A. INTRODUCTION

This chapter examines the potential impacts from the St. George Waterfront Redevelopment (the proposed project) on terrestrial and aquatic natural resources and floodplains near the project sites along the waterfront in northern Staten Island's St. George neighborhood. This chapter describes:

- The regulatory programs that protect floodplains, wildlife, threatened or endangered species, aquatic resources, or other natural resources within the project sites;
- The current condition of the floodplain and natural resources within the project sites, including groundwater, water and sediment quality, aquatic and 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 "No-Action" condition);
- The potential impacts of the proposed project on the floodplain, water quality, and natural resources (the With-Action condition); 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, water quality, and floodplains.

PRINCIPAL CONCLUSIONS

As detailed in this chapter, the condition of water quality, aquatic biota, wetlands, floodplains, groundwater, and terrestrial natural resources within and near the project sites would remain generally unchanged in the With-Action condition. The project would include mixed-use redevelopment of existing waterfront parking lots that presently contain minimal natural resources other than small areas of manicured lawn with trees, ruderal vegetation, and disturbance-tolerant wildlife species that are ubiquitous in urban areas. In addition, a waterborne transit landing may be pursued as a third project component independent of the proposed North and South Site developments. The potential waterborne transit landing would be established to service the project sites from New York Harbor. ~~Proposed landscaping plans and building green roofs would reduce existing impervious surface coverage, thereby decreasing stormwater runoff and flooding, and~~

With the implementation of stormwater management measures in accordance with the Stormwater Pollution Prevention Plan(s) (SWPPPs) prepared for the proposed project the discharge of stormwater with the proposed project would not adversely affect ~~benefitting~~ water quality, New York State Department of Environmental Conservation (NYSDEC) littoral zone tidal wetlands, and aquatic biota ~~offshore during project operation~~ in the vicinity of the stormwater outfalls discharging stormwater from the proposed project. Potential sediment suspension and harbor bottom disturbance during operation of the potential waterborne transit

landing would not be expected to have significant adverse impacts to the Harbor's tidal wetlands, water quality, or aquatic biota. Similarly, runoff from the additional areas of impervious coverage within the NYSDEC tidal wetlands Adjacent Area located within the North Site and Bank Street Expansion area would be conveyed subject to stormwater quality treatment practices and the discharge of this treated stormwater would not adversely affect NYSDEC littoral zone tidal wetlands. Authorization under Article 25 of the Environmental Conservation Law (ECL) would be required from NYSDEC for the proposed development within the NYSDEC tidal wetlands Adjacent Area.

The proposed project would result in an increase in the coverage of impervious surfaces, primarily on the North Site. However, with implementation of green roofs, the proposed project would result in a net increase in vegetation cover and diversity of wildlife habitat at the project sites, which would potentially benefit some wildlife such as insects and songbirds. However, the project sites would likely support the same community of urban-adapted wildlife as at present. Collisions of migrating birds with the Wheel would likely be rare with the anticipated implementation of certain lighting practices and restrictions. Threatened or endangered species with the potential to occur in the area are limited to transient sea turtles and sturgeon that may occasionally and briefly occur offshore from the project sites; because operation of the proposed project would not significantly affect water quality or habitat conditions in Upper New York Harbor in the vicinity of the project sites, there would be no direct or indirect effects on any individuals of these species. Overall, operation of the proposed project would not have significant adverse impacts to natural resources or floodplains in the area, and with the implementation of stormwater management measures, the increase in impervious surface would not adversely affect water quality, aquatic biota, or NYSDEC littoral zone tidal wetlands of the Upper New York Harbor within the vicinity of the project site. ~~may slightly improve water quality by increasing pervious surface coverage and improving stormwater capture.~~

As discussed in Chapter 1, "Project Description," it is possible that the project sites could be developed with a No Catering Facility Scenario. The findings presented in this chapter would be the same for the No Catering Facility Scenario.

B. METHODOLOGY

STUDY AREA

The project area consists of the North Site, the South Site, the Bank Street Expansion, and the potential waterborne transit landing site that is located along the shoreline between the North Site and South Site. Terrestrial natural resources and floodplains were evaluated within 400 feet of the boundaries of the project sites (see **Figure 9-1**). Threatened, endangered, and special concern species were evaluated for a distance of 0.5 miles from the project sites. The study area for water quality and aquatic resources included the overall aquatic resources within the Upper New York Bay.

EXISTING CONDITIONS

Existing conditions for floodplains and natural resources within the study area were summarized from:

- Existing information identified in literature and obtained from governmental and nongovernmental sources (see **Appendix D**), such as the New York City Department of

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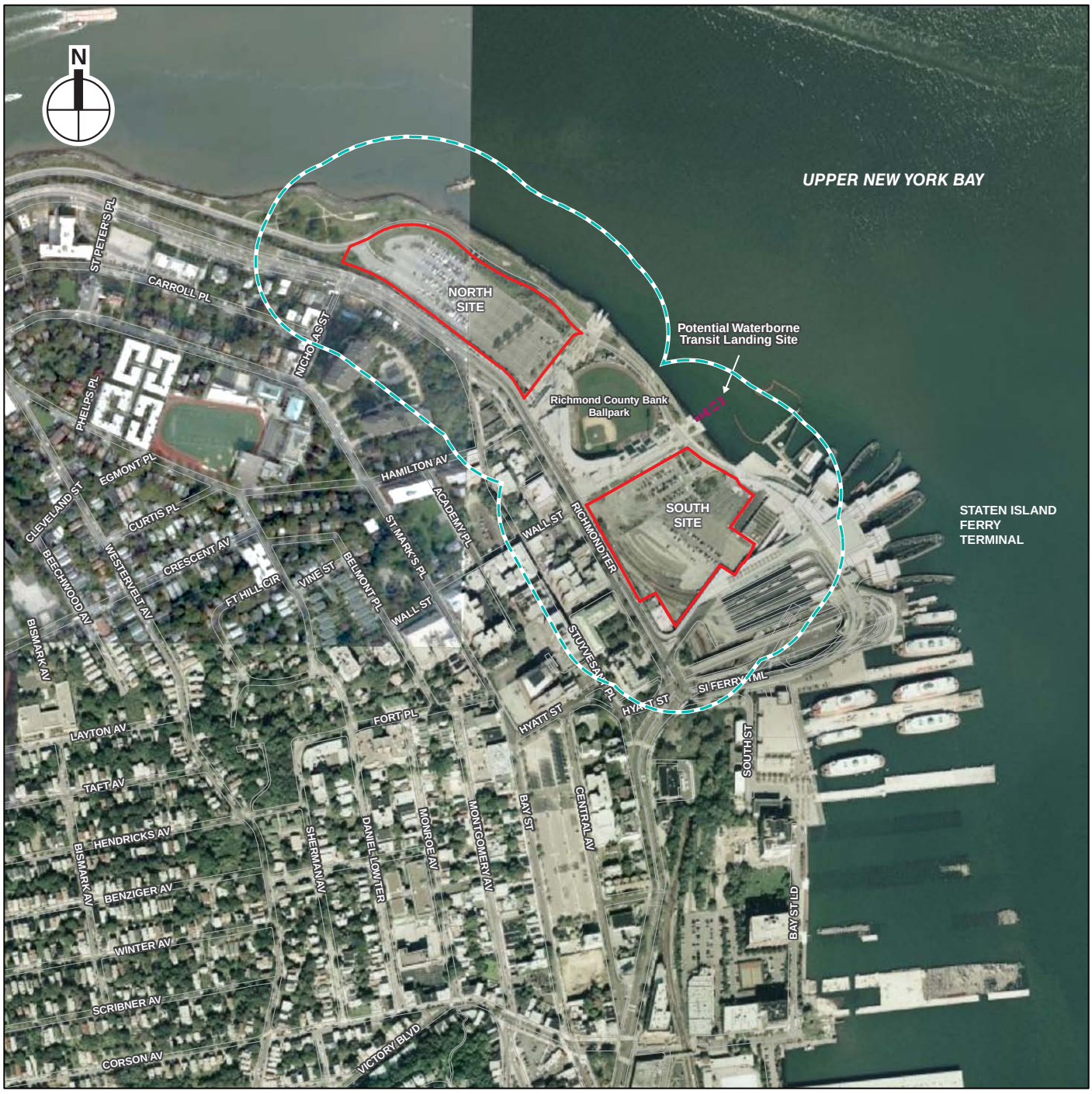

ST. GEORGE WATERFRONT REDEVELOPMENT

Site Location
Figure 9-1

Environmental Protection (NYCDEP) Harbor Water Quality Survey reports; NYCDEP City-Wide Long Term CSO Control Planning Project reports; U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps and Information, Planning and Consultation system for federally threatened and endangered species (http://ecos.fws.gov/ipac); New York State Breeding Bird Atlas, 2000-2005; New York/New Jersey Harbor Estuary Program; Federal Emergency Management Agency (FEMA) ~~flood insurance rate maps (FIRMs) and~~ Best Available Flood Hazard Data (BAFHD); and U.S. Army Corps of Engineers (USACE) studies conducted as part of the New York and New Jersey Harbor Navigation Project.

- Responses to requests for information on rare, threatened, or endangered species in the vicinity of the project sites from the National Marine Fisheries Service (NMFS) and the New York Natural Heritage Program (NYNHP) (see **Appendix D**).
- Observations made during site reconnaissance conducted within the project sites on August 23, 2012.

THE FUTURE WITHOUT THE PROPOSED PROJECT

The expected state of natural resources within the study area in the No-Action condition is evaluated under the assumption that by the Build year (2016), land cover type and human activity would not differ from the present. Both the North Site and the South Site would remain paved surface public parking lots for the St. George Terminal of the Staten Island Ferry and the Stadium. In addition, the access roadways would also remain impervious surfaces in the future without the proposed project. The reconstruction of the Wall Street Ramp between Richmond Terrace and Bay Street will increase number of parking spaces on the South Site from 754 existing spaces to 810 spaces. Redevelopment projects elsewhere in the study area that are expected to be completed by 2016, such as the redevelopment of a former Coast Guard facility (the U.S. Lighthouse Service Depot site) and the Homeport U.S. Navy facility (the Stapleton Waterfront project) into residential and commercial space, will not significantly alter natural resources from their current state. Water quality in Upper New York Harbor is likely to continue gradually improving as a result of several ongoing local and regional initiatives, but otherwise, floodplains and terrestrial and aquatic resources in the study area are expected to remain much the same as at present in the future without the proposed project.

THE FUTURE WITH THE PROPOSED PROJECT

Potential impacts in the With-Action condition were assessed by considering aspects of project operation, such as stormwater management, disturbances to wildlife from increased human activity, bird collisions with the Wheel and other project structures, and potential habitat improvements (e.g., improved terrestrial habitat from landscaping and green roofs). Potential impacts to natural resources from construction of the proposed project are evaluated in Chapter 20, "Construction."

C. REGULATORY CONTEXT

The following sections identify the 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 that would apply to the proposed project.

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, agricultural fields, construction sites, and mining.

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 Essential Fish Habitat (EFH). EFH is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 USC §1802(10)).

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 habitatwide 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, ENVIRONMENTAL CONSERVATION LAW [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. 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 SPDES to regulate discharges to New York State's waters. Activities requiring a SPDES permit include point source discharges of wastewater into surface or groundwater 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 one 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 the 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

The 2012 *City Environmental Quality Review (CEQR) Technical Manual* defines natural resources as "(1) the City's biodiversity (plants, wildlife and other organisms); (2) any aquatic or terrestrial areas capable of providing suitable habitat to sustain the life processes of plants, wildlife, and other organisms; and (3) any areas capable of functioning in support of the ecological systems that maintain the City's environmental stability." Under CEQR, a natural resources assessment is to consider the plant, wildlife and other species in the context of the surrounding environment, habitat or ecosystem and examines a project's potential to impact those resources. Resources such as groundwater, soils and geologic features, natural and human-created habitats, and any areas used by wildlife may be considered in a natural resources analysis. Stormwater runoff may also be considered in a natural resources assessment and evaluated in the context of its impact on local ecosystem functions and on the quality of adjacent waterbodies.

In accordance with the *CEQR Technical Manual*, this section describes the following existing natural resources within the study areas on the basis of existing information and the results of the reconnaissance field survey: aquatic resources, wetlands, groundwater and floodplains, vegetation and ecological communities, wildlife, and threatened, endangered, and special concern species.

GROUNDWATER

As discussed in Chapter 10, "Hazardous Materials," groundwater is first encountered at approximately 6 to 10 feet below grade. Groundwater in Staten Island is not used as a source of potable water (the municipal water supply uses upstate reservoirs). Soil and groundwater testing conducted in 2012 (i.e., following the remediation of the VCA Site) identified volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) above detection limits, but at levels generally below NYSDEC Restricted Residential Soil Cleanup Objectives and Groundwater Criteria, with the exception of certain polycyclic aromatic hydrocarbons (PAHs) in soil which are attributable to the historical fill materials, and bis(2-ethlyhexyl)phthalate (BEHP)

in groundwater which is likely attributable to plastic well materials and sampling equipment or a laboratory artifact (URS 2012).

FLOODPLAINS

On July 2, 2013, FEMA released BAFHD maps for areas in New York City, including Staten Island. Although the BAFHD maps have yet to be fully approved and adopted as the new Flood Insurance Rate Maps (FIRM), their use is encouraged by FEMA and the City. Therefore, BAFHD maps have been used in the planning for the proposed project. The North Site is almost completely within the 100-year floodplain (an area with a 1 percent chance of flooding) or 500-year floodplain (an area with a 0.2 percent chance of flooding); only the southeastern corner of the North Site that runs along Richmond Terrace is outside of any floodplain (see **Figure 9-2**). ~~Based on June 2013currently effective FEMA FIRM maps, the 100-year flood elevation within the North Site is at 11 feet National Geodetic Vertical Datum 1929 (NGVD 29), or approximately 10 feet when referenced to the North American Vertical Datum of 1988 (NAV88) and 7.8 feet when referenced to the Staten Island Datum (SID). Approximately two-thirds of the North Site is within the 100-year floodplain, while the remaining one-third is within the 500-year floodplain.~~

The majority of the South Site is within either the 100-year or 500-year floodplain (see **Figure 9-2**). ~~Based on currently effective FEMA FIRMs, the 100-year flood elevation on the South Site is 11 feet NGVD 29, or approximately 10 feet when referenced to NAV88 and 7.8 feet SID. The 500-year floodplain within the South Site extends approximately 25-250 feet northwest of Richmond Terrace. Approximately one-third of the South Site is within the 100-year floodplain, and another one-third is within the 500-year floodplain. The southwestern and southeastern sections of the South Site are outside of any floodplain.~~

The potential waterborne transit landing site is located completely within the 100-year floodplain.

The majority of the Bank Street Expansion area is within the 500-year floodplain, although sections of Bank Street west of St. Peters Place are not within the 500-year or 100-year floodplains.

~~On February 25, 2013, FEMA released Advisory Base Flood Elevation (ABFE) maps for areas in New York City, including Staten Island.~~ The 100-year flood ~~ABFE~~ BAFHD for the North and South Site is 12 feet NAVD88 (or ~~13.1 feet NGVD29 and~~ 9.9 feet SID) towards the center of the sites and 11 feet NAVD88 (or ~~12 feet NGVD29 and~~ 8.9 feet SID) on the portions of the sites that are closest to Richmond Terrace~~ (i.e., approximately 2.1 feet greater than the currently effective FIRM elevation). Floodplain boundaries based on existing FIRMs are currently the only regulatory standard relating to elevations of new developments, although the ABFE may soon be adopted into the New York City Building Code and other pertinent City policies.~~

WETLANDS

According to NYSDEC tidal wetlands mapping (see **Figure 9-3**), the shoreline within the study area has been mapped as littoral zone (i.e., tidal wetlands under no more than 6 feet of water at mean low water that do not fall under any other wetland category). The North or South project sites, with the exception of the potential waterborne transit landing site, are located outside of the NYSDEC-mapped littoral zone. The littoral zone extends from the shoreline, near the project sites, into the Upper New York Bay. The NYSDEC-regulated tidal wetland Adjacent Area has

been designated on uplands within the project sites. A portion of the Bank Street Expansion Area, the North Site, and a small portion of the proposed New York City Department of Transportation (NYCDOT) service road near the South Site are within the tidal wetlands Adjacent Area (see **Figure 9-3**). Approximately 32 percent of the approximately 5 acres of NYSDEC tidal wetlands Adjacent Area that occurs within the waterfront lots (Lot 20, containing the North Site, Bank Street Expansion Area, and South Site; and Lots 1 and 5, containing the area adjacent to the South Site for the NYCDOT service road) is covered by impervious surface comprising roadway (Bank Street), esplanade, surface parking and buildings. Within the individual waterfront lots comprising the project site—Lots 20, 5, and 1—the percentage of impervious cover (approximately 32, 25, and 77 percent respectively) exceeds the 20 percent impervious cover limit for the NYSDEC tidal wetlands Adjacent Area.

National Wetlands Inventory (NWI) designated wetlands (see **Figure 9-4**) have not been identified within the North or South project sites. However, NWI has identified an estuarine subtidal wetland with unconsolidated bottom (E1UBL) within the study area, and within the potential waterborne transit landing site. This wetland is permanently flooded by tidal waters. The NWI-mapped wetland extends from the shoreline, near the project sites, into the Upper New York Bay.

AQUATIC RESOURCES

SURFACE WATER RESOURCES

The project sites are within the Upper New York Bay, which is tidally influenced. The tidal range for the Upper New York Bay is approximately 4.5 feet (1.4 meters) (NYCDEP 2007). The salinity of the Upper Bay varies daily with the tidal cycle and seasonally with the volume of freshwater entering from the Hudson River. The Upper New York Bay is partially stratified—higher salinity water toward the bottom and freshwater toward the top (USACE 1999). It tends to be well-mixed during low flow conditions and more stratified under high flow conditions when the freshwater overrides the saltwater layer (Moran and Limburg 1986; NYCDEP 2004).

WATER QUALITY

Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 703 includes surface water standards for each use class of New York surface waters. The Upper New York Bay is Use Classification I saline surface waters. Best usages for Use Classification I waters are secondary contact recreation and fishing. Water quality should be suitable for fish propagation and survival.

The water quality of the Upper New York Bay is strongly affected by human activity and the densely populated and industrialized land uses that surround it. Historically, water quality problems included low dissolved oxygen (DO) content, high nutrient concentrations, algal blooms, excessive numbers of coliform bacteria, and the presence of floatables.

The results of Harbor Surveys conducted by NYCDEP (2006; 2010b,c) show that the water quality of New York Harbor, including the Upper New York Bay, has improved significantly since the 1970s as a result of measures undertaken by the City (e.g., infrastructure improvements such as major improvements to wastewater treatment plants [WWTP] and increased capture of stormwater runoff) and others (NYCDEP 2010a,b). Water quality data (2006 through 2010) from the NYCDEP Harbor Survey station at the B&O Coal Dock (Station K1), the station closest to the project sites, indicate that the water quality in this part of the Upper New York Bay

is good and meets the water quality standards for Use Classification I waters, with the exception of the lowest dissolved oxygen value in the 5-year period, which falls just below the 4 mg/L standard (see **Table 9-1**). Chlorophyll-a concentrations[1] were not indicative of high nutrient concentrations during this 5-year period. Secchi transparency[2] during this 5-year period was indicative of low water clarity, likely due to high suspended solid concentrations of surface waters (NYCDEP 2010b,c).

Table 9-1
NYCDEP Water Quality Data for the B&O Coal Dock Station (K1)
(2006–2010)

Parameter—[*Use Class I Standard*]	Top Waters			Bottom Waters		
	Low	High	Avg	Low	High	Avg
Temperature (°C) [*No Standard*]	2.4	25.6	18.5	2.8	24.4	17.4
Salinity (psu) [*No Standard*]	7.1	25.8	20.6	17.6	28.6	25.1
Fecal coliform (colonies per 100mL) [*Monthly geometric mean less than or equal to 2,000 colonies/100 milliliters (mL) from five or more samples*]	1	940	80	N/M	N/M	N/M
Dissolved oxygen (DO)[3] (mg/L) [*Never less than 4 mg/L*]	3.8	13.2	6.4	4.0	12.2	6.2
Secchi transparency (ft) [*No Standard*]	1.0	9.0	4.3	N/A	N/A	N/A
Chlorophyll *a* (µg/L) [*No Standard*]	0.4	24.6	4.2	N/M	N/M	N/M

Notes: N/M = not measured, N/A = not applicable.
Source: NYCDEP 2010c

SEDIMENT QUALITY

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

Typical of any urban watershed, New York Harbor Estuary sediments, including those of the Upper New York Bay, 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 dichloro-diphenyl-trichloroethane (DDT); metals such as mercury, cadmium,

[1] 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 (NYCDEP 2010b).

[2] Secchi transparency is a measure of the clarity of surface waters. Transparency greater than 5 feet (1.5 meters) indicates relatively clear water. 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 and 5.5 feet (1.1 to 1.8 meters) (NYCDEP 2010b).

[3] DO in the water column is necessary for respiration by aquatic biota. The bacterial breakdown of high organic loads can deplete DO and result in low DO levels. Persistently low DO can degrade habitat and affect aquatic biota. Consequently, DO is one of the most universal indicators of overall water quality in aquatic systems.

lead, and copper; polychlorinated biphenyls (PCBs), and various polycyclic aromatic hydrocarbons (PAHs) (Rohmann and Lilienthal 1987). The Upper New York Bay is listed on the New York State 2010 303(d) list of impaired waters for sediments contaminated with cadmium (first listed in 2002) and PCBs and other toxics (first listed in 1998). Adams et al. (1998) found the mean sediment contaminant concentration for 50 of 59 chemicals measured in sediment samples from the New York/New Jersey Harbor Estuary to be statistically higher 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 upon 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 (Steinberg et al. 2004). Within the Upper Harbor, the percentage of benthic communities considered impacted decreased significantly from 75 percent in 1993 to 48 percent in 1998 (Steinberg et al. 2004).

AQUATIC BIOTA

The New York/New Jersey Harbor Estuary supports a diverse and productive aquatic community of over 100 species of finfish, more than 100 invertebrate species, and a variety of phytoplankton and zooplankton. The following sections provide a brief description of the primary groups of aquatic biota found in the Harbor Estuary.

Primary Producers

Phytoplankton

Phytoplankton is a taxonomic group of microscopic plants whose movements within the system are largely governed by prevailing tides and currents. Light penetration, turbidity, and nutrient concentrations are important factors in determining phytoplankton productivity and biomass. Diatoms such as *Skeletonema costatum* and *Thalassiosira* spp. generally dominate the phytoplankton community, with lesser contributions from dinoflagellates and green algae (Brosnan and O'Shea 1995). While nutrient concentrations in most areas of New York Harbor are very high, low light penetration has often precluded the occurrence of phytoplankton blooms.

Phytoplankton sampling in Upper New York Harbor over a 10-year period between 1991 and 2000 resulted in the collection of a total of 90 taxa. The most frequently collected taxa were *Nannochloris atomus, Skeletonema costatum, Prorocentrum redfieldii*, and *Rhizosolenia delicatula* (NYCDEP 2007).

Submerged Aquatic Vegetation and Benthic Macroalgae

Submerged aquatic vegetation (SAV) consists of rooted aquatic plants that are often found in shallow areas of estuaries and provide nursery and refuge habitat for fish. Light penetration, turbidity and nutrient concentrations are all important factors in determining SAV and benthic algae productivity and biomass. Due to limited light penetration, extensive shoreline development, and swift currents, occurrence of SAV is limited within the New York Harbor Estuary.

Benthic macroalgae are large multicellular algae that are important primary producers in the aquatic environment. They are often seen on rocks, jetties, pilings, and sandy or muddy bottoms (Hurley 1990). Because these organisms require sunlight as their primary source of energy, the limited light penetration in New York Harbor limits their distribution to shallow areas. Common macro-algae known to occur within the Harbor Estuary include the Phaeophyte species *Fucus vesiculosus* (brown algae), and the Chlorophyte species *Ulva lactuca* (sea lettuce) (Perlmutter 1971).

Zooplankton

Zooplankton are microscopic organisms that consume phytoplankton and represent an important food source for organisms at higher trophic levels. Consumers of zooplankton typically include forage fish, such as bay anchovy, as well as commercially and recreationally important species, such as striped bass and white perch, 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 dominate the zooplankton community within the New York Harbor (e.g., copepods *Acartia tonsa*, *Acartia hudsonica*, *Eurytemora affinis*, and *Temora longicornis)*, with the dominant species changing with the season (Perlmutter 1971, Lauer 1971, Stepien et al. 1981, Hazen and Sawyer 1983, Lonsdale and Cosper 1994). Zooplankton sampling in the Upper New York Bay over a 10-year period between 1991 and 2000 resulted in the collection of a total of 19 taxa. The most frequently collected taxa were *Tintinnopsis spp*., nauplius of copepods, and *Eutreptia spp*. (NYCDEP 2007).

Benthic Invertebrates

Invertebrate organisms that inhabit estuary bottom sediments and 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 carbon (or living material). 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 the sediment and water column. Substrate type (rocks, pilings, sediment grain size, etc.), salinity, and DO levels are the primary factors influencing benthic invertebrate communities; secondary factors include currents, wave action, predation, succession, and disturbance.

The major groups of benthic invertebrates collected in the estuary include aquatic earthworms (oligochaetes), segmented worms (polychaetes), snails (gastropods), bivalves, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp. Dominant benthic species within the Upper New York Bay include *Streblospio beredicti*, *Mediomastus*, *Mulina lateralis*, *Sabellaria vulgaris*, and *Heteromastus filformis* (NYCDEP 2007).

Fish

New York City is located at the convergence of several major river systems, all of which connect to the New York Bight portion of the Atlantic Ocean. This convergence has resulted in a mixture of habitats in the Harbor Estuary 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 9-2** lists fish species known to occur within the Harbor Estuary and have the potential to occur offshore from the project sites.

Table 9-2
Marine Finfish Species With the Potential to Occur within the Study Area

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
American eel	*Anguilla rostrata*
American sand lance	*Ammodytes hexapterus*
American shad	*Alosa sapidissima*
Atlantic cod	*Gadus morhua*
Atlantic croaker	*Micropogonias undulatus*
Atlantic herring	*Clupea harengus*
Atlantic mackerel	*Scomber scombrus*
Atlantic menhaden	*Brevoortia tyrannus*
Atlantic moonfish	*Selene setapinnis*
Atlantic needlefish	*Strongylura marina*
Atlantic silverside	*Menidia menidia*
Atlantic sturgeon	*Acipenser oxyrhynchus*
Banded killifish	*Fundulus diaphanous*
Bay anchovy	*Anchoa mitchilli*
Black sea bass	*Centropristis striata*
Blackfish	*Tautoga onitis*
Blueback herring	*Alosa aestivalis*
Bluefish	*Pomatomus saltatrix*
Butterfish	*Peprilus triacanthus*
Clearnose skate	*Raja eglanteria*
Conger eel	*Conger oceanicus*
Crevalle jack	*Caranx hippos*
Cunner	*Tautogolabrus adspersus*
Fawn cusk eel	*Lepophidium cervinum*
Feather blenny	*Hypsoblennius hentzi*
Fourbeard rockling	*Enchelypus cimbrius*
Four-spot flounder	*Paralichthys oblongus*
Gizzard shad	*Dorosoma cepedianum*
Goosefish	*Lophius americanus*
Grey snapper	*Lutjanus griseus*
Grubby	*Myoxocephalus aenaeus*
Hickory shad	*Alosa mediocris*
Hogchoker	*Trinectes maculatus*
Inshore lizardfish	*Synodus foetens*
Lined seahorse	*Hippocampus erectus*
Little skate	*Raja erinacea*
Longhorn sculpin	*Myoxocephalus octodecimspinosus*
Lookdown	*Selene vomer*
Mummichog	*Fundulus heteroclitus*
Naked goby	*Gobiosoma bosci*
Northern kingfish	*Menticirrhus saxatilis*
Northern pipefish	*Syngnathus fuscus*
Northern puffer	*Sphoeroides maculatus*

Table 9-2 (cont'd)
Marine Finfish Species With the Potential to Occur in the Study Area

Common Name	Scientific Name
Northern searobin	*Prionotus carolinus*
Oyster toadfish	*Opsanus tau*
Planehead filefish	*Monacanthus hispidus*
Pollock	*Pollachius virens*
Rainbow smelt	*Osmerus mordax*
Red hake	*Urophycis chuss*
Rock gunnel	*Pholis gunnellus*
Rough scad	*Trachurus lathami*
Scup	*Stenotomus chrysops*
Seaboard goby	*Gobiosoma ginsburgi*
Short bigeye	*Pristigenys alta*
Silver hake	*Merluccius bilinearis*
Silver perch	*Bairdiella chrysoura*
Smallmouth flounder	*Etropus microstomus*
Spot	*Leiostomus xanthurus*
Spotfin butterflyfish	*Chaetodon ocellatus*
Spotted hake	*Urophycis regia*
Striped bass	*Morone saxatilis*
Striped cuskeel	*Ophidion marginatum*
Striped killifish	*Fundulus majalis*
Striped mullet	*Mugil cephalus*
Striped searobin	*Prionotus evolans*
Summer flounder	*Paralichthys dentatus*
Tautog	*Tautoga onitis*
Threespine stickleback	*Gasterosteus aculeatus*
Tomcod	*Microgadus tomcod*
Weakfish	*Cynoscion regalis*
White hake	*Urophycis tenuis*
White mullet	*Mugil curema*
White perch	*Morone americana*
Windowpane	*Scophthalmus aquosus*
Winter flounder	*Pseudopleuronectes americanus*
Yellowtail flounder	*Limanda ferruginea*

Sources: NYCDEP (2007), Able and Studholme (1993), Woodhead (1990), AKRF (1998), LMS (2003a,b)

ESSENTIAL FISH HABITAT (EFH)

The NMFS designates EFH within 10' x 10' squares identified by latitude and longitude coordinates. The waters offshore from the project sites are within a portion of the New York/New Jersey Harbor Estuary EFH that is situated in the NMFS 10' x 10' square with coordinates (North) 40°40.0' N, (East) 74°00.0' W, (South) 40°30.0' N, (West) 74°10.0' W. This square includes the Atlantic Ocean waters and the Hudson River estuary affecting the following: Staten Island, from Port Richmond, NY on the north, west around to Great Kills South Harbor of Great Kills, NY, south of Bayonne, NY. **Table 9-3** lists the species and life stages of fish identified as having EFH in the portion of the Upper New York Bay near the project sites.

Table 9-3
Essential Fish Habitat Designated Species in the Study Area

Species	Eggs	Larvae	Juveniles	Adults
Red hake (*Urophycis chuss*)	x	x	x	
Winter flounder (*Pseudopleuronectes americanus*)	x	x	x	x
Windowpane flounder (*Scopthalmus aquosus*)	x	x	x	x
Atlantic sea 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
Bluefin tuna (*Thunnus thynnus*)	x	x	x	x
Smooth dogfish (*Mustelus canis*)	x	x	x	x
Sand tiger shark (*Odontaspis taurus*)		x[(1)]		
Dusky shark (*Charcharinus obscurus*)		x[(1)]	x	
Sandbar shark (*Charcharinus plumbeus*)		x[(1)]		x

Notes: n/a – insufficient data for this lifestage exists and no EFH designation has been made.
[(1)] Neither of these species have 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: NMFS (2012a,b)

TERRESTRIAL RESOURCES

VEGETATION AND ECOLOGICAL COMMUNITIES

The North Site and South Site are very similar in terms of their ecological communities and vegetation. Both project sites are largely composed of paved parking lots, small areas of grass planted with trees, and vegetated stormwater detention basins (see **Figures 9-5 through 9-8**). These landscapes would be characterized by Edinger et al. (2002) as "terrestrial cultural" communities. Terrestrial cultural communities are defined as "communities that are either created and maintained by human activities, or are modified by human influence to such a degree that the physical conformation of the substrate, or the biological composition of the resident community is substantially different from the character of the substrate or community as it existed prior to human influence (Edinger et al. 2002)."

Vegetated terrestrial cultural communities that are present within both the project sites include mowed lawn with trees[1], and paved road/path[2]. As shown in **Figure 9-5,** the paved road/path

[1] Edinger et al. (2002) defines this community as "residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30% cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50% cover. The groundcover is maintained by mowing."

[2] Edinger et al. (2002) defines this community as "a road or pathway that is paved with asphalt, concrete, brick, stone, etc. There may be sparse vegetation rooted in cracks in the paved surface."

community, which best describes the parking lots, covers approximately 80 to 85 percent of the South Site, and 65 to 70 percent of the North Site. The parking lots are sparsely vegetated, primarily on their boundaries and largely with invasive/non-native species. Tree-of-heaven (*Ailanthus altissima*) saplings, mugwort (*Artemisia vulgaris*), Queen Anne's lace (*Daucus carota*), common reed (*Phragmites australis*), and sweet goldenrod (*Solidago odora*) are the dominant plant species in the parking lots. The mowed lawn with trees community makes up the remaining 15 to 20 percent of the South Site and 30 to 35 percent of the North Site, and is comprised of vegetated detention basins, and strips of grass planted with trees that are located within the parking lot. The detention basins are dominated by red maple (*Acer rubrum*), white mulberry (*Morus alba*), and London planetree (*Platanus acerfolia*) in the overstory; Japanese privet (*Ligustrum japonicum*) and spirea (*Spirea* sp.) in the shrub layer; and Japanese silver grass (*Miscanthus sinensis*), crab grass (*Digitaria* sp.), and bluegrass (*Poa* sp.) in the herbaceous layer. The strips of mowed grass are primarily planted with common catalpa (*Catalpa bignonioides*), London planetree, and bigtooth aspen (*Populus grandidentata*), with white clover (*Trifolium repens*) and bluegrass dominating the herbaceous layer. **Table 9-4** lists the plant species observed during the August 2012 reconnaissance investigation.

The Bank Street Expansion area is similar to the North Site and South Site in terms of plant species composition. The vegetated terrestrial cultural community present in the Bank Street Expansion area is an urban vacant lot[1]. Black locust (*Robinia pseudoacacia*) is the dominant tree species, while the herbaceous layer is predominantly common mugwort. Japanese honeysuckle (*Lonicera japonica*) dominates the vine strata and is present on the chain-link fence that borders Bank Street.

These maintained terrestrial ecological communities are expected to provide limited habitat to wildlife, as described below.

WILDLIFE

Because the majority of the study area is developed, the habitat available to terrestrial wildlife is extremely limited and primarily consists of manicured lawn and rows or clusters of deciduous shade trees that are amongst the residential buildings southwest of the project sites. The waterfront esplanade between the project sites and Upper New York Bay also contains manicured lawn with scattered shade trees, as well as cobbled and rip-rapped shoreline. As described above, the project sites, which mainly consist of two existing parking lots, are almost entirely unvegetated and covered by impervious surface, with small portions of mowed lawn with trees. As such, wildlife communities within the project sites and the overall study area are composed of disturbance-tolerant, generalist species that are common to degraded habitats within urban areas.

[1] Edinger et al. (2002) defines this community as "an open site in a developed urban area that has been cleared either for construction or following the demolition of a building. Vegetation may be sparse, with large areas of exposed soil, and other with rubble or other debris."

Table 9-4
Vegetation Identified at the Project Sites

Common Name	Scientific Name	Stratum
Indian mallow	*Abutilon theophrasti*	Herbaceous
Red maple	*Acer rubrum*	Tree/overstory
Tree-of-heaven	*Ailanthus altissima*	Tree/understory
Serviceberry	*Amelanchier sp.*	Shrub
Porcelain berry	*Ampelopsis brevipedunculata*	Vine
Mugwort	*Artemisia vulgaris*	Herbaceous
Aster	*Aster sp.*	Herbaceous
Beggar ticks	*Bidens frondosa*	Herbaceous
Sedge	*Carex sp.*	Herbaceous
Common catalpa	*Catalpa bignonioides*	Tree/overstory
Asiatic bittersweet	*Celastrus orbiculatus*	Vine
Lamb's quarters	*Chenopodium album*	Herbaceous
Canada thistle	*Cirisium arvense*	Herbaceous
Sweet pepperbush	*Clethra alnifolia*	Shrub
Hedge bindweed	*Convolvulus sepium*	Vine
Queen Anne's lace	*Daucus carota*	Herbaceous
Crab grass	*Digitaria sp.*	Herbaceous
Quickweed	*Galinsoga ciliata*	Herbaceous
Japanese privet	*Ligustrum japonicum*	Shrub
Bush honeysuckle	*Lonicera sp.*	Shrub
Japanese silver grass	*Miscanthus sinensis*	Herbaceous
Carpetweed	*Mollugo verticillata*	Herbaceous
White mulberry	*Morus alba*	Tree/overstory
Yellow wood sorrel	*Oxalis europaea*	Herbaceous
Boston ivy	*Parthenocissus tricuspidata*	Vine
Common reed	*Phragmites australis*	Herbaceous
Pokeweed	*Phytolacca americana*	Herbaceous
European plantain	*Plantago lanceolata*	Herbaceous
Common plantain	*Plantago major*	Herbaceous
London planetree	*Platanus acerfolia*	Tree/overstory
Bluegrass	*Poa sp.*	Herbaceous
Lady's thumb	*Polygonum persicaria*	Herbaceous
Smartweed	*Polygonum sp.*	Herbaceous
Eastern cottonwood	*Populus deltoides*	tree/overstory
Bigtooth aspen	*Populus grandidentata*	tree/overstory
Purslane	*Portulaca oleracea*	Herbaceous
Common cinquefoil	*Potentilla simplex*	Herbaceous
White oak	*Quercus alba*	Tree/overstory
Japanese wineberry	*Rubus phoenicolasius*	Shrub
Bitter dock	*Rumex obtusifolius*	Herbaceous
Climbing nightshade	*Solanum dulcamara*	Vine
Sweet goldenrod	*Solidago odora*	Herbaceous
Spiny-leaved sow thistle	*Sonchus asper*	Herbaceous
Spirea	*Spirea sp.*	Shrub
Dandelion	*Taraxacum officinale*	Herbaceous
White clover	*Trifolium repens*	Herbaceous
Wouthern arrowwood	*Viburnum dentatum*	Shrub
Vetch	*Vicia sp.*	Herbaceous
Common blue violet	*Viola papilionacea*	Herbaceous

Source: Reconnaissance investigation on August 23, 2012.

Birds

Breeding birds within the study area likely include mostly non-native species such as house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris)*, and rock pigeon (*Columba livia*), and some urban-adapted native birds, such as American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), and blue jay (*Cyanocitta cristata*). The 2000–2005 New York Breeding Bird Atlas documented 49 species as possible, probable, or confirmed breeders in the census block in which the study area is located (5749A). Census blocks span three square miles, however, and Block 5749A includes woodland, freshwater ponds, and other habitat types that are not present in the study area. As such, many bird species documented by the Atlas within this census block would not occur in the study area specifically. On the basis of their habitat requirements, 18 of the 49 species documented by the Atlas are considered to have the potential to nest within the study area (**Table 9-5**).

Many of the bird species that are likely to breed in the study area are non-migratory and expected to also occur in the study area during winter. Examples include house sparrow, European starling, rock pigeon, blue jay, and mourning dove. Other birds with the potential to occur within the terrestrial sections of the study area during winter include black-capped chickadee (*Poecile atricapillus*), red-bellied woodpecker (*Melanerpes carolinus*), tufted titmouse (*Baeolophus bicolor*), American goldfinch (*Spinus tristis*), and white-breasted nuthatch (*Sitta carolinensis*), among others. Waterfowl, such as American black duck (*Anas rubripes*), American wigeon (*Anas americana)*, bufflehead (*Bucephala albeola*), canvasback (*Aythya valisineria*), common goldeneye (*Bucephala clangula)*, greater scaup (*Aythya marila),* green-winged teal (*Anas crecca*), 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*) may occur offshore in late fall and throughout the winter.

Although the terrestrial habitats within the study area provide breeding and wintering habitat for only a limited number of bird species, they may be briefly used as stopover sites for additional species that migrate through the area during the spring and fall. Most species are more generalistic in their habitat preferences during migration than during the non-migratory periods, and thus, more species are likely to occur in the study area during spring and fall than at other times of year. Some migratory landbirds that are common to the region and that may briefly stop over in the study area on occasion include common yellowthroat (*Geothlypis trichas*), red-eyed vireo (*Vireo olivaceus*), northern parula (*Parula americana*), white-throated sparrow (*Zonotrichia albicollis*), and yellow-rumped warbler (*Setophaga coronata*). Migratory shorebirds, which are generally sensitive to disturbance, are not expected to commonly occur along the study area's shoreline due to the high levels of human activity along the esplanade and in the water.

Birds observed during the August 23, 2012 field survey include American robin, European starling, house sparrow, and Canada goose (*Branta canadensis*), all of which are expected to nest in the study area.

Mammals

The eastern gray squirrel (*Sciurus carolinensis*) and Norway rat (*Rattus norvegicus*) are the only mammals expected to occur within the project sites. Elsewhere in the study area where there are larger clusters of trees, raccoons (*Procyon lotor*) and white-footed mice (*Peromyscus leucopus*) may also occur. No mammals were observed in the study area during the August 23, 2012 field survey.

Table 9-5
Birds Documented by the 2000–2005 Breeding Bird Atlas in Block 5749A

Common name	Scientific name
Canada Goose	*Branta canadensis*
Gadwall	*Anas strepera*
American Black Duck	*Anas rubripes*
Mallard	*Anas platyrhynchos*
Ring-necked Pheasant	*Phasianus colchicus*
Green Heron	*Butorides virescens*
Killdeer	*Charadrius vociferus*
Spotted Sandpiper	*Actitis macularius*
Rock Pigeon	*Columba livia*
Mourning Dove	*Zenaida macroura*
Eastern Screech-Owl	*Megascops asio*
Chimney Swift	*Chaetura pelagica*
Ruby-throated Hummingbird	*Archilochus colubris*
Red-bellied Woodpecker	*Melanerpes carolinus*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Willow Flycatcher	*Empidonax traillii*
Eastern Kingbird	*Tyrannus tyrannus*
Warbling Vireo	*Vireo gilvus*
Red-eyed Vireo	*Vireo olivaceus*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Tree Swallow	*Tachycineta bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Tufted Titmouse	*Baeolophus bicolor*
Carolina Wren	*Thryothorus ludovicianus*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Northern Mockingbird	*Mimus polyglottos*
Brown Thrasher	*Toxostoma rufum*
European Starling	*Sturnus vulgaris*
Cedar Waxwing	*Bombycilla cedrorum*
Yellow Warbler	*Dendroica petechia*
Common Yellowthroat	*Geothlypis trichas*
Eastern Towhee	*Pipilo erythrophthalmus*
Chipping Sparrow	*Spizella passerina*
Field Sparrow	*Spizella pusilla*
Song Sparrow	*Melospiza melodia*
Northern Cardinal	*Cardinalis cardinalis*
Red-winged Blackbird	*Agelaius phoeniceus*
Common Grackle	*Quiscalus quiscula*
Baltimore Oriole	*Icterus galbula*
House Finch	*Carpodacus mexicanus*
American Goldfinch	*Spinus tristis*
House Sparrow	*Passer domesticus*

Note: Species in boldface are considered to have the potential to breed within the study area on the basis of their habitat associations.

Reptiles and Amphibians

The project sites and surrounding study area lack surface waters and other features needed to support many of the reptiles and amphibians of the region. The asphalt parking lots, small areas of manicured lawn with shade trees, and cobbled shoreline of the project sites are not expected to satisfy the habitat requirements of any reptiles or amphibians, and no such species are expected to occur. The northern brown snake (*Storeria dekayi*) and northern red-back salamander (*Plethodon cinereus*), perhaps the most disturbance-tolerant and common species of reptile and amphibian in the region (Gibbs et al. 2007), have the potential to occur in the areas of clustered trees southwest of the project sites. Marine turtles, such as green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and loggerhead sea turtle (*Caretta caretta*) may occasionally occur in Upper New York Harbor, and therefore have the potential to be present in the waters offshore from the project sites (see "Threatened, Endangered, and Special Concern Species" below).

The New York State Herp Atlas Project was a 10-year effort to map the spatial distribution of reptiles and amphibians in New York State. Northern red-back salamander, northern two-lined salamander (*Eurycea bislineata*), red-eared slider (*Trachemys scripta*), northern brown snake, and northern ring-neck snake (*Diadophis punctatus*) were the species documented in the census block in which study area is located (*Jersey City* USGS quadrangle). Among these, the northern red-back salamander and northern brown snake are the only species considered to have the potential to occur within the study area, on the basis of their habitat associations (Mitchell et al. 2006, Gibbs et al. 2007). Neither species is likely to occur within the project sites specifically.

No reptiles or amphibians were observed in the study area during the August 23, 2012 field survey.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

Federally listed species noted by the USFWS Information, Planning and Consultation system as occurring in Richmond County include piping plover (*Charadrius melodus*; Threatened) and roseate tern (*Sterna dougalli*; Endangered). The breeding population of piping plovers in New York City is limited to the Rockaway Peninsula in Queens County (Fowle and Kerlinger 2001, Boretti et al. 2007), and the project sites lack wide, open expanses of unvegetated beach that the piping plover uses for habitat. Therefore, piping plovers are not considered to have the potential to occur within the project sites. Roseate terns do not nest anywhere in New York City or its neighboring counties (Fowle and Kerlinger 2001, Mitra 2008), and any occurrence of roseate terns in the vicinity of Staten Island would be limited to rare and brief passages of birds offshore that are associated with nesting colonies elsewhere, such as eastern Long Island.

NMFS indicated that federally listed shortnose sturgeon (*Acipenser brevirostrum*; Endangered), multiple Distinct Population Segments (DPS) of Atlantic sturgeon (*Acipenser oxyrhynchus*; Endangered), the Northwest Atlantic DPS of loggerhead sea turtle (Threatened), and Endangered Kemp's ridley, green, and leatherback sea turtles occur within Upper New York Harbor (Damon-Randall 2012). NYNHP has no records of state-listed species or significant natural communities occurring within the study area (Pietrusiak 2012).

None of the species documented by the 2000–2005 Breeding Bird Atlas and 1990–1999 Herp Atlas Project in the census blocks in which the project sites are located is federally or state-listed. No federally or state listed species were observed during the August 23, 2012 reconnaissance field survey.

SEA TURTLES

Leatherback, green, loggerhead, and Kemp's ridley sea turtles can be found in the New York Bight and waters off of Long Island during the warmer months of summer and fall, and have the potential to occur in Upper New York Harbor at these times of year. Generally, these species prefer bays and other sheltered areas off of Long Island's north and south shores (e.g., Great South Bay) and eastern end (e.g., Peconic Bay), which provide rich food sources (Standora et al. 1989, Morreale and Standora 1998). With the exception of the leatherback, nearly all sea turtles in these waters are juveniles or subadults (Morreale and Standora 1995). Sea turtles neither nest in the Upper New York Harbor, nor reside there year-round. Upper New York Harbor is generally considered to be of marginal quality or less as sea turtle habitat, and evidence of sea turtles in the area is scarce despite extensive monitoring and sampling efforts (Ruben and Morreale 1999, USACE 2001). Any occurrence of green, loggerhead, and Kemp's ridley sea turtles in Upper New York Harbor is likely limited to rare and brief explorations by transient juveniles. Leatherback turtles tend to remain off the coast in the deeper pelagic waters of the Atlantic Ocean rather than moving into harbors and bays (USACE 2001).

SHORTNOSE STURGEON

The federally and state-listed endangered shortnose sturgeon is an anadromous bottom-feeding fish that can be found throughout the Hudson River system from New York Harbor up through Troy Dam. These fish spawn, develop, and overwinter in the upper Hudson River, and prefer colder, deeper waters for all life stages. Staten Island is at the southern limit of this population's range. Shortnose sturgeon may be present offshore from the project sites during the winter, but their presence is likely limited due to high salinity levels this close to the Atlantic Ocean (Dadswell et al. 1984). Shortnose sturgeon are expected to occur off of Staten Island primarily as transients emigrating from the Hudson River to more southerly populations (Waldman et al. 1996, Kynard 1997).

ATLANTIC STURGEON

The New York Bight population is one of four DPSs of the Atlantic sturgeon and is federally listed as endangered. Atlantic sturgeon belonging to the New York Bight DPS spawn in freshwater sections of the Hudson River and overwinter throughout the Bight, off the south shore of Long Island, and throughout Long Island Sound (Waldman et al. 1996, Bain 1997, Savoy and Pacileo 2003). Atlantic sturgeon are most abundant in these waters from late September to late March (Dunton et al. 2010). Dunton et al. (2010) identified the Atlantic waters off of Rockaway Peninsula and Sandy Hook, NJ as significant concentration areas of Atlantic sturgeon. Transients moving between Hudson River spawning grounds and these overwintering areas pass Staten Island and may occur in the vicinity of the project sites. Occurrence would likely be brief, as non-spawning Atlantic sturgeons are generally found in more open, marine waters and at greater depths (Hatin et al. 2002, 2007; Savoy and Pacileo 2003, Dunton et al. 2010).

E. THE FUTURE WITHOUT THE PROPOSED PROJECT

The following assessment of natural resources in the No-Action condition assumes that by the Build year (2016), land cover type and human activity would not differ from the present condition. Both the North Site and the South Site would remain public surface parking for the St. George Terminal of the Staten Island Ferry and the Stadium. In addition, the access roadways

would also remain impervious surfaces in the future without the proposed project. The existing stormwater management systems would remain in place. Redevelopment projects elsewhere in the study area that are expected to be completed by 2016 will not significantly alter natural resources from their current state.

GROUNDWATER

The No-Action condition would involve the project sites remaining in use as parking lots. Subsequently, no change to the existing condition of groundwater is expected in the No-Action condition.

WETLANDS

As described above, the No-Action condition would likely result in sea level rise due to global climate change. The wetlands present in the study area are littoral zone/estuarine subtidal wetlands that could be impacted by a rise in sea level. Littoral zone is partly defined as being under no more than 6 feet of water at mean low water; it is possible that sea level rise would alter the status of the existing wetlands. The NYSDEC tidal wetland Adjacent Area that occurs within the waterfront lots containing the North Site, Bank Street Expansion Area, and South Site would continue to exceed the 20 percent impervious cover limit for the Adjacent Area, and would continue to provide a limited buffer to the NYSDEC tidal wetlands of the Upper Bay and limited wildlife habitat. There are no other wetlands within the project sites that could be impacted under the No-Action condition.

AQUATIC RESOURCES

WATER QUALITY

The No-Action condition would likely result in continued minor improvements to the water quality conditions of the Upper Bay as a result of proposed and ongoing projects aimed at improving water quality and aquatic resources in the New York/New Jersey Harbor Estuary. The NYC Green Infrastructure Plan, for example aims to reduce combined sewer overflow (CSO) by forty percent over the next twenty years (NYCDEP 2011), which will further decrease point source pollution in the Upper Bay.

SEDIMENT QUALITY

The No-Action condition would involve the project sites remaining in use as parking lots. Subsequently no change to the existing conditions, with regards to sediment quality, is expected in the No-Action condition.

TERRESTRIAL RESOURCES

VEGETATION AND ECOLOGICAL COMMUNITIES

The vegetation and ecological communities of the project sites would remain largely unchanged in the No-Action condition because of the frequency of mowing and other maintenance activities occurring within the stormwater detention basins and mowed lawn with trees found within the parking lots of both the North Site and South Site. There may be some spread of invasive/non-native species which are currently found on site including tree-of-heaven, white mulberry, Asiatic bittersweet (*Celastrus orbiculatus*), common reed, and mugwort; but primarily limited to

the edges of the parking lots and not to any significant degree. Therefore, the No-Action condition is likely to result in no significant change to the vegetation and ecological communities within the project sites.

WILDLIFE

Because land cover type and the patterns and levels of human activity within the study area are not expected to change in the future without the proposed project, the same species of wildlife currently present are expected to remain. The parking areas, patches of manicured lawn with shade trees, and debilitated shoreline within the project sites will continue to support the same communities of urban-adapted, generalist wildlife such as rock dove, house sparrow, and Norway rat.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

Aquatic habitat conditions in the study area are not expected to significantly change in the future without the proposed project. As such, the same threatened and endangered species of sea turtles and sturgeon will continue to have the potential to occur in Upper New York Harbor and with the same likelihood as at present.

F. THE FUTURE WITH THE PROPOSED PROJECT

The proposed project would consist of the mixed-use development of the North Site and the South Site. Green roofs and a green infrastructure would be incorporated into the design of the buildings on both the North Site and South Site., and t The development would likely involve reconstruction and upgrades to the existing outfalls, as well as implementation of best management practices (BMPs) such as sand filters and permeable pavement, all of which would provide a stormwater management system that would meet the standard requirements of NYSDEC water quality treatment practices.

GROUNDWATER

Removal of asphalt in several areas of the project sites, including the parking lots on both the North Site and South Site, and addition of green roofs would result in a decrease in the amount of impervious surface on the project sites (approximately 0.53 acres and 2.33 acres less impervious surface on the North Site and South Site respectively), and a decrease in the total amount of stormwater runoff generated within the project sites. Following completion of the subsurface disturbance in accordance with the procedures described in Chapter 10, "Hazardous Materials," and continued implementation of the engineering and institutional controls set out by the OM&M Plan, operation of the proposed project would not be associated with any significant potential for adverse effects to groundwater. Because groundwater is not used as a potable water supply on Staten Island, operation of the proposed project would not have the potential to affect drinking water supplies.

FLOODPLAINS

Green roofs installed on the North Site and South Site would attenuate stormwater flow and reduce the amount of impervious surface on the project sites (approximately 0.53 acres and 2.33 acres less impervious surface on the North Site and South Site respectively), which would help to moderate flooding within the project sites. Stormwater collected on site will be discharged into the Upper Bay through existing outfalls, which would be reconstructed and appropriately sized per to convey stormwater per the *New York State Stormwater Manual*.

Chapter 16, "Greenhouse Gases and Climate Change," describes the state and City efforts to address potential impacts to the coastal areas and the City's critical infrastructure against rising seas and the sea level rise projections developed by the New York City Panel on Climate Change (NPCC). As discussed in Chapter 16, the NPCC projected sea level rise under median conditions would result in a 1- to 2-foot increase in the flood elevation associated with the current 100-year storm by the ~~end~~ middle of the century (2050s). ~~This would result in an increase in the currently effective FIRM elevation associated with the current 100-year storm from 11 feet NGVD29 (10 feet NAVD88, (7.8 feet SID) to 12 to 13 feet NGVD29 (11 to 12 feet NAVD88, (8.8 to 9.8 feet SID).~~ The 100-year ~~ABFE~~ BAFHD floodplain elevation would increase from ~~13 feet NGVD29~~ 12 feet NAVD88 (9.8 feet SID) to ~~14 to 15 feet NGVD29 (~~12 to 13 feet NAVD88 (11.8 to 12.8 feet SID), based on NPCC projections of sea level rise by the 2050s. As projected by NPCC, the frequency and severity of storms and coastal flooding will continue to increase over the next century.

Most of the project elements to be developed in the North Site and South Site would be located within the 100-year floodplain. As discussed in Chapter 16, "Greenhouse Gases and Climate Change," first floor elevations of the proposed buildings would be at least 1 foot above ~~ABFE~~BAFHD 100-year floodplain elevations to provide resilience to projected sea level rise by the 2050s. Development would be consistent with the New York City Building Code requirements for construction within the 100-year floodplain 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), and any subsequent revisions to these requirements (e.g., adoption of ~~ABFEs~~BAFHD). Compliance with these requirements would reduce the potential for public and private loses due to flood damage under current and projected flood conditions. Because the 100-year floodplain within and adjacent to the project sites is affected by coastal flooding (rather than local or fluvial flooding) as a result of astronomic tides and meteorological forces, flooding conditions in the project site and surrounding area would not be affected by the proposed project. Therefore, operation of the proposed project would not result in significant adverse impacts to the floodplain.

WETLANDS

The operation of the North Site and South Site facilities would not ~~directly or indirectly~~ be expected to adversely affect the NYSDEC tidal wetlands near the project sites although the project would alter the amount of development in the regulated Adjacent Area and would require authorization by NYSDEC through a Tidal Wetlands permit under Article 25 of the ECL. The proposed project would result in an increase in impervious cover within the regulated Tidal Wetlands Adjacent Area (the waterfront portions of Lots 1, 5, and 20) from 32 percent under the existing condition to 41 percent in the future with the proposed project.

Since both the existing and future condition exceed the regulatory threshold of 20 percent coverage by impervious surfaces stated in 6 NYCRR Part 661 Tidal Wetlands—Land Use Regulations, the development's tidal wetland permit would require a variance. The preliminary assessment supporting a variance is based on existing site constraints combined with the proposed extensive green infrastructure and other stormwater management practices consistent with the *NYSDEC Stormwater Management Design Manual* (Manual). The design characteristics of both the North and South Sites would greatly offset the effect of new impervious surfaces by treating the water quality volume in accordance with the Manual, and providing some reduction in pollutant loading and management of the rate at which stormwater

from the developed areas is discharged to the Upper Harbor through the proposed green roofs. The design characteristics would improve with no incremental adverse effect to NYSDEC littoral zone tidal wetlands of the Upper Harbor in the vicinity of the stormwater outfalls.

The existing conditions and planning requirements imposed on the proposed development create a variety of constraints on site planning. This includes (a) the historically high level of impervious coverage of well over 75 percent; (b) a Voluntary Cleanup Agreement (VCA) that constrains current site infiltration and new subsurface disturbance; (c) shallow depth to groundwater that may limit infiltration opportunities; and (d) that the Adjacent Area within the project area currently provides no more than a limited buffer or wildlife habitat to the NYSDEC tidal wetlands of the Upper Bay. Planning and development requirements include that the new development provide the same parking capacity currently provided by the surface parking lots as well as accommodate the demand for the new development (existing parking capacity must also be maintained during construction, a condition that has imposed significant constraints on site design and construction logistics) and that Bank Street from Jersey Street to the easternmost boundary of the North Site be widened by six feet to facilitate emergency vehicle access. For these reasons there are few practical means by which the proposed project can increase the pervious area or avoid development within the NYSDEC tidal wetlands Adjacent Area.

Nonetheless, throughout the site planning process, the North and South Sites have been designed to accommodate extensive green infrastructure (i.e., green roof) and an array of stormwater management practices necessary to meet NYSDEC stormwater management design requirements. These design characteristics would provide greater protection to the NYSDEC tidal wetlands of the Upper Bay adjacent to the project sites and more successfully enhance the buffering function of upland areas adjacent to tidal wetlands in comparison to the existing site characteristics by:

- Controlling the quality of stormwater discharged from the North Site, the Bank Street Expansion Area, and the South Site;
- Controlling the rate of stormwater discharge from the North and South Sites through the installation of green roofs;
- Increasing diversity of wildlife habitat; and
- Enhancing aesthetics and increased public access.

In summary, in coordination with NYSDEC during the permitting process, it is anticipated that the justification for the variance for the North Site and Bank Street Expansion Area (Lot 20) would include consideration of the practical difficulties imposed by existing site constraints; the limited value of the Adjacent Area under the existing conditions; and enhancements to the buffering value of the tidal wetland Adjacent Area within the waterfront lots containing the North Site and Bank Street Expansion Area that would result from the proposed project. Justification for the South Site includes these same elements and the additional considerations that the affected Adjacent Area on Lots 1 and 5 is quite small (1,111 square feet) and that there would be no overall change in the percentage of impervious coverage associated with the proposed relocation of the NYCDOT service road and the public esplanade.

WATERBORNE TRANSIT

The operation of the possible waterborne transit landing has potential to resuspend sediments and disturb the benthic habitat in the Upper Harbor adjacent to the potential waterborne transit landing. Approximately 66 percent of the waterborne transit landing's gangway would be

located in waters less than 6 feet deep MLLW. This area is mapped by NYSDEC as littoral zone wetland, and by NWI as an E1UBL wetland. None of the piles of the waterborne transit landing would be within the littoral zone. The portion of the gangway within the littoral zone (approximately 480 square feet) would result in indirect effects to benthic habitat due to shading. However, the area of this potential disturbance would be limited and operation of the proposed project would not result in significant adverse impacts to NWI estuarine subtidal and NYSDEC littoral zone tidal wetlands of the Upper Bay.

AQUATIC RESOURCES

WATER QUALITY

The operation of the proposed project would not result in water quality conditions within the Upper Harbor that fail to meet Class I standards. Green roofs (approximately 5 acres on the North Site (of which 1.6 acres are pathways or impermeable surfaces) and 3 acres on the South Site), and on the North Site sand filters, rain gardens, rainwater collection systems, and reuse of stormwater would be incorporated into the design of the buildings to the extent possible ~~on both the North Site and South Site (approximately 6 4.6 acres and 3.0 acres respectively)~~, and would help control the rate of stormwater discharge from the project site to the Upper Harbor. ~~minimize stormwater runoff entering the Upper Harbor.~~ Existing outfalls on the North Site would likely be rebuilt and upgraded, while the outfalls on the South Site would remain as they are now. Additional outfalls would not be constructed within the project sites. As part of the proposed project, coverage under a NYSDEC State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) would be required. In accordance with NYSDEC SPDES (GP-0-10-001), a SWPPP consisting of both temporary erosion and sediment controls and post-construction stormwater management practices would be prepared. Water quality treatment would be designed consistent with the Manual. The design features listed above approved by NYSDEC would be incorporated into the project's SWPPP. Post-construction stormwater management measures that would be integrated into the proposed project as part of the project's SWPPP may include green roofs, sand filters, rain gardens, rainwater collection systems, and reuse of stormwater to the extent possible. ~~The implementation of these post-construction measures would further reduce discharge of stormwater to the Upper Bay and improve its quality.~~ Therefore, the discharge of stormwater due to the proposed project would not result in significant adverse impacts to water quality of the Upper Bay. ~~and treat stormwater runoff from the proposed project into the New York Harbor.~~

The waterborne transit operator would implement any necessary measures (e.g., low draft vessels, speed limits, etc.) to minimize the resuspension of sediments during operation of the proposed project. Therefore, the operation of the proposed project would not result in significant adverse impacts to the water quality of the Upper Bay.

The volume of sanitary sewage generated by the North Site and South Site would be 0.05 and 0.22 percent of the permitted average daily flow of 60 million gallons per day (mgd) at the Port Richmond Wastewater Treatment Plant (WWTP), respectively. The volume would not result in an exceedance of the Port Richmond WWTP's capacity; therefore, the proposed project would not result in a significant adverse impact on the City's sanitary sewage treatment system. In addition, per the New York City Plumbing Code (Local Law 33 of 2007), low-flow fixtures are required to be implemented and would help to reduce sanitary flows from the proposed project.

SEDIMENT QUALITY

~~As previously mentioned, green roofs would be incorporated into the design of the buildings on both the North Site and South Site. These green roofs would reduce stormwater runoff, and the associated suspended sediments and potential contaminants, entering the Upper Bay.~~ Stormwater from the project site would be captured and conveyed to stormwater quality treatment measures in accordance with the SWPPP prepared for the project and approved by NYSDEC. With the implementation of these stormwater management measures, the discharge of stormwater from the project site would not adversely affect sediment quality of the Upper Bay. ~~As discussed above, the implementation of sustainable design features and other measures implemented as part of the post-construction stormwater management measures that would be incorporated in the SWPPP, would further reduce discharge of stormwater and associated pollutants to the Upper Bay. In addition, the piles of the potential waterborne transit landing would result in a cumulative permanent loss of approximately 42 square feet of benthic habitat, while the floating dock and gangway (approximately 3,800 square feet cumulative) would result in indirect effects to benthic habitat due to shading. Therefore, the operation of the proposed project would not result in significant adverse impacts to the sediment quality of the Upper Bay.~~

AQUATIC BIOTA

The operation of the proposed project would not result in water quality conditions within the Upper Bay that fail to meet Class I standards. As discussed under "Water Quality," potential impacts to aquatic biota ~~from~~ due to the discharge of stormwater from the proposed project would be minimized through implementation of ~~due to the decrease in impervious area, and other measures implemented as part of the~~ post-construction stormwater management measures that would be incorporated in the SWPPP and approved by NYSDEC. ~~would minimize the potential for operation of the project to adversely affect the quality of stormwater discharged to the Upper Bay.~~ The volume of sanitary sewage generated by the North Site and South Site would be 0.05 and 0.22 percent of the permitted average daily flow of 60 mgd at the Port Richmond WWTP, respectively. The volume would not result in an exceedance of the Port Richmond WWTP's capacity. Therefore, the proposed project would not have the potential to adversely affect sanitary and stormwater drainage and management within northern Staten Island, and would not result in adverse impacts to water quality and aquatic biota of the Upper Bay.

The floating dock and gangway (approximately 3,800 square feet (0.09 acres) cumulative) would result in ~~indirect~~ adverse effects to benthic habitat due to shading. However, the proposed floating dock is only 30 feet wide and some light would be expected to penetrate the water column along the sides of the platform during some period of the day. The loss of the small area of habitat under the platform hat may be unsuitable to aquatic biota due to shading would not result in significant adverse impacts to aquatic biota of the Upper Bay. ~~Therefore, the operation of the proposed project would not result in significant adverse impacts to the sediment quality of the Upper Bay.~~The waterborne transit operator would implement any necessary measures (e.g., low draft vessels, speed limits, etc.) to minimize the resuspension of sediments during operation of the proposed project. Therefore, the operation of the proposed project would not result in significant adverse impacts to the aquatic biota of the Upper Bay.

EFH

Operation of the proposed project would not result in any significant adverse impacts on water or sediment quality, nor would it result in adverse impacts to aquatic biota. Therefore, operation of the proposed project would not result in significant adverse impacts to EFH.

TERRESTRIAL RESOURCES

VEGETATION AND ECOLOGICAL COMMUNITIES

Plants used in the landscaping plans could benefit some species of wildlife, such as beneficial insects and songbirds, providing them with suitable habitat and forage. The landscaped areas and green roofs on the project sites would also increase the acreage of green space on the project sites. The South Site would be planted with yew (*Taxus* sp), Boston ivy (*Parthenocissus tricuspidata*), honey locust (*Gleditsia triacanthos*), and fountain grass (*Pennisetum* sp). Approximately 4.8 acres of the North Site would be planted. The North Site's green roof would be planted to mimic meadow and bluff ecological communities, while other sections of the North Site would be planted as woodlands. **Table 9-6** lists the plant species included in the North Site's planting plan. The Bank Street Expansion Area would be planted with trees to replace trees removed or damaged during the widening. Therefore, the operation of the proposed project would not result in significant adverse impacts to vegetation and ecological communities.

Table 9-6
Vegetation Included in the North Site's Proposed Planting Plan

Common Name	Scientific Name
Red maple	*Acer rubrum*
American beachgrass	*Ammophila breviligulata*
Sea rocket	*Cakile sp.*
Bearded sedge	*Carex comosa*
Pennsylvania sedge	*Carex pensylvanica*
False heather	*Cuphea hyssopifolia*
Joe pye weed	*Eutrochium*
Witchhazel	*Hamamelis virginiana*
Beach heather	*Hudsonia tomentosa*
Blue flag	*Iris virginica*
Rush	*Juncus sp.*
Common juniper	*Juniperus communis*
Eastern red cedar	*Juniperus virginiana*
Northern bayberry	*Myrica pensylvanica*
Pitch pine	*Pinus rigida*
Eastern white pine	*Pinus strobus*
Sand cherry	*Prunus pumula*
Black cherry	*Prunus serotina*
Oak	*Quercus sp.*
Rose	*Rosa sp.*
Dune willow	*Salix cordata*
Bulrush	*Scirpus sp.*
New England aster	*Symphyotrichum novae-angliae*
Cocklebur	*Xanthium strumarium*

WILDLIFE

At present, only highly urban-adapted, synanthropic wildlife species (i.e., those that benefit from an association with humans) occur within the project sites. The increased human activity that would result from operation of the proposed project would not adversely affect these disturbance-tolerant species, and for some, numbers would possibly increase. The green roofs and other landscaped areas would increase vegetative cover within the project sites from the existing condition, but would not be expected to provide habitat capable of supporting additional species beyond those that are already present. The majority of the year, wildlife that would be expected to occur in these areas would remain limited to non-native, invasive birds such as the house sparrow. During spring and fall, common migratory songbirds would have the potential to occasionally and briefly occur in the trees present within the North Site. Depending on plant selection, green roofs and landscaped areas within the project sites could represent a food source for migrating monarch butterflies (*Danaus plexippus*). Overall, operation of the proposed project would have no significant adverse impacts to wildlife, and for some species, may provide minor benefits by increasing resource availability.

Bird Collisions

Nighttime collisions with the Wheel.

Decorative lighting plans for the Wheel have yet to be designed in detail or finalized, but it is currently envisioned that light-emitting diodes (LEDs) would be placed on the capsules, rim, and cable spokes (or similar hub-to-rim catenaries). Because of its height, the Wheel would also require obstruction beacons. Decorative lighting would be highly directional to shield adjacent neighborhoods, minimize sky glow, and avoid interference with aircraft and watercraft navigation.

Artificial lighting can disorient night-migrating birds and result in collisions with tall structures, particularly in foggy conditions and during low cloud cover when birds migrate at lower altitudes (Gauthreaux and Belser 2006, Longcore et al. 2008, Gehring et al. 2011). Thus, obstruction beacons and decorative lighting used during operation of a structure like the Wheel could impact birds migrating at night (primarily songbirds). Collisions with structures, however, are highly dependent on lighting characteristics, and the risk of collisions with the Wheel would be diminished through the selection of particular lighting schemes and implementation of other management practices (see below).

In addition to lighting and weather conditions, bird collision risk is highly dependent on structure height. For example, several studies have found bird mortality at communication towers taller than 300 meters (984 feet) to be significantly greater than mortality at towers that are less than 150 meters (492 feet) tall (Longcore et al. 2008). Most birds migrate at altitudes of 200-750 meters (656-2461 feet; Able 1970, Mabee et al. 2006) and uncommonly fly below 90 meters (295 feet) during clear weather (Mabee and Cooper 2004). At approximately 625 feet tall, the Wheel would not intersect the strata of airspace in which migrating birds most commonly fly. However, relatively short structures may represent collision hazards during inclement weather and when their lighting scheme is such that birds are attracted to and/or disoriented by the light.

Ultimately, the potential for bird collisions with the Wheel would be most dependent on its lighting characteristics. For unknown reasons, artificial light can attract migrating birds to the light source and cause them to circle, often until they eventually collide with the object. Lighting color appears to be the strongest determinant of bird collisions. Recent research has found red

light to be particularly problematic and cause the greatest number of bird collisions relative to other colors. Red light disorients birds by interfering with their ability to see the earth's magnetic fields by which they navigate (Wiltschko et al. 1993). This is particularly so during periods of fog and inclement weather, when migrating birds rely on their magnetic compass for navigation more so than celestial cues. During these periods, lighting on the Wheel would likely be limited to mandatory obstruction lighting and would not include decorative lighting.

Federal Aviation Administration (FAA) regulations require structures over 200 feet in height to be marked with red or white obstruction beacons. In an urban area, however, the FAA discourages the use of white lights and instead recommends red lights (FAA Advisory Circular 70/7460-1K). Until recently, red lights were required to be steady burning, but in response to research that has shown flashing red lights to be significantly less detrimental to birds (Gehring et al. 2009), the FAA is in the process of revising its regulations to allow red obstruction lights to be flashing (until official revisions take effect, the FAA is accepting requests for "Deviations from Red Obstruction Light Standards"). Flashing red lights would be used on the Wheel instead of steady-burning lights, and based on an FAA study, would have a flash rate of 27 to 33 flashes per minute (Patterson 2012). Slower flash rates than these do not provide sufficient warning to pilots, and faster flash rates do not allow the light to extinguish long enough to be less of a hazard to migrating birds. The FAA also recently issued a recommendation to use LEDs in place of traditional incandescent bulbs for flashing red obstruction lights because the filament in incandescent bulbs never fully extinguishes in between flashes (Patterson 2012). Flashing LEDs such as those to be used on the Wheel have a more distinct pulse that is thought to further reduce bird disorientation and collision risk~~, and would be used on the Wheel~~.

An operations manual would be developed and followed during the spring and fall migration periods to minimize potential impacts of the Wheel to migrating birds. The manual would outline several best management practices for reducing the potential for bird disorientation, entrapment, and collisions, including:

- Reducing the quantity of decorative lighting used during the primary spring and fall passage periods of nocturnally migrating songbirds through New York City (late April to early June and late August to mid-October).
- Minimizing use of colors in the red to yellow light spectrum during these migration seasons, and instead using blue to green lighting. As explained above, red light interferes with the magnetic compass of migrating birds, whereas blue and green light generally does not (Manville 2005, Poot et al. 2008).
- Further reducing all decorative lighting and entirely avoiding light in the red to yellow spectrum during fog, light rain, and other overcast conditions.

During the spring and fall migration periods, a monitoring plan would also be implemented and would allow for adaptive management of these operations practices. Searches for dead or injured birds beneath the Wheel would be conducted on several mornings each spring and fall to document any evidence of bird collisions. In the event that bird collisions were found to be occurring often, lighting restrictions would be strengthened further until the desired level of effectiveness was achieved.

With these lighting and monitoring plans in place during the bird migration seasons, collisions of birds with the Wheel would likely be rare and would not be expected to amount to a source of mortality that would be capable of affecting their population sizes. For perspective from a recent and nearby study of bird collisions, extensive observations of night-migrants from the top of the

brightly illuminated Empire State Building found that only 22 percent of the autumn migration periods of 2004 and 2005 had overcast conditions that brought migrants close to the building and caused them to briefly circle before continuing onwards. Out of the 33,800 total migrants observed during the study, only 7 individuals collided with the building (all of which occurred on 1 rainy night) (DeCandido 2007). During spring 2004, none of the 3,415 observed migrants collided with the building (DeCandido and Allen 2006). Nighttime collisions of migratory birds with illuminated city skyscrapers have been well publicized, but the reality is that collisions with buildings at night are relatively rare and are largely limited to sporadic episodes of mass mortality that can occur with the right mix of extremely poor weather conditions and particularly disorienting lighting characteristics (DeCandido and Allen 2006). Throughout New York City, bird collisions with buildings are mostly attributable to daytime strikes with lower story reflective glass windows, not nighttime collisions with upper floors of skyscrapers (Gelb and Delacretaz 2006, 2009; Klem et al. 2009). Nighttime collisions with the Wheel would likely be a similarly rare occurrence and have no significant impact on migratory birds with the use of proper lighting practices and restrictions.

Daytime collisions with buildings.
Daytime bird collisions with buildings usually occur when birds attempt to fly towards images of vegetation or sky reflected by a building's windows or other glass surfaces. The risk of bird collisions with a given building is a function of glass coverage and reflectivity, surrounding habitat, and the abundance and species of birds in the area (Hager et al. 2008, Gelb and Delacretaz 2009, Klem et al. 2009). The buildings in the South Site would have little greenery in the surrounding area, and as such, there would be little to no reflectivity of bird habitat by the buildings' glass. Additionally, because of the extremely limited amount of vegetation around the proposed buildings, only the most urban-adapted generalists (e.g., European starling, rock dove, house sparrow), which seldom collide with windows relative to migrants (O'Connell 2001, Gelb and Delacretaz 2006, Sloan 2007), would be likely to occur nearby. The South Site would not contain attractive or suitable stopover habitat; therefore, migrants would not be expected to occur in proximity to the proposed buildings and be at risk of collisions. The green roofs of the proposed buildings in the South Site, depending on their design and vegetation composition, could attract some migrating birds in search of stopover habitat, but any birds occurring on the rooftops would be surrounded by open air, not glass. The proposed terminal building at the North Site, which would be primarily occupied by the above-ground parking structure, would not have reflective glass on the sides facing the harbor and the waterfront trees and other landscaping. As such, any birds occurring in the vicinity of the building would not be at risk of daytime collisions.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

The federally or state-listed species with the potential to occur within the study area include shortnose sturgeon, Atlantic sturgeon, loggerhead sea turtle, leatherback turtle, Kemp's ridley sea turtle, and green sea turtle. Sea turtles neither nest in New York Harbor, nor reside there year-round, and would be unlikely to occur in the study area except as occasional transients. Similarly, Atlantic and shortnose sturgeon would only occur as transients passing through New York Harbor between Hudson River breeding grounds and Atlantic Ocean overwintering areas. As discussed under "Water Quality and Aquatic Biota," operation of the proposed project would not adversely affect water quality or habitat conditions in Upper New York Harbor in the vicinity of the project sites, and would therefore have no direct or indirect effects on any individuals of these species potentially occurring in the area. Operation of the proposed project would likewise have no adverse impact to EFH within Upper New York Harbor. ✷