A. INTRODUCTION

This chapter examines the potential impacts from the proposed project on terrestrial and aquatic natural resources[1] and floodplains near the project site (see Chapter 1, "Project Description"). The project site is an approximately 9.9-acre waterfront parcel and a 1.3-acre upland parcel along the East River, between Grand Street and South 5th Street, in Williamsburg, Brooklyn. It is generally bounded by Grand Street to the north, Kent and Wythe Avenues to the east, the East River to the west, and South 5th Street to the south (see Figure 1-1 in Chapter 1, "Project Description").

This chapter describes:

- The regulatory programs that protect floodplains, wildlife, threatened or endangered species, aquatic resources, or other natural resources within the project site;
- The current condition of the floodplain and natural resources within the project site, including water and sediment quality, and biological resources, including aquatic biota, terrestrial biota, and threatened or endangered species and species of special concern;
- The floodplain, water quality, and natural resources conditions in the future without the proposed project;
- The potential impacts of the proposed project on the floodplain, water quality, and natural resources; and
- The measures that would be developed, as necessary, to mitigate and/or reduce any of the proposed project's potential significant adverse effects on natural resources and floodplains.

PRINCIPAL CONCLUSIONS

The proposed project would not cause any significant adverse environmental impacts on terrestrial plant communities or wildlife, or on floodplains, wetlands, water quality, or aquatic biota in the East River. The construction of in-water project elements (i.e., stone riprap aprons associated with the two stormwater outfalls, new sheet pile bulkhead, and new piles for the replacement overwater platform), would adversely affect New York State Department of Environmental Conservation (NYSDEC)-designated littoral zone tidal wetlands and aquatic biota through the loss of aquatic habitat and possibly some benthic invertebrate individuals. However, these adverse impacts would be minimal and would be offset by the restoration of aquatic habitat achieved through the removal of piles for the existing overwater platform, and

[1] Natural resources are defined as "plant and animal species and any area capable of providing habitat for plant and animal species or capable of functioning to support ecological systems and maintain the City's environmental balance" (*City Environmental Quality Review (CEQR) Manual*, City of New York, 2001).

bottom material between the Mean High Water (MHW) elevation, as well as the new landward location of the sheet pile bulkhead.

The construction of the two stone riprap aprons to be located below the stormwater outfalls at the western terminus of South 3rd and South 2nd Streets would result in the removal of approximately 142 cubic yards (cy) of bottom material within an approximately 1,275-square-foot area (0.03 acres), and replacement with an equal volume of stone riprap to generally match the existing bottom profile. The proposed installation of new sheet piling and backfill within the project site would adversely affect approximately 414 square feet (sf), or 0.01 acres, of NYSDEC designated shaded littoral zone tidal wetlands and their use as aquatic habitat. Driving of piles to support the reconstructed overwater platform would result in the permanent loss of approximately 1,205 sf (0.03 acres) of benthic habitat. The temporary loss of aquatic habitat within the area of disturbance for the stone riprap aprons, the permanent loss of a small amount of shaded aquatic habitat within the area of disturbance for the new sheet piling and piles, the loss of some benthic macroinvertebrates within the area of disturbance for these in-water structures, and the loss of open water habitat that would become unavailable with the installation of the new sheet piling north of South 2nd Street would not be expected to result in significant adverse impacts to NYSDEC littoral zone tidal wetlands and populations of aquatic species using shaded habitats within the East River.

Encrusting organisms and benthic macroinvertebrates would be expected to quickly colonize the newly placed stone material comprising the riprap aprons for the stormwater outfalls. The proposed stone riprap for the outfall aprons may benefit aquatic resources by increasing the diversity of aquatic habitat for benthic macroinvertebrates and fish available within the project site. The minimal loss of shaded littoral zone tidal wetland and aquatic habitat due to the construction of the new sheet pile bulkhead would be offset through the restoration of at least an equal area of shaded aquatic habitat expected to include littoral zone wetlands. Restoration would be achieved through removal of upland material between the existing mean high water (MHW) elevation and the new sheet pile bulkhead location for portions of the shoreline south of South 2nd Street. The permanent loss of aquatic habitat within the footprints of the new piles would be offset through the restoration of a greater area of aquatic habitat achieved by removing or cutting the existing piles at the mudline, resulting in a net increase of 375 sf of aquatic habitat. Additionally, by reducing the number of piles and increasing the pile spacing, the proposed reconstruction of the overwater platform would also result in an increase in open-water habitat available under the platform and improved circulation under the overwater platform, which may result in some improvement to water quality under the platform.

Potential benefits to natural resources that would result from the proposed project include improved habitat for birds and other wildlife within the waterfront park and other open space areas. In addition, the proposed project's approximately four acres of open space would substantially increase the amount of pervious surface on the project site, thereby decreasing the rate of stormwater discharge from the project site. Stormwater best management measures implemented as part of the proposed project would result in improved quality of stormwater discharged from the project site, and minimize the potential for adverse impacts to aquatic resources of the East River from the discharge of stormwater.

The western portion of the project site is within the 100-year floodplain. Portions of the existing overwater platform in the southern part of the project site, and some upland area, are within the 100-year floodplain. Most of the upland area within the 100-year floodplain would comprise the open space area proposed between South 2nd and South 3rd Streets, and the waterfront

esplanade. Clean fill may be placed over portions of the project site designated for the open space area adjacent to the esplanade or other open space areas that would not be covered by impervious surface or structures. The possible placement of clean fill within the open space areas and reconstruction of the overwater platform would not exacerbate flooding conditions near the project site. The floodplain within and adjacent to the project site is affected by coastal flooding. Unlike fluvial flooding, which is affected by activities within the floodplain of a river, coastal flooding is influenced by tidal and meteorological forces and is not affected by activities within the floodplain. Therefore, the use of a portion of the 100-year floodplain for open space areas would not adversely affect flooding of areas adjacent to the project site.

The top of the reconstructed overwater platform would be 1 foot above the current 100-year flood elevation and would be above the New York City Panel on Climate Change (NPCC) projected increased 100-year flood elevation in the 2020s. The elevation of the lowest floor of the proposed buildings would be about 11 feet above the current 100-year flood elevation and would be well above the NPCC projected increased 100-year flood elevation in the 2020s. Therefore, the design for these structures would minimize the potential for public and private losses due to flood damage under current and projected flood conditions.

B. METHODOLOGY

OVERVIEW

Because the proposed project would not affect the surrounding terrestrial resources or the floodplain either directly or indirectly during construction or operation of the proposed project, the study area is limited to the boundaries of the project site and the immediate vicinity. An exception was made for the identification of threatened or endangered species, which were evaluated for a distance of at least 0.5 miles from the project site. The study area for water quality and aquatic resources included the overall aquatic resources within the East River and the East River waterfront portion of the project site. The proposed project would be completed and occupied by 2020.

EXISTING CONDITIONS

Existing conditions for floodplain, water quality, and natural resources within the study area were summarized from:

- Existing information identified in literature and obtained from governmental and non-governmental agencies, such as the New York City Department of Environmental Protection (DEP) Harbor Water Quality Survey (DEP 2007a and b) and *East River and Open Waters Waterbody/Watershed Facility Plan Report* (DEP 2007c); U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps and federally listed threatened or endangered species for Kings County, New York; U.S. Environmental Protection Agency (EPA) National Sediment Quality Survey Database, 1980-1999 (EPA 2001); New York/New Jersey Harbor Estuary Program; EPA Regional Environmental Monitoring and Assessment Program (R-EMAP); Federal Emergency Management Agency (FEMA) flood insurance rate maps; and U.S. Army Corps of Engineers (USACE) studies conducted as part of the New York and New Jersey Harbor Navigation Project.
- On-site observations.

- Responses to requests for information on rare, threatened, or endangered species in the vicinity of the project site. These requests were submitted to the National Marine Fisheries Service (NMFS) and the New York Natural Heritage Program (NYNHP), a joint venture of the NYSDEC and The Nature Conservancy (TNC). NYSDEC maintains the NYNHP files. The NYNHP database is updated continuously to incorporate new records and changes in the status of rare plants or animals. In addition to the state program, the USFWS maintains information for federally listed threatened or endangered freshwater and terrestrial plants and animals, and the NMFS does the same for federally listed threatened or endangered marine organisms.

THE FUTURE WITHOUT THE PROPOSED PROJECT

FLOODPLAINS, GEOLOGIC CONDITIONS, GROUNDWATER, AND TERRESTRIAL RESOURCES

In the future without the proposed project, the project site, which comprises the study area for the groundwater, floodplains, and terrestrial resources, would be developed with uses permitted under the existing M3-1 zoning (see Chapter 2, "Analytical Framework"). The Refinery and the boiler house would remain as vacant buildings. The rest of the buildings on the project site would be demolished. The portion of the project site west of Kent Avenue, between South 3rd and South 5th Streets, would be developed as a storage facility. The portion of the project site west of Kent Avenue and between South 2nd and South 1st Streets would be developed as a building material storage yard. A new distribution facility would be located immediately south of Grand Ferry Park and north of the building material storage yard. The upland portion of the project site east of Kent Avenue would be developed with a two-story building to be used as a catering hall/restaurant on the upper floor, and parking on the ground floor.

WATER QUALITY AND AQUATIC RESOURCES

The assessment of water quality and aquatic resources for the future without the proposed project considered ongoing and proposed projects in the vicinity of the project site, including:

- Water quality and sediment quality improvements expected to occur as a result of regional and local programs;
- Habitat enhancement or restoration activities associated with the New York/New Jersey Harbor Estuary Program (HEP) or Hudson-Raritan Estuary Ecosystem Restoration Project (HRE);
- Water quality improvements in the East River resulting from New York City projects. These include the implementation of the East River and Open Waters Waterbody/Watershed Facility Plan developed as part of the Citywide Long Term Control Plan (LTCP) to address combined sewer overflow (CSO) discharges, in compliance with the EPA's CSO Control Policy and as specified in the Consent Order signed by NYSDEC and New York City in 2005 (NYSDEC Case No. CO2-20000107-8).
- Landside (sewer system) modeling (see Appendix D1), using the InfoWorks hydraulic model, discussed in detail below under "Future With the Proposed Project." Under the future condition without the proposed project, the InfoWorks model was adjusted to account for expected increases in flow rates from the current (2007) rates determined on the basis of

planning-level population and water use projections made by the New York City Department of City Planning (DCP).[1] Using these values, and the projected incremental increases to sanitary flow associated with the Greenpoint-Williamsburg rezoning project anticipated for buildout by 2013, the projected average dry-weather (sanitary) sewage flow rate in the future without the proposed project is approximately 235 million gallons per day (mgd) for the entire Newtown Creek Water Pollution Control Plant (WPCP) drainage area, and approximately 92 mgd for the Brooklyn sewershed for the Newtown Creek WPCP[2] (i.e., Newtown Creek Brooklyn sewershed).

- Analyses conducted to assess potential impacts on water quality of the East River and Newtown Creek in the future without the project due to projected increases in sanitary sewage (dry weather) discharges to the Newtown Creek Brooklyn sewershed, and from CSOs within the Newtown Creek Brooklyn sewershed, as evaluated in the landside modeling. These analyses are discussed in detail below under "Future With the Proposed Project."

Within the project site, the existing overwater platform would remain in its current condition. No substantial infrastructure changes would be required for the as-of-right developments within the project site.

THE FUTURE WITH THE PROPOSED PROJECT

With the proposed project, stormwater discharged to the East River could affect the East River's water quality and aquatic habitats. Specifically, additional discharges to the combined sewer system generated by the proposed project have the potential to affect pollutant loadings to the East River from CSOs and, consequently, water quality and aquatic habitats of the East River, and are considered in the context of the LTCP and other requirements of the 2005 Consent Order to control pollutant discharges from CSOs.

Potential impacts on the floodplain, wetlands, aquatic, and terrestrial resources from the proposed project were assessed by considering the following:

- The existing water quality and natural resources of the East River in the vicinity of the project site.
- The potential for construction of in-water components, such as shoreline modifications (i.e., removal of piles for the existing waterfront platform, installation of a new sheet pile bulkhead, reconstruction of the pile-supported platform within the current footprint, and construction of the two stormwater outfall riprap aprons), to result in temporary impacts to water quality and aquatic organisms. These potential impacts may include:
  - Temporary increases in suspended sediment and release of contaminants during sediment disturbance; and
  - Temporary loss of fish breeding, nursery, or foraging habitat, or Essential Fish Habitat (EFH) identified by the NMFS, from temporary water quality changes.

[1] "Population Projections for NYC Neighborhoods: 2010 and 2030," prepared by DCP for the Mayor's Strategic Planning Initiative, presented 11/16/2005 and distributed by Angela Sung, Office of the Deputy Mayor for Economic Development and Rebuilding, on November 18, 2005.

[2] Brooklyn sewershed represents approximately 39 percent of the total flow to the Newtown Creek WPCP.

- Temporary impacts on water quality and aquatic biota from the discharge of stormwater during construction of the upland components of the proposed project.
- Temporary impacts on water quality and aquatic biota from the possible discharge of groundwater recovered during dewatering.
- Temporary impacts on terrestrial resources associated with land clearing, grading, and other upland activities associated with construction of the proposed project.
- Results of analyses conducted to assess the potential effects on the municipal combined sewer system and Newtown Creek WPCP, and to the East River and Newtown Creek and its tributaries from the discharge of sanitary sewage generated by the proposed project, and to the East River from the discharge of stormwater through a separate storm sewer developed on the project site. These analyses included the following:
  - Results of landside (sewer system) modeling, using the InfoWorks hydraulic model, conducted to assess the potential effects on the municipal combined sewer system and Newtown Creek WPCP from the discharge of sanitary sewage generated by the proposed project (see Appendix D1). The InfoWorks hydraulic model includes components for hydrology (rainfall-runoff) and hydraulics (pipe flow), and was used to determine runoff flows, water surface elevations, and flows within sewers. For hydrology, InfoWorks uses recorded rainfall information.[1] Sewer conditions were evaluated for CSOs. The results of the model simulations were used to estimate the total annual overflow volumes and frequencies by CSO outfall in the Newtown Creek Brooklyn sewershed, where the project site is located, for the Build year with and without the proposed project. The analysis evaluated potential impacts on the Newtown Creek WPCP from increased sewage flow resulting from the proposed project, from the DEP projection of a future dry weather sewage flow of approximately 92 mgd in the Build year without the proposed project, and a separate stormwater system in place within the project site. The separate stormwater system that would be developed as part of the proposed project would divert an estimated 3.1 million gallons of stormwater from the combined sewer system[2] per year. This volume of stormwater would be directed to a separate stormwater management system that comprises catch basins, stormwater best management practices (BMPs), storm sewers, and new stormwater outfalls to the East River.
  - Results of water quality modeling conducted using the Newtown Creek Model (NCM) to assess potential impacts on water quality (i.e., incremental change) of the East River and Newtown Creek from additional sewage flow to the Newtown Creek WPCP and from CSOs within the Brooklyn sewershed for the Newtown Creek WPCP (see Appendix D2). The NCM model is a hydrodynamic/eutrophication model developed as part of the DEP CS0 LTCP that encompasses Newtown Creek and a portion of the East River. NCM's hydrodynamic capabilities enable it to determine the circulation of water throughout the model region by incorporating the effects of tidal interactions and freshwater inputs from WPCPs, CSOs, storm sewers, and natural tributaries. NCM's water-quality capabilities allow it to project the additional effects of chemical and

[1] DEP has adopted the calendar year 1988 hourly precipitation measured at JFK Airport as the "standard" rainfall record associated with average hydraulic/CSO conditions, for use in hydrologic modeling conducted for various DEP projects (e.g., CSO Long Term Control Plan).

[2] Rooftop runoff collected from about 0.85 acres of the project site.

biological processes on concentrations of dissolved oxygen, phytoplankton, nutrients, pathogens and other pollutants. Using the pollutant discharge information projected by the InfoWorks landside modeling, the NCM was used to determine the potential impacts of the incremental changes in pollutant loads attributable to CSOs (sanitary and stormwater fractions), stormwater discharges, and Newtown Creek WPCP, on water quality in the receiving waters of Newtown Creek and the East River under the 2007 existing, and the future without the proposed project ("No Action") and future with the proposed project conditions. Parameters of concern evaluated in the NCM included: dissolved oxygen (DO), an indicator pathogen (i.e., *Enterococci*), nutrients (i.e., total nitrogen and phosphorous), and selected metals (i.e., copper, lead, and zinc). The projected pollutant loadings for these parameters from CSOs were based on DEP-reported pollutant concentrations in the influent to the WPCP, and the historical concentrations of these same pollutants in stormwater. Simulations for all parameters used a standardized rainfall condition, which is the base year for DEP's Use and Standards Attainment and the LTCP projects for all of New York City. It has also been used as the base year for the Long Island Sound total maximum daily loads (TMDLs) and for New York Harbor nutrient and pathogen TMDLs. For all parameters of concern, the project-induced incremental changes in water quality were then assessed relative to the existing water-quality conditions, as measured in ambient sampling studies[1] to determine whether the changes are significant.

- Projected sea level rise due to climate change.
- Potential long-term beneficial impacts on plants and wildlife from the proposed landscaping within the proposed public open space areas developed within the project site.

C. REGULATORY CONTEXT

In-water activities associated with the proposed project—such as pile driving and removal, and construction of the replacement waterfront platform, construction of stormwater outfall riprap aprons, discharge of stormwater, and activities within the New York State Coastal Zone—must comply with federal and state legislation and regulatory programs that pertain to activities in coastal areas, surface waters, floodplains, wetlands, and the protection of species of special concern.

FEDERAL

CLEAN WATER ACT (33 USC §§ 1251 TO 1387)

The objective of the Clean Water Act, 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, the discharge of dredged or fill material into navigable waters and other waters; and non-point source pollution, such as runoff from streets,

[1] Existing water quality data included results of the DEP Harbor Survey and other special studies at locations in the East River and Newtown Creek, and metals concentrations collected in the vicinity of the project site as part of the EPA sampling program in 1991 (the most recent extensive study of heavy metals).

agricultural fields, construction sites, and mining that enter water bodies from other than the end of a pipe.

Under Section 401 of the Act, 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 Clean Water Act. Applicants for discharges to navigable waters in New York must obtain a Water Quality Certification from NYSDEC.

Section 404 of the Act requires authorization from the Secretary of the Army, acting through USACE, for the permanent or temporary discharge of dredged or fill material into navigable waters and other waters of the United States. Waters of the United States is defined in 33 CFR 328.3 and includes wetlands, mudflats, and sandflats that meet the specified requirements, in addition to streams and rivers that meet the specified requirements. Activities authorized under Section 404 must comply with Section 401 of the Act.

RIVERS AND HARBORS ACT OF 1899

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through USACE, for the construction of any structure in or over any navigable water 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. The purpose of this Act is to protect navigation and navigable channels. Any structures placed in or over navigable waters, such as pilings, piers, or bridge abutments up to the mean high water line, are regulated pursuant to this Act.

MAGNUSON-STEVENS ACT (16 USC §§ 1801 TO 1883)

Section 305(b)(2)-(4) of the Magnuson-Stevens 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 EFH. EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC §1802(10)).

Adverse impacts on EFH, as defined in 50 CFR 600.910(A), include any impact that reduces the quality and/or quantity of EFH. Adverse impacts may include:

- Direct impacts, such as physical disruption or the release of contaminants;
- Indirect impacts, such as the loss of prey or reduction in the fecundity (number of offspring produced) of a managed species; and
- Site-specific or habitat-wide impacts that may include individual, cumulative, or synergetic consequences of a federal action.

ENDANGERED SPECIES ACT OF 1973 (16 USC §§ 1531 TO 1544)

The Endangered Species Act 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 Act prohibits the importation, exportation, taking, possession, and other activities involving illegally taken species covered under the Act, and interstate or foreign

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

FISH AND WILDLIFE COORDINATION ACT (PL 85-624; 16 USC 661-667D)

The Fish and Wildlife Coordination Act entrusts the Secretary of the Interior with providing assistance to, and cooperation with, federal, state, and public or private agencies and organizations to ensure that wildlife conservation receives equal consideration and coordination with other water-resource development programs. These programs can include the control (such as a diversion), modification (such as channel deepening), or impoundment (dam) of a body of water.

NEW YORK

PROTECTION OF WATERS, ARTICLE 15, TITLE 5, ECL, IMPLEMENTING REGULATIONS 6 NYCRR PART 608.

NYSDEC is responsible for administering the Protection of Waters Act and regulations to govern activities on surface waters (rivers, streams, lakes, and ponds). The Protection of Waters Permit Program regulates five different categories of activities: disturbance of stream beds or banks of a protected stream or other watercourse; construction, reconstruction, or repair of dams and other impoundment structures; construction, reconstruction, or expansion of docking and mooring facilities; excavation or placement of fill in navigable waters and their adjacent and contiguous wetlands; and Water Quality Certification for placing fill or other activities that result in a discharge to waters of the United States in accordance with Section 401 of the Clean Water Act.

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM (SPDES) (N.Y. ENVIRONMENTAL CONSERVATION LAW [ECL] ARTICLE 3, TITLE 3; ARTICLE 15; ARTICLE 17, TITLES 3, 5, 7, AND 8; ARTICLE 21; ARTICLE 70, TITLE 1; ARTICLE 71, TITLE 19; IMPLEMENTING REGULATIONS 6 NYCRR ARTICLES 2 AND 3)

Title 8 of Article 17, ECL, Water Pollution Control, authorized the creation of the State Pollutant Discharge Elimination System (SPDES) to regulate discharges to New York State's waters. Activities requiring an SPDES permit include point source discharges of wastewater into surface or groundwaters of the state, including the intake and discharge of water for cooling purposes, constructing or operating a disposal system (sewage treatment plant), discharge of stormwater, and construction activities that disturb 1 or more acres.

TIDAL WETLANDS ACT, ARTICLE 25, ECL, IMPLEMENTING REGULATIONS 6 NYCRR PART 661.

Tidal wetlands regulations apply anywhere tidal inundation occurs on a daily, monthly, or intermittent basis. In New York, tidal wetlands occur along the tidal waters of the Hudson River up to the salt line and along the saltwater shore, bays, inlets, canals, and estuaries of Long Island, New York City, and Westchester County. NYSDEC administers the tidal wetlands regulatory program and the mapping of the state's tidal wetlands. A permit is required for almost any activity that would alter wetlands or the adjacent areas (up to 300 feet inland from wetland boundary or up to 150 feet inland within New York City).

ENDANGERED AND THREATENED SPECIES OF FISH AND WILDLIFE; SPECIES OF SPECIAL CONCERN (ECL, SECTIONS 11-0535[1]-[2], 11-0536[2], [4], IMPLEMENTING REGULATIONS 6 NYCRR PART 182)

The Endangered and Threatened Species of Fish and Wildlife, Species of Special Concern Regulations prohibit the taking, import, transport, possession, or selling of any endangered or threatened species of fish or wildlife, or any hide, or other part of these species as listed in 6 NYCRR §182.6.

D. EXISTING CONDITIONS

This section describes existing natural resource conditions within the terrestrial and water quality and aquatic resources study areas.

GEOLOGICAL CONDITIONS

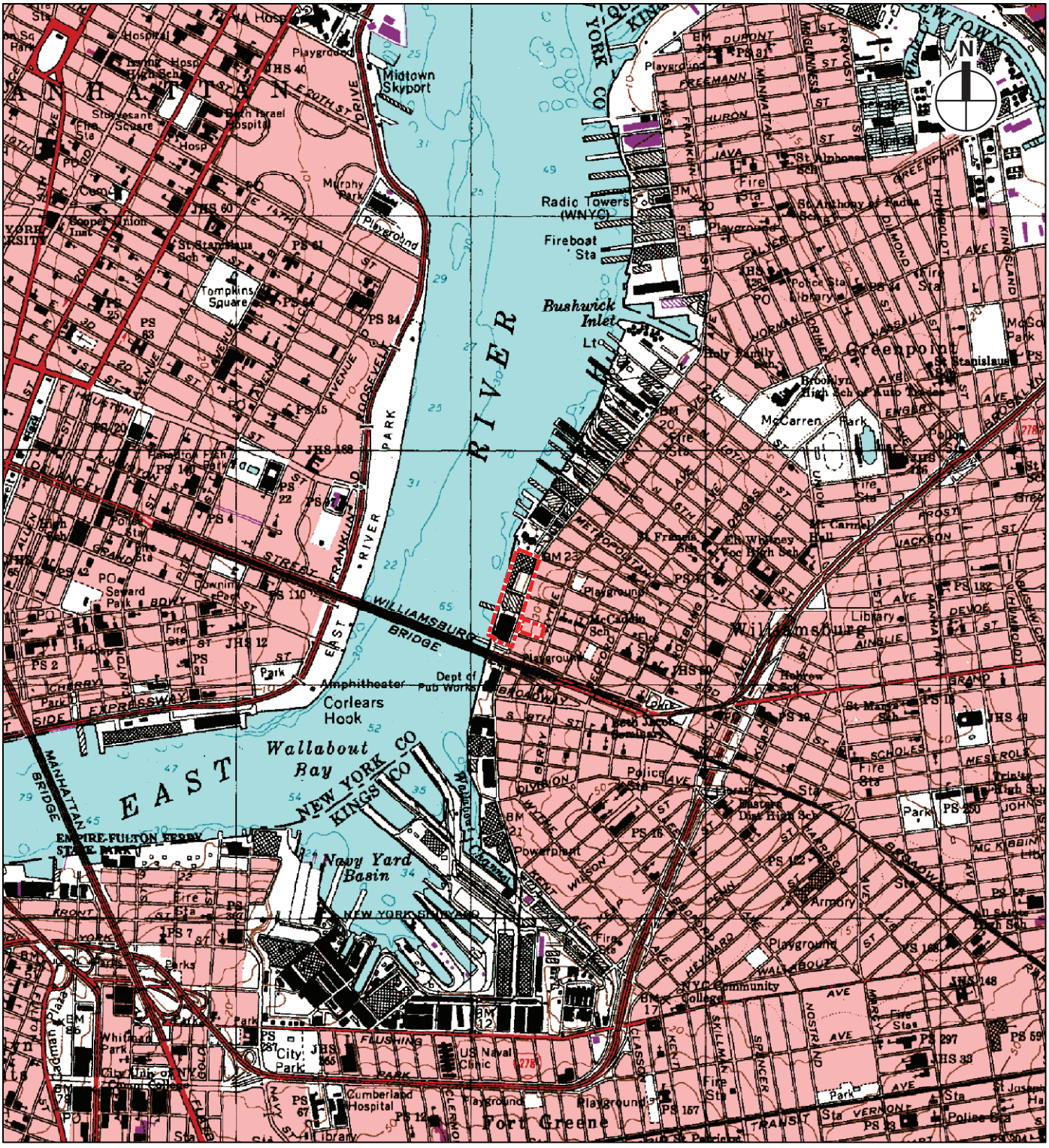
On the basis of the U.S. Geological Survey (USGS) topographic map, Brooklyn quadrangle (see Figure 11-1), topography of the project site slopes gently to the west-northwest, from an elevation of about 30 feet above mean sea level (MSL) to about 10 feet above MSL at the East River. Bedrock, composed of granitic gneiss, is reported to range from 50 to 90 feet below the ground surface (Dames and Moore 1991 in EHI 2004). Subsurface investigations performed by Mueser Rutledge Consulting Engineers (MRCE) in 2005 and 2008 indicate that top of bedrock is in excess of 150 feet below the ground surface in some portions of the project site. The varying depth to bedrock is attributable to the differences of surface elevation and erosion of the bedrock surface. Overlying bedrock are unconsolidated deposits of stratified and interbedded layers of clay and fine-to-course sands and gravel of the Upper Glacial Formation (EHI 2004).

Miscellaneous fill material, comprising medium-to-fine sand and silty sand with concrete, brick, wood, and other debris, is present throughout the project site to a depth of up to 30 feet below grade (EHI 2004). As discussed in Chapter 12, "Hazardous Materials," due to the potential of contaminants in fill material in urban settings, the site was identified as a potential environmental concern during redevelopment. Subsurface investigations (soil and ground water sampling) of the project site were conducted by Nova Consulting and Engineering in 2004 (Nova Consulting and Engineering 2004a and b). Analysis of soil samples for volatile organic compounds (VOCs) detected low concentrations well below NYSDEC Recommended Soil Cleanup Objectives (RSCOs). VOCs detected within the project site included acetone, benzene, Freon, toluene, and 1,2,4-trimethylbenzene. Analysis of soil samples for semivolatile organic compounds (SVOCs) detected concentrations of benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and phenanthrene above NYSDEC RSCOs. Three metals, cadmium, chromium, and mercury, were detected in shallow soil samples throughout the project site at concentrations slightly above NYSDEC RSCOs. The SVOCs and metals detected within the project site were attributed to the presence of historic fill material.

GROUNDWATER

The project site is within the area designated for the Brooklyn Queens Sole Source Aquifer. However, groundwater is not used as a potable water supply in this part of Brooklyn and non-potable use is limited. Potable water in Brooklyn is provided by New York City's public water supply, which comprises a system of upstate reservoirs. During subsurface investigations conducted within the project site, groundwater was encountered between 6 and 24 feet below

8.1.08



Latitude: 73o 58' 36" W Longitude: 40o 42' 52.73" N

USGS 7.5 Minute Topographic Map - Brooklyn Quad

Figure 11-1

grade (Nova Consulting and Engineering 2004a and b) and is anticipated to flow west toward the East River. MRCE subsurface investigations conducted in 2005 encountered groundwater at elevations of 2 to 4 feet above MSL, with the lower elevations occurring near the East River. No significant levels of contaminants were detected in a groundwater sample collected within the project site. Only one VOC (trichloroethylene) and two SVOCs (Bis(2-chloroethylhexyl)phthalate and Di-n-Butyl Phthalate) were detected in groundwater samples collected within the project site. Their concentrations were below the NYSDEC Class GA Ambient Water Quality Standards (drinking water standards) (Nova Consulting and Engineering 2004b).

Two underground storage tanks (UST) were present within the project site for the storage of No. 6 fuel oil (see Chapter 12, "Hazardous Materials"). As required by NYSDEC for Major Oil Storage Facilities (MOSF, facilities with the capacity to store greater than 400,000 gallons of petroleum), annual groundwater monitoring from four wells was conducted at the project site, starting in about 1991, and no contaminants were detected (EHI 2004).

As described in Chapter 12, "Hazardous Materials," laboratory analysis of additional groundwater samples collected during additional sampling in November 2008 detected Methyl ethyl ketone (MEK) at a concentration that exceeded the NYSDEC Class GA Ambient Water Quality Standards at a sampling location located near the northern end of the project site. Cis 1,2-dichloroethylene (DCE), tetrachloroethene (PCE) and trichloroethene (TCE) were detected at concentrations that exceeded the Class GA standard at a sampling location located at a parking lot upgradiant of the industrial complex. The absence of these VOCs in soil in the vicinity of the wells, and their location suggest these compounds are likely attributable to regional groundwater quality, i.e., affected by past industrial/manufacturing operations in the area.

The SVOCs 4-methylphenol, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl) phthalate, chrysene, and ideno(1,2,3-cd)pyrene were detected at concentrations exceeding their respective Class GA standard in groundwater samples collected from three sampling locations. These compounds were detected in the fill materials, and small amounts of fill material can become entrained in the samples, which are not filtered, when agitated by the sampling process. Detected SVOCs may also be attributable to general groundwater quality in the area, which has a history of manufacturing. The SVOC compounds and concentrations detected in groundwater at SB-7 were consistent with the site-wide groundwater quality indicating that the detections are associated with fill material and/or general groundwater quality in the area.

Thirteen metals were detected at concentrations above Class GA standards in the total (unfiltered) groundwater samples. In the filtered samples (dissolved metals analysis), only iron, magnesium, manganese, and sodium were detected above their respective Class GA standards. These results suggest that most of the detections in the total metals analyses are due to suspended sediments in the samples. Since the site is in an area that may be tidally influenced, the magnesium, manganese and sodium detected above Class GA standards in the dissolved metals analyses (filtered samples) are likely attributable to the presence of brackish water. The remaining dissolved metals detected were below the Class GA standards and are typical of groundwater quality in New York City.

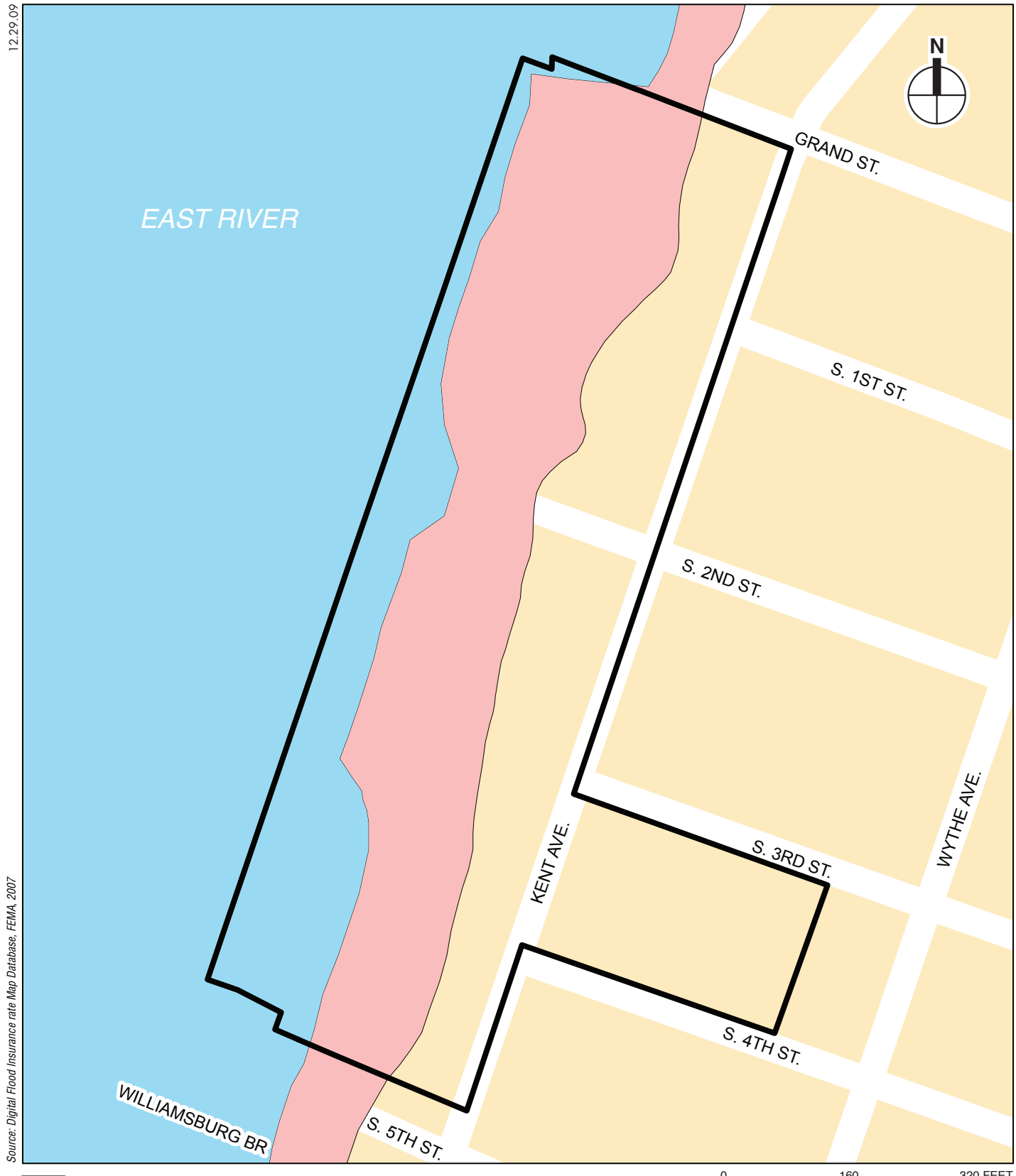
FLOODPLAINS AND WETLANDS

The project site is located within three different flood zones (see Figure 11-2). In general, the westernmost portion of the project site nearest the East River is located within the 100-year floodplain (Zone AE), defined as a high risk area (with a 1 percent chance of flooding each year). Adjacent to that zone, the central portion of the project site is located within the 500-year floodplain (Zone X Shaded), defined as a moderate risk area (with a 0.2 percent chance of flooding each year). The easternmost portion of the project site is located outside of the 500-year flood plain (Zone X Unshaded), defined as a low risk area, outside the 500-year floodplain. Portions of the existing overwater platform and some upland area are within the 100-year floodplain. The 100-year flood elevation is 10 feet above National Geodetic Vertical Datum (NGVD), which approximates mean sea level, or elevation +7.5 Brooklyn Borough Highway Datum. The height of the existing platform at the southern portion of the project site is at elevation +9 NGVD (+6.5 Brooklyn Borough Highway Datum), which is 1 foot below the 100-year flood elevation. The height of the overwater platform in the northern portion of the project site is at elevation +11 NGVD (+8.5 Brooklyn Borough Highway Datum) which is 1 foot above the 100-year flood elevation.

Currently, the majority of stormwater runoff generated within the project site is discharged directly to the East River by overland flow. Approximately 0.85 acres of the project site discharges stormwater runoff (i.e., rooftop runoff) to the combined sewer. Under existing conditions, approximately 3.1 million gallons per year of stormwater runoff are discharged from the project site to the combined sewer.

An approximately 1,265-foot-long pile-supported overwater platform extends the full length of the project site. The width of the platform ranges from 45 feet at the northern end of the project site to about 100 feet at the southern end. The overwater platform generally consists of a 10-inch-thick, reinforced concrete deck spanning timber pile caps supported on timber piles. Bent spacing (i.e., the distance between rows of piles perpendicular to the river) south of South 2nd Street is approximately 10 feet, and north of South 2nd Street is 11 feet on center. Pile spacing within bents is approximately 5 feet on center. Beneath the platform, the shoreline is engineered from south of South 2nd Street to the northern project site boundary with a concrete retaining wall supported on timber piles. Vertical timber sheeting exists below the outboard edge of the retaining wall from north of South 2nd Street to the southern project site boundary. A rock-filled timber crib structure, faced with vertical timber sheeting or horizontal timbers is present on the project site from south of South 2nd Street to South 5th Street and exhibits an increasing degree of deterioration from about midway between South 2nd and South 3rd Streets to South 5th Street. The crib structure south of South 4th Street has completely deteriorated and only remnants of the vertical timber sheeting are visible. The MHW elevation from about the midpoint between South 2nd and South 3rd Streets is located inboard of the bulkhead.

The existing overwater platform limits the potential for tidal marsh plants or submerged aquatic vegetation. No vegetated tidal wetlands are present within the project site. The USFWS National Wetlands Inventory (see Figure 11-3) classifies the waters of the East River within the vicinity of the project site as estuarine subtidal wetlands with unconsolidated bottom (E1UBL). Subtidal estuarine wetlands are continuously submerged areas with low energy and variable salinity, influenced and often enclosed by land. Unconsolidated bottoms have at least 25 percent cover of particles smaller than 6 or 7 centimeters (cm), and less than 30 percent vegetative cover. Because the waters within the project site do not contain tidal wetland plants, USACE would



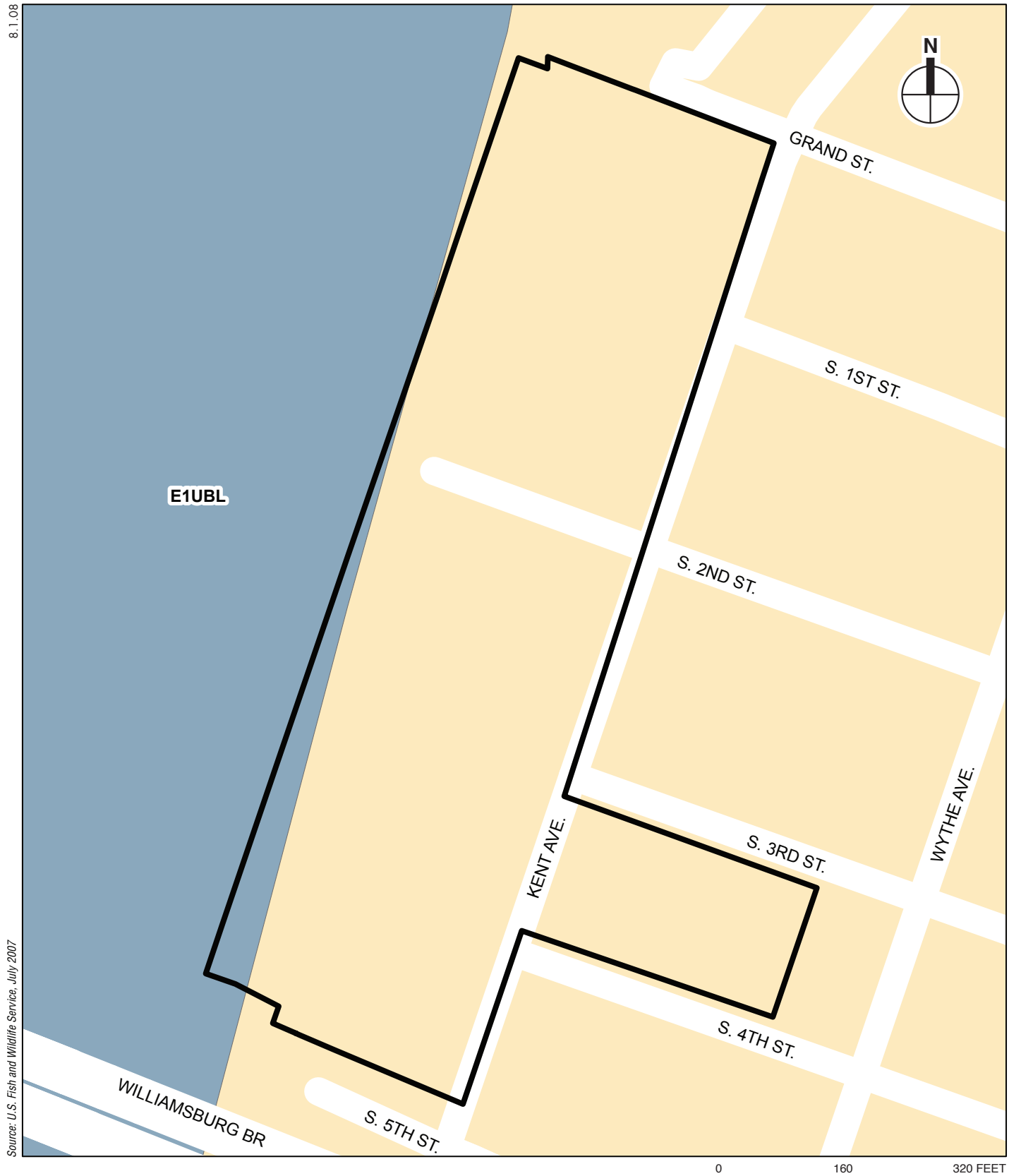
Project Site

FEMA Flood Hazard

- 1% Annual Chance of Flooding (Zone AE)
- 0.2% Annual Chance of Flooding (Zone X Shaded)
- Area of Minimal Flooding (Zone X Unshaded)

FEMA Flood Hazard Areas

Figure 11-2



National Wetlands Inventory Mapped Wetlands

Figure 11-3

likely regulate them as waters of the United States and would not be likely to classify portions of the study area as wetlands.

NYSDEC designates the East River a littoral zone (shallow waters 6 feet or less in depth at mean low water (MLW) that are not included in other NYSDEC tidal wetland categories) (see Figure 11-4). However, NYSDEC regulations state that actual water depths determine whether or not an area is a littoral zone. Water depths under the platform within the project site range from 10 to 32 feet at MLW at the outboard edge of the platform to 0 to 2 feet at MLW along the bulkhead. These reported water depths suggest that water depths less than 6 feet at MLW occur along the shoreline of the project site underneath the existing platform.

AQUATIC RESOURCES

SURFACE WATER RESOURCES IN THE STUDY AREA

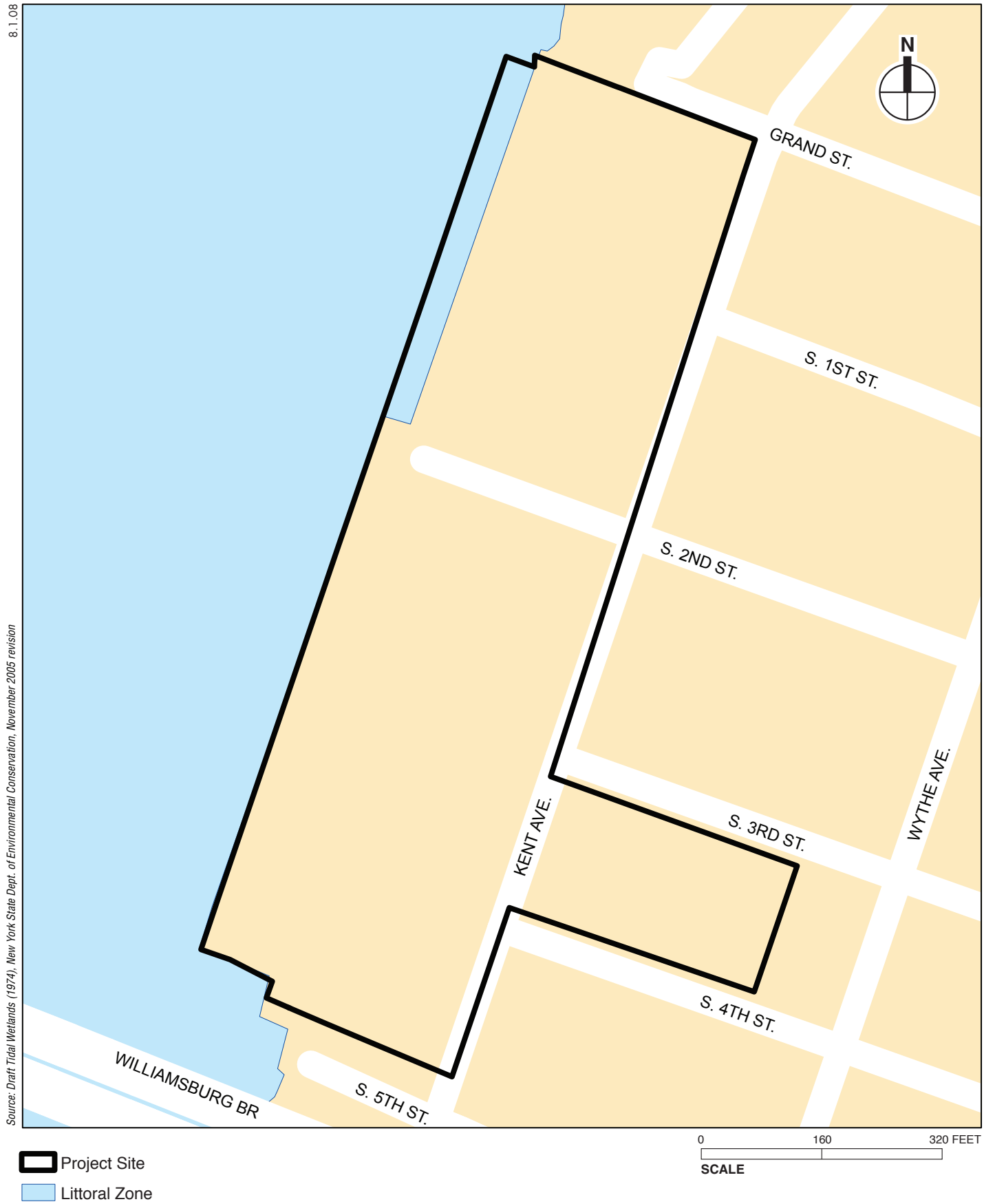
The study area is located along the eastern shore of the East River, a tidal strait that connects New York Harbor (the Battery) with the western end of Long Island Sound (Willets Point). The East River's circulation and salinity structure are largely determined by conditions in the Upper Harbor and the Sound. The river is approximately 16 miles long (26 kilometers [km]) and generally ranges from 600 to 4,000 feet wide (183 to 1,219 meters [m]). Water depth in the federal navigation channel is maintained to 40 feet (12 meters below MLW) from the Battery to the former Brooklyn Navy Yard, and 35 feet (about 11 m) at MLW from that point to the Throgs Neck Bridge (Willets Point). In reality, the channel is much deeper in places than the maintained depth, reaching up to 100 feet deep (about 30 m) in areas just north of Hell Gate.

During the early flood cycle of the East River, Hudson River water flows in via the Battery, and during the entire flood cycle, Hudson River water enters through the Harlem River. The mean tidal range is considerable—approximately 4.3 feet (1.3 m) at the Battery, 5.1 feet (1.6 m) at Hell Gate, and increasing to 7.2 feet (2.2 m) at Willets Point. The phase of the tide at Willets Point lags the Battery by about 3 hours. This phase difference, and the difference in resulting water elevations between the Battery and Willets Point, is chiefly responsible for the rapid tidal currents in this waterbody (Hazen and Sawyer 1983). Maximum current velocity measurements have been reported by several investigators. In 1994 and 1995, Blumberg et al. (1999) reported maximum velocities in the East River approaching 3.2 ft/sec (1.9 knots) at College Point, 6.0 ft/sec (3.6 knots) at Red Hook, and 1.6 ft/sec (1.0 knots) at the Battery. USACE reported velocities ranging from 2.0 to 7.9 ft/sec (1.2 to 4.7 knots) in the lower East River (USACE 1999), and average maximum velocities of 4.7 (2.8 knots) and 2.9 ft/sec (1.7 knots) at the Brooklyn Bridge and Hunts Point, respectively.

Sources of freshwater flow to the East River include the Bronx River, Westchester Creek, Hudson River, CSOs, and wastewater point sources (e.g., Newtown Creek and Red Hook wastewater treatment facilities). Regional surface water runoff also contributes to freshwater input.

WATER QUALITY

Title 6 of the NYCRR Part 703 includes surface water standards for each Use Class of New York surface waters. The lower East River near the study area is Use Classification I. The best usages for Class I waters are as secondary contact recreation and fishing. Water quality should be suitable for fish propagation and survival. Water quality standards for fecal and total coliform, dissolved oxygen (DO), and pH for Use Classification I waters are as follows (there are no New York State standards for chlorophyll *a* or water clarity):



NYS DEC Mapped Tidal Wetlands

Figure 11-4

- Fecal coliform—Monthly geometric mean less than or equal to 2,000 colonies/100mL from 5 or more samples.
- DO—Never less than 4 milligrams per liter (mg/L).
- pH—The normal range shall not be extended by more than 0.1 of a pH unit.

New York City has monitored New York Harbor water quality for over 90 years through the Harbor Survey. DEP evaluates surface water quality of four designated regions: Inner Harbor Area, upper East River-western Long Island Sound, Lower New York Bay-Raritan Bay, and Jamaica Bay (DEP 2007a). The project site is in the Inner Harbor Area, which includes the lower East River to the Battery.

Temperature and salinity influence several physical and biological processes within the Harbor and the lower East River. Temperature has an effect on the spatial and seasonal distribution of aquatic species and affects oxygen solubility, respiration, and other temperature-dependent water column and sediment biological and chemical processes. Salinity fluctuates in response to tides and freshwater discharges. Salinity and temperature largely determine water density and can affect vertical stratification of the water column. Salinity is also an important habitat variable, as most aquatic species have salinity tolerances within particular ranges.

Average temperatures within the Upper Bay range from about 3.7°C to 23.8°C (38.7°F to 74.8°F) (USACE 1999). Within the Upper New York Harbor, higher salinity bottom waters tend to be somewhat warmer than the less saline surface waters during the winter months, with the opposite being true during the summer. Temperatures in the East River measured near the project site during the Harbor Survey from 1995 to 2007 ranged from approximately 1.1°C to 25.5°C (34 to 77.9°F) (DEP 2007b).

Salinity varies spatially within the Harbor Estuary depending on the amount of freshwater flow. Within the New York-New Jersey Harbor Estuary system, average salinity values are highest in the Lower New York Harbor and Raritan Bay, and decrease moving up-estuary to the Upper New York Harbor, the lower Hudson River, and the lower East River. The Upper New York Harbor is partially stratified—higher salinity water originating from the Atlantic Ocean at the mouth of the estuary tends to remain near the bottom, while freshwater from the rivers draining to the estuary remains near the surface. Average salinity differences throughout the water column in the harbor are generally between 1 and 3 parts per thousand (ppt) (USACE 1999). The swift tidal currents and limited freshwater inflow to the lower East River result in vertical mixing that prohibits the formation of large salinity gradients in this part of the river. From 2003 to 2007, surface water and bottom water salinities recorded in the East River near the project site ranged from 12.8 to 27.0 ppt and 13.6 to 27.1 ppt, respectively.

The results of recent Harbor Surveys (DEP 2001, 2002, 2003, 2004, 2005, 2006, 2007a and b) show that the water quality of New York Harbor has improved significantly since the 1970s as a result of measures undertaken by the City. These measures include infrastructure improvements, eliminating 99 percent of raw dry-weather sewage discharges, reducing illegal discharges, increasing the capture of wet-weather-related floatables, and reducing the toxic metals loadings from industrial sources by 95 percent (DEP 2002). The 1999 and 2000 IEC 305(b) reports also indicate that the year-round disinfection requirement for discharges to waters within its district (including New York Harbor) has contributed significantly to water quality improvements since the requirement went into effect in 1986 (IEC 2000, 2001).

As described in further detail below, survey data from a Harbor Survey station close to the study area, East 23rd Street (Station E2, located near Manhattan shoreline), indicate that the water quality in this part of the lower East River is generally good and meets the water quality requirements for Use Classification I waters (see Table 11-1).

Table 11-1
2003-2007 DEP Water Quality Data for the East 23rd Street Sampling Station

Parameter	Top Waters			Bottom Waters		
	Low	High	Avg	Low	High	Avg
Fecal Coliform (per 100 mL)	1.0	1,660	76.6	NM		
Dissolved Oxygen (mg/L)	2.8	12.8	7.5	2.4	12.7	7.4
Secchi Transparency (ft)	1.5	9.0	4.3	NM		
Chlorophyll *a* (µg/L)	0.4	19.9	3.7	NM		

Notes: NM = not measured; Avg weighted for number of samples in a given month.
Source: DEP 2004, 2005, 2006, 2007a, 2007b.

The presence of fecal coliform bacteria in surface waters indicates potential health impacts from human or animal waste, and elevated levels of coliform can result in the closing of bathing beaches and shellfish beds. According to the New York Harbor Water Quality Regional Summaries and data from the past five years (DEP 2004, 2005, 2006, 2007a and b), the waters of the Inner Harbor Area, which includes the lower East River, meet the fecal coliform standard for Use Class I waters at most sampling locations. Temporary increases in fecal coliform concentrations may occur during wet weather due to increased fecal coliform loadings following a rain event.

The project site is located within the Newtown Creek Brooklyn sewershed, which contributes an estimated 39 percent of the dry weather flow for the Newtown Creek WPCP. In 2007, the Newtown Creek Brooklyn sewershed contributed an average dry weather flow of approximately 87 mgd, and an annual total (i.e., wet and dry weather) flow of approximately 35,283 million gallons, to the Newtown Creek WPCP. Given the existing (2007) infrastructure and operations, and an annual rainfall pattern causing average CSO discharges across New York City (i.e., 1988 rainfall record), CSOs within the Newtown Creek Brooklyn sewershed are projected to discharge during 64 wet weather CSO "events" a total of 207.6 million gallons per year (mgy) to the East River, and 588.6 mgy to Newtown Creek, as well as the following discharges to tributaries of Newtown Creek: 240.1 mgy to English Kills, 243.4 mgy to Maspeth Creek, and 279.7 mgy to Wallabout Channel.

While CSOs may result in temporary increases in fecal coliform concentration, overall, fecal coliform concentrations in this area have declined to less than 100 colonies/100 mL (DEP 2007c), significantly improving water quality from the early 1970s, when levels were well above 2,000 colonies/100 mL (DEP 2001), and the 1980s when the geometric mean concentration was reported as greater than 1,600 colonies/100 mL (DEP 2007c). From 2003 to 2007, fecal coliform concentrations from the East River station near the project site peaked as high as 1,660 colonies/100 mL but generally remained below 200 colonies/100 ml, averaging 76.6 colonies/100 mL (DEP 2004, 2005, 2006, 2007a and b).

DO in the water column is necessary for respiration by all aerobic forms of life, including fish, invertebrates such as crabs and clams, and zooplankton. The bacterial breakdown of high organic loads from various sources can deplete DO to low levels. Persistently low DO can degrade habitat and cause a variety of sublethal or, in extreme cases, lethal effects. Consequently, DO is one of the most universal indicators of overall water quality in aquatic systems. DO summer concentrations in the Inner Harbor Area have increased over the past 30 years from an average of bottom water that was below 3 mg/L in 1970 to above 6 mg/L in 2007, a value fully supportive of ecological productivity (DEP 2007b). For the period from 2003 to

2007, the average DO concentration of bottom water near the project site at the East River station was 7.4 mg/L. All pH levels in the New York Harbor Area are in attainment, with the average being 7.5 at the East 23rd Street Station (DEP 2004, 2005, 2006, 2007a and b). On the basis of design average rainfall conditions and estimated pollutant loadings to the New York Harbor, the East River is projected to meet the DO standard of Use Class I waters throughout the year (DEP 2007c).

High levels of nutrients can lead to excessive plant growth (a sign of eutrophication) and depletion of DO. Concentrations of the plant pigment chlorophyll-*a* in water can be used to estimate productivity and the abundance of phytoplankton. Chlorophyll-*a* concentrations greater than 20 micrograms per liter (µg/L) are considered suggestive of eutrophic conditions. Chlorophyll-*a* concentrations for the East River are below 20 µg/L (DEP 2007c). From 2003 to 2007, concentrations at the East 23rd Street station averaged 3.7 µg/L (DEP 2007a and b).

Secchi transparency is a measure of the clarity of surface waters. Transparency greater than 5 feet (1.5 meters) indicates relatively clear water in turbid estuaries. Decreased clarity can be caused by high suspended solid concentrations or blooms of plankton. Secchi transparencies less than 3 feet (0.9 meters) may be considered indicative of poor water quality conditions. Average Secchi readings in the Inner Harbor area have remained relatively consistent since measurement of this parameter began in 1986, ranging between approximately 3.5 feet and 5.5 feet (1.1 and 1.8 meters). For the period of 2003 through 2007, the average Secchi transparency at the sampling station near the project site (East 23rd Street station) is 4.3 feet (1.3 meters) (DEP 2004, 2005, 2006, 2007a and b). Only six of the 112 measurements taken in 2004 through 2006 were less than 3 feet (0.9 meters), indicating that water quality in this area is infrequently impaired by reduced water transparency (DEP 2004, 2005, 2006, 2007a).

NYSDEC is leading a collaborative effort to reduce toxic chemicals in New York Harbor. This work is being done under the Contamination Assessment and Reduction Project (CARP). NYSDEC developed a comprehensive, multimedia contaminant identification and track-down program simultaneously with New Jersey and the CARP Work Group (a group of government, academic, and consultant experts). The states, together with the work group, are undertaking a variety of projects, including studies of Harbor water quality and tracking down contaminant sources in the surface water, groundwater, and wastewater of the Harbor. The overall goal of the initiative is to reduce the flow of contaminants to the Port of New York and New Jersey. The principal chemicals of concern include dioxins/furans, PolyChlorinated Biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), metals (silver, mercury, cadmium, and lead), and pesticides (dieldrin and chlordane).

The CARP sampling areas near the project site include the lower East River near the Brooklyn Navy Yard, and the outfall of the Newtown Creek WPCP. The average pesticide concentration from the lower East River was 0.00000022 mg/L for both dieldrin and chlordane. PCBs, PAHs, and metals (cadmium, mercury, and lead) were also reported in samples from the lower East River site (Litten 2003).

SEDIMENT QUALITY

Upper New York Bay has a complex distribution of sediments in the area because of variable currents and a high degree of sediment input from natural and human actions. Sediments in the Upper Bay vary from coarse sands and gravels in high-energy areas to fine-grained silts and clays in low-energy areas (USACE 1999). The lower East River primarily has a hard, rock bottom

consisting of gravel, cobble, rocks, and boulders covered with a shallow layer of sediment. The shallow sediment cover is affected by strong tidal currents in the river.

Typical of any urban watershed, New York Harbor Estuary sediments, including the East River, are contaminated due to a history of industrial uses in the area. Contaminants found throughout the New York Harbor Estuary include pesticides such as chlordane and DDT, metals such as mercury and copper, and various polycyclic aromatic hydrocarbons. Adams et al. (1998) found the mean sediment contaminant concentration for 50 of 59 chemicals measured to be statistically higher in the Harbor Estuary than other coastal areas on the East Coast. Within the New York Harbor Estuary, Adams et al. (1998) ranked Newark Bay as the most degraded area on the basis of sediment chemistry, toxicity, and benthic community, followed by the Upper Harbor, Jamaica Bay, Lower Harbor, western Long Island Sound, and the New York Bight Apex. Biological effects, identified based on the benthic invertebrate community, were found to be associated with the chemical contamination. While the sediments of the New York Harbor Estuary are contaminated, the levels of most sediment contaminants (e.g., dioxin, DDT, and mercury) have decreased on average by an order of magnitude over the past 30 years (Steinberg et al. 2002). Between 1993 and 1998, the percentage of sediment sampling locations with benthic macroinvertebrate communities considered impacted, or of degraded quality, decreased throughout the New York/New Jersey Harbor Estuary. Within the Upper Harbor, the percentage of benthic communities considered impacted decreased from 75 percent in 1993 to 48 percent in 1998 (Steinberg et al. 2004).

Litten (2003) reported the following concentrations of pesticides in sediment samples collected from the East River as part of CARP—dieldrin 0.0019 mg/kg, hexachlorobenzene 0.00085 mg/kg, heptachlor 0.000018 mg/kg, hexachlorocyclohexane (HCH), 0.00047 mg/kg, chlordane 0.017 mg/kg, and DDT 0.046 mg/kg. NYSDEC has established sediment quality threshold values for dredging activities, or riparian or in-water placement of dredged material for three of these pesticides (NYSDEC 2004): dieldrin, chlordane, and DDT. The dieldrin concentration falls into the classification of no appreciable contamination (no toxicity to aquatic life). The chlordane concentration falls into the classification of moderate contamination (chronic toxicity to aquatic life), and the DDT concentration falls into the classification of high contamination (acute toxicity to aquatic life).

AQUATIC BIOTA

The hydrodynamic and estuarine character of the East River, coupled with the numerous municipal and industrial discharges that have occurred in the river over many years, make this river a physically harsh environment; therefore, many of the species using the area must be tolerant of highly variable conditions. The following sections provide a description of the aquatic biota found in the lower East River.

Primary Producers

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. While nutrient concentrations in most areas of New York Harbor are very high, rapid light attenuation has often limited the occurrence of phytoplankton blooms. Because of the strong currents and high rate of

tidal exchange, planktonic organisms found in western Long Island Sound, the lower Hudson River, and Upper New York Harbor would also be expected to occur in the East River.

A recent survey of phytoplankton conducted from 1996 through 2003 on the East River to the west of the project site in lower Manhattan (Pier 17 South Street Seaport) and the lower Hudson River assessed the presence or absence of 29 taxa of phytoplankton along with various water quality parameters with respect to temporal distribution patterns (Levandowsky et al. 2004). While not a comprehensive survey of phytoplankton species, the study allowed investigators to discern relationships between the presence or absence of any of the 29 taxa evaluated and water quality parameters, such as temperature and salinity. The lower Hudson River phytoplankton community was generally more structured (i.e., phytoplankton monitored exhibited consistent temporal and spatial distribution, possibly due to the stratified nature of the Hudson River) when compared with the phytoplankton community of the East River, which was more variable with respect to time and location (possibly due to the well-mixed nature of the East River).

In other surveys focusing on the East River, up to 107 phytoplankton taxa have been collected (DEP 2007c). Diatoms are generally the most widely represented class of phytoplankton, accounting for over 90 percent of the different taxa collected in one 1983 survey; the green alga *Nannochloris* was the most abundant single taxa identified in this area (Hazen and Sawyer 1983). In a 1993 survey of New York Harbor, 29 taxa of phytoplankton were identified, with the diatom *Skeletonema costatum* and the green algae *Nannochloris atomus* determined to be the most abundant species at the monitored sites (Brosnan and O'Shea 1995). The average summer cell counts in that year ranged from 6,300 to 97,000 cells/mL. DEP surveys of phytoplankton in the East River conducted from 1991 to 2000 also found *Skeletonema costatum* and *Nannochloris atomus* to be the most abundant species (DEP 2007c).

Resident times of phytoplankton species within New York Harbor are short, and species move quickly through the system. Investigators have suggested that the overall composition and relative abundance of phytoplankton taxa in the East River are more heavily influenced by the influx from waters of the sound and New York Harbor than by localized water quality conditions (Con Edison 1982).

Submerged Aquatic Vegetation and Benthic Marine Algae

Submerged aquatic vegetation (SAV) are vascular aquatic plants that are often found in shallow areas of estuaries. These organisms are important because they provide nursery and refuge habitat for fish. Benthic algae can be large multicellular algae that are important primary producers in the aquatic environment. They are often observed attached to rocks, jetties, pilings, and sandy or muddy bottoms (Hurley 1990). Since these organisms require sunlight as their primary source of energy, the limited light penetration of New York Harbor limits their distribution to shallow areas. Light penetration, turbidity, reduced light penetration due to high suspended sediment loads, and nutrient concentrations are all important factors in determining SAV and benthic algae productivity and biomass.

None of the studies reviewed as part of this assessment reported the presence of SAV in the lower East River. The extensively developed shoreline, swift currents, and steeply sloped engineered shorelines severely limit potential inhabitation of this area by SAV.

Common macro-algae known to occur within the East River include the Phaeophyte species *Fucus vesiculosus*, the Chlorophyte species *Ulva lactuca*, and *Enteromorpha* species (Perlmutter 1971). These species have a particular affinity for hard substrates within the photic zone and are frequent colonists of pilings, rocks, bulkheads, and other structures.

Zooplankton

Zooplankton—planktonic animals that include microscopic protozoans and rotifers less than 200 microns in size; copepods and invertebrate larvae between 200 microns and 2 millimeters in size; and amphipods, shrimp, fish larvae, and jelly fish that are greater than 2 millimeters in size—are an integral component of aquatic food webs. They typically are the principal grazers on phytoplankton and detritus material, and are themselves consumed by organisms at higher trophic levels. The higher level consumers of zooplankton generally include forage fish, such as bay anchovy (*Anchoa mitchilli*), as well as commercially and recreationally important species, such as striped bass (*Morone saxatilis*) and white perch (*M. americana*) during their early life stages. Predacious zooplankton species can consume eggs and larvae and can have a detrimental effect on certain fish species.

Crustacean taxa are generally the most abundant group of zooplankton collected in New York Harbor. The most dominant species include the copepod*s Acartia tonsa, Acartia hudsonica*, *Eurytemora affinis*, and *Temora longicornis*, with each species being prevalent in certain seasons (Stepien et al. 1981, Lonsdale and Cosper 1994, Perlmutter 1971, Lauer 1971, Hazen and Sawyer 1983). The data suggest that the copepods collected in the East River are extensions of populations present in Long Island Sound and New York Harbor. In the East River, DEP identified 20 taxa during sampling conducted from 1991 through 2000, represented mostly by arthropods (copepods) and protozoa. *Eutreptia* species and *Tintinnopsis* species were the most abundant protozoa (DEP 2007c).

Benthic Invertebrates

Invertebrate organisms that inhabit river bottom sediments and the surfaces of submerged objects (such as rocks, pilings, or debris) are commonly referred to as benthic invertebrates. These organisms are important to an ecosystem's energy flow because they convert detrital and suspended organic material into living tissue; moreover, they are also integral components of the diets of ecologically and commercially important fish and waterfowl species. Benthic invertebrates are also essential in promoting the exchange of nutrients between sediment and the water column. Benthic invertebrates include those specimens that can be retained on a 0.5-mm screen (defined as macroinvertebrates), as well as smaller forms, such as nematodes (a class of roundworm) and harpacticoid copepods (order of copepods that are primarily benthic), collectively called meiofauna. Some of these animals live on top of the substratum (epifauna) and some within the substratum (infauna). Substrate type (rocks, pilings, sediment grain size, etc.), salinity, and DO levels are important factors influencing benthic invertebrate communities; other factors include currents, reproductive success, larval distribution, wave action, predation, succession, and disturbance.

More than 100 benthic invertebrate taxa (mostly crustaceans or polychaete worms) have been identified in the East River (Coastal Environmental Services 1987). Within the portion of the Harbor Estuary comprising the Hudson River, East River, and Upper New York Harbor, common infaunal macroinvertebrates include oligochaete worms, polychaetes, gastropod and bivalve mollusks, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp. Epifauna include hydrozoans, sea anemones, flatworms, oligochaete worms, polychaetes, bivalves, barnacles, gammaridean and caprellid amphipods, isopods, tunicates, hermit crabs, rock crabs, grass shrimp, sand shrimp, blue crabs, mud dog whelks, mud crabs, horseshoe crabs, blue mussels, soft-shell clams, and nudibranchs (EA Engineering, Science, and Technology 1990, Able et al. 1995, New York City Department of Parks and Recreation [DPR] 1994, PBS&J 1998).

Two separate but intermingled benthic invertebrate subcommunities have been identified in the East River on the basis of sediment hardness (Hazen and Sawyer 1983). The hard substrate community is characterized by organisms that are either firmly attached to rocks and other hard objects (e.g., mussels or barnacles) or that build or live in tubes. Other species of polychaetes and amphipods also occur on the hard bottom surfaces, and several species utilize the East River's hard bottoms and rapid currents by colonizing the abandoned tubes or shells of other species. The soft substrate community occurs in the more protected areas within the East River where detritus, clay, silt, and sand have accumulated in shallow, lower velocity areas near piers and pilings. Common soft substrate organisms include oligochaete worms, the soft-shelled clam *Mya arenaria*, and a variety of flatworms, nemerteans, polychaetes, and crustaceans (Hazen and Sawyer 1985).

Benthic and epibenthic sampling conducted in the East River by HydroQual (DEP 2007c) from July 2000 through August 2001 collected nine benthic macroinvertebrate taxa at the sampling station (Station ER1) near the project site as reported, which included annelids, arthropods and mollusks. *Haploscoloplos robustus* (annelid), *Melampus bidentatus* (mollusk) and *Mulinia lateralis* (mollusk) were collected in the highest densities.

Fish

As discussed earlier, New York City is located at the confluence of several major river and estuarine systems, all of which discharge to the New York Bight of the Atlantic Ocean. This convergence has resulted in a mix of habitats in the East River that supports marine fish, estuarine fish, anadromous fish (fish that migrate up rivers from the sea to breed in freshwater), and catadromous fish (fish that live in freshwater but migrate to marine waters to breed). Table 11-2 lists fish known to occur in the East River.

Despite the relatively low value of the East River as residential fish habitat, the waterway serves as a major migratory route from the Hudson River to the Long Island Sound. Harsh conditions within the lower East River, including its swift currents and lack of shoals and protected habitat, contribute to the limited utilization by fish at various times of the year. In addition, many species encountered in the East River are only seasonably abundant due to their natural migratory patterns or life history strategies. From 1999 through 2001, 64 species of finfish were collected during sampling conducted at the Charles Poletti Power Project ("Poletti") (Heimbuch et al. 2007), located on the East River across from Randall's Island, to the northeast of the project site. Striped bass post-yolk-sac larvae collected at Poletti during this period are believed to have been transported from the lower Hudson River estuary into the East River and into western Long Island Sound (Dunning et al. 2006).

DEP conducted sampling for ichthyoplankton during March, May, July, and August of 2001, and for juvenile and adult fish in the winter and spring of 2001 (DEP 2007c). At the sampling station near the project site, ER1, seven finfish egg taxa were collected. Eggs of the marine species, cunner (*Tautogolabrus adspersus*), were the most abundant. Eleven finfish larvae were collected, with the most abundant being winter flounder (*Psuedopleuronectes americanus*). Bottom trawls and gillnet sampling collected 15 and 8 fish taxa, respectively. Blueback herring, bay anchovy, weakfish, striped bass, and butterfish were the most abundant species collected in the bottom trawls, and Atlantic menhaden, striped bass, and bluefish were the most abundant species collected in gillnet sampling.

The general East River fish communities are described below.

Table 11-2
List of Fish Species Known to Occur in the East River

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
American eel	*Anguilla rostrata*
American sand lance	*Ammodytes americanus*
American shad	*Alosa sapidissima*
Anchovy spp.	*Anchoa spp.*
Atlantic herring	*Clupea harengus*
Atlantic menhaden	*Brevoortia tyrannus*
Atlantic silverside	*Menidia menidia*
Atlantic tomcod	*Microgadus tomcod*
Banded killifish	*Fundulus diaphanus*
Bay anchovy	*Anchoa mitchilli*
Black sea bass	*Centropristis striata*
Blueback herring	*Alosa aestivalis*
Bluefish	*Pomatomus saltatrix*
Butterfish	*Peprilus triacanthus*
Cunner	*Tautogolabrus adspersus*
Fourbeard Rockling	*Enchelyopus cimbrius*
Goby spp.	Gobiidae Family
Herring spp.	Clupeidae Family
Little skate	*Raja erinacea*
Mummichog	*Fundulus heteroclitus*
Naked goby	*Gobiosoma bosc*
Northern searobin	*Prionotus carolinus*
Rock gunnel	*Pholis gunnellus*
Sculpin spp.	Cottidae Family
Scup	*Stenotomus chrysops*
Spotted Hake	*Urophycis regia*
Striped bass	*Morone saxatilis*
Striped searobin	*Prionotus evolans*
Summer flounder	*Paralichthys dentatus*
Tautog	*Tautoga onitis*
Weakfish	*Cyanoscion regalis*
White perch	*Morone americana*
Windowpane flounder	*Scophthalmus aquosus*
Winter flounder	*Pseudopleuronectes americanus*
Winter skate	*Raja ocellata*
Wrasses	Labridae Family

Sources: Able et al. 1995; DSNY 2005, EA Engineering, Science & Technology 1990; EEA 1988; LMS 2002, 2003a, 2003b; Heimbuch et al. 2007; Woodhead 1990.

Marine Species

Winter flounder, scup, and bluefish are examples of marine species present in the East River. Winter flounder is an important commercial and recreational fish species that prefers cold water. Adults have a short migration pattern, moving offshore a short distance in spring and returning to shallow inshore or estuarine waters in late fall (Bigelow and Schroeder 1953). Winter flounder spawn in the lower estuary during winter and early spring and prefer sandy bottoms in shallow water where freshwater from the estuary dilutes salinities to slightly below full ocean concentration (Pereira et al. 1999). Winter flounder most likely use the lower East River as residences during the winter months. Winter flounder have a varied diet of small invertebrates and fish fry (Grimes et al. 1989).

Scup, or porgy, is a marine species reported for the East River that migrates inshore during late spring. It tends to remain close to the coast during the summer months before moving offshore during the fall to deeper waters. Scup are bottom feeders that spawn from May through August (Bigelow and Schroeder 1953).

Bluefish is a pelagic species whose young migrate into estuaries and harbors along the coast during late spring or early summer. The major spawning grounds of the bluefish are located on the outer continental shelf and the resulting young move inshore in the late summer to forage (Bigelow and Schroeder 1953). The incidence of young bluefish in the East River is related to this migration pattern (PAS 1985).

Estuarine Species

Abundant estuarine species of the East River include resident fish, such as the bay anchovy, Atlantic silverside, striped and common killifish/mummichog (*Fundulus majalis* and *Fundulus heteroclitus*, respectively), and white perch. These species are important as forage species for larger predator fish and are commonly used as bait by fishermen.

Bay anchovy are found in salinities ranging from fresh to seawater. This species is common in its range and may be the most abundant species in the western north Atlantic (McHugh 1967 in Vougilitois et al. 1987). Bay anchovy use the Harbor Estuary extensively for spawning, embryonic development, and hatching. Spawning in the New York Bight occurs from about May through September, and females spawn many times per year (Houde and Zastrow 1991). The yolk sac stage typically lasts less than one day. The peak abundance of post-yolk-sac larvae bay anchovy is in June and July. Juveniles occur from mid-August through October. Trawl data indicate that north of Delaware Bay, bay anchovy move out of estuaries and southward during the fall and are virtually absent from the inshore continental shelf of New York during the winter months (ASA 2001).

Atlantic silversides are small fish that school in shallow water and are permanent residents of the estuary. They spawn in May through early July and mature in one year. Atlantic silversides are omnivorous and feed chiefly on copepods, mysids, shrimp, amphipods, cladocerans, fish eggs, young squid, annelid worms, and mollusk larvae (Bigelow and Schroeder 1953).

Common killifish spawn primarily in fresh or brackish water, usually from spring to late summer or early autumn. Adults generally mature during their second year. Striped killifish spawn in shallow water close to shore from June through August, and again mature in their second year. Both species feed primarily on crustaceans and polychaetes (Abraham 1985).

White perch is another estuarine species that has been found in the East River. Adult white perch migrate to shallow fresh and slightly brackish water in the spring and early summer to spawn, after which they return to the lower estuary. The demersal eggs hatch in three to five days, and after approximately one month they begin to look like small adults. The juveniles inhabit creeks and inshore areas until they are about a year old (Heimbuch et al. 1994). Small white perch primarily eat invertebrates. Larger white perch in salt and brackish water eat small fish fry, crabs, shrimp, and other invertebrates. White perch of more than 200 mm in length eat mostly fish (Stanley and Danie 1983).

Anadromous Species

Anadromous species that use the East River include striped bass, tomcod, and members of the herring family. Striped bass use the East River for migration from fall through spring (PAS 1985). Mature striped bass return from marine waters to fresh water to spawn before migrating

back to salt waters. The young then use the brackish waters as nursery and wintering area. Juvenile striped bass migrate to marine waters when nearing maturity. The majority of adults then spend much of their time in coastal, bay, and river mouth waters before returning to spawn in the spring each year (Bigelow and Schroeder 1953). Juvenile striped bass eat a variety of invertebrates, and adults eat a variety of fish and may also eat shrimp. Young-of-the-year and older striped bass have been shown to overwinter in large numbers in the lower Hudson River estuary. They feed primarily on invertebrates; as they grow, striped bass feed primarily on fish (Fay et al. 1983).

Tomcod is an inshore species of cod that is distributed from southern Labrador to Virginia along the Atlantic Coast. Adults may spawn in marine waters but are typically anadromous and migrate into rivers and estuaries during late fall and winter to spawn. In New York waters, the adult tomcod move out from shore to cooler waters in the spring. These fish feed mainly on small crustaceans (Bigelow and Schroeder 1953).

Alewife and American shad are members of the herring family. These species live in the ocean as adults and move into estuaries in spring on their spawning migrations. Both spawn in freshwater. Juveniles migrate from the estuaries in their first year, primarily in the fall. These species primarily eat small planktonic crustaceans and other invertebrates (Bigelow and Schroeder 1953).

Catadromous Species

The single catadromous species found in the East River is the American eel. Eels spawn in the Atlantic Ocean and the young move into the estuary as elvers in the spring, typically in February and March (Fahay 1978). American eels are opportunistic feeders, and juveniles eat crustaceans, polychaetes, bivalves, and fish. They grow slowly, and at sexual maturity move down the estuary in the fall and out to sea (Bigelow and Schroeder 1953).

TERRESTRIAL RESOURCES

The waterfront portion of the project site is currently a complex of vacant industrial buildings and an overwater platform. The buildings within the project site range in height from 1 to 16 stories. The upland parcel located east of Kent Avenue is a vacant lot that was formerly used for surface parking. Following the nomenclature from the New York Natural Heritage Program (Edinger et al. 2002), the primary habitat classification present within the project site is "urban structure exterior," with smaller areas of "urban vacant lot" (see aerial photograph in Figure 1-3 of Chapter 1, "Project Description"). In general, the project site has little vegetation and provides limited habitat for wildlife other than those species capable of using urban structure exterior habitats, whose impervious structures and surfaces support little-to-no vegetation and offer minimal habitat (e.g., rooftops and other exterior surfaces and cracks in paved areas where plants can grow).

Structural elements within the project site (i.e., buildings) may provide nesting and perching opportunities for passerine bird species, such as chimney swifts (*Chaetura pelagica),* pigeons (most commonly the feral rock dove, or *Columba livia*), mourning doves (*Zenaida macroura*), and other species known for their propensity to inhabit heavily urbanized areas.

The New York State Breeding Bird Atlas project provides records of birds that have the potential to breed within Block 5850A (surveyed 2000 to 2005), which includes the project site. Examples of birds that have the potential to breed in the immediate vicinity of the project site include peregrine falcon (*Falco peregrinus*), rock pigeon (*Columba livia*), mourning dove (*Zenaida macroura*), chimney swift (*Chaetura pelagica*), downy woodpecker (*Picoides*

pubescens), American robin (*Turdus migratorius*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), northern cardinal (*Cardinalis cardinalis*), and house sparrow (*Passer domesticus*).

Mammalian wildlife within the project site is expected to be limited to common urban-breeding native and non-native species that are able to persist in urban developed habitats, such as mice (*Mus musculus*) and other small rodents. None of these species depend on habitats specific to the project site. The developed nature of the project site affords little potential for reptile or amphibian species to occur within the project site.

As discussed previously under "Floodplains and Wetlands," the entire shoreline within the project site is engineered with a pile-supported wharf structure and bulkhead, and would provide minimal habitat for waterfowl and shorebirds other than as resting and perching habitat. Waterfowl known to occur along the East River during the spring and fall migratory periods include American black duck (*Anas rubripes*), American widgeon (*Anas americana*), bufflehead (*Bucephala albeola*), canvasback (*Aythya valisineria*), greater scaup (*Aythya marila*), green-winged teal (*Anas carolinensis*), hooded merganser (*Lophodytes cucullatus*), lesser scaup (*Aythya affinis*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), red-breasted merganser (*Mergus serrator*), and ruddy duck (*Oxyura jamaicensis*) (NOAA 2001). Wading birds, such as herons and egrets; and shorebirds, such as sandpipers and gulls, might occur within the shoreline area associated with Grand Ferry Park, north of the project site; and at South 5th Street, south of the project site.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

Requests for information on rare, threatened, or endangered species within the immediate vicinity of the study area were submitted to NYNHP, and NMFS. NYNHP has a record of peregrine falcon (*Falco peregrinus*) nesting at or in the vicinity of the project site (Seoane 2008). The USFWS list of federally threatened or endangered species and candidate species for Kings County identifies one federally endangered species, the shortnose sturgeon (*Acipenser brevirostrum*) which is known to occur within the county.

NMFS identified the endangered shortnose sturgeon (*Acipenser brevirostrum*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and four sea turtle species—the federally threatened loggerhead (*Caretta caretta*) the federally endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), and leatherback (*Dermonchelys coriacea*)—as potentially occurring within the lower East River in the vicinity of the project site (Colligan 2008). These species are discussed below.

PEREGRINE FALCON

Peregrine falcons nest on ledges and small shallow caves on high cliff walls, man-made platforms, or in urban areas on bridges and tall buildings. In the New York City area, courtship occurs in February and March, with egg laying in April and May. Peregrine falcons typically return to the same nest every year. Within the vicinity of the project site, peregrine falcons have been reported as nesting on the Williamsburg Bridge. Nesting on the bridge was first reported in 2005. No nesting occurred on the bridge in 2008, although a nesting platform is located on the Manhattan side of the bridge. The next closest known nesting location is across the East River at 55 Water Street in Manhattan (Loucks 2008). Coordination has occurred with NYSDEC's Region 2 and NYNHP regarding current and past nesting activity within the vicinity of the

project site. Additional coordination would be conducted prior to the anticipated start of construction.

SHORTNOSE STURGEON

The federally and state-listed endangered shortnose sturgeon is a semi-anadromous bottom-feeding fish that can be found throughout the Hudson River system. These fish spawn, develop, and overwinter in the mid-Hudson River well up-estuary of the project site (NYSDEC 2003). Shortnose sturgeon spend most of their lives in the Hudson River estuary and prefer colder, deeper waters for all life stages.

Although larvae can be found in brackish areas of the Hudson River, the juveniles (fish ranging from 2 to 8 years old) are predominantly confined to freshwater reaches above the downstream saline area. The primary summer habitat for shortnose sturgeon in the middle section of the Hudson River is the deep river channel (13 to 42 m, or 43 to 138 feet, deep). The river channel downstream of this middle estuary area is 18 to 48 m, or 59 to 157 feet, deep (Peterson and Bain 2002). The Hudson River below Tappan Zee is not considered optimal shortnose sturgeon habitat (Bain 2004).

The Hudson River shortnose sturgeon population has been estimated at approximately 61,000 fish (Peterson and Bain 2002). These studies show that the population has increased approximately 450 percent since the 1970s. Size and body condition of the fish caught in these studies indicate that the population consists of primarily healthy, long-lived adults. Although larvae can be found in brackish areas of the river, the juveniles (fish ranging from 2 to 8 years old) are predominantly confined to freshwater reaches (Peterson and Bain 2002).

Shortnose sturgeon have been reported near Staten Island in New York Harbor and near the confluence of the East River and New York Harbor. In addition, two individuals tagged in the Hudson River have been recaptured in the Connecticut River. It is unknown whether these individuals traveled through the East River and into Long Island Sound, or exited New York Harbor into the Atlantic Ocean and then traveled north along the southern coast of Long Island and into Long Island Sound. The East River is not considered to be a high-use area for shortnose sturgeon, and there have been no documented captures of this species from within the East River (Colligan 2008). Individuals are only expected to occur near the project site as transient individuals while traveling to or from Hudson River spawning, nursery, and overwintering areas.

ATLANTIC STURGEON

The Atlantic sturgeon, an NMFS candidate species, is also known to occur in the Hudson River and surrounding coastal waters. It is a large, anadromous, bottom-feeding species that spawns in the Hudson River and matures in marine waters; females return to spawn at 18 years, males earlier (Bain 1997). In the Hudson River, Atlantic sturgeon are found in the deeper portions and do not occur farther upstream than Hudson, New York. Atlantic sturgeon migrate from the ocean upriver to spawn above the salt front from April to early July (Smith 1985, Stegemann 1999). Individuals are likely to occur in the East River, although not in high numbers (Colligan 2008). Juveniles may use the East River to migrate from the Hudson River to Long Island Sound (Savoy and Pacileo 2003). Their diet consists largely of benthic organisms (including worms and amphipods), plants, and small fish (Bain 1997, NYSDEC 2008). Overfishing, reduction of key spawning areas, and pollution have been suggested as reasons for the range-wide decline of this species (Smith 1985, Bain 2004).

SEA TURTLES

Four species of marine turtles, all state- and federally listed, can occur in western Long Island Sound and the New York Harbor complex, typically as small juveniles. Juvenile Kemp's ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) turtles regularly enter the New York Harbor and bays in the summer and fall. The other two species, green sea turtle (*Chelonia mydas*) and leatherback sea turtle (*Dermochelys coriacea*), are usually restricted to the higher salinity areas of the Harbor and are rarely are found in-shore (USFWS 1997, Colligan 2008). These four turtle species mostly inhabit Long Island Sound and Peconic and Southern Bays. They neither nest in the New York Harbor Estuary nor reside there year-round (Morreale and Standora 1995). Turtles leaving Long Island Sound for the winter usually do so by heading east to the Atlantic Ocean before turning south (Standora et al. 1990). It is unlikely that these turtle species would occur in the study area in the lower East River except as occasional transients.

ESSENTIAL FISH HABITAT

The study area on the East River is within a portion of the Hudson River Estuary EFH. This EFH is situated in the NOAA/NMFS 10' x 10' square with coordinates (North) 40°50.0' N, (East) 73° 50.0' W, (South) 40°40.0' N, (West) 74°00.0' W, and includes Atlantic Ocean waters within the Hudson River Estuary affecting the following areas: Manhattan Island, College Point, NY; Long Island City, NY; Brooklyn, NY; Port Morris, NY; Unionport, NY; Flushing Bay, Astoria, NY; LaGuardia Airport, Badland Island, Rikers Island, Roosevelt Island, Wards Island, and Hell Gate; along with the East River, the Harlem River, and the Bronx River. Table 11-3 lists the species and life stages of fish identified as having EFH in the portion of the East River near the project site.

Table 11-3
Essential Fish Habitat Designated Species for the East River

Species	Eggs	Larvae	Juveniles	Adults
Pollock (*Pollachius virens*)			x	x
Red hake (*Urophycis chuss*)		x	x	x
Winter flounder (*Pseudopleuronectes americanus*)	x	x	x	x
Windowpane flounder (*Scopthalmus aquosus*)	x	x	x	x
Atlantic herring (*Clupea harengus*)		x	x	x
Bluefish (*Pomatomus saltatrix*)			x	x
Atlantic butterfish (*Peprilus triacanthus*)		x	x	x
Atlantic mackerel (*Scomber scombrus*)			x	x
Summer flounder (*Paralicthys dentatus*)		x	x	x
Scup (*Stenotomus chrysops*)	x	x	x	x
Black sea bass (*Centropristus striata*)	n/a		x	x
King mackerel (*Scomberomorus cavalla*)	x	x	x	x
Spanish mackerel (*Scomberomorus maculatus*)	x	x	x	x
Cobia (*Rachycentron canadum*)	x	x	x	x
Clearnose skate (*Raja eglanteria*)			x	x
Little skate (*Leucoraja erinacea*)			x	x
Winter skate (*Leucoraja ocellata*)			x	x
Sand tiger shark (*Odontaspis taurus*)		x[(1)]		
Dusky shark (*Charcharinus obscurus*)		x[(1)]		
Sandbar shark (*Charcharinus plumbeus*)		x[(1)]		x

Notes: [(1)] None of these species has a free-swimming larval stage; rather, they are live bearers that give birth to fully formed juveniles. For the purposes of this table, "larvae" for sand tiger and sandbar sharks refers to neonates and early juveniles.

Source: National Marine Fisheries Service. "Summary of Essential Fish Habitat (EFH) Designation" posted on the Internet at http://www.nero.noaa.gov/hcd/STATES4/conn_li_ny/40407350.html

E. THE FUTURE WITHOUT THE PROPOSED PROJECT

As discussed previously, in the future without the proposed project, the project site would be developed with uses permitted under the existing M3-1 zoning (see Chapter 2, "Analytical Framework").

GROUNDWATER

Because groundwater is not used as a potable water supply in this part of Brooklyn, the as-of-right developments that would occur in the future without the proposed project would not have the potential to affect drinking water supplies. SVOCs and metals detected in the soil samples collected within the project site were attributed to the presence of historic fill and/or general groundwater quality in the area. These contaminants were detected at concentrations that would not pose a significant adverse impact to human health or the environment and would not result in significant adverse impacts to groundwater, the floodplain, or terrestrial resources during construction activities. Hazardous materials (e.g., asbestos-containing materials) would be appropriately addressed prior to or during the demolition of existing structures in accordance with DEP, NYSDEC, Occupational Safety and Health Administration (OSHA), and EPA requirements. Implementation of general guidelines and measures for remediation and proper handling of soil during the redevelopment of the project site, as part of a Remedial Action Plan (RAP) approved by NYSDEC, would minimize the potential for significant adverse impacts to groundwater resources resulting from as-of-right uses permitted within the project site.

FLOODPLAINS

Portions of the existing overwater platform in the southern part of the project site, and a portion of the upland area, are within the 100-year floodplain. The upland area within the 100-year floodplain currently contains buildings. The demolition of the existing structures and construction of new structures for the as-of-right development within the project site would not exacerbate flooding conditions near the project site.

TERRESTRIAL RESOURCES

The demolition of the existing structures and other site disturbance activities for the future without the proposed project scenario would result in the loss of the limited wildlife habitat (i.e., urban structure exterior habitat) present within the project site. The loss of this habitat would have the potential to adversely affect some individual birds and other wildlife using the project site that are unable to find suitable available habitats nearby. However, the wildlife species expected to occur within this area are common to urban areas, and the loss of some individuals would not result in a significant adverse impact on the bird and wildlife community of the New York City region. Therefore, no significant adverse impacts to terrestrial resources are expected as a result of construction of the as-of-right developments.

WATER QUALITY AND AQUATIC RESOURCES

Construction and operation of the projects developed within the project site in the future without the proposed project would not result in significant adverse impacts to water quality or aquatic resources of the East River in the vicinity of the site. The development activities would be covered under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-08-001. To obtain coverage under this permit, a

stormwater pollution prevention plan (SWPPP) would be prepared and a Notice of Intent (NOI) would be submitted to NYSDEC. The SWPPP would comply with all of the requirements of GP-0-08-001, NYSDEC's technical standard for erosion and sediment control, presented in "New York Standards and Specifications for Erosion and Sediment Control," and NYSDEC's technical standard for the design of water quantity and water quality controls (post-construction stormwater control practices), presented in the *New York State Stormwater Management Design Manual*. Implementation of erosion and sediment control measures, and stormwater management measures identified in the SWPPP would minimize potential impacts on water quality and aquatic resources of the East River. The development that would occur within the project site in the future without the proposed project would not result in an increase in impervious surface within the project site, and would not result in an increase in stormwater generated within the project site. The future without the proposed project scenario would not substantially change the amount of pervious surface or stormwater runoff on the project site compared with existing conditions.

It is anticipated that no repairs or modifications to the overwater platform would be required for the No Action condition that would result in in-water activities.

The developments for the No Action condition would not result in an increase in the discharge of sanitary sewage from the project site that would result in adverse impacts to the Newtown Creek WPCP, or have the potential to result in an increase in the frequency or volume of CSOs.

INCREASED FLOWS TO NEWTOWN CREEK BROOKLYN SEWERSHED DUE TO OTHER PROJECTS

The dry weather flow in the Build year without the proposed project for the entire Newtown Creek WPCP drainage area is estimated at approximately 234.8 mgd. This projected flow is well below the Newtown Creek WPCP's permitted daily flow limit of 310 mgd, and would not be expected to adversely affect compliance of the Newtown Creek WPCP effluent with the SPDES permit limits. The results of water quality analyses conducted of these projected flows to the Newtown Creek WPCP for the Build year without the proposed project indicate that changes in the modeled water quality parameters would be minimal and likely undetectable using current water quality measuring techniques. Therefore, the projected increased dry weather flows to the Newtown Creek WPCP in the future without the proposed project would not result in significant adverse impacts to the water quality of the East River, or contribute to violations of Use Class I water quality standards.

The projected annual flow (wet and dry weather) to the Newtown Creek WPCP from the Brooklyn sewershed in the Build year without the proposed project is approximately 37,813 million gallons. The average dry weather flow (sanitary flow) to the Newtown Creek WPCP from the Brooklyn sewershed in the Build year without the proposed project is projected to be approximately 92 mgd. The results of the InfoWorks modeling predict no change in the frequency of CSO events to the East River in the Build year without the proposed project. The frequency of CSO events in the remaining portion of the Brooklyn sewershed is projected to increase by 2 events. CSO volume discharged to the East River and Newtown Creek and its tributaries is projected to increase by approximately 33 mgy (i.e., a total volume of approximately 1,592 mgy) from the existing condition of about 1,559 mgy, an increase of about 2 percent. This minimal change in the volume of CSOs would not result in a significant adverse impact to the water quality of the East River, or Newtown Creek or its tributaries.

OTHER PROJECTS

Proposed and ongoing projects aimed at improving water quality and aquatic resources in the New York/New Jersey Harbor Estuary have the potential to improve water quality and aquatic habitat in the Upper Harbor and East River near the project site. As described below, these projects are independent of the proposed project, and the resulting improvements to water quality and aquatic resources will occur without the proposed project.

New York/New Jersey Harbor Estuary Program Projects

The HEP Final Comprehensive Conservation and Management Plan (CCMP) contains a number of goals to improve water quality and aquatic resources throughout the Harbor Estuary. To meet these goals, the CCMP outlines objectives for the management of toxic contamination, dredged material, pathogenic contamination, floatable debris, nutrients and organic enrichment, and rainfall-induced discharges. Most of these objectives aim to increase knowledge of the nature and extent of various forms of pollution (e.g., toxic chemicals, sewage overflows, and floatables), reduce inputs of these pollutants, and increase the habitat and human use potential of the Harbor Estuary area. The floatables action plan of the HEP aims to reduce the amount of debris in the water of New York and New Jersey. It includes marine debris survey collection programs, improved street cleaning, combined sewer overflow and stormwater abatement, enforcement of solid waste transfer regulations, shoreline cleanup programs, and public education.

The HEP Habitat Workgroup developed watershed-based priorities for acquisition, protection, and restoration. USACE New York District began a feasibility study in 2001 to assess potential sites for habitat restoration in New York Harbor. In May 2003, the Regional Plan Association identified needs and opportunities for environmental restoration in the Hudson-Raritan Estuary. These sites involve the preservation and enhancement of tidal wetlands that will provide improved habitat for fish and macroinvertebrates as well as the birds, mammals, and reptiles that depend on these habitats. While no HEP Acquisition and Restoration Sites have been identified near the project site, habitat restoration activities within the Harbor Estuary will benefit aquatic resources throughout the estuary, including the East River.

New York City Projects

The EPA's National CSO Strategy of 1989 requires states to eliminate dry-weather overflows of sewers, meet federal and state water quality standards for wastewater discharges, and minimize impacts on water quality, plant and animal life, and human health. As of 2007, New York City had spent or committed over $2.1 billion in its citywide CSO abatement program. These measures include eliminating dry-weather sewage discharges to the combined sewer system, reducing illegal discharges, increasing the capture of wet-weather-related floatables, reducing the toxic metals loadings, making improvements to WPCPs, pump stations and collection systems, and mitigating discharges from CSOs.

As required by EPA's CSO Control Policy, DEP initiated its LTCP in 2004. The LTCP will integrate CSO Facility Planning and the Comprehensive Citywide Floatables Abatement Plan, incorporate ongoing Use and Standards Attainment Program (USA) Project work, and develop Waterbody/Watershed Facility Plan Reports and the LTCP for each waterbody area. DEP submitted the "East River and Open Waters Waterbody/Watershed Facility Plan Report," prepared as part of the Citywide Long Term CSO Control Planning Project, to NYSDEC in June 2007. The LTCP monitors and assures compliance with applicable Administrative Consent

Orders between NYSDEC and New York City for the CSO Abatement Program. In addition, DEP plans to increase identification and control of pollutants of concern, including mercury, PCBs, and solvents. The Drainage Basin Specific and LTCP that will be developed are intended to further control CSO discharges. The City's implementation of measures to address CSO discharges, along with other programs, has resulted in dramatic improvements to water quality over the past 30 years. Continuation of the citywide CSO abatement program and implementation of the Waterbody/Watershed Facility Plan for the East River and Open Waters assessment area (DEP 2007c) will result in continued improvements to water quality over the next 10 years. With implementation of the Waterbody/Watershed Facility Plan, the fecal coliform and total coliform concentrations within the Lower East River, where the project site is located, are projected to be in attainment of the Use Class I standards 100 percent of the time. In addition, while the implementation of the Waterbody/Watershed Facility Plan for the East River and Open Waters will not completely eliminate the discharge of organic solids, increases in turbidity after significant rainfall events, or discharges of oil, floating substances, and floating materials, or phosphorus and nitrogen, it will significantly reduce the discharge of these materials and increases in turbidity (DEP 2007c).

State and Regional Projects

The HRE is a cooperative project being led by USACE and the Port Authority of New York and New Jersey (PANYNJ) with involvement from EPA, USFWS, National Oceanic and Atmospheric Administration (NOAA), National Resource Conservation Service, New Jersey Department of Environmental Protection, New Jersey Department of Transportation, NYSDEC, NYSDOS, DEP, DPR, and the New Jersey Meadowlands Commission. The study will identify the actions needed to restore the Hudson-Raritan Estuary and develop a plan for their implementation.

The study area for the program includes all of the waters of the New York and New Jersey Harbor and the tidally influenced portions of all rivers and streams that empty into and ecologically influence the Harbor. The program has drafted a plan that presents an ecosystem approach to restoration of the estuary, provides guidance for selecting specific projects, measurable objectives called target ecosystem characteristics, and tracking program performance.

Thirteen sites in New York and New Jersey have been identified as the first sites for potential restoration projects and feasibility level analysis. It is anticipated that expedited restoration of these sites will provide substantial immediate value to the ecosystem. None of these sites are near the project site.

Overall restoration measures identified by the HRE to enhance aquatic and nearshore terrestrial habitat within the East River include restoring/creating wetlands, softening and revegetating the shoreline, removing contaminated sediment, and restoring and enhancing upland habitat adjacent to the water for management of surface runoff and wildlife habitat (USACE 2004).

THREATENED OR ENDANGERED SPECIES

The threatened or endangered species and candidate species identified as having the potential to occur in the East River near the project site as transient individuals are expected to continue to occur as transient individuals in the future without the proposed project. These species—shortnose sturgeon, Atlantic sturgeon, and the four species of sea turtles—are expected to benefit

from the water quality improvements that would occur as a result of the projects discussed in the previous section.

ESSENTIAL FISH HABITAT

EFH designated for the portion of the East River near the project site is expected to be unchanged in the future without the proposed project. The fish species identified as having EFH in the East River will benefit from the water quality improvements that would occur as a result of the projects discussed above in "Water Quality and Aquatic Resources."

F. FUTURE WITH THE PROPOSED PROJECT

The proposed project would include residential, retail/commercial, and community facility space, and would provide approximately four acres of public open space comprising an approximately 1-acre lawn between the Refinery and the waterfront, as well as a waterfront esplanade and connections to the upland streets.

The existing approximately 1.3-acre overwater platform would be replaced with a new concrete pile-supported platform within the footprint of the existing platform. The existing timber piles would be extracted or cut at the mudline. The new overwater platform would replace the existing approximately 10-foot bent spacing, and 5-foot on center spacing between piles in each bent with 20- to 22-foot bent spacing**,** and 12- to 15-foot on center spacing between piles in each bent, requiring fewer piles than under the existing condition. The footprint of the new piles would total approximately 1,205 sf, compared with the current pile footprint of 1,580 sf.

The proposed project would install new sheet pile bulkhead along the shoreline within the project site. From a point approximately 100 feet south of the southern edge of South 2nd Street to South 5th Street, the existing rock-filled timber crib structure is in deteriorated condition. South of South 4th Street the timber crib structure has completely deteriorated. As a result of these deteriorated conditions below South 2nd Street, the existing MHW elevation is now landward of the original bulkhead location. Within this section of the bulkheaded shoreline, the new sheet pile bulkhead would be driven landward of MHW.

From a point about 100 feet south of South 2nd Street to Grand Street at the northern border of the project site, the existing bulkhead is intact and MHW is located at the bulkhead. Within this section of the bulkheaded shoreline, the new sheet piling would be driven immediately outboard of the existing concrete retaining wall present from a location 100 feet south of South 2nd Street to the north side of South 2nd Street, and immediately outboard of the timber sheeting and concrete retaining wall supported on timber piles present from the north side of South 2nd Street to Grand Street.

The potential for natural resource impacts to occur as a result of the proposed project is discussed below.

GROUNDWATER

Significant adverse impacts to groundwater are not expected to occur as a result of construction or operation of the proposed project. Because groundwater is not used as a potable water supply in this part of Brooklyn, the proposed project would not affect drinking water supplies.

As discussed in Chapter 12, "Hazardous Materials," the project site SVOCs and metals detected in the soil samples collected within the project site were attributed to the presence of urban fill

material. These contaminants were detected at concentrations that would not pose a significant adverse impact to human health or the environment and would not result in significant adverse impacts to groundwater. Hazardous materials (e.g., asbestos-containing materials) would be appropriately addressed prior to or during the demolition of existing structures in accordance with DEP, NYSDEC, OSHA, and EPA requirements, and the construction health and safety plan (CHASP) that has been prepared for the proposed project and approved by DEP. During grading, any hazardous materials encountered would be handled and removed in accordance with DEP, NYSDEC, OSHA, and EPA requirements, and a CHASP. Remediation activities would be conducted in accordance with the DEP-approved Remedial Action Plan (RAP). The RAP prepared for the proposed project outlines general guidelines and measures for remediation and proper handling of soil during construction activities. Implementation of the measures during construction activities would minimize the potential for significant adverse impacts to groundwater quality.

Dewatering activities for construction of the proposed project, if necessary, may require treatment of the groundwater before discharge to the municipal sewer. Before any dewatering activities, sampling would be performed to ensure that any discharged groundwater meets the DEP limitations for effluent to municipal sewers.

FLOODPLAINS AND WETLANDS

CONSTRUCTION

While estuarine wetlands within the study area are identified on the National Wetlands Inventory (NWI) map (see Figure 11-3), these areas are unvegetated, and therefore would be regulated by the USACE as waters of the United States and not as wetlands. Reported water depths along the shoreline of the project site adjacent to the bulkhead (i.e., 0 to 2 feet below MLW) suggest the potential for NYSDEC littoral zone tidal wetlands within the footprint of the overwater platform.

Reconstruction of the overwater platform would be conducted within the footprint of the existing platform and would not result in significant adverse impacts to littoral zone tidal wetlands. The proposed project would install new sheet pile bulkhead along the shoreline within the project site. As discussed previously, from a point approximately 100 feet south of South 2nd Street to the southern end of the project site at South 5th Street, the deteriorated nature of the rock-filled timber crib bulkhead has resulted in an existing MHW elevation that is landward of the original bulkhead location. Within this section of the bulkheaded shoreline, the new sheet piling would be driven landward of the existing MHW elevation, avoiding adverse impacts to littoral zone tidal wetlands. From approximately 100 feet south of South 2nd Street to the northern edge of the project site at Grand Street, new sheet piling would be driven immediately outboard of the existing concrete retaining wall, resulting in the loss of about 414 sf[1]of aquatic habitat, which is expected to include littoral zone tidal wetlands.

[1] From about 100 feet south of South 2nd Street to the north side of South 2nd Street, installation of new sheet piling immediately outboard of the existing concrete retaining wall would adversely affect approximately 94 sf of aquatic habitat within the sheet pile footprint. From the north side of South 2nd Street to Grand Street, installation of new sheet piling immediately outboard of the existing concrete retaining wall supported on timber piles, the outboard edges of which are faced with vertical timber sheeting, would result in the loss of approximately 320 sf of aquatic habitat within the sheet pile footprint.

In total, the proposed installation of new sheet piling within the project site would have the potential to adversely affect approximately 2,700 sf, or 0.06 acres, of shaded littoral zone tidal wetlands within the footprint of the new sheet piling and backfill material[1]. This minimal loss of shaded littoral zone tidal wetland would not result in significant adverse impacts to littoral zone tidal wetland resources within the East River, and would be minimized through the restoration of at least an equal area of shaded aquatic habitat within the project site expected to include littoral zone wetlands. Restoration would be achieved through removal of upland material between the existing MHW elevation and the new sheet pile bulkhead location for portions of the shoreline south of South 2nd Street.

New stormwater outfalls constructed as part of the new storm sewer system for the proposed project are anticipated to be within the new sheet pile bulkhead at the end of South 2nd and South 3rd Streets. Construction of the stone riprap aprons for the two new stormwater outfalls would result in temporary adverse impacts to NYSDEC littoral zone tidal wetlands due to the removal of approximately 142 cy of existing bottom material from within the footprint of the two aprons pads (1,275 sf, or 0.03 acres), and replacement with a similar volume of stone riprap to generally match the existing bottom profile. Some of this area of disturbance is expected to be considered NYSDEC littoral zone tidal wetlands. Construction of the stone riprap aprons would not result in a net placement of fill material within NYSDEC littoral zone tidal wetlands.

Measures would be implemented during these reconstruction activities to minimize any temporary impacts to littoral zone wetlands due to disturbance of bottom sediments. The installation of new sheet piling, removal and driving of piles, construction of the stone riprap aprons, and other in-water construction activities within the littoral zone tidal wetlands would require authorization from NYSDEC under the Tidal Wetlands Act, Article 25 of the Environmental Conservation Law (Implementing Regulations 6 NYCRR PART 661), Protection of Waters, Article 15, Title 5, of the Environmental Conservation Law (implementing regulations 6 NYCRR Part 608) and a Section 401 Water Quality Certificate. These in-water construction activities would also require authorization from the USACE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act.

The proposed project would be covered under the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-08-001. To obtain coverage under this permit, an SWPPP would be prepared and a Notice of Intent (NOI) would be submitted to NYSDEC. The SWPPP would comply with all of the requirements of GP-0-08-001, NYSDEC's technical standard for erosion and sediment control, presented in "New York Standards and Specifications for Erosion and Sediment Control," and NYSDEC's technical standard for the design of water quantity and water quality controls (post-construction stormwater control practices) presented in the New York State Stormwater Management Design Manual. The SWPPP would include both structural (e.g., silt fencing, inlet protection, and installation of a stabilized construction entrance) and non-structural (e.g., routine inspection, dust control, cleaning, and maintenance programs; instruction on the proper management, storage, and handling of potentially hazardous materials), best management practices (BMPs). Implementation of erosion and sediment control measures, and stormwater management measures identified in the SWPPP, would minimize potential impacts on littoral zone tidal

[1] This calculation assumes that all of the habitat affected would be classified as NYSDEC littoral zone tidal wetlands.

wetlands along the edges of the project site associated with discharge of stormwater runoff during land-disturbing activities resulting from construction of the proposed project.

OPERATION

As discussed in "Existing Conditions," the project site is located within three flood zones. The western and central portions of the project site are located within the 100-year (Zone AE) or 500-year (Zone X Shaded) floodplain. The easternmost portion is located outside the 500-year floodplain (Zone X Unshaded). Portions of the existing overwater platform in the southern part of the project site, and some upland area, are within the 100-year floodplain. Most of the upland area within the 100-year flood plain would comprise the open space area proposed between South 2nd and South 3rd Streets and the waterfront esplanade.

Clean fill may be placed over portions of the project site designated for the approximately 1-acre open space area adjacent to the esplanade or other open space areas that would not be covered by impervious surface or structures. The possible placement of clean fill within the open space areas and reconstruction of the overwater platform would not exacerbate flooding conditions near the project site. New York City is affected by local (e.g., flooding of inland portions of the city from short-term, high-intensity rain events in areas with poor drainage), fluvial (e.g., rivers and streams overflowing their banks), and coastal flooding (e.g., long and short wave surges that affect the shores of the Atlantic Ocean, bays such as Upper New York Bay, and tidally influenced rivers such as the East River, streams, and inlets [FEMA 2007]). The floodplain within and adjacent to the project site is affected by coastal flooding, which is influenced by astronomic tide and meteorological forces (e.g., northeasters and hurricanes [FEMA 2007]), and, therefore, would not be affected by the proposed project. The use of this portion of the 100-year floodplain for open space areas would not adversely affect the floodplain.

As discussed in Chapter 14, "Infrastructure," the proposed project would result in an increase in the portion of the project site covered by pervious surface as a result of the development of the open space areas. The increase in pervious surface would result in a decrease in surface runoff generated within the project site. In addition, stormwater best management practices (BMPs), implemented as part of the SWPPP developed for the proposed project, would regulate the quality and rate at which stormwater is discharged from the project site through a new separate storm sewer. Because the 100-year floodplain within the project site is influenced by coastal flooding rather than local or fluvial flooding, the discharge of stormwater from the project site would not result in significant adverse impacts to the 100-year floodplain or affect flooding in adjacent areas.

The top of the new overwater platform would be at elevation +11 NGVD (+8.5 Brooklyn Borough Highway Datum), which is 1 foot above the 100-year flood elevation of +10 NGVD (i.e., +7.5 Brooklyn Borough Highway Datum). The slab of the below grade parking level and the mechanical-electrical-plumbing spaces for the four buildings along the East River would be below the 100-year flood elevations, but the basement structures would be floodproofed and designed structurally to withstand the hydrostatic pressure exerted by the groundwater (which will also rise to about the 100-year elevation during a 100-year flood), consistent with Appendix G of the *New York City Building Code*. For these reasons, the proposed project would minimize the potential for public and private losses due to flood damage, and reduce the exposure of public utilities to flood hazards.

The slabs for the retail spaces for these structures would be at elevation +21.2 NGVD (+18.6 Brooklyn Borough Highway Datum), about 11 feet above the 100-year flood elevation.

Therefore, the proposed project would be consistent with the New York City Building Code requirement that residential buildings have a finished floor elevation (FFE) at or above the Base Flood Elevation (BFE)[1] for the 100-year flood, and would meet the minimum elevation requirements for the lowest floor relative to the design flood elevation (DFE) as specified in Appendix G: "Flood Resistant Construction," of the New York City Building Code (http://home2. nyc.gov/html/dob/ downloads/pdf/cc_appendix_g.pdf) for the applicable building category (see Table 1604.5 of the *New York City Building Code* or Table 1-1 of Appendix G to the *New York City Building Code*). The proposed project would result in the development of buildings that may be classified as Structural Occupancy Category II and/or III in accordance with the New York City Building Code. Within A-Zones, the minimum elevation of the lowest floor for Category II structures must be at the BFE, and must be at least one foot above the BFE for Category III buildings.

Projections of sea-level rise, changes in 100-year flood elevation, and reduction of the 100-year flood return period have been generated by the New York City Panel on Climate Change[2] (NPCC). The *Climate Risk Information* report released by the NPCC, was prepared as part of PlaNYC, the City's comprehensive sustainability plan, to advise the Mayor and the New York City Climate Change Adaptation Task Force on issues related to potential impacts on infrastructure due to climate change (i.e., temperature, precipitation, rising sea levels, and extreme events). Projections for New York City were developed using Intergovernmental Panel on Climate Change (IPCC)-based methods to generate model-based probabilities for sea level rise in the 2020s, 2050s and 2080s from global climate model (GCM) simulations based on three Greenhouse Gas (GHG) emission scenarios developed by the IPCC[3]. The methods used to project sea level rise for the New York City region included global expansion of the oceans due to warming, meltwater from glaciers, ice caps, and ice sheets, and local land subsidence and water surface elevation. In addition to the IPCC approach to sea level rise, the NPCC also employed an alternative "rapid ice-melt" approach, which is based on an extrapolation of recent accelerating rates of ice melt from Greenland and West Antarctic ice sheets and paleoclimate studies that suggest sea level rise on the order of approximately 41 to 55 inches by the 2080s.

Current rates of sea level rise[4] in New York City range between 0.86 and 1.5 inches per decade. The long-term rate since 1900 averages 1.2 inches per decade. The NPCC report projects a sea level rise, or increase in the flood height associated with the 100-year flood, in New York City for the 2020s period (i.e., a 30-year period extending from 2010 to 2039), the period applicable to the 2020 build year, of 2 to 5 inches based on GCM simulations.[5] The placement of the elevation of the lowest floor for the proposed buildings at elevation +21.2 NGVD +18.6 Brooklyn Borough Highway Datum), about 11 feet above the current BFE, would result in the

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[1] At the project site, the BFE for 100-year flood is +7.5 feet Brooklyn Borough Highway Datum.

[2] New York City Panel on Climate Change. Climate Risk Information, February 17, 2009, http://www.nyc.gov/html/planyc2030/html/plan/climate.shtml.

[3] IPCC Special Report on Emissions Scenarios (SRES), IPCC 2000.

[4] Observed current rates of sea level rise over the past century can be attributed to regional subsidence of the earth's crust and expansion of the oceans as they warm due to global increases in temperature (NPCC 2009).

[5] Range of projected sea level rise represents middle 67 percent of values from model-based probabilities to the nearest inch at the Battery, as presented in *Climate Risk Information*, New York City Panel on Climate Change, February 17, 2009.

elevation of the lowest floor that would also be well above the NPCC projected increased 100-year flood elevation in the 2020s. Due to the proposed 1-foot separation between the top of the reconstructed overwater platform and the current 100-year flood elevation, the top of the platform would continue to be above the NPCC projected 100-year flood elevation in the 2020s. Therefore, the design for these structures would reduce the potential for public and private loses due to flood damage under current and projected flood conditions.

Operation of the proposed project is not expected to result in long-term significant adverse impacts to existing NYSDEC-designated littoral zone wetlands. Implementation of the SWPPP developed for the project site would minimize potential impacts to existing NYSDEC-designated littoral zone tidal wetlands. A new storm sewer system would be constructed on the project site that would separate stormwater and sanitary sewage flow. This new storm sewer would remove stormwater generated within the project site from the combined sewer system, eliminating the potential for stormwater to affect CSOs. As discussed above, stormwater BMPs implemented within the project site would regulate the quality and rate of stormwater discharge from the project site. Therefore, the discharge of stormwater from the project site would not result in adverse impacts to littoral zone tidal wetlands within the project site.

As detailed in Chapter 7, "Shadows," the proposed project would result in incremental shadows from the new development on portions of the East River during the morning hours throughout the year. However, the incremental shadows would be on the outboard edge of the overwater platform, a portion of the East River too deep to be designated littoral zone tidal wetlands. Therefore, the incremental shadows resulting from the proposed project would not adversely affect littoral zone tidal wetlands.

AQUATIC RESOURCES

WATER QUALITY

Construction

Implementation of erosion and sediment control measures (e.g., silt fences and straw bale dikes), and stormwater management measures, as part of the SWPPP during construction and operation of the proposed project, would minimize potential impacts to water quality of the East River associated with stormwater runoff during land-disturbing activities that would occur in upland areas. These activities would include demolition of existing structures, debris removal, excavation activities for site grading, foundation work and placement of utilities, and placement of clean fill within the project site where required as part of remediation activities. During these activities, any hazardous materials encountered would be handled and removed in accordance with DEP, NYSDEC, OSHA, and EPA requirements, and the DEP-approved RAP and CHASP. The implementation of these measures, and the SWPPP prepared for the proposed project during construction activities, would minimize the potential for significant adverse impacts to surface water quality.

Groundwater recovered during dewatering of excavations would be sent to an on-site sedimentation tank so that the suspended solids could settle out. The decanted water would be discharged into the New York City combined sewer system, and the settled sediment conveyed to a licensed disposal area. Water discharged into the New York City combined sewer is regulated by DEP. In the event dewatering is necessary, a DEP Sewer Discharge Permit must be obtained prior to discharge to the combined sewer system, and a Long Island Well Permit requested if groundwater withdrawal exceeds 45 gallons per minute.

In-water construction activities for the proposed project with the potential to result in sediment disturbance include removal of the piles for the overwater platform, installation of the new sheet pile bulkhead, construction of the stone riprap aprons, and driving of piles to support the reconstructed overwater platform. These in-water construction activities would require authorization from the USACE under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act, and from NYSDEC under Protection of Waters, Article 15, Title 5, of the Environmental Conservation Law (implementing regulations 6 NYCRR Part 608), Tidal Wetlands, Article 25, of the Environmental Conservation Law (implementing regulations 6 NYCRR Part 661), and a Section 401 Water Quality Certificate. In-water and shoreline construction work would be done using a barge-based crew using barge-mounted cranes. Floating debris screens would be in place throughout demolition and construction activities to capture floating debris. Sediment disturbance associated with the in-water construction activities listed above has the potential to result in minor, short-term increases in suspended sediment and, as a consequence, resuspension and re-deposition of sediment-associated contaminants. These temporary effects would be localized and confined to the immediate vicinity of construction activities. During these in-water construction activities, appropriate measures such as the use of a floating boom and silt curtain to capture floating debris and to contain sediment resuspended during bottom disturbing construction activities, would be implemented to minimize increases of suspended sediment.

The maximum current velocities reported for the East River range from 1 to 5 knots, with the average maximum current velocities ranging from 1.7 to 2.8 knots. Therefore, any sediment resuspended during pile driving or shoreline activity associated with the replacement of the bulkhead would move away from the area of in-water construction and would be expected to dissipate shortly after the completion of pile driving and other in-water construction activity. In addition, the temporary, localized increases in suspended sediment during pile driving would be intermittent, occurring during the 20 to 60 minutes anticipated for the driving of each new pile, and followed by a period of no sediment-disturbing activity while the next pile is being prepared for installation. Therefore, in-water construction activities would not result in significant adverse impacts to water quality. Similarly, any contaminants released to the water column as a result of sediment disturbance would be expected to dissipate rapidly and would not result in significant long-term impacts to water quality.

Operation

The proposed project would result in an increase in the portion of project site covered by pervious surface from about 4 percent under the existing condition to about 17 percent. The increase in pervious surface within the project site would reduce the rate of stormwater discharge to the East River. In addition, stormwater BMPs (i.e., hydrodynamic separators and stormwater detention) implemented as part of the SWPPP developed for the proposed project would regulate the quality and rate at which stormwater is discharged from the project site through a new separate storm sewer. Implementation of these measures, as well as other stormwater management measures specified in the SWPPP, would minimize potential impacts to the East River from the discharge of stormwater from the project site. A new sewer system would be constructed on the project site that would separate stormwater and sanitary sewage flow. This new storm sewer would remove stormwater generated within the project site from the combined sewer system, eliminating the potential for stormwater to affect CSOs and adversely affect East River water quality. The developer would construct and install the new sewer lines.

As discussed in Chapter 14, "Infrastructure," the proposed project would result in the discharge of approximately 787,352 gallons per day (gpd) of sanitary sewage from the project site to the combined sewer system, which represents about 0.3 percent of the average wastewater flows at the Newtown Creek WPCP, and 0.25 percent of its SPDES permitted daily dry weather flow limit of 310 mgd, and would not be expected to adversely affect compliance of the Newtown Creek WPCP effluent with the SPDES permit limits. The results of water quality analyses conducted of these projected flows to the Newtown Creek WPCP for the Build year with the proposed project indicate that changes in the modeled water quality parameters would be minimal and likely undetectable using current water quality measuring techniques. Therefore, the projected increased dry weather flows to the Newtown Creek WPCP in the future with the proposed project would not result in significant adverse impacts to the water quality of the East River, or contribute to violations of Use Class I water quality standards.

The projected annual flow (wet and dry weather) to the Newtown Creek WPCP from the Brooklyn sewershed in the Build year with the proposed project is approximately 38,105 million gallons, an increase of 292 million gallons (i.e., 0.8 percent) from the future condition without the project, and an increase of 2,818 mgy from the 2007 existing condition (i.e., 8 percent). The results of the InfoWorks modeling conducted to assess potential impacts to the combined sewer system, and CSO frequency and volume due to the projected future total flow to the Newtown Creek Brooklyn sewershed with the proposed development projects an increase in CSO volume discharged to the East River and Newtown Creek and its tributaries of approximately 2 mgy (i.e., total volume of approximately 1,595 mgy) from the future condition without the project (i.e., total volume of approximately 1,593.5 mgy), an increase of about 0.1 percent, and increase by about 35 mgy (2.3 percent increase) from the 2007 existing condition. This minimal change in the volume of CSOs would not result in a significant adverse impact to the water quality of the East River, or Newtown Creek or its tributaries.

The incremental impact of the projected increased dry weather flow in the Build year with the proposed project at individual combined sewer outfalls varies. Due to the particular hydraulics of the sewer system, one of the outfalls with the largest impacts is outside the project site, located on Wallabout Channel to the west of the project site. CSO volume at this outfall is projected to increase by 0.8 mgy from the future condition without the proposed project, an increase of 0.30 percent.

Stormwater on the project site would be collected on-site and conveyed through a network of separate storm sewers and discharged into the East River. The proposed project would divert approximately 3.1 mgy of stormwater from the combined sewer system, discharging this flow to the on-site stormwater management system and then to the East River.

In summary, the projected average daily flow to Newtown Creek WPCP in 2020 with the proposed project would not affect compliance of the effluent with the SPDES permitting conditions and would not result in the failure of East River water quality in the vicinity of the Newtown Creek WPCP to meet the Use Classification I water quality standards. The increased flow of sanitary sewage to the combined sewer would not result in an increase in CSO events, and would result in a minimal increase in CSO volume and pollutant loading to the East River, which would not result in water quality conditions that fail to meet Class I (East River) standards.

Management of the landscaped portions of the waterfront esplanade and waterfront open space area within the project site would include implementation of an Integrated Pest Management (IPM) strategy to minimize use of fertilizers, pesticides, and herbicides in accordance with DPR

policies. Implementation of the IPM would minimize potential impacts to stormwater quality from surface runoff generated within these open space areas.

The proposed project would result in fewer, more widely spaced piles within the area of the overwater platform than under the existing condition. This wider spacing would result in improved flow under the platform, which may result in some improvement to water quality under the platform. In addition, the installation of new sheet piling inboard of the MHW elevation would prevent future erosion from this portion of the project site, and the associated increase in suspended sediment.

AQUATIC BIOTA

Construction

Implementation of the SWPPP would minimize potential adverse impacts to aquatic biota from the discharge of stormwater during construction of the upland project elements. As described above under "Water Quality," in-water construction activities with the potential to result in sediment disturbance, and resulting increases in suspended sediment, include removal of piles for the existing overwater platform, construction of stone riprap aprons for the outfalls, installation of the new sheet pile bulkhead, and driving of piles to support the new overwater platform. Increases in suspended sediment have the potential to result in temporary adverse impacts to fish and macroinvertebrates. However, as described previously, increases in suspended sediment would be localized and temporary and would not result in significant adverse impacts to aquatic biota of the East River. While East River sediments have been found to contain contaminants at concentrations that may pose a risk to some benthic macroinvertebrates, the resuspended sediments are expected to be widely dissipated such that redeposition within or outside the study area is not expected to adversely affect benthic macroinvertebrates or bottom fish.

Life stages of estuarine-dependent and anadromous fish species, bivalves, and other macroinvertebrates are fairly tolerant of elevated suspended sediment concentrations and have developed behavioral and physiological mechanisms for dealing with variable concentrations of suspended sediment (Birtwell et al. 1987, Dunford 1975, Levy and Northcote 1982 and Gregory 1990 in Nightingale and Simenstad 2001, LaSalle et al. 1991). Fish are mobile and generally avoid unsuitable conditions in the field, such as increases in suspended sediment and noise (Clarke and Wilber 2000). While the localized increase in suspended sediment may cause fish to temporarily avoid the area where bottom-disturbing activities are occurring, the affected area is expected to be small. Similar suitable habitats would be available for use by fish to avoid the area being disturbed. Fish also have the ability to expel materials that may clog their gills when they return to cleaner, less sediment-laden waters. Most shellfish are adapted to naturally turbid estuarine conditions and can tolerate short-term exposures by closing valves or reducing pumping activity. More mobile benthic invertebrates that occur in estuaries have been found to be tolerant of elevated suspended sediment concentrations. In studies of the tolerance of crustaceans to suspended sediments that lasted up to two weeks, nearly all mortality was caused by extremely high suspended sediment concentrations (greater than 10,000 mg/L) (Clarke and Wilber 2000), which would not occur from the in-water work associated with the proposed project. Therefore, temporary increases in suspended sediment resulting from in-water construction activities are not expected to result in significant adverse impacts to fish and mobile benthic macroinvertebrates.

Pile driving can produce underwater sound pressure waves that can affect fish, with the type and intensity of sounds varying with factors such as the type and size of the pile, firmness of the substrate, depth of water, and the type and size of the pile driving hammer. Larger piles and firmer substrate require greater energy to drive the pile resulting in higher sound pressure levels (SPL). Hollow steel piles appear to produce higher SPLs than similarly sized wood or concrete piles (Hanson et al. 2003). Sound attenuates more rapidly in shallow waters than in deep waters (Rogers and Cox 1988 in Hanson et al. 2003). SPLs generated by the driving of hollow steel piles with impact hammers can reach levels that can injure fish (Hanson et al. 2003), and may not generate sound in the frequencies that elicit avoidance behavior in fish. Impact hammers generate short pulses of sound with little of the sound energy occurring in the infrasound frequencies, the sound frequencies that have been shown to elicit an avoidance response in fish (Enger et al. 1993, Knudsen et al. 1994, and Sand et al. 2000 in Hanson et al. 2003). Therefore, fish have been observed exhibiting an initial startle response to the first few strikes of an impact hammer, after which fish may remain in an area with potentially harmful sound levels (Dolat 1997, NMFS 2001 in Hanson et al. 2003). While there is little data available on the SPL required to injure fish, fish with swim bladders and smaller fish have been shown to be more vulnerable (Hanson et al. 2003).

It is anticipated that the piles installed for the new overwater platform will be precast/prestressed concrete type piles which, as discussed above, produce lower SPLs than hollow steel piles. During the approximately 22-month in-water construction period (i.e., extracting or cutting of piles, pile driving, and installation of sheet pile bulkhead) that would occur primarily during two in-water construction phases starting in April and ending in November in 2013 and 2014, pile driving itself is expected to last a total of approximately 12.5 months (approximately 5.5 months of pile driving is expected to occur during the first 8.5-month phase of platform reconstruction and 7 months during the second 10-month phase of platform reconstruction). The length of time for driving each new pile should be less than one hour, typically 15 to 20 minutes of actual driving time. Because the length of time for driving each pile is expected to be short, and the sound generated during pile driving intermittent, individual fish would not be exposed to potentially dangerous SPLs long enough to result in mortality. Therefore, the pile driving that would occur as a result of the proposed project would not result in significant adverse impacts to aquatic biota. No pile driving or other in-water construction activities would occur during the November to April window typically imposed by regulatory agencies to protect certain fish species overwintering in the Harbor Estuary (e.g., winter flounder and striped bass).

The construction of in-water project elements (i.e., stone riprap aprons associated with the two stormwater outfalls, new sheet pile bulkhead, and new piles for the replacement overwater platform), would adversely affect aquatic biota through the loss of aquatic habitat and possibly some benthic invertebrate individuals. However, these adverse impacts would be minimal and, as discussed below under “Operation,” would be offset through the restoration of aquatic habitat achieved through the removal of piles for the existing overwater platform, and bottom material between the MHW elevation and the new landward location of the sheet pile bulkhead, as discussed . The construction of the two stone riprap aprons to be located below the stormwater outfalls at the western terminus of South 3rd Street and South 2nd Street would result in the removal of approximately 142 cy of bottom material within an approximately 1,275-square-foot area (0.03 acres), and replacement with an equal volume of stone riprap. As described above under “Floodplains and Wetlands,” the proposed installation of new sheet piling within the project site would have the potential to adversely affect approximately 414 sf (0.01 acres) of shaded littoral zone tidal wetlands, and their use as aquatic habitat, within the footprint of the

new sheet piling and backfill material, as well as the loss of benthic macroinvertebrates associated with these areas that are unable to move from the area of activity. Driving of piles to support the reconstructed overwater platform would result in the loss of approximately 1,205 sf (0.03 acres) of benthic habitat, and benthic macroinvertebrates associated with these areas that are unable to move from the area of activity. The temporary loss of aquatic habitat within the area of disturbance for the stone riprap aprons, the small loss of shaded aquatic habitat for benthic macroinvertebrates and fish within the area of disturbance for the new sheet pile bulkhead and piles, the loss of some benthic macroinvertebrates within the area of disturbance for these in-water construction activities, and the loss of open water habitat that would become unavailable with the installation of the new sheet pile bulkhead north of South 2nd Street[1], would not be expected to result in significant adverse impacts to populations of aquatic species using shaded habitats within the East River.

Operation

The proposed project would not result in water quality conditions within the East River that fail to meet Class I standards. As discussed under "Water Quality," potential impacts to aquatic biota from the discharge of stormwater would be minimized through the implementation of the SWPPP and the implementation of an IPM strategy to minimize adverse impacts to stormwater quality from vegetation management of landscaped areas. The increased discharge of sanitary sewage to the combined sewer system is not expected to result in significant adverse impacts to water quality of the East River in the vicinity of the Newtown Creek WPCP, or within the vicinity of CSOs that receive flow from regulators receiving sanitary sewage from the proposed project. Therefore, discharges of sanitary sewage to the combined sewer system would not result in significant adverse impacts to aquatic biota.

Because the proposed project would replace the existing overwater platform with a new overwater platform of the same size, there would be no increase in the amount of aquatic habitat affected by shading. Therefore, the proposed project would not have the potential to result in significant adverse impacts to aquatic habitat due to shading from overwater structures.

The replacement of existing bottom material with riprap for the proposed outfall aprons would not be expected to result in significant adverse impacts to aquatic biota. Encrusting organisms and benthic macroinvertebrates would be expected to quickly colonize the newly placed stone material. The proposed stone riprap for the outfall aprons may benefit aquatic resources by increasing the diversity of aquatic habitat for benthic macroinvertebrates and fish available within the project site. In general, the greater the physical complexity the better the aquatic habitat. In-water structures such as riprap have rough surfaces with many interstitial spaces and a high surface area to volume ratio (USACE 1993) that provide more surface area for invertebrates that attach to surfaces (fouling community), and habitat (foraging and refuge) for fish (Heiser and Finn in Chmura and Ross 1978).

The permanent loss of benthic macroinvertebrates within the footprints of the new piles and the sheet pile bulkhead (a total of approximately 414 sf, or 0.01 acres) would not significantly impact the food supply for fish foraging in the area. In addition, these adverse impacts to aquatic resources would be minimized through the restoration of shaded aquatic habitat within the

[1] The existing concrete retaining wall north of South 2nd Street has an approximately 4.5-foot-wide ledge that is exposed to the river. With the proposed installation of the new sheet pile bulkhead, this ledge would no longer be exposed to the river.

project site at least equal in area to the area of habitat impacted by the placement of the new sheet piling, as described previously, and the restoration of approximately 1,580 sf (0.04 acres) of aquatic habitat achieved by removing the existing piles (i.e., between 1,700 and 1,800 existing piles) that support the overwater platform. This newly exposed bottom habitat would be expected to be quickly recolonized by macroinvertebrates, and the new piles would provide additional attachment sites for algae and sessile macroinvertebrates. The new pile configuration proposed for the overwater platform (i.e., between 400 and 500 piles), when compared to the existing pile configuration, would result in a net increase in aquatic habitat of 375 sf. The increased pile spacing[1] should also allow better flushing of the area under the platform, improving the habitat for aquatic biota. Therefore, the proposed project may result in benefits to aquatic biota.

As detailed in Chapter 7, "Shadows," the proposed project would result in incremental shadows from the new development on portions of the East River during the morning hours throughout the year. The current flows rather swiftly in the East River and would move phytoplankton and zooplankton quickly through the shaded areas. Therefore, project-generated shadows would not be expected to affect primary or secondary productivity within the East River, and would not be expected to result in significant adverse impacts to other aquatic biota.

TERRESTRIAL RESOURCES

CONSTRUCTION

As noted previously, wildlife habitat within the project site is limited to the wading bird and waterfowl perching and resting areas on the overwater platform and the low-quality terrestrial habitat found within the upland portions of the project site. The proposed project would result in the demolition of existing structures, grading, and excavation during construction that would result in the removal of the existing urban structure exterior habitat and small urban vacant lot areas with minimal vegetation. The loss of this habitat would have the potential to adversely affect some individual birds and other wildlife currently using the limited wildlife habitat within the project site should these individuals be unable to find suitable available habitats nearby. However, the wildlife species expected to occur within this area are common to urban areas, and the loss of some individuals would not result in a significant adverse impact on the bird and wildlife community of the New York City region. Therefore, no significant adverse impacts to terrestrial resources are expected as a result of construction of the proposed project.

OPERATION

The operation of the proposed project would increase public access to the East River waterfront. While human activity is prevalent within the study area, the nature of the human activity under the proposed project is expected to change. Approximately four acres of open space would be created within the project site, and this open space would connect to the existing Grand Ferry Park to the north. Street trees would also be planted along the public streets located adjacent to the project site. The approximately 1-acre open space area adjacent to the esplanade and waterward of the Refinery would be lawn. The esplanade would have a pedestrian path that

[1] The new overwater platform would have 20 to 22-foot bent spacing and 12- to 15-foot on center spacing between piles in each bent, compared with the existing approximately 10-foot bent spacing, and 5-foot on center spacing between piles in each bent.

would be bordered with trees in planters at grade. Several active recreation areas would be located along the esplanade, including tot lots and active play lawn. Landscaping vegetation within the proposed open space areas would provide higher quality habitat for wildlife than currently found within the project site. Street trees would also provide habitat for urban-tolerant birds and other wildlife. The landscaping that would be present as a result of the proposed project would also have the potential to provide improved resting or stopover habitat for migratory songbirds during the spring and autumn migrations. However, this increase in bird habitat for resident and migratory species would have the potential to result in bird strikes on glass surfaces associated with the proposed development.

The maximum heights of the buildings to be developed on the project site would reach up to 300 and 400 feet on portions of the site. These building heights would be taller than the existing buildings immediately surrounding the project site but comparable to new buildings being developed on the waterfront several blocks to the north of the project site. Building height, nighttime lighting, and the reflective nature of glass façades would affect the potential for the proposed buildings to result in collisions by birds migrating at night (Schmidt-Koenig 1979, Ogden 1996, Avery et al. 1976 in Ogden 1996, Martin 1990 in Ogden 1996). In addition, landscaping design and the design of the lower building stories would affect the potential for the proposed buildings to cause daytime bird strikes. Approximately 75 percent of nocturnally migrating songbirds do so at altitudes of between 500 and 2,000 feet (600 meters) above the surface (Deinlein undated, Kerlinger 1995). In general, structures that are about 500 feet or less in height (i.e., below the migratory altitude for most migratory songbirds) would be expected to pose a lower risk for bird collisions. Therefore, the proposed maximum building height within the project site (i.e., 400 feet) would pose a low risk for bird losses due to building strikes, and no significant adverse impacts to populations of songbirds migrating through New York City are expected. Consideration will be given to incorporating measures to reduce the potential for resident and migratory bird strikes, such as those outlined in the New York City Audubon *Bird-Safe Building Guidelines* (undated, www.nycaudubon.org).

As discussed in Chapter 7, "Shadows," the proposed esplanade and open space area along the waterfront would receive incremental shadow in the mornings throughout the year but would be sunlit during afternoons. Shade-tolerant native plants would thrive in these areas and would provide habitat for wildlife. This level of shading would not be expected to result in adverse impacts to wildlife habitat or populations.

THREATENED OR ENDANGERED SPECIES

Construction and operation of the proposed project would not be expected to result in significant adverse impacts to the use of the Williamsburg Bridge for nesting by peregrine falcons. Nesting peregrine falcons did not occur on the Williamsburg Bridge in 2008, although a nesting platform is present on the Manhattan side of the bridge. Unsuccessful nesting attempts have occurred on the Williamsburg Bridge in past years. Additional coordination would be conducted with NYSDEC, NYNHP, and DEP prior to the anticipated start of construction with respect to peregrine falcon nesting activity on the Williamsburg Bridge. Peregrine falcons not breeding in the vicinity of the project site that may forage in the vicinity of the project site (such as falcons linked to the 55 Water Street nest in lower Manhattan) would not be adversely impacted by construction activities resulting from the proposed project. In the event that peregrine falcon nesting activity is documented as occurring on or near the project site (i.e., the Williamsburg Bridge and/or nearby buildings) prior to or during construction of the proposed project, measures to minimize potential adverse impacts to peregrine falcons would be developed in

coordination with NYSDEC and DEP. These measures would focus on minimizing potential impacts to nesting, foraging or roosting activity by adult falcons and offspring in the vicinity of proposed construction. Potential measures could include bird control devices on the tops of cranes or other tall construction equipment to prevent young falcons from landing on such equipment and becoming entangled or otherwise injured.

Peregrine falcons are accustomed to the intensely developed habitats of New York City and are not expected to experience a significant adverse impact due to the proposed project.

The preference of shortnose sturgeon and Atlantic sturgeon for deep-water habitat (e.g., Upper Hudson River) suggests that it is unlikely that individuals of these species would occur near the project site except as transients. Because water quality impacts associated with construction of the proposed project would be limited and localized to the shoreline, the deep channel habitat preferred by these species while in transit to and from spawning and nursery habitat would not be impacted during the proposed construction. Operation of the proposed project would not result in any significant adverse impacts on water or sediment quality. Therefore, no significant adverse impacts would occur to the federally and state-listed endangered shortnose sturgeon, or to the Atlantic sturgeon.

The four turtle species noted by NMFS, when present within in-shore waters, are more likely to occur in Long Island Sound and Peconic/Southern Bays. Because they neither nest nor reside in the area year-round, and are only rarely observed in this portion of the estuary, they are not expected to be adversely affected by the construction or operation of the proposed project.

In sum, based on the above considerations, the proposed project is not expected to result in significant adverse impacts to any federally or state-listed endangered species or habitats of concern.

ESSENTIAL FISH HABITAT

As discussed under "Aquatic Resources," in-water construction activities with the potential to result in sediment disturbance and resulting increases in suspended sediment, include removal/cutting of piles for the existing overwater platform, installation of the new sheet pile bulkhead, construction of the stone riprap aprons for the two stormwater outfalls, and driving of piles to support the reconstructed overwater platform. However, as described previously, increases in suspended sediment would be localized and temporary and would not result in significant adverse impacts to aquatic biota of the East River and would not adversely affect EFH.

The permanent loss of benthic macroinvertebrates within the footprints of the new piles or sheet pile bulkhead being installed outboard of the existing bulkhead within the portion of the project site north of South 2nd Street would not significantly impact the food supply for fish foraging in the area. The replacement of the existing overwater platform with one of the same size would not result in increased shading of fish habitat. In addition, the reconstruction of the overwater platform with fewer more widely spaced piles would be expected to improve water quality under the platform and result in a net increase of open water habitat of 375 sf. Operation of the proposed project would not result in any significant adverse impacts on water or sediment quality. Therefore, operation of the proposed project would not result in significant adverse impacts to EFH. ✷