Flood Zones

- Zone X Shaded: 0.2% chance of Flood (Lower Potential to Flood)
- Zone AE : 1% (Higher Potential to Flood)
- Zone VE : 1% (Higher Potential to Flood Due to wave Action)

Source: See Map Data Page

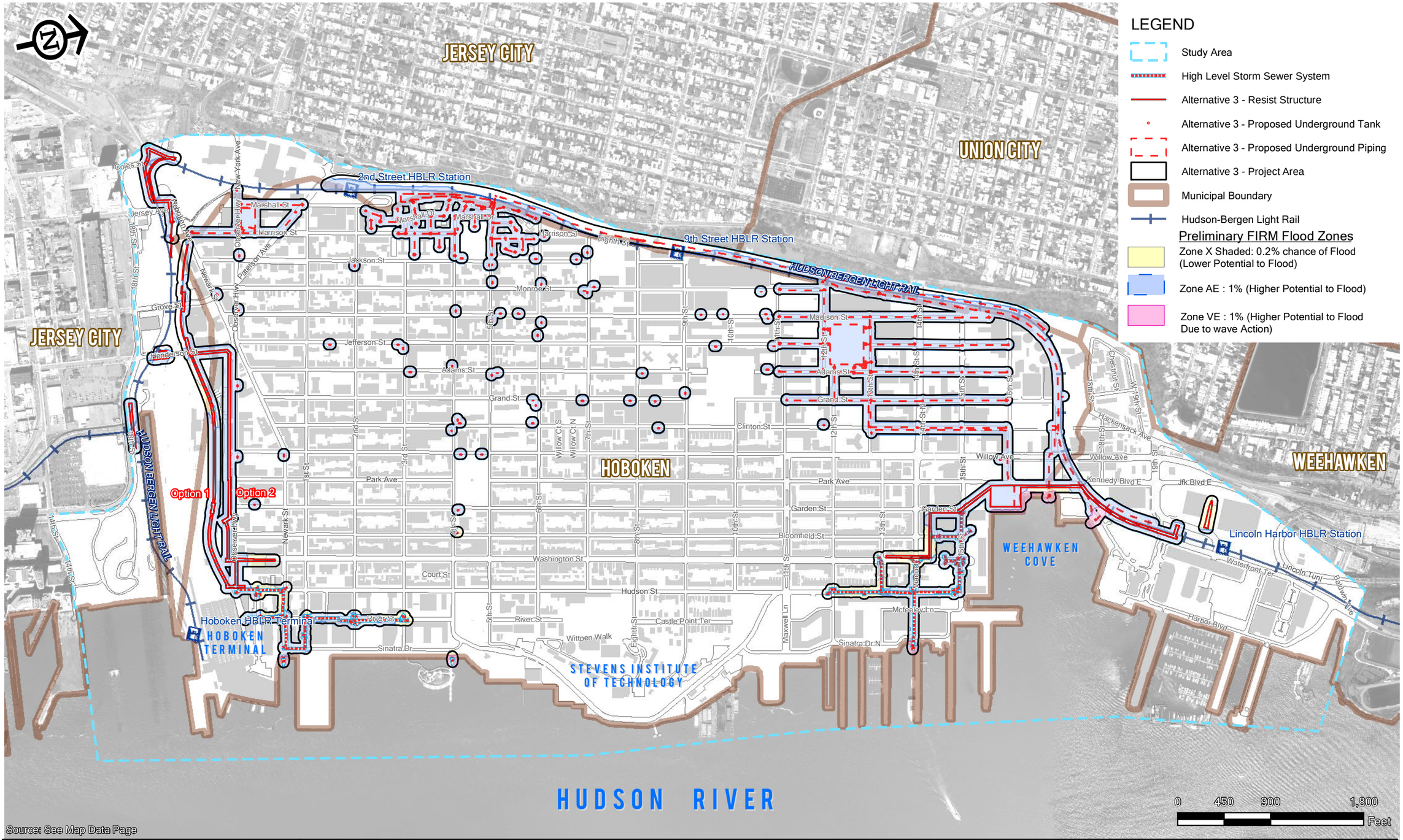
REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Floodplain Impacts Map - Alternative 2

January 2017

FIGURE 24



LEGEND

- Study Area
- High Level Storm Sewer System
- Alternative 3 - Resist Structure
- Alternative 3 - Proposed Underground Tank
- Alternative 3 - Proposed Underground Piping
- Alternative 3 - Project Area
- Municipal Boundary
- Hudson-Bergen Light Rail

Preliminary FIRM Flood Zones

- Zone X Shaded: 0.2% chance of Flood (Lower Potential to Flood)
- Zone AE : 1% (Higher Potential to Flood)
- Zone VE : 1% (Higher Potential to Flood Due to wave Action)

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Floodplain Impacts Map - Alternative 3

January 2017

FIGURE 26

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Impacted Wetlands / Photograph Key Map

January 2017

FIGURE 28

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Upland Vegetation Impacts Map - Alternative 1

January 2017

FIGURE 29

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry | State of New Jersey Department of Environmental Protection

Upland Vegetation Impacts Map - Alternative 2

January 2017

FIGURE 30

Source: See Map Data Page

REBUILD BY DESIGN HUDSON RIVER ▪ RESIST ▪ DELAY ▪ STORE ▪ DISCHARGE ▪

Dewberry · State of New Jersey Department of Environmental Protection

Upland Vegetation Impacts Map - Alternative 3

January 2017

FIGURE 31

MAP DATA SOURCES

New Jersey Transit Corporation (NJ Transit), January 2012.

Sanborn 1935 Jamboree Drive, Suite 100 Colorado Springs, CO 80920, 2007

New Jersey Department of Environmental Protection (NJDEP) Geographic Information System geospatial data.
http://www.state.nj.us/dep/gis/listall.html

Federal Emergency Management Agency, U.S. Department of Homeland Security, 500 C Street SW, Washington, DC 20472
https://msc.fema.gov/portal

Environmental Data Resources Inc.
http://www.web.edrnet.com/

New Jersey Geographic Information Network, NJ Office of Information Technology, Office of GIS.
https://njgin.state.nj.us/NJ_NJGINExplorer/index.jsp

Images from The David Rumsey Historical Map Collection
http://www.davidrumsey.com/

ArcGIS Online, ESRI.com
http://www.arcgis.com/home/item.html?id=2d483d85b8d94046ae9907bd4f2fe0b9

Geographic Products Branch, Geography Division, United States Census Bureau, 4600 Silver Hill Road Washington, DC 20233-7400
https://www.census.gov/geo/maps-data/data/tiger-line.html

Various data sets provided by Hoboken, Jersey City & Weehawken GIS departments

Bailey, O.H. and A. Ward. *The City of Hoboken, New Jersey*. Boston: O.H. Bailey & Co., 1881.

Bien, Joseph Rudolph. *Atlas of the Metropolitan District and Adjacent County*. New York: Julies Bien, 1891.

Burr, David. *Map of the City and County of New York with the Adjacent Country*. Simeon DeWitt, 1832.

Clerk & Bacot. *Topographical Map of Hudson County, New Jersey from Actual Surveys*. Jersey City: Wood, 1854.

Douglas, L.F. *Topographical Map of Jersey City, Hoboken, and the Adjacent Country.* Jersey City: Douglas, 1841.

G.M. Hopkins& Co. *Plat Book of Jersey City, Hudson County, N.J.* Accessed online April 1, 2016, http://mapmaker.rutgers.edu/JCplat_book/Frontpage/index.htm.

—. *Atlas of the State of New Jersey and the County of Hudson.* Philadelphia: G.M. Hopkins & Co., 1873.

—. *Atlas of Hudson County, New Jersey, Volume II.* Philadelphia: G.M. Hopkins & Co., 1909.

Google Earth. "Aerial Imagery." Accessed April 19, 2016 at http://www.google.com/earth/.

Hills, John. *A Sketch of the Northern Parts of New Jersey*. Accessed March 16, 2016. \\paterson\Projects-ENV\50074974\Adm\Reports\Cultural Resources\Research\Historic Maps\Hills 1781 A Sketch of the Northern Parts of New Jersey.jp2.

Hufnagel, B. and E. Hexamer. *Map of the City of Hoboken Situated in the County of Hudson, New* Jersey. On file: Hoboken, Hoboken Public Library, 1856.

Hughes and Bailey. *City of Hoboken, New York*. New York: Hughes & Bailey, 1904.

Mallory, F.W. and W.M. Miller. *Section No. 5 Map Showing the Survey of Lands Lying Under the Waters of the Hudson River & Bay of New York and Lands Adjacent Thereto, to Accompany Report of the Commissioners to the Legislature of State of New Jersey*. On file, Trenton: New Jersey State Archives, 1865.

New Jersey Department of Environmental Protection (NJDEP), Office of Information Resources Management (OIRM), Bureau of Geographic Information Systems (BGIS). *NJDEP New Jersey Environmental Management System (NJEMS) Sites*, Version 201010 (NJ-GeoWeb Layer). Trenton: DJ Department of Environmental Protection, 2016. Accessed online at <http://www.nj.gov/dep/gis/geowebsplash.htm>.

North Hudson Sewerage Authority [NHSA]. *GIS Sewer Data*. Electronic files provided to Dewberry in 2016.

Sanborn Library, LLC. *Fire Insurance Maps*. 1885-2006.

Sanborn-Perris Map Co. *Insurance Maps of Hudson County, New Jersey*, Vol. 7. New York: Sanborn-Perris Map Co., 1891

Speilmann and Brush, *Sanitary and Topographical Map of Hudson County*. Prepared for the National Board of Health. Hoboken: Speilmann and Brush, 1880.

Taintor Brothers. *New Map of the Great Metropolis, Including the Cities of New York, Brooklyn, Jersey City, Hoboken, Etc.* New York City: Taintor Brothers, Merrill & Co., 1860.

United States Coast and Geodectic Survey. *Topographic Survey of the New Jersey Coast, Sheet T-17.* United States Coastal Survey, 1837.

—. *Nautical Map of Hudson and East Rivers, from West 67th Street to Blackwells Island*. Washington, D.C.: U.S. Coast and Geodectic Survey, 1926.

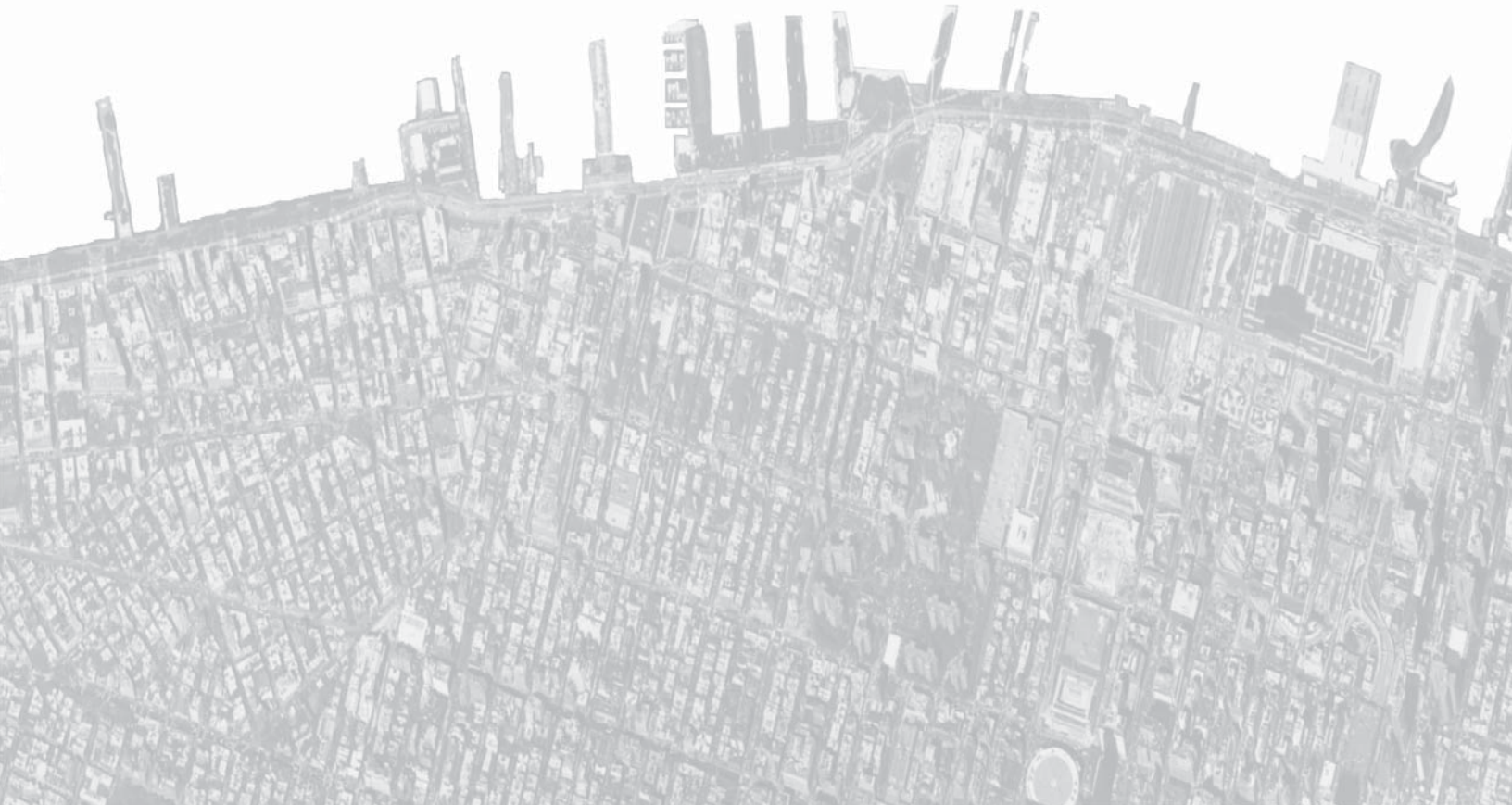
United States Coastal Survey. *Pendulum Station, Coast Survey Map*. Accessed online March 31, 2016, https://historicalcharts.noaa.gov/.

—. *Pendulum Station Map, Stevens Institute, Hoboken.* Coast Survey Report, 1876.

—. *Map of New-York Bay and Harbor and the Environs*. United States Coast Survey, 1844.

Whittemore, J.O. *Map of the City of Hoboken, N.J., Showing Existing Sewers Built Previous to 1940*. Map on file, Hoboken: North Hudson Sewerage Authority (NHSA). 1940.

APPENDIX A - HUD 8-STEP PROCESS



EXECUTIVE ORDER 11988 – FLOODPLAIN MANAGEMENT AND EXECUTIVE ORDER 11990 – PROTECTION OF WETLANDS EIGHT-STEP PROCESS U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT COMMUNITY DEVELOPMENT BLOCK GRANT – DISASTER RELIEF (CDBG-DR) PROGRAM

--Rebuild by Design – Hudson River Project: Resist, Delay, Store, Discharge

--Decision Process for Executive Order 11988 and 11990 as Provided by 24 CFR §55.20

Step 1: ***Determine whether the proposed action is located in the 100-year floodplain (or a 500-year floodplain for critical actions) or wetlands.***

The proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. Approximately 745 acres of land within the Study Area are included within the FEMA 100-year flood zone, including the AE and VE zones (FEMA Flood Insurance Rate Maps (FIRM) 34017C0043D, 34017C0044D, 34017C0106D, and 34017C0107D). Of this, the Build Alternatives would impact between approximately 5.76 and 7.57 acres of floodplain through the placement of permanent above-ground structures (i.e., the Resist barrier). In addition, six (6) wetland areas have been delineated within the Study Area, located primarily along or within close proximity to the Hudson-Bergen Light Rail (HBLR) tracks. The total delineated wetland acreage (within the Study Area) is approximately 2.48 acres. Approximately 230 square feet of wetlands would be impacted by all three Build Alternatives. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) also identifies the open waters of the Hudson River as Estuarine and Marine Deepwater wetland. Bulkhead work associated with the placement of Resist structures and outfalls could impact these areas.

The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City, with the following approximate boundaries: the Hudson River to the east; Baldwin Avenue (in Weehawken) to the north; the Palisades to the west; and 18th Street, Washington Boulevard and 14th Street (in Jersey City) to the south. The Study Area includes approximately 1,020 acres of land, as well as about 233 acres of the Hudson River.

Executive Order (EO) 11988 within HUD Regulations 24 CFR Part 55 details floodplain management, and EO 11990 details wetlands protection. The purpose of EO 11988 is “to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or

indirect support of floodplain development wherever there is a practicable alternative." An evaluation of direct and indirect impacts associated with construction, occupancy, and modification of the floodplain is required. The purpose of EO 11990 is "to avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative." An evaluation of direct and indirect impacts associated with the destruction, loss or degradation of wetlands is required.

Currently the project has not started. Based on the activity being proposed, the project does not meet the exceptions at 24 CFR 55.12, and an 8-step analysis of the direct and indirect impacts associated with the construction, occupancy, and modification of the floodplain, as well as the destruction, fill or degradation of wetlands is required. This analysis will consider impacts to the floodplain and wetlands, along with concerns for loss of life and property.

Step 2: ***Notify the public for early review of the proposal and involve the affected and interested public in the decision making process.***

The proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The purpose of the Project is to reduce flood risk and minimize impacts from coastal storm surge, high tide and rainfall flood events in the Study Area; therefore, per 24 CFR 55.2(b)(10)(i)(A)(2), early notice and public review of a proposed activity in a 100-year floodplain and wetlands was published on September 30, 2016 in the *Star Ledger* and *El Especialito* for a 15-day public comment period. No comments were received from the public. Copies of the publications, affidavits, and email correspondence are provided in Attachment A.

In addition, notice was submitted to the U.S. Fish and Wildlife Service (USFWS), U.S. Environmental Protection Agency (EPA), Federal Emergency Management Agency (FEMA), Department of Housing and Urban Development (HUD), U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), New Jersey Department of Environmental Protection (NJDEP) Division of Land Use Regulation (DLUR), New Jersey Historic Preservation Office (NJHPO) and the local floodplain administrator (Hoboken, Weehawken and Jersey City local governments). The following agencies responded (see Attachment A):

<u>NOAA NMFS</u>

NMFS Responded stating that the proposed project may impact Shortnose Sturgeon. They offered the following best management practices (BMPs) for consideration as the project develops:

- For activities that increase levels of suspended sediment, consider the use of silt management and/or soil erosion best practices (i.e., silt curtains and/or cofferdams).

- For any impacts to habitat or conditions that temporarily render affected water bodies unsuitable for the above-mentioned species, consider the use of timing restrictions for in-water work.
- For pile driving or other activities that may affect underwater noise levels, consider the use of cushion blocks and other noise attenuating tools to avoid reaching noise levels that will cause injury or behavioral disturbance to sturgeon - see the table below for more information regarding noise criteria for injury/behavioral disturbance in sturgeon.

Organism	Injury	Behavioral Modification
Sturgeon	206 dB re 1 µPaPeak and 187 dB cSEL	150 dB re 1 µPaRMS

NMFS stated that if the lead agency determines that species may be affected, formal Section 7 consultation would be required under the Endangered Species Act (ESA). This consultation is currently taking place and is described in greater detail under the Natural Ecosystems Technical Environmental Study (TES) and is summarized in the Environmental Impact Statement (EIS).

NJHPO
The NJHPO stated that they received the notification for the 8 Step analysis but did not provide comment. It is noted that the NJHPO is being consulted on the project as part of the Cultural Resources Technical Environmental Study, provided under separate cover. Impacts to cultural resources are explained in detail in that report and are summarized in the EIS.

Step 3: ***Identify and evaluate practicable alternatives to locating in the floodplain or wetland.***

The proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The purpose of the Project is to reduce flood risk and minimize impacts from coastal storm surge, high tide and rainfall flood events in the Study Area. Due to the nature of the project, none of the Build Alternatives are located outside of the floodplain.

The three Build Alternatives are:

- Alternative 1: Resist structures primarily along the waterfront including approximately 5,735 linear feet of bulkhead work. The Delay, Store, Discharge (DSD) element of the Project consists of over 60 sites that will include new and/or improved stormwater management areas. Two new outfall pipes in northern Weehawken Cove are proposed as the Discharge component of the Project. Natural topographical low points would serve as catchment areas for stormwater where the delay/storage of stormwater will be enhanced, as well as the installation of underground water storage/holding tanks. Three pumps would be incorporated to drain the areas via two new outfalls at Weehawken Cove.
- Alternative 2: Resist structures are located inland with the exception of approximately 555 linear feet of bulkhead work. Street crossings will feature gates to allow for access during non-flood conditions.

Consideration will be given to adapting the use of structures in a way to provide urban amenities and landscape enhancements. The DSD element of Alternative 2 is the same as Alternative 1.

- Alternative 3: Resist structures are located inland, on alternate locations from Alternative 2, including a private alleyway. Alternative 3 proposes approximately 555 linear feet of bulkhead work (same as Alternative 2). The DSD element of Alternative 3 is the same as Alternatives 1 and 2.
- A No Action Alternative was also considered. No Resist, Delay, Store, Discharge features would be installed to reduce flooding risk and minimize damage from coastal storm surge, high tide and rainfall flood events in the Study Area.

Refer to Section 3 of the Rebuild by Design Hudson River: Resist, Delay, Store, Discharge EIS for detailed descriptions of each of the Alternatives.

Step 4: *Identify potential direct and indirect impacts associated with the occupancy or modification of floodplains and wetlands that could result from the proposed action.*

The HUD-funded CDBG-DR program is intended to fund a broad range of activities to recover from declared disasters. The eligible activities include recovery efforts involving infrastructure and prevention of further damage. HUD's regulations limit what actions can be considered under the CDBG-DR program. Descriptions of the potential impacts to floodplain and wetlands from the proposed action and alternatives are described below:

- Under Alternative 1/Option 1, there would be an estimated total of approximately 7.54 acres of permanent 100-year floodplain disturbance for construction of 16,291 lineal feet of Resist barrier (floodwalls, flood logs and gates) and for DSD infrastructure. Under Alternative 1/Option 2, there would be an estimated total of approximately 7.57 acres of permanent 100-year floodplain disturbance for construction of 15,887 lineal feet of Resist barrier (floodwalls, flood logs and gates) and for DSD infrastructure. Permanent aboveground disturbance is limited to 7.54 acres under Option 1 and 7.57 acres under Option 2. Under Alternative 1, where Resist structures are located along the Study Area waterfront, there would be collateral flooding to one parcel in the south (a parking lot located at the intersection of Washington Avenue and Observer Highway), as well as within the NJ Transit yard. The potential for and magnitude of impacts resulting from coastal storm surge flooding would be reduced for 98 percent of the persons residing within the 100-year floodplain within the Study Area.

  Under Alternative 1, wetland impacts associated with the build alternatives are related to the installation of a floodwall in the southwestern portion of the Study Area and would result in an estimated total of 230 SF (0.005 acres) of palustrine emergent wetland (PEM). The wetland that would be impacted by this Resist feature is Wetland B, a man-made drainage ditch with a concrete lining, in the area of the HBLR line. It is anticipated that Wetland B would be classified as Ordinary Resource Value. The loss of the

functions and values of the impacted wetlands would be negligible in terms of stormwater conveyance and floodflow alteration, and it provides little in terms of habitat and wildlife values. Its functions would be replaced by the proposed floodwall to be constructed. The wetlands impact resulting from Alternative 1 would be negligible and compensatory mitigation is not anticipated.

- Under Alternative 2/Option 1, there would be an estimated total of approximately 5.81 acres of 100-year floodplain disturbance for construction of 9,323 lineal feet of Resist barrier and for DSD infrastructure. Under Alternative 2/Option 2, there would be an estimated total of approximately 5.85 acres of 100-year floodplain disturbance for construction of 9,150 lineal feet of Resist barrier and for DSD infrastructure. Permanent aboveground disturbance is limited to 5.81 acres under Option 1 and 5.85 acres under Option 2. The potential for and magnitude of impacts resulting from coastal storm surge flooding would be reduced for 86 percent of the persons residing within the 100-year floodplain within the Study Area. Under Alternative 2, where Resist barriers are located inland, stormwater modeling indicates the potential for a minor increase in flooding of five properties located in the Study Area. These properties are located along the southwestern edge of Weehawken Cove, as well as the parking lot located at the intersection of Washington Avenue and Observer Highway and within the NJ Transit yard noted in Alternative 1.

  The wetland impacts under Alternative 2 would be identical to the impacts described in Alternative 1.

- Under Alternative 3/Option 1, there would be an estimated total of approximately 5.76 acres of permanent 100-year floodplain disturbance for construction of 8,913 lineal feet of Resist barrier and for DSD infrastructure. Under Alternative 3/Option 2, there would be an estimated total of approximately 5.80 acres of permanent100-year floodplain disturbance for construction of 8,757 lineal feet of Resist barrier and for DSD infrastructure. The potential for and magnitude of impacts resulting from coastal storm surge flooding would be reduced for 86 percent of the persons residing within the 100-year floodplain within the Study Area. Under Alternative 3, where Resist barriers are located inland, stormwater modeling indicates the potential for a minor increase in flooding of five properties located in the Study Area. These properties are located along the southwestern edge of Weehawken Cove, as well as the parking lot located at the intersection of Washington Avenue and Observer Highway and within the NJ Transit yard noted in Alternative 1.

  The wetland impacts under Alternative 3 would be identical to the impacts described in Alternatives 1 and 2.

- The No Action Alternative does not impact floodplain or wetlands, but would not implement any flood risk reduction measures, therefore leaving the potential for future flooding and risk to lives or properties

the same as the current condition. This option will have both short term and long term impacts to the floodplain.

Since the Study Area already is fully developed, many of the traditional approaches for minimizing and avoiding floodplain and wetlands impacts identified in the procedures of implementation of EO 11988 and EO 11990 are not applicable to this Project. Best Management Practices (BMPs), good housekeeping practices, and adherence of any special conditions imposed by jurisdictional agencies will be utilized to minimize impacts to the floodplain and wetlands and to restore and preserve natural and beneficial floodplain and wetland values at the conclusion of construction.

Refer to Section 6 of the Natural Ecosystems TES, included within the EIS, for a detailed environmental impact analysis and mitigation measures for each of the Alternatives as it pertains to floodplains, ecosystems and wetland impacts.

Step 5: ***Where practicable, design or modify the proposed action to minimize the potential adverse impacts to lives, property, and natural values within the floodplain, and restore and preserve the natural and beneficial values served by floodplains and wetlands.***

The proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The purpose of the Project is to reduce flood risk and minimize impacts from coastal storm surge, high tide and rainfall flood events in the Study Area. Due to the nature of the project, none of the Build Alternatives are located outside of the floodplain and wetlands. Based on the scope of the project, and the topography of the Study Area, all of the Build Alternatives encompass a full flood barrier system area (Project Area) which contains floodplain and wetland areas. However, a range of alternatives and options were designed to present varying degrees of flood risk reduction versus resulting environmental impacts.

Refer to Section 1 of the Rebuild by Design Hudson River: Resist, Delay, Store, Discharge EIS for a detailed description of the Project Area.

Mitigation for the project's potential impacts to aquatic species (see Step 2) are further discussed in the Natural Ecosystems TES and are summarized in the EIS.

Step 6: ***Reevaluate the alternatives.***

The purpose of the Project is to reduce flood risk and minimize impacts from coastal storm surge, high tide and rainfall flood events in the Study Area; therefore, no reevaluation or redesign to avoid floodplains and wetlands was completed. Based on the project purpose, and the resulting floodplain and wetlands impacts (and other environmental resources impacts) from the Build Alternatives, the New Jersey Department of Environmental

Protection (NJDEP) has determined that Alternative 3 is the Proposed Alternative, and will minimize any potential adverse impacts through the use of BMPs, mitigation measures and adherence of any special conditions imposed by jurisdictional agencies.

Alternative 3/Option 1 (Proposed Alternative): Resist structures are located inland, on slightly different alignments than Alternative 2, including a private alleyway. Alternative 3 proposes approximately 555 linear feet of bulkhead work. The DSD element of the Project consists of over 60 sites that will include new and/or improved stormwater management areas. Two new outfall pipes in northern Weehawken Cove are proposed as the "discharge" component of the Project. Natural topographical low points would serve as catchment areas for stormwater where the delay/storage of stormwater will be enhanced, as well as the installation of underground water storage/holding tanks. Three pumps would be incorporated to drain the areas via two new outfalls at Weehawken Cove. This meets the project goals of reduction of flood risks while minimizing impacts to the built and natural environment.

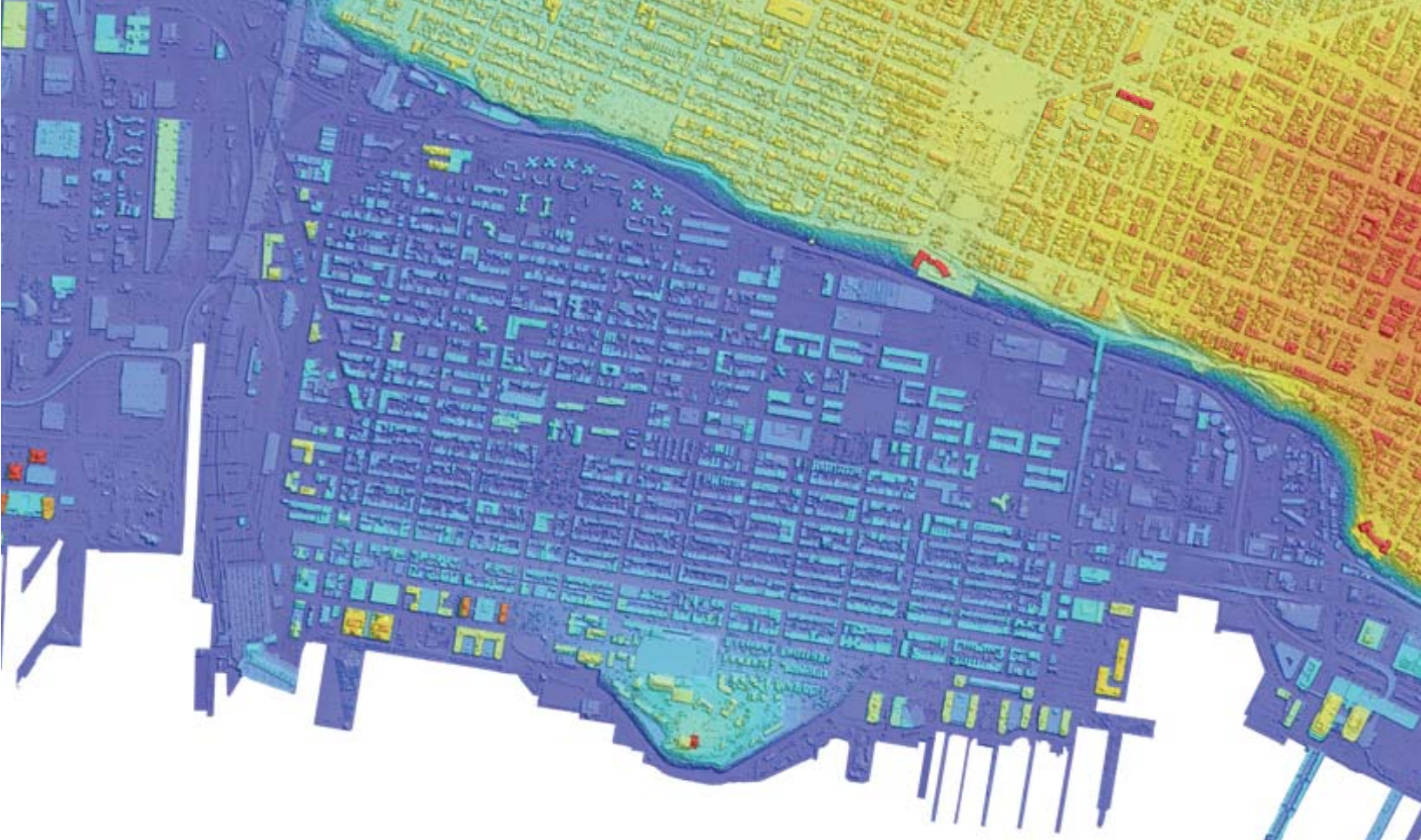
Step 7: ***Issue findings and a public explanation.***

A final public notice will be published in accordance with 24 CFR Part 55 for a minimum 15-day comment period. The notice shall state the reasons why the project must be located in the floodplain and wetland, provide a list of alternatives considered, and all mitigation measures to be taken to minimize adverse impacts and preserve natural and beneficial floodplain and wetland values. All comments received during the comment period will be responded to and fully addressed prior to funds being committed to the proposed project, in compliance with Executive Orders 11988 and 11990 or 24 CFR Part 55.

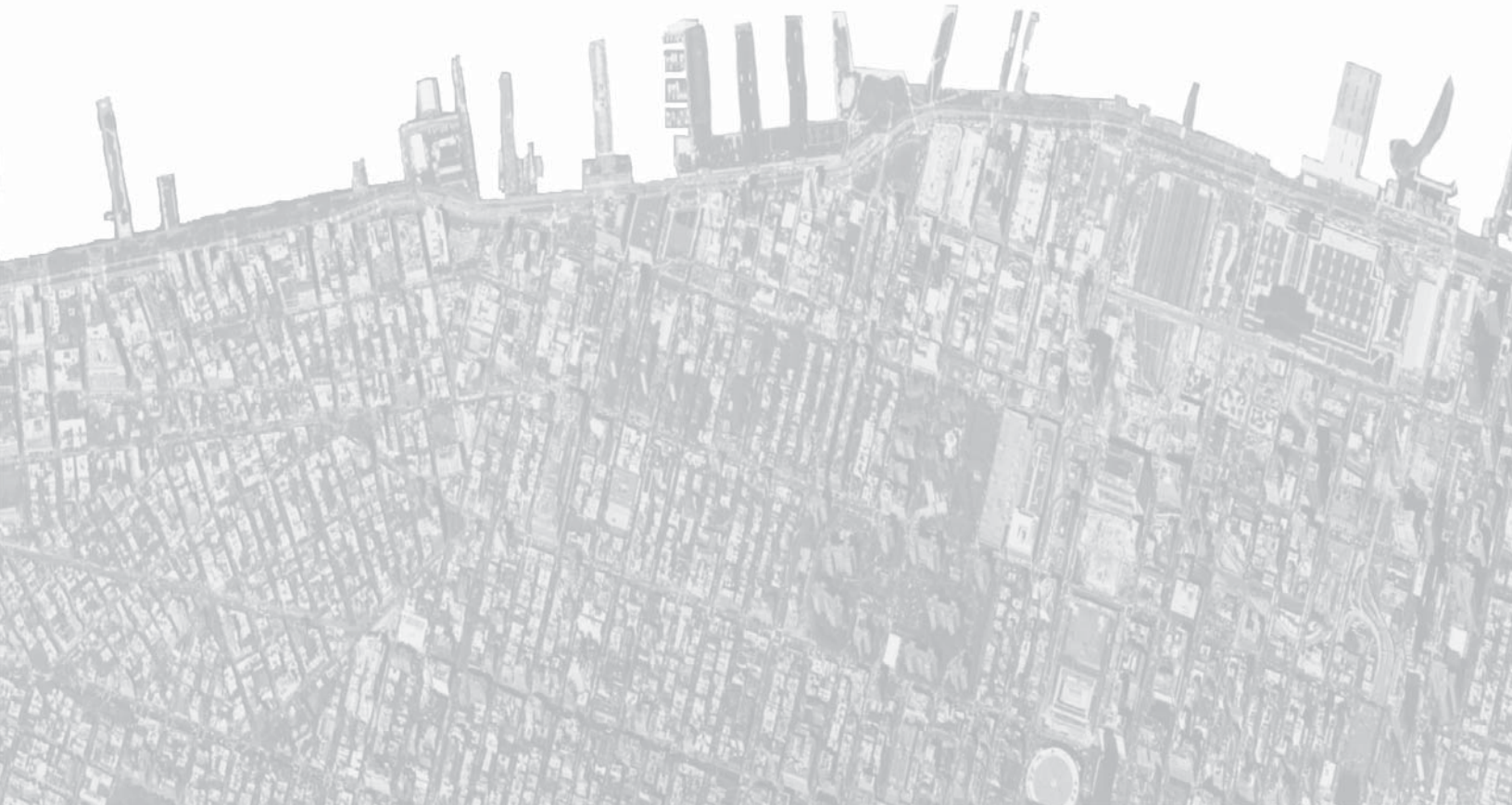
Step 8: ***Implement the Proposed Action***

Step Eight is implementation of the proposed action. BMPs, mitigation measures and adherence of any special conditions imposed by jurisdictional agencies, will be incorporated into the proposed project to minimize any potential adverse impacts and to restore and preserve natural and beneficial floodplain and wetland values where possible. Implementation of the proposed action will require additional local and state permits, which could place additional design modifications or mitigation requirements on the project.

Refer to Section 8 of the Natural Ecosystems TES for detailed permitting requirements.



ATTACHMENT A – PUBLICATIONS, AFFIDAVITS, AND EMAIL CORRESPONDENCE



EARLY NOTICE AND PUBLIC REVIEW OF A PROPOSED ACTIVITY IN A 100-YEAR FLOODPLAIN AND WETLAND

September 30, 2016

To: All Interested Agencies, Groups & Individuals

This is to provide notice pursuant to 24 CFR Part 55 that the proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The New Jersey Department of Environmental Protection (NJDEP) will be identifying and evaluating practicable alternatives to locating the actions in the floodplain and wetlands and the potential impacts from the proposed actions, as required by Executive Orders (EO) 11988 (Floodplain Management) and 11990 (Protection of Wetlands).

The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City, with the following approximate boundaries: the Hudson River to the east; Baldwin Avenue (in Weehawken) to the north; the Palisades to the west; and 18th Street, Washington Boulevard and 14th Street (in Jersey City) to the south. The Study Area includes approximately 1,020 acres of land, as well as about 233 acres of the Hudson River, and includes portions of FEMA Flood Insurance Rate Maps (FIRM) 34017C0043D, 34017C0044D, 34017C0106D, and 34017C0107D.

Approximately 745 acres of land within the Study Area are included within the FEMA 100-year flood zone (including the AE and VE zones). Of this, the Build Alternatives would impact between approximately 5.76 and 7.57 acres of floodplain through the placement of permanent above-ground structures (i.e., the Resist barrier). In addition, six freshwater wetland areas have been delineated within the Study Area, located primarily along or within close proximity to the Hudson-Bergen Light Rail (HBLR) tracks. The total delineated wetland acreage (within the Study Area) is approximately 2.48 acres. Approximately 230 square feet of freshwater wetlands would be impacted by all three Build Alternatives. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) also identifies the open waters of the Hudson River as Estuarine and Marine Deepwater wetland. Bulkhead work associated with the placement of Resist structures and outfalls could impact these areas. Alternative 1 would potentially require approximately 5,735 linear feet of bulkhead work and Alternative 2 and Alternative 3 would potentially require approximately 555 linear feet of bulkhead work.

There are three primary purposes for this notice. First, people who may be affected by activities in floodplains and wetlands and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Second, an adequate public notice program can be an important public education tool. Commenters are encouraged to offer alternative methods to serve the same project purpose, and methods to minimize and mitigate impacts. The dissemination of information and request for public comment about floodplains and wetlands can facilitate and enhance Federal efforts to reduce the risks associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the Federal government determines it will participate in actions taking place in floodplains and wetlands, it must inform those who may be put at greater or continued risk.

Written comments must be received by NJDEP on or before October 17, 2016, or fifteen (15) days from the actual date of publication, whichever is later. Written comments to this Notice can also be submitted to the NJDEP via (1) electronic submittal of comments to rbd-hudsonriver@dep.nj.gov, (2) mail to: Dennis Reinknecht, RBD Program Manager, Engineering and Construction, Office of Rebuild by Design, 501 East State Street, Mail Code 501-01A, P.O. Box 420, Trenton, NJ 08625-0420 or (3) submitted to the DCA website at http://www.nj.gov/dca/divisions/sandyrecovery/review/. In the alternative, comments may be submitted on paper to: Laura Shea, Assistant Commissioner, Sandy Recovery Division, New Jersey Department of Community Affairs, 101 South Broad Street, P.O . Box 800, Trenton, NJ 08625-0800. Documentation is also available for public review on the project's website at www.rbd-hudsonriver.nj.gov.

Dave Rosenblatt, Assistant Commissioner
New Jersey Department of Environmental Protection

AVISO TEMPRANO Y REVISIÓN PÚBLICA DE UNA ACTIVIDAD PROPUESTA EN UNA LLANURA DE INUNDACIÓN DE 100 AÑOS Y HUMEDAL

30 de septiembre de 2016

A: Todos las agencias, grupos y personas interesadas

Esto es para dar aviso de conformidad con 24 CFR Parte 55 que la propuesta acción de financiación federal (Proyecto Río Hudson: Resistencia, Retraso, Almacenamiento, Descarga) se encuentra dentro de la llanura de inundación de 100 años y humedales. El Nueva Jersey Departamento de Protección Ambiental (NJDEP, por sus siglas en inglés) identificará y evaluará alternativas posibles para ubicar las acciones en la llanura de inundación y humedales y los posibles impactos de las acciones propuestas, según lo requerido por Órdenes del Ejecutivo (EO, por sus siglas en inglés) 11988 (Administración de Llanuras de Inundación) y 11990 (Protección de los Humedales).

El proyecto propuesto consiste en una estrategia integral de cuatro partes, incluyendo: 1) infraestructura duro y suave paisaje para defensa costera (Resistencia); 2) recomendaciones de política, directrices e infraestructura urbana para disminuir la escorrentía de tormenta (Retraso); 3) mejoras en la infraestructura verde y gris para permitir un mayor almacenamiento de agua de lluvia exceso (Almacenamiento); y 4) bombas de agua y rutas alternativas para drenaje (Descarga). El proyecto propuesto se producirá a lo largo de la ciudad de Hoboken y se extenderá en Weehawken y Ciudad de Jersey, con los siguientes límites aproximados: el Río Hudson hacia el este; Avenida de Baldwin (en Weehawken) hacia el norte; el Palisades al oeste; y calle 18, el Bulevar Washington y calle 14 (en Jersey City) al sur. El área de estudio incluye aproximadamente 1,020 acres de tierra, así como alrededor de 233 acres del Río Hudson e incluye porciones de los Mapas de FEMA de Tarifas de Seguro de Inundación (FIRM, por sus siglas en inglés) 34017C0043D, 34017C0044D, 34017C0106D y 34017C0107D.

Aproximadamente 745 acres de tierra dentro del área de estudio se incluyen dentro de la zona de inundación de 100 años FEMA (incluyendo las zonas AE y VE). De esto, las alternativas de construcción afectarían entre aproximadamente 5.76 y 7.57 acres de llanura de inundación a través de la colocación de las estructuras permanentes sobre el suelo (es decir, la barrera de resistencia). Además, seis humedales de agua dulce han sido delineados dentro del área de estudio, ubicados principalmente a lo largo o cerca de las pistas del Hudson-Bergen Light Rail (HBLR, por sus siglas en inglés). La superficie total de humedales delineados (dentro del área de estudio) es aproximadamente 2.48 acres. Aproximadamente 230 pies cuadrados humedales de agua dulce serían afectados por las tres alternativas de construcción. El Servicio de Pesca y Vida Silvestre de los EE.UU. (USFWS, por sus siglas en inglés) Inventario Nacional de Humedales (NWI, por sus siglas en inglés) también identifica las aguas abiertas del río Hudson como humedales estuarios y marinas de aguas profundas. Trabajo de mamparo asociado con la colocación de las estructuras y las desembocaduras de Resistencia podría impactar estas áreas. Alternativa 1 potencialmente requiere aproximadamente 5,735 pies lineales de trabajo de mamparo y Alternativa 2 y Alternativa 3 potencialmente requiere aproximadamente 555 pies lineales de trabajo de mamparo.

Hay tres propósitos principales para este aviso. Primeramente, personas que puedan verse afectadas por las actividades de las llanuras de inundación y humedales, y aquellos que tienen un interés en la protección del medio ambiente deben tener la oportunidad para expresar sus preocupaciones y proporcionar información sobre estas áreas. Segundamente, un programa de notificación pública adecuado puede ser una herramienta importante de educación pública. Comentaristas son animados a ofrecer métodos alternativos para servir al mismo propósito de proyecto y métodos para minimizar y mitigar los impactos. La diseminación de información y solicitud de comentarios públicos sobre las llanuras de inundación y humedales puede facilitar y mejorar los esfuerzos Federales para reducir los riesgos asociados con la ocupación y modificación de estas zonas especiales. Terceramente, como una

cuestión de justicia, cuando el Gobierno Federal determina participará en acciones tomando lugar en las llanuras de inundación y humedales, debe informar a aquellos que podrían estar en mayor o riesgo permanente.

Comentarios escritos deben ser recibidos por el NJDEP en o antes del 17 de octubre de 2016, o quince (15) días a partir de la fecha de publicación, lo que sea posterior. Comentarios escritos a este aviso también pueden ser enviados al NJDEP por (1) envío electrónico a rbd-hudsonriver@dep.nj.gov , (2) correo a: Dennis Reinknecht, RBD Program Manager, Engineering and Construction, Office of Rebuild by Design, 501 East State Street, Mail Code 501-01A, P.O. Box 420, Trenton, NJ 08625-0420 o (3) enviado por el sitio web de DCA: http://www.nj.gov/dca/divisions/sandyrecovery/review/. En la alternativa, comentarios pueden ser presentados en papel a: Laura Shea, Assistant Commissioner, Sandy Recovery Division, New Jersey Department of Community Affairs, 101 South Broad Street, P.O . Box 800, Trenton, NJ 08625-0800. También hay documentación disponible para revisión pública en el sitio web del proyecto en www.rbd-hudsonriver.nj.gov.

Dave Rosenblatt, Assistant Commissioner
New Jersey Department of Environmental Protection

EARLY NOTICE AND PUBLIC REVIEW OF A PROPOSED ACTIVITY IN A 100-YEAR FLOODPLAIN AND WETLAND

September 30, 2016

To: All Interested Agencies, Groups & Individuals

This is to provide notice pursuant to 24 CFR Part 55 that the proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The New Jersey Department of Environmental Protection (NJDEP) will be identifying and evaluating practicable alternatives to locating the actions in the floodplain and wetlands and the potential impacts from the proposed actions, as required by Executive Orders (EO) 11988 (Floodplain Management) and 11990 (Protection of Wetlands).

The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City, with the following approximate boundaries: the Hudson River to the east; Baldwin Avenue (in Weehawken) to the north; the Palisades to the west; and 18th Street, Washington Boulevard and 14th Street (in Jersey City) to the south. The Study Area includes approximately 1,020 acres of land, as well as about 233 acres of the Hudson River, and includes portions of FEMA Flood Insurance Rate Maps (FIRM) 34017C0043D, 34017C0044D, 34017C0106D, and 34017C0107D.

Approximately 745 acres of land within the Study Area are included within the FEMA 100-year flood zone (including the AE and VE zones). Of this, the Build Alternatives would impact between approximately 5.76 and 7.57 acres of floodplain through the placement of permanent above-ground structures (i.e., the Resist barrier). In addition,

AFFIDAVIT

State of New Jersey
County of Middlesex

Melinda Jones, being duly sworn, says that (s)he is connected with The Star Ledger, a newspaper circulating in Atlantic, Bergen, Burlington, Cape May, Essex, Hudson, Hunterdon, Mercer, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren Counties, New Jersey, and that a notice of which the annexed is a true copy was published on the following dates in said newspaper:

9/30/2016

Melinda Jones

Melinda Jones

Sworn to before me this 4 day of Oct, 2016.

Marianne Ulrich
NOTARY PUBLIC

MARIANNE ULRICH
Notary Public, State of New Jersey
My Commission Expires
September 04, 2019

EL ESPECIAL

El Especialito

U.S.A. Distributors, Inc.

Declaration of performance
Affidavit

Product: Fitzgerald & Halliday INS Dep.

Newspaper: El Especialito Hudson

IO/Job#:

Tab size: Full color (2 x 5.5) 1/4 page Display ad.

Insertion Date: September 30, 2016

Quantity Received:

Quantity Shipped:

Newspaper Gross Run:

Quantiy inserted: 25,000 copies

Newspaper Net Paid Circ:

Method of Destruction:

If not destroyed, state method of disposal:

Declaration completed Milady Tizon Date: September 30, 2016

I declare under penalty of perjury that the information set forth in the Declaration of Performance is accurate in all aspects.

Signature: _____

Accounts Receivable
Title

Print name: Milady P. Tizon

State of New Jersey
County of Bergen

Notary Public Seal

Sworn to and Subscribed Before Me
Date: 9/30/16

_____
Notary Public Signature

SASHA MENOCAL
NOTARY PUBLIC OF NEW JERSEY
ID # 2389798
My Commission Expires 12/1/2019

From: Marcopul, Kate <Kate.Marcopul@dep.nj.gov>
Sent: Wednesday, October 12, 2016 8:55 AM
To: Doss, Gary
Subject: RE: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge

Hi Gary,

I received your e-mail yesterday. We will be sure to reach out to you if we have any questions.

Sincerely,
Kate

Katherine J. Marcopul
Administrator and
Deputy State Historic Preservation Officer

Mail Code 501-04B
NJ Historic Preservation Office
Department of Environmental Protection
P.O. Box 420
Trenton, NJ 0625-0420

Phone: (609) 984-5816
Fax: (609) 984-0578

From: Doss, Gary [mailto:gdoss@Dewberry.com]
Sent: Tuesday, October 11, 2016 1:15 PM
To: Marcopul, Kate
Subject: FW: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge

Kate – Please see the email below and the attached. I sent this last week but got bounce-backs from our email server. Let me know if you get this message and have any questions.

Thanks,
Gary

Gary Doss
Environmental Planner
Dewberry
600 Parsippany Rd., Suite 301
Parsippany, NJ 07054-3715

973.576.9661
973.428.8509 fax
www.dewberry.com

From: Doss, Gary
Sent: Wednesday, October 05, 2016 1:47 PM
To: 'paul_kenney@nps.gov' <paul_kenney@nps.gov>; 'Carlo_Popolizio@fws.gov' <Carlo_Popolizio@fws.gov>; 'Ron_Popowski@fws.gov' <Ron_Popowski@fws.gov>; Ryan Anderson <Ryan.Anderson@dep.nj.gov>; 'Reynolds, Samuel L NAP' <Samuel.L.Reynolds@usace.army.mil>; 'Jodi.m.mcdonald@usace.army.mil' <Jodi.m.mcdonald@usace.army.mil>; 'Christopher.s.mallery@usace.army.mil' <Christopher.s.mallery@usace.army.mil>; 'Musumeci, Grace' <Musumeci.Grace@epa.gov>; 'karen.greene@noaa.gov' <karen.greene@noaa.gov>; 'Megan.jadrosich@fema.dhs.gov' <Megan.jadrosich@fema.dhs.gov>; 'William.Mcdonnell@fema.dhs.gov' <William.Mcdonnell@fema.dhs.gov>; 'Emily.Hodecker@fema.dhs.gov' <Emily.Hodecker@fema.dhs.gov>; 'robert.lore@fema.dhs.gov' <robert.lore@fema.dhs.gov>; 'Michael.r.furda@hud.gov' <Michael.r.furda@hud.gov>; Colleen Keller <Colleen.Keller@dep.nj.gov>; 'dave.fanz@dep.nj.gov' <dave.fanz@dep.nj.gov>; 'kate.marcopul@dep.state.nj.gov' <kate.marcopul@dep.state.nj.gov>; 'Jennifer Goebel - NOAA Federal' <jennifer.goebel@noaa.gov>; 'richard.shaw@nj.usda.gov' <richard.shaw@nj.usda.gov>; 'james.w.haggerty@usace.army.mil' <james.w.haggerty@usace.army.mil>; 'Brandy Forbes' <bforbes@hobokennj.gov>; 'Caleb Stratton' <cstratton@hobokennj.gov>
Cc: Smith, Lawrence <lismith@Dewberry.com>; 'McEvoy, Kim' <Kim.McEvoy@dep.nj.gov>; DEP rbdh-archive <rbdh-archive@dep.nj.gov>; Schwarz, Frank <Frank.Schwarz@dep.nj.gov>; Reinknecht, Dennis <Dennis.Reinknecht@dep.nj.gov>; Taylor, Alexis <Alexis.Taylor@dep.nj.gov>; Spahn, Kenneth <kspahn@Dewberry.com>; Sherman, Clay <Clay.Sherman@dep.nj.gov>
Subject: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge

All,

We are currently working on an Environmental Impact Statement (EIS) on behalf of the New Jersey Department of Environmental Protection (NJDEP) for the HUD-funded Rebuild by Design Hudson River Project: Resist, Delay, Store, Discharge. The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City. As part of the EIS, we are analyzing the impacts from three Build Alternatives, as well as a No Action Alternative.

Due to the potential for floodplain and wetland impacts, we are currently conducting an 8-Step Floodplain/Wetland review pursuant to HUD regulations to satisfy Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), and are notifying the public and agencies to satisfy Step 2 of the process (24 CFR 55.20). The attached public notice was published in local English and Spanish newspapers on September 30, 2016 to solicit early public comment on the 8-Step process. If you could let me know whether you have any early comments on the project by October 21, 2016, it would be appreciated. The Draft EIS will also be made available for review prior to its publication at the end of the year, and you can provide comment at that time as well.

Additional information on the project can be found on the project website www.rbd-hudsonriver.nj.gov. If there's anything else you need, please do not hesitate to contact me.

Thank you,
Gary

Gary Doss
Environmental Planner
Dewberry
600 Parsippany Rd., Suite 301
Parsippany, NJ 07054-3715

973.576.9661
973.428.8509 fax
www.dewberry.com

Visit Dewberry's website at www.dewberry.com

From: Daniel Marrone - NOAA Federal <daniel.marrone@noaa.gov>
Sent: Thursday, October 13, 2016 3:20 PM
To: Doss, Gary
Subject: Re: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge

Hi Gary,
Can you please replace Jennifer Goebel's name with mine for the NMFS GARFO ESA section 7 contact for this project? Thanks.

We offer the the following comments for ESA-listed species under NMFS jurisdiction in the proposed project area.

Atlantic Sturgeon
Atlantic sturgeon are present in the waters of the Hudson River and its adjacent bays and tributaries. The New York Bight, Chesapeake Bay, South Atlantic and Carolina DPS of Atlantic sturgeon are endangered; the Gulf of Maine DPS is threatened. Individuals originating from any of these DPS could occur in the proposed project area. As young remain in their natal river/estuary until approximately age 2, and early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile Atlantic sturgeon will occur within the waters of the lower Hudson River and its adjacent bays and tributaries.

On June 3, 2016, we issued two proposed rules to designate critical habitat for the five listed distinct population segments of Atlantic sturgeon found in U.S. waters (81 FR 35701 and 81 FR 36078). The action you have proposed will occur in an area proposed to be designated as critical habitat.

Shortnose Sturgeon
Shortnose sturgeon are present in the waters of the Hudson River and could occur in their adjacent bays and tributaries. Shortnose sturgeon are listed as endangered throughout their range. As early life stages are not tolerant of saline waters, no eggs, larvae, or juvenile shortnose sturgeon will occur within the saline waters of the lower Hudson River and its adjacent bays and tributaries.

As project details develop, we recommend you consider the following effects of the project on Atlantic and shortnose sturgeon:
- For activities that increase levels of suspended sediment, consider the use of silt management and/or soil erosion best practices (i.e., silt curtains and/or cofferdams).
- For any impacts to habitat or conditions that temporarily render affected water bodies unsuitable for the above-mentioned species, consider the use of timing restrictions for in-water work.
- For pile driving or other activities that may affect underwater noise levels, consider the use of cushion blocks and other noise attenuating tools to avoid reaching noise levels that will cause injury or behavioral disturbance to sturgeon - see the table below for more information regarding noise criteria for injury/behavioral disturbance in sturgeon.

Organism	Injury	Behavioral Modification
Sturgeon	206 dB re 1 µPaPeak and 187 dB cSEL	150 dB re 1 µPaRMS

The lead federal action agency for this action will be responsible for determining whether the proposed action may affect listed species under the ESA and if a conference for Atlantic sturgeon critical habitat is required. If

the agency determines that the proposed action may affect a listed species and/or a conference for Atlantic sturgeon critical habitat is required, they should submit their determination of effects, along with justification and a request for concurrence to the attention of the Section 7 Coordinator, NMFS, Greater Atlantic Regional Fisheries Office, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930 or nmfs.gar.esa.section7@noaa.gov.

Please be aware that we have recently provided on our website guidance and tools to assist action agencies with their description of the action and analysis of effects to support their determination. See - http://www.greateratlantic.fisheries.noaa.gov/section7. After receiving a complete, accurate comprehensive request for consultation, in accordance to the guidance and instructions on our website, we would then be able to conduct a consultation under section 7 of the ESA. Should project plans change or new information become available that changes the basis for this determination, further coordination should be pursued.

On Fri, Oct 7, 2016 at 12:14 PM, Mark Murray-Brown - NOAA Federal <mark.murray-brown@noaa.gov> wrote:

> Dan - Are these coming to you or onto Edith? Can you let Jen know and cc me too
>
> ---------- Forwarded message ----------
> From: **Jennifer Goebel - NOAA Federal** <jennifer.goebel@noaa.gov>
> Date: Thu, Oct 6, 2016 at 9:05 AM
> Subject: Fwd: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge
> To: Mark MurrayBrown <mark.murray-brown@noaa.gov>
>
> Hi Mark,
> I think this is a carry-over from my S7 days.
> Could you let him know who to replace me with?
>
> Thanks,
> Jen
> ---------- Forwarded message ----------
> From: **Doss, Gary** <gdoss@dewberry.com>
> Date: Wed, Oct 5, 2016 at 1:46 PM
> Subject: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge
> To: "paul_kenney@nps.gov" <paul_kenney@nps.gov>, "Carlo_Popolizio@fws.gov" <Carlo_Popolizio@fws.gov>, "Ron_Popowski@fws.gov" <Ron_Popowski@fws.gov>, Ryan Anderson <Ryan.Anderson@dep.nj.gov>, "Reynolds, Samuel L NAP" <Samuel.L.Reynolds@usace.army.mil>, "Jodi.m.mcdonald@usace.army.mil" <Jodi.m.mcdonald@usace.army.mil>, "Christopher.s.mallery@usace.army.mil" <Christopher.s.mallery@usace.army.mil>, "Musumeci, Grace" <Musumeci.Grace@epa.gov>, "karen.greene@noaa.gov" <karen.greene@noaa.gov>, "Megan.jadrosich@fema.dhs.gov" <Megan.jadrosich@fema.dhs.gov>, "William.Mcdonnell@fema.dhs.gov" <William.Mcdonnell@fema.dhs.gov>, "Emily.Hodecker@fema.dhs.gov" <Emily.Hodecker@fema.dhs.gov>, "robert.lore@fema.dhs.gov" <robert.lore@fema.dhs.gov>, "Michael.r.furda@hud.gov" <Michael.r.furda@hud.gov>, Colleen Keller <Colleen.Keller@dep.nj.gov>, "dave.fanz@dep.nj.gov" <dave.fanz@dep.nj.gov>, "kate.marcopul@dep.state.nj.gov" <kate.marcopul@dep.state.nj.gov>, Jennifer Goebel - NOAA Federal <jennifer.goebel@noaa.gov>, "richard.shaw@nj.usda.gov" <richard.shaw@nj.usda.gov>, "james.w.haggerty@usace.army.mil" <james.w.haggerty@usace.army.mil>, Brandy Forbes <bforbes@hobokennj.gov>, Caleb Stratton <cstratton@hobokennj.gov>
> Cc: "Smith, Lawrence" <lismith@dewberry.com>, "McEvoy, Kim" <Kim.McEvoy@dep.nj.gov>, DEP rbdh-

archive <rbdh-archive@dep.nj.gov>, "Schwarz, Frank" <Frank.Schwarz@dep.nj.gov>, "Reinknecht, Dennis" <Dennis.Reinknecht@dep.nj.gov>, "Taylor, Alexis" <Alexis.Taylor@dep.nj.gov>, "Spahn, Kenneth" <kspahn@dewberry.com>, "Sherman, Clay" <Clay.Sherman@dep.nj.gov>

All,

We are currently working on an Environmental Impact Statement (EIS) on behalf of the New Jersey Department of Environmental Protection (NJDEP) for the HUD-funded Rebuild by Design Hudson River Project: Resist, Delay, Store, Discharge. The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City. As part of the EIS, we are analyzing the impacts from three Build Alternatives, as well as a No Action Alternative.

Due to the potential for floodplain and wetland impacts, we are currently conducting an 8-Step Floodplain/Wetland review pursuant to HUD regulations to satisfy Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands), and are notifying the public and agencies to satisfy Step 2 of the process (24 CFR 55.20). The attached public notice was published in local English and Spanish newspapers on September 30, 2016 to solicit early public comment on the 8-Step process. If you could let me know whether you have any early comments on the project by October 21, 2016, it would be appreciated. The Draft EIS will also be made available for review prior to its publication at the end of the year, and you can provide comment at that time as well.

Additional information on the project can be found on the project website www.rbd-hudsonriver.nj.gov. If there's anything else you need, please do not hesitate to contact me.

Thank you,

Gary

Gary Doss

Environmental Planner

Dewberry

600 Parsippany Rd., Suite 301

Parsippany, NJ 07054-3715

973.576.9661

973.428.8509 fax

www.dewberry.com

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Jennifer S. Goebel
Public Affairs Officer
office: 978-281-9175/cell 978-290-0203
Greater Atlantic Regional Fisheries Office
NOAA Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

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Mark Murray-Brown
Section 7 Coordinator
Protected Resources Division
NOAA National Marine Fisheries Service
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
Gloucester MA 01930
(978) 281-9306

From: McEvoy, Kim <Kim.McEvoy@dep.nj.gov>
Sent: Thursday, October 06, 2016 12:54 PM
To: Sam Berman; mkilkeary@tow-nj.net; Gahmad@tow-nj.net
Cc: Doss, Gary; Moore, Clifford; Schwarz, Frank; Reinknecht, Dennis; Taylor, Alexis; DEP rbdh-archive; Sherman, Clay; Soto, Nicole
Subject: FW: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge - forwarding message!
Attachments: RBDH Floodplain Wetland 8 Step Early Notice_English.pdf

All,

We are currently working on an Environmental Impact Statement (EIS) on behalf of the New Jersey Department of Environmental Protection (NJDEP) for the HUD-funded Rebuild by Design Hudson River Project: Resist, Delay, Store, Discharge. The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City. As part of the EIS, we are analyzing the impacts from three Build Alternatives, as well as a No Action Alternative.

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Gary Doss
Environmental Planner
Dewberry
600 Parsippany Rd., Suite 301
Parsippany, NJ 07054-3715
973.576.9661
973.428.8509 fax
www.dewberry.com

From: Doss, Gary
Sent: Wednesday, October 05, 2016 1:47 PM
To: 'paul_kenney@nps.gov'; 'Carlo_Popolizio@fws.gov'; 'Ron_Popowski@fws.gov'; Ryan Anderson; 'Reynolds, Samuel L NAP'; 'Jodi.m.mcdonald@usace.army.mil'; 'Christopher.s.mallery@usace.army.mil'; 'Musumeci, Grace'; 'karen.greene@noaa.gov'; 'Megan.jadrosich@fema.dhs.gov'; 'William.Mcdonnell@fema.dhs.gov'; 'Emily.Hodecker@fema.dhs.gov'; 'robert.lore@fema.dhs.gov'; 'Michael.r.furda@hud.gov'; Colleen Keller; 'dave.fanz@dep.nj.gov'; 'kate.marcopul@dep.state.nj.gov'; 'Jennifer Goebel - NOAA Federal'; 'richard.shaw@nj.usda.gov'; 'james.w.haggerty@usace.army.mil'; 'Brandy Forbes'; 'Caleb Stratton'
Cc: Smith, Lawrence; 'McEvoy, Kim'; DEP rbdh-archive; Schwarz, Frank; Reinknecht, Dennis; Taylor, Alexis; Spahn, Kenneth; Sherman, Clay
Subject: 8-Step Review Agency Notice: RBD Hudson River Project: Resist, Delay, Store, Discharge
Attachments: RBDH Floodplain Wetland 8 Step Early Notice_English.pdf

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Thank you,
Gary

Gary Doss
Environmental Planner
Dewberry
600 Parsippany Rd., Suite 301
Parsippany, NJ 07054-3715
973.576.9661
973.428.8509 fax
www.dewberry.com

From: Caulfield, David <David.Caulfield@dep.nj.gov>
Sent: Tuesday, October 18, 2016 7:38 PM
To: Smith, Lawrence; Doss, Gary
Cc: McEvoy, Kim
Subject: Public Comments - Early Floodplain/Wetland Notice Hoboken
Attachments: RE: myNJ DocLib Hudson River Rebuild By Design _ Early Floodplain and Wetland Notice

Good evening,

Enclosed please find 1 of 2 of the "no comment" e-mails from DCA regarding the public notice of the above.

Thanks,
DC

From: Ryan, Lisa <Lisa.Ryan@dca.nj.gov>
Sent: Monday, October 17, 2016 12:50 PM
To: Caulfield, David; Lewin, Deonna
Cc: McEvoy, Kim
Subject: RE: myNJ DocLib Hudson River Rebuild By Design _ Early Floodplain and Wetland Notice

Hi David,

We (DCA Communications and Sandy Constituent Services) did not receive any public comments to the Early Floodplain and Wetland Notices for the Hudson River RBD project. Thanks.

Lisa

Lisa M. Ryan
Director, Strategic Communications
Sandy Recovery Division
New Jersey Department of Community Affairs
PO Box 823
Trenton, NJ 08625-0823
(609) 292-7083
lisa.ryan@dca.nj.gov

From: Caulfield, David
Sent: Monday, October 17, 2016 11:53 AM
To: Lewin, Deonna; Ryan, Lisa
Cc: McEvoy, Kim
Subject: myNJ DocLib Hudson River Rebuild By Design _ Early Floodplain and Wetland Notice

Hello Deonna and Lisa,

The Early Floodplain and Wetland Notices for the Hudson River Rebuild By Design (RBD) project were uploaded to the DCA website on Friday, September 30th, with the public comment period ending on Monday, October 17th. Please confirm that there were no comments received on the above project.

Thanks & Have a Great Day,
DC

From: Caulfield, David <David.Caulfield@dep.nj.gov>
Sent: Tuesday, October 18, 2016 7:43 PM
To: Smith, Lawrence; Doss, Gary
Cc: McEvoy, Kim
Subject: Hudson RBD Early Floodplain/Wetland Notice
Attachments: RE: Hudson River Rebuild By Design - Early Floodplain and Wetland Notice

Enclosed for your files please find 2 of 2 "no comment" emails from DCA regarding the above project.

Thanks,
DC

From: Lewin, Deonna <Deonna.Lewin@dca.nj.gov>
Sent: Tuesday, October 18, 2016 3:08 PM
To: Caulfield, David
Subject: RE: Hudson River Rebuild By Design - Early Floodplain and Wetland Notice

You are most welcome David ☺

Best regards,
Deonna

Deonna Lewin
Administrative Assistant
TBRA Program
NJ Department of Community Affairs
PO Box 823
101 South Broad Street
Trenton, NJ 08625
Office #: 609-633-7308
Fax #: 609-292-3701
Email: deonna.lewin@dca.nj.gov

From: Caulfield, David
Sent: Tuesday, October 18, 2016 3:07 PM
To: Lewin, Deonna
Subject: RE: Hudson River Rebuild By Design - Early Floodplain and Wetland Notice

Thank you

Sent from my Windows Phone

From: Lewin, Deonna
Sent: 10/18/2016 3:03 PM
To: Caulfield, David
Cc: Ryan, Lisa
Subject: RE: Hudson River Rebuild By Design - Early Floodplain and Wetland Notice

Good afternoon David,

No public comments were received regarding the above-mentioned project. Thank you so much.

I have copied Ms. Ryan who also tracks public comments for our Sandy projects/applications to confirm on her end if public comments were received for the project you noted above.

Do have great day now.

Best regards,
Deonna

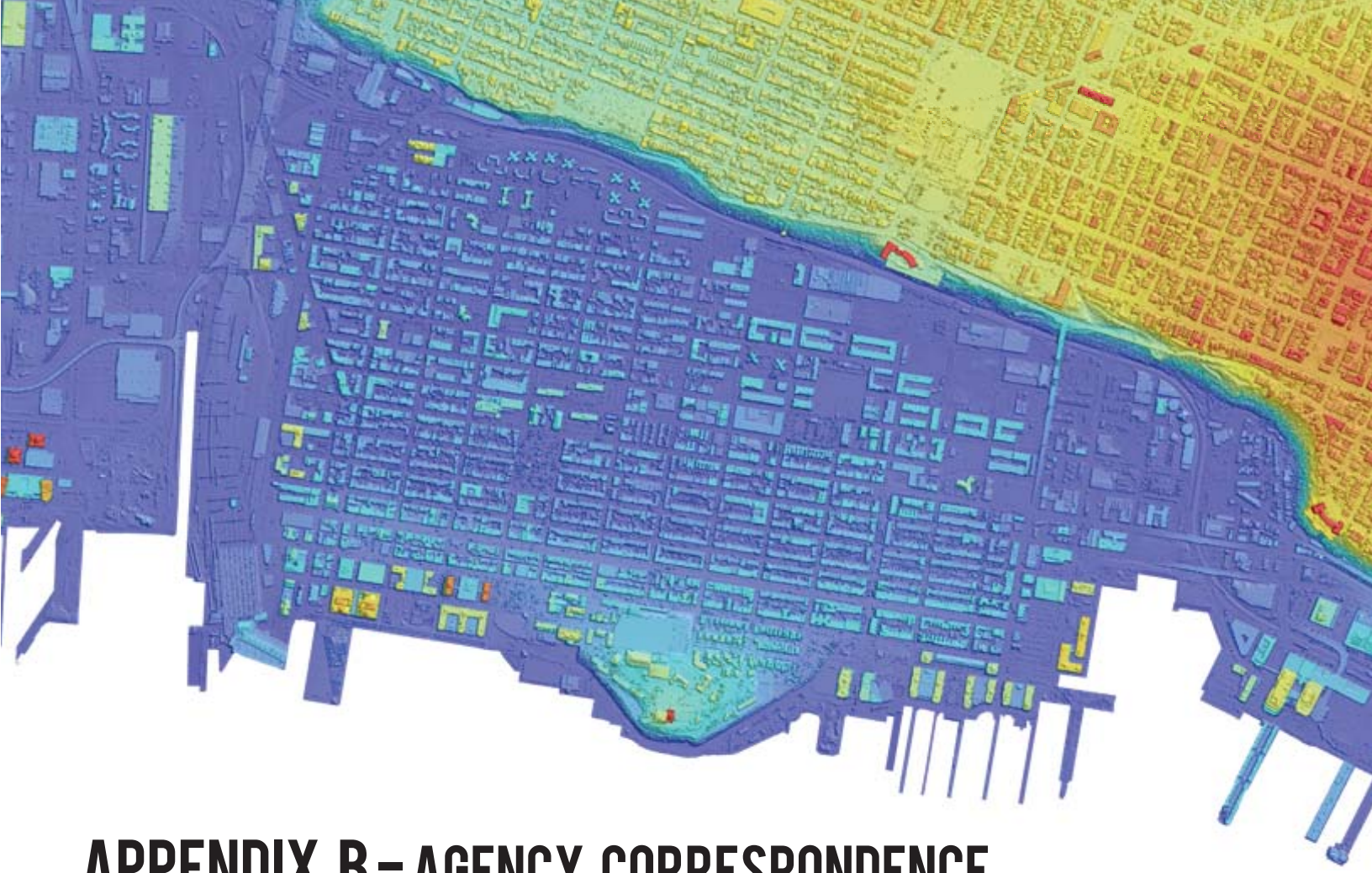
Deonna Lewin
Administrative Assistant
TBRA Program
NJ Department of Community Affairs
PO Box 823
101 South Broad Street
Trenton, NJ 08625
Office #: 609-633-7308
Fax #: 609-292-3701
Email: deonna.lewin@dca.nj.gov

From: Caulfield, David
Sent: Tuesday, October 18, 2016 2:57 PM
To: Lewin, Deonna
Subject: Hudson River Rebuild By Design - Early Floodplain and Wetland Notice

Hi Deonna,

I'm just checking in to see if there were any comments received on the above mention project.

Thanks,
DC



APPENDIX B – AGENCY CORRESPONDENCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

July 8, 2015

Andrew Raddant, Office of Environmental Policy and Compliance, Department of the Interior
Nancy Danzig, Federal Transit Administration, Region 2, Department of Transportation
Timothy Timmermann, Region 1, EPA
Grace Musumeci, Region 2, EPA
Katherine Zeringue, Region 2, FEMA
Irene Chang-Cimino, Sandy Recovery Office, FEMA
Therese Fretwell, Regions I and II, HUD
COL David Caldwell, New York District, USACE
LTC Michael Bliss, Philadelphia District USACE
COL Christopher Barron, New England District, USACE

Re: Sandy Regional Infrastructure Resilience Coordination - Federal Review and Permitting

Dear Mr. Raddant, Ms. Danzig, Mr. Timmerman, Ms. Musumeci, Ms. Zeringue, Ms. Chang-Cimino, Ms. Fretwell, Col. Caldwell, Lt Col. Bliss, and Col. Barron:

You have requested guidance on consulting with NMFS Protected Resources Division, Greater Atlantic Region, under Section 7 of the Endangered Species Act (ESA), as amended, for species listed under our jurisdiction, and with NMFS Habitat Conservation Division, Greater Atlantic Region under the essential fish habitat (EFH) provisions of the Magnuson Stevens Fishery Conservation and Management Act (MSA), regarding the projects in the Sandy-affected region funded under the following federal grant/loan programs, some of which are supported by the Disaster Relief Appropriations Act of 2013 (Sandy Supplemental), and/or other federal programs or authority including the following:

- **DOI's** Hurricane Sandy Coastal Resiliency Competitive Grant Program
- **DOT's** FHWA Emergency Relief Program and FTA Emergency Relief Program
- **EPA**'s Clean Water State Revolving Fund (annual + Sandy Supplemental) and Drinking Water State Revolving Fund (annual + Sandy Supplemental)
- **FEMA**'s Public Assistance and Hazard Mitigation Grant Program
- **HUD**'s Community Development Block Grant - Disaster Recovery
- **NOAA**'s Coastal Resilience Networks (CRest) and Cooperative Institute of North American Research (CINAR)
- **USACE's** Civil Works Program, Sandy Supplemental appropriations to USACE, and the USACE Regulatory Program
- **USDA**'s Natural Resources Conservation Service (NRCS) Emergency Watershed Protection Program

You have requested technical guidance to help you determine which activities funded by the program may require additional coordination with NOAA's National Marine Fisheries Service, including potential future consultation pursuant to Section 7 of the ESA and the MSA. We propose that it would be more efficient to consider ESA Section 7 and MSA EFH consultation needs as they apply to the entire group of above-funded projects rather than having you submit a separate request for each project. The guidelines provided below are intended to be incorporated into your environmental review process so that you can determine which projects require additional coordination with us. This letter is provided as technical assistance, and Section 7 and EFH consultations have not been initiated. In fact, as indicated below, we expect the majority of activities being considered for funding will not need additional coordination with us.

We understand that this guidance applies to (but is not limited to) the following proposed land-based activity:

1. Rehabilitation and repair of 1-4 unit homes, 5-9 unit buildings, and commercial properties, including appropriate elevations of properties within a floodplain.
2. Repair and replacement of bulkheads in accordance with the USACE Nationwide General Permit Program, for which EFH consultation is complete on a regional basis.
3. Buy-out of certain storm-damaged properties for conversion to green space or other public facility in perpetuity.
4. Acquisition of certain damaged properties for future redevelopment.
5. Coastal infrastructure, both green and gray.

Endangered Species Act Guidance

Several species of listed sea turtles and Atlantic and shortnose sturgeon occur in the coastal waters of New York and New Jersey. Distribution maps are currently available on our website (http://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html). Because these species only occur in the water in New York and New Jersey, they would not be exposed to any effects of activities that occur solely on land or above the high tide line and do not involve work in waterways. We also understand that appropriate best management practices will be required by other permits and employed to avoid any discharge into waterways and wetlands during any work. While there are ESA listed species under our jurisdiction in the coastal waters adjacent to where these land projects maybe based, these species are aquatic and limited to oceans and rivers (e.g., there are no nesting beaches for sea turtles in New York or New Jersey). Activities that have no effect on waterways or wetlands do not have the potential to impact our listed species and their habitats. ESA Section 7 consultation is required when a proposed Federal action may affect a listed species. Because no listed species under our jurisdiction will be exposed to effects from proposed activities on land, no section 7 consultation is necessary.

For activities such as bulkhead repair and replacement that occur along the shoreline, typical bulkhead repair and replacement methodologies include sheet pile installation, individual piles used to support an aboveground structure, or, gravity construction resting on the shore bottom supported by its own weight. The presence of sea turtles and sturgeon in shallow waters adjacent to the shoreline where bulkheads are typically installed would be rare. Impacts to these species are more likely to occur as a result of increased turbidity (due to sediment disturbance) and noise

resulting from the installation of piles. Measures that can be implemented to minimize the potential exposure of these species to these stressors include the use of turbidity or silt curtains, construction at low tide when water is absent from the area, use of vinyl piles, use of the smallest diameter piles practicable, and use of vibratory pile drivers. Avoidance of the May-October time period would also reduce the likelihood of impacts to listed species of sea turtles. We also encourage you to follow the guidance of the relevant permit conditions of the USACE Nationwide Permit Program (e.g. #3 (maintenance), 13 (Bank Stabilization), 23 (NEPA CE exclusions)), as well as general and regional specific conditions for New York and New Jersey.

The lead action agency, or their designated non-Federal representative, is responsible for determining if a proposed action may affect a listed species. If you determine that listed species will not be exposed to any effects of a proposed activity, no additional coordination with us is necessary. For any activities that may affect a listed species, section 7 consultation is required. We expect the projects that will require additional coordination would be any that result in negative impacts to submerged aquatic vegetation (SAV), shellfish resources, or involve pile installation, or dredging and disposal.

Essential Fish Habitat Guidance

EFH has been designated within the proposed project area by the New England and Mid-Atlantic Fishery Management Councils. The MSA requires federal agencies to consult with us on any action or proposed action authorized, funded, or undertaken by the agency that may adversely affect EFH identified under the MSA. Additional information on EFH designations and the EFH consultation process can be found at http://www.greateratlantic.fisheries.noaa.gov/habitat. Programs occurring along the shoreline and adjacent to nearshore coastal waters will likely require federal authorizations by USACE pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act, potentially through the Nationwide General Permit Program. One aspect of the conditions for these authorizations is to identify and implement measures which would avoid and minimize adverse effects to EFH and other trust resources; therefore, avoiding the need for additional consultation with us.

In order to avoid and minimize impacts to EFH, we encourage you to design any shoreline structures in accordance with the regional and general conditions for the Nationwide Permits. The regional conditions for New Jersey can be found on the USACE Philadelphia District website (http://www.nap.usace.army.mil/Missions/Regulatory/Permits/NWP.aspx). The regional conditions for New York can be found on the USACE New York District website (http://www.nan.usace.army.mil/Portals/37/docs/regulatory/geninfo/natp/NWP_PN_30MAY12.pdf). Activities that do not meet these regional conditions will require additional EFH consultation with our office.

Conclusion

Under the ESA and MSA and our implementing regulations, it is up to the action agency to make the determination of whether to consult. This guidance applies to all present and potential projects under the above-listed grants and loan programs, including bulkhead repair activities, housing rehabilitation for homes of all sizes, reimbursement for costs incurred, demolition, redevelopment activities, economic development, and infrastructure activities, and will assist you in determining if consultation is necessary.

We look forward to continuing to work with you on projects funded by the above-listed programs. Should you have any questions regarding the ESA comments, please contact Jennifer Goebel in our Protected Resources Division (978-281-9373 or jennifer.goebel@noaa.gov). If you have any questions concerning the EFH comments, please contact Karen Greene in our Habitat Conservation Division (732-872-3023 or karen.greene@noaa.gov).

Sincerely,

Kimberly Damon-Randall
Assistant Regional Administrator
Protected Resources Division

EC: Goebel, Murray-Brown GARFO PRD
Chiarella, Greene – GARFO HCD

From: Melissa Alvarez - NOAA Federal
To: Sayre, Brian
Subject: Hoboken Rebuild by Design project, Information Request
Date: Tuesday, August 25, 2015 3:25:08 PM

Dear Mr. Sayre,

We have reviewed the information provided to us regarding the above subject area. We offer the following comments pursuant to the Fish and Wildlife Coordination Act and the Magnuson-Stevens Fishery Conservation and Management Act.

Fish and Wildlife Coordination Act

A wide variety of resources of concern to NMFS occur in the Hudson River including but not limited to winter flounder, windowpane, summer flounder, bluefish and Atlantic tomcod. Anadromous fish including striped bass, alewife, blueback herring and American shad may also be found in the project area. As part of the federal permit process, the applicant should demonstrate that the impacts to the aquatic environment have been avoided, minimized to the extent practical and unavoidable impacts mitigated. Should the filling of the canal be authorized, we would recommend that the canal be sealed off from the river before filling. Seasonal work restrictions may be needed to minimize impacts to EFH and other NOAA resources.

Magnuson-Stevens Fishery Conservation and Management Act - Essential Fish Habitat

Essential Fish Habitat (EFH) has been designated in the project area. Further consultation by the federal action agency may be required as part of the federal permit process. Should project plans change that would alter the basis for determination, or if new species or EFH is designated, consultation should be reinitiated. For a listing of EFH and further information, please go to our website at: http://www.nero.noaa.gov/hcd. If you wish to discuss this further, please contact Melissa Alvarez at melissa.alvarez@noaa.gov.

Melissa D. Alvarez, PWS
Marine Habitat Resource Specialist
Habitat Conservation Division
National Marine Fisheries Service
James J. Howard Marine Sciences Laboratory
74 Magruder Rd.
Highlands, NJ 07732
(732) 872-3116 phone
(732) 872-3077 fax
melissa.alvarez@noaa.gov
http://www.greateratlantic.fisheries.noaa.gov/

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
State Forestry Services
Mail Code 501-04
ONLM - Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

July 28, 2015

Ami M. Gulden
Dewberry-Goodkind, Inc.
101 Noble Boulevard
Carlisle, PA 17013-4109

Re: Hoboken RBD (Rebuild by Design)
Hoboken City, Jersey City and Weehawken Township, Hudson County

Dear Ms. Gulden:

Thank you for your data request regarding rare species information for the above referenced project site in Hoboken City, Jersey City and Weehawken Township, Hudson County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3.1) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Landscape Project habitat mapping and the Biotics Database for occurrences of any rare wildlife species or wildlife habitat on the referenced site. The Natural Heritage Database was searched for occurrences of rare plant species or ecological communities that may be on the project site. Please refer to Table 1 (attached) to determine if any rare plant species, ecological communities, or rare wildlife species or wildlife habitat are documented on site. A detailed report is provided for each category coded as 'Yes' in Table 1.

We have also checked the Landscape Project habitat mapping and Biotics Database for all occurrences of rare wildlife species or wildlife habitat within one mile of the referenced site. Please refer to Table 2 (attached) to determine if any rare wildlife species or wildlife habitat is documented within one mile of the project site. Detailed reports are provided for each category coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

For requests submitted as part of a Flood Hazard Area Control Act (FHACA) rule application, we report records for all rare plant species and ecological communities tracked by the Natural Heritage Program that may be on your project site. (In some borderline cases these records may be described as on or in the immediate vicinity of your project site.) A subset of these plant species are also covered by the FHACA rules when the records are located within one mile of the project site. One mile searches for plant species will only report occurrences for those plant species identified under the FHACA regulations as being critically dependent on the watercourse. Please refer to Table 2 (attached) to determine if any rare plant species covered by the FHACA rules have been documented. Detailed reports are provided for each category coded as 'Yes' in Table 2. These reports may include species that have also been documented on the project site.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Please refer to Tables 1 and 2 (attached) to determine if any priority sites are located on or within one mile of the project site.

NHP File No. 15-4007461-8036

A list of rare plant species and ecological communities that have been documented from the project site, referenced above, can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2010.pdf.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive NJ-GeoWeb website at the following URL, http://www.state.nj.us/dep/gis/geowebsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292-9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 15-4007461-8036

Table 1: On Site Data Request Search Results (7 Possible Reports)

Report Name	Included	Number of Pages
1. Possibly on Project Site Based on Search of Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
2. On or In the Immediate Vicinity of the Project Site Based on Search of the Natural Heritage Database: Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database	No	0 pages included
3. Natural Heritage Priority Sites On Site	No	0 pages included
4. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
5. Vernal Pool Habitat on the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
6. Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
7. Other Animal Species On the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Rare Wildlife Species or Wildlife Habitat on the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

Table 2: Within 1 Mile for FHACA Searches (6 possible reports)

Report Name	Included	Number of Pages
1. Rare Plant Species Covered by the Flood Hazard Area Control Act Rule Within One Mile of the Project Site Based on Search of Natural Heritage Database	No	0 pages included
2. Natural Heritage Priority Sites within 1 mile	No	0 pages included
3. Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches	Yes	1 page(s) included
4. Vernal Pool Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1	No	0 pages included
5. Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Stream Habitat File	No	0 pages included
6. Other Animal Species Within One Mile of the Project Site Based on Additional Species Tracked by Endangered and Nongame Species Program	No	0 pages included

Rare Wildlife Species or Wildlife Habitat Within One Mile of the Project Site Based on Search of Landscape Project 3.1 Species Based Patches

Class	Common Name	Scientific Name	Feature Type	Rank	Federal Protection Status	State Protection Status	Grank	Srank
Aves								
	Black-crowned Night-heron	Nycticorax nycticorax	Foraging	3	NA	State Threatened	G5	S2B,S3N
	Glossy Ibis	Plegadis falcinellus	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Little Blue Heron	Egretta caerulea	Foraging	2	NA	Special Concern	G5	S3B,S3N
	Peregrine Falcon	Falco peregrinus	Urban Nest	4	NA	State Endangered	G4	S1B,S3N
	Snowy Egret	Egretta thula	Foraging	2	NA	Special Concern	G5	S3B,S4N
	Tricolored Heron	Egretta tricolor	Foraging	2	NA	Special Concern	G5	S3B,S3N
Osteichthyes								
	Shortnose Sturgeon	Acipenser brevirostrum	Migration Corridor - Adult Sighting	5	Federally Listed Endangered	State Endangered	G3	S1

EARLY NOTICE AND PUBLIC REVIEW OF A PROPOSED ACTIVITY IN A 100-YEAR FLOODPLAIN AND WETLAND

September 30, 2016

To: All Interested Agencies, Groups & Individuals

This is to provide notice pursuant to 24 CFR Part 55 that the proposed federally-funded action (Hudson River Project: Resist, Delay, Store, Discharge) is located within the 100-year floodplain and wetlands. The New Jersey Department of Environmental Protection (NJDEP) will be identifying and evaluating practicable alternatives to locating the actions in the floodplain and wetlands and the potential impacts from the proposed actions, as required by Executive Orders (EO) 11988 (Floodplain Management) and 11990 (Protection of Wetlands).

The proposed project consists of a four-part comprehensive strategy, including: 1) hard infrastructure and soft landscape for coastal defense (Resist); 2) policy recommendations, guidelines and urban infrastructure to slow storm water runoff (Delay); 3) green and grey infrastructure improvements to allow for greater storage of excess rainwater (Store); and 4) water pumps and alternative routes to support drainage (Discharge). The Proposed Project will occur throughout the City of Hoboken, and will extend into Weehawken and Jersey City, with the following approximate boundaries: the Hudson River to the east; Baldwin Avenue (in Weehawken) to the north; the Palisades to the west; and 18th Street, Washington Boulevard and 14th Street (in Jersey City) to the south. The Study Area includes approximately 1,020 acres of land, as well as about 233 acres of the Hudson River, and includes portions of FEMA Flood Insurance Rate Maps (FIRM) 34017C0043D, 34017C0044D, 34017C0106D, and 34017C0107D.

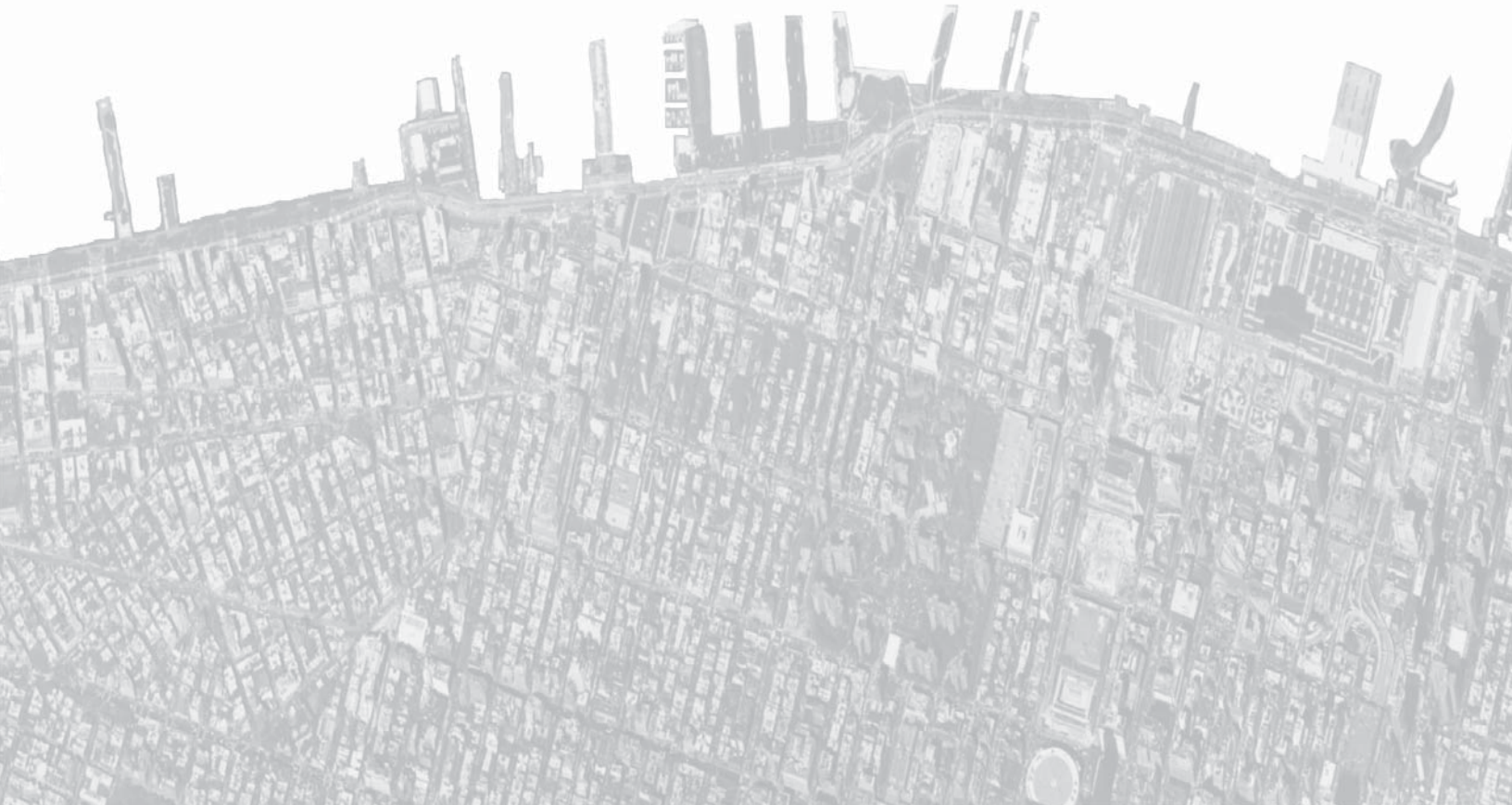
Approximately 745 acres of land within the Study Area are included within the FEMA 100-year flood zone (including the AE and VE zones). Of this, the Build Alternatives would impact between approximately 5.76 and 7.57 acres of floodplain through the placement of permanent above-ground structures (i.e., the Resist barrier). In addition, six freshwater wetland areas have been delineated within the Study Area, located primarily along or within close proximity to the Hudson-Bergen Light Rail (HBLR) tracks. The total delineated wetland acreage (within the Study Area) is approximately 2.48 acres. Approximately 230 square feet of freshwater wetlands would be impacted by all three Build Alternatives. The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) also identifies the open waters of the Hudson River as Estuarine and Marine Deepwater wetland. Bulkhead work associated with the placement of Resist structures and outfalls could impact these areas. Alternative 1 would potentially require approximately 5,735 linear feet of bulkhead work and Alternative 2 and Alternative 3 would potentially require approximately 555 linear feet of bulkhead work.

There are three primary purposes for this notice. First, people who may be affected by activities in floodplains and wetlands and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Second, an adequate public notice program can be an important public education tool. Commenters are encouraged to offer alternative methods to serve the same project purpose, and methods to minimize and mitigate impacts. The dissemination of information and request for public comment about floodplains and wetlands can facilitate and enhance Federal efforts to reduce the risks associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the Federal government determines it will participate in actions taking place in floodplains and wetlands, it must inform those who may be put at greater or continued risk.

Written comments must be received by NJDEP on or before October 17, 2016, or fifteen (15) days from the actual date of publication, whichever is later. Written comments to this Notice can also be submitted to the NJDEP via (1) electronic submittal of comments to rbd-hudsonriver@dep.nj.gov, (2) mail to: Dennis Reinknecht, RBD Program Manager, Engineering and Construction, Office of Rebuild by Design, 501 East State Street, Mail Code 501-01A, P.O. Box 420, Trenton, NJ 08625-0420 or (3) submitted to the DCA website at http://www.nj.gov/dca/divisions/sandyrecovery/review/. In the alternative, comments may be submitted on paper to: Laura Shea, Assistant Commissioner, Sandy Recovery Division, New Jersey Department of Community Affairs, 101 South Broad Street, P.O . Box 800, Trenton, NJ 08625-0800. Documentation is also available for public review on the project's website at www.rbd-hudsonriver.nj.gov.

Dave Rosenblatt, Assistant Commissioner
New Jersey Department of Environmental Protection

APPENDIX C- WETLAND DELINEATION DATA FORMS



ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/5/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #1	**Transect:** Wetland A	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	80
Lythrum salicaria	FACW	H	20
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Laguardia artifactual coarse sandy loam, 0-3% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**

ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/5/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #1	**Transect:** Wetland B	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	80
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Laguardia artifactual coarse sandy loam, 0-3% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**

ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/5/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #2	**Transect:** Wetland C	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	70
Morella pennsylanica	FAC	S	15
Populus deltoides	FAC	T	15
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Laguardia artifactual coarse sandy loam, 0-3% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**

ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/5/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #7	**Transect:** Wetland D	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	60
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Laguardia artifactual coarse sandy loam, 0-3% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**

ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/9/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #3	**Transect:** Wetland E	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	30
Phalaris arundinacea	FACW	H	20
Baccharis halimifolia	FACW	S	5
Solidago sempervirens	FACW	H	3
Solidago rugosa	FAC	H	3
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Urban Land, wet substratum, 0-8% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**

ROUTINE METHOD WETLAND DATA FORM

Investigators: Chris Mullan, Gene McColligan, PWS		**Date**: 5/11/2016
Site Name: Hudson Bergen Light Rail	**Twp:** Hoboken	**County:** Hudson
Applicant: City of Hoboken		
Sample: Area #10	**Transect:** Wetland F	
Site Conditions: Disturbed Drainage Swale	**Weather:** Clear, 50 degrees F	

Vegetation-Cover Type

Species	Status	Stratum	% Cover
Phragmites australis	FACW	H	50
Solidago sempervirens	FACW	H	20
Results: Dominance Test is >50 percent. Therefore the vegetation is hydrophytic**.**			

Soils

Series Laguardia artifactual coarse sandy loam, 0-3% slopes		**Hydric Soil List:** N/A		**Histic: N/A**
Profile			**Alteration:**	
Horizon	**Depth**	**Chroma**	**Mottles**	**Texture**
A				
B				
Results: Soils at the surface exhibited wetland colors and were moist to the touch. Due to the potential for hazardous materials and extensive construction debris in the soils, soil borings were not taken. Therefore, two parameters were used to determine the presence or absence of wetlands (vegetation and hydrology).				

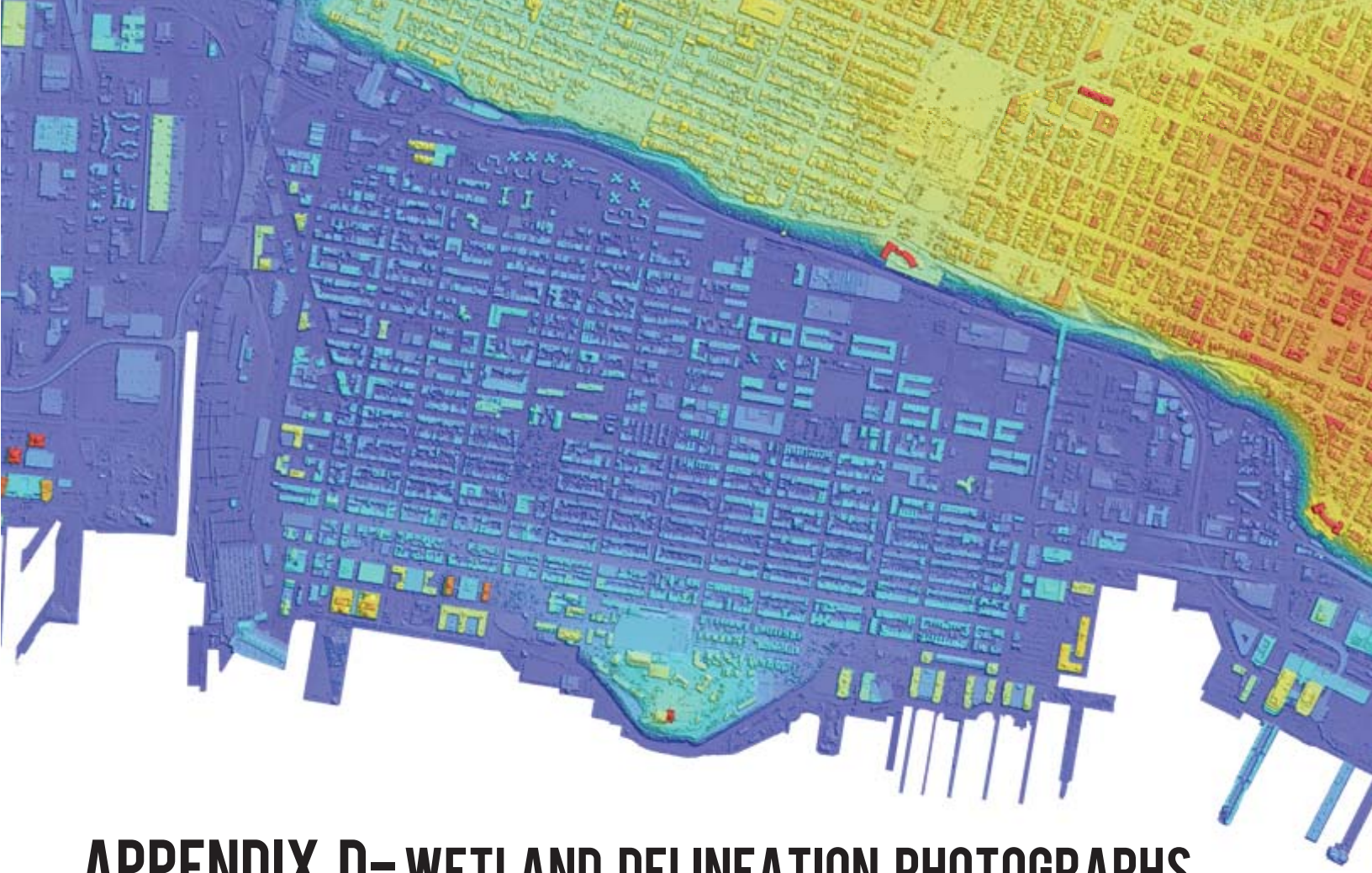
Hydrology

Surface inundation: Yes	**Saturation Depth**: N/A	**Evidence:** Surface Water
Wetland classification: Palustrine	**Hydrology type:** Surface Inundation	
Results: Wetland hydrology present. Evidence of surface water and saturation.		

Wetland Determination

Yes	**X**	**No**	

***- Note: Pursuant to NJAC 7:7-1.1 et seq, this data form comports with the requirements set forth in the 1989 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.**



APPENDIX D- WETLAND DELINEATION PHOTOGRAPHS

Appendix C
Natural Ecosystems Technical Environmental Study
Rebuild By Design: Resist, Delay, Store, Discharge Project
Cities of Hoboken, Weehawken, and Jersey City
Hudson County, New Jersey

Photograph 1: View facing south of Wetland A; located in Area 1.

Photograph 2: View facing south of Wetland B; located in Area 1.

Photograph 3: View facing west of Wetland C; located in Area 2.

Photograph 4: View facing south of Wetland E; located in Area 3.

Photograph 5: View facing west of Wetland D; located in Area 7.

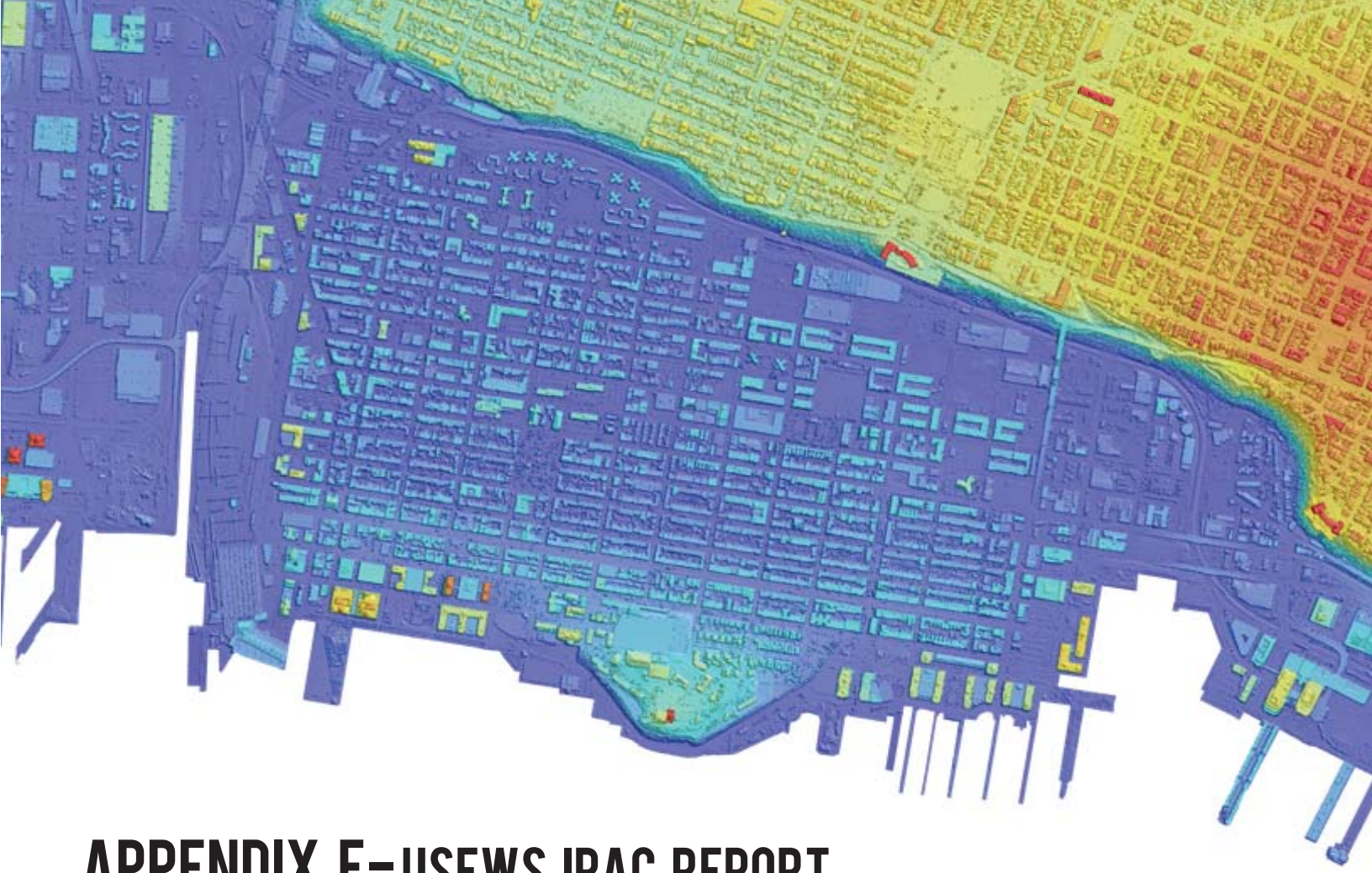
Photograph 6: Concrete swale and upland area located in Area 5.

Photograph 7: View facing west of concrete swale and upland area located in Area 8.

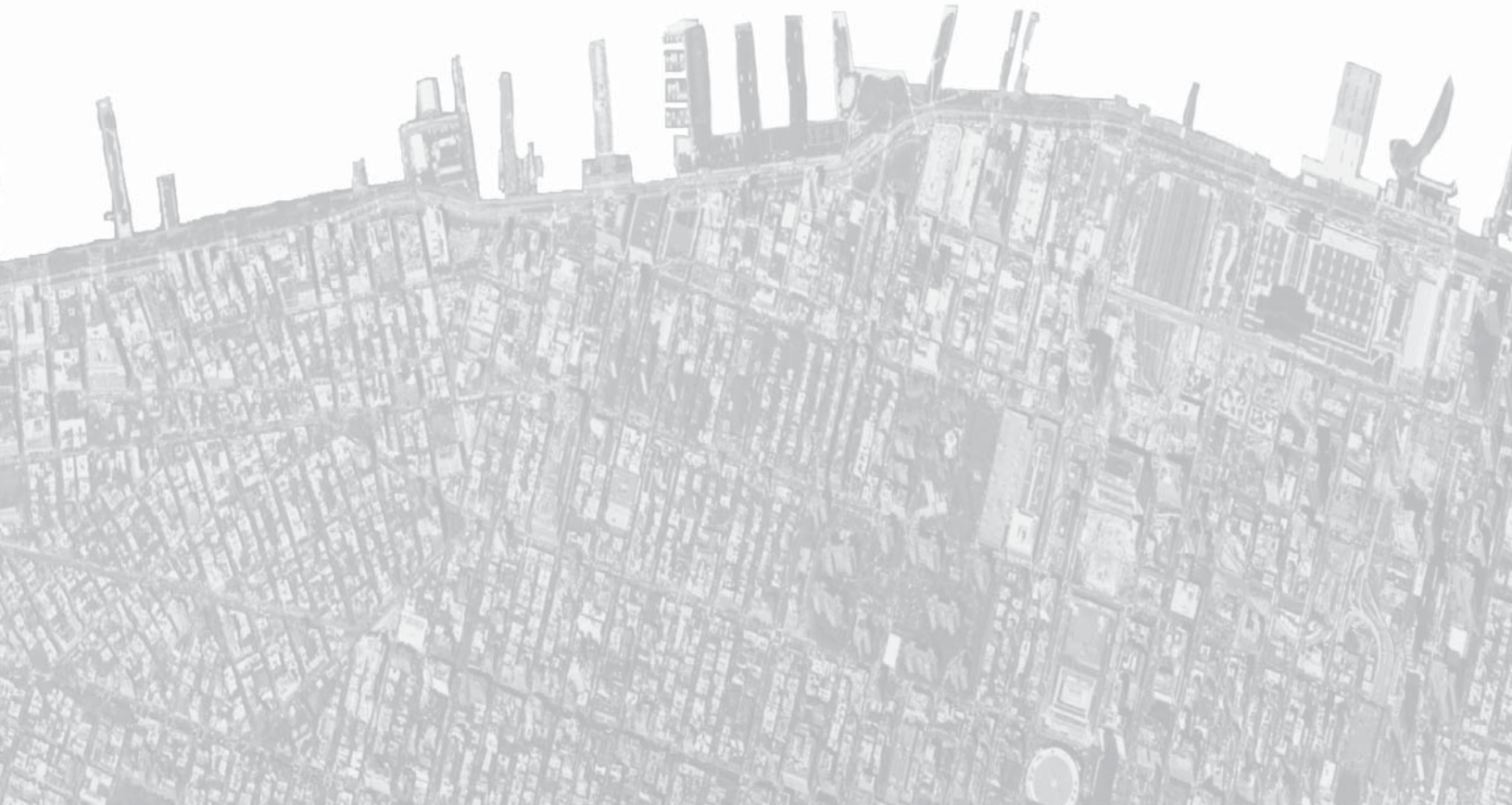
Photograph 8: View facing north of concrete swale and upland area located in Area 9.

Photograph 9: View facing east of Wetland F; located in Area 10. Wetland Line follows bulkhead/rocky shoreline.

Photograph 10: View facing east of Wetland F; located in Area 10. Note standing water present during site visit.



APPENDIX E–USFWS IPAC REPORT



Hudson River Project: Resist, Delay, Store, Discharge

IPaC Trust Resource Report

Generated July 14, 2015 01:17 PM MDT

US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

Hudson River Project: Resist, Delay, Store, Discharge

PROJECT CODE

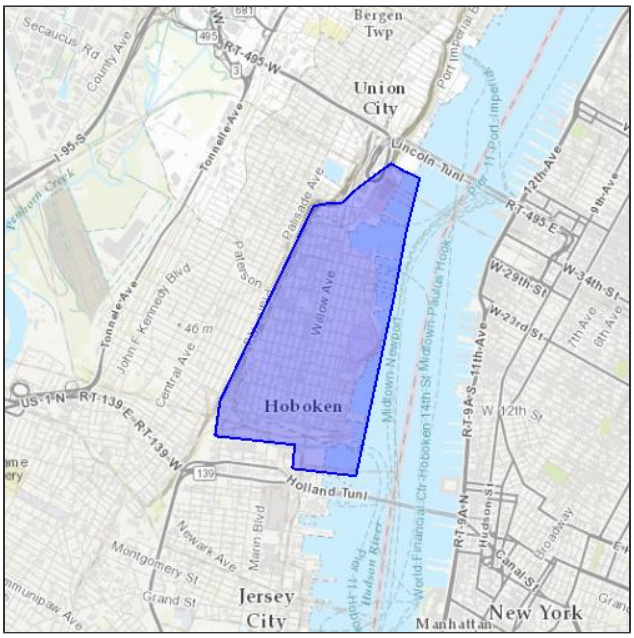
DOVM4-LPKEJ-ESFCY-ZU4QP-36XAOY

LOCATION

Hudson County, New Jersey

DESCRIPTION

Hoboken, Weehawken and Jersey City



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

New Jersey Ecological Services Field Office
927 North Main Street, Building D
Pleasantville, NJ 8232-1454
(609) 646-9310

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an Official Species List from the regulatory documents section.

There are no endangered species identified for this project area

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Oystercatcher Haematopus palliatus — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G8

American Bittern Botaurus lentiginosus — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F3

Bald Eagle Haliaeetus leucocephalus — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008

Black Skimmer Rynchops niger — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EO

Black Rail Laterallus jamaicensis — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09A

Black-billed Cuckoo Coccyzus erythropthalmus — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HI

Blue-winged Warbler Vermivora pinus — **Bird of conservation concern**
Season: Breeding

Canada Warbler Wilsonia canadensis — **Bird of conservation concern**
Season: Breeding

Cerulean Warbler Dendroica cerulea — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09I

Fox Sparrow Passerella iliaca — **Bird of conservation concern**
Season: Wintering

Golden-winged Warbler Vermivora chrysoptera — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G4

Gull-billed Tern Gelochelidon nilotica — **Bird of conservation concern**
Season: Breeding

Hudsonian Godwit Limosa haemastica — **Bird of conservation concern**
Season: Migrating

Kentucky Warbler Oporornis formosus — **Bird of conservation concern**
Season: Breeding

Least Bittern Ixobrychus exilis — **Bird of conservation concern**
Season: Breeding

Least Tern Sterna antillarum — **Bird of conservation concern**
Season: Breeding

Peregrine Falcon Falco peregrinus — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Pied-billed Grebe Podilymbus podiceps — **Bird of conservation concern**
Year-round

Prairie Warbler Dendroica discolor — **Bird of conservation concern**
Season: Breeding

Purple Sandpiper Calidris maritima — **Bird of conservation concern**
Season: Wintering

Red Knot Calidris canutus rufa — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DM

Rusty Blackbird Euphagus carolinus — **Bird of conservation concern**
Season: Wintering

Saltmarsh Sparrow Ammodramus caudacutus — **Bird of conservation concern**
Season: Breeding

Seaside Sparrow Ammodramus maritimus — **Bird of conservation concern**
Year-round

Short-eared Owl Asio flammeus — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD

Snowy Egret Egretta thula — **Bird of conservation concern**
Season: Breeding

Upland Sandpiper Bartramia longicauda — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HC

Wood Thrush Hylocichla mustelina — **Bird of conservation concern**
Season: Breeding

Worm Eating Warbler Helmitheros vermivorum — **Bird of conservation concern**
Season: Breeding

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to NWI wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

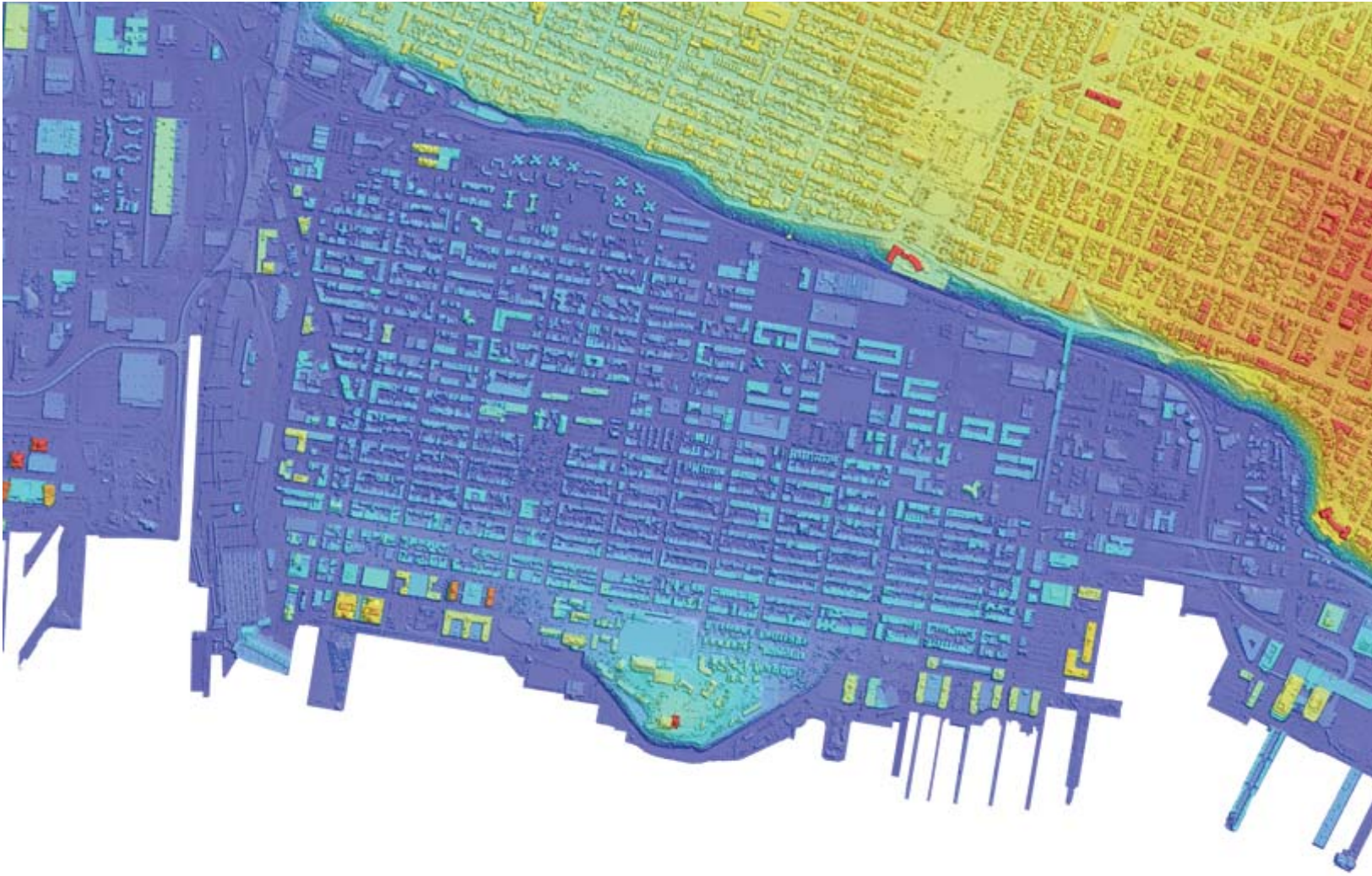
DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Wetland data is unavailable at this time.



Dewberry

State of New Jersey
Department of Environmental Protection

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