

A. INTRODUCTION

This chapter examines the potential impacts from the Proposed Project on aquatic, palustrine, and terrestrial natural resources located in southwest Staten Island. As described in greater detail in Chapter 1, “Project Description,” the Proposed Project is a commercial center with the associated parking, open space, and street and infrastructure improvements. An assessment and analysis of natural resources is necessary, as the Project Site contains natural resources and the Proposed Project involves the disturbance of a natural resource. Natural resources located on the project site including but not limited to water resources (water bodies and groundwater) wetland resources, (freshwater wetlands, tidal wetlands and surface water hydrology), upland resources (ecological communities), and significant, sensitive or designated resources. The chapter describes:

- The regulatory programs that protect wetlands, wildlife, threatened or endangered species, aquatic, and terrestrial resources, or other natural resources within the Project Site;
- The existing conditions of the natural resources within the Project Site, including groundwater, floodplain, aquatic resources, wetlands, terrestrial resources, significant, sensitive, and designated resources, and threatened or endangered species and species of special concern;
- The groundwater, floodplain, aquatic resources, wetlands, terrestrial resources, significant, sensitive, and designated resources, and threatened or endangered species and species of special concern in the future without the Proposed Project (the No Action condition);
- The potential impacts of the Proposed Project on the groundwater, floodplains, aquatic resources, wetlands, terrestrial resources, significant, sensitive, and designated resources, and threatened or endangered species and species of special concern (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.

PRINCIPAL CONCLUSIONS

As detailed in this chapter, the surface water quality, groundwater quality and aquatic biota conditions within and near the Proposed Project would remain essentially unchanged. Wetlands, floodplains, and terrestrial natural resources would be impacted in the With Action condition; however, green roofs and other green stormwater infrastructure and wetlands enhancements, would maintain and in some areas improve natural resource habitats on the Project Site. The Proposed Project would include commercial development of a primarily vacant lot that presently contains natural resources including vegetation in previously disturbed areas, freshwater and tidal wetlands, patches of forested upland area, manicured lawn with trees, and disturbance-tolerant wildlife species that are ubiquitous in urban areas. Proposed green infrastructure

inclusive of vegetated stormwater practices, permeable pavers, and green roofs would offset the potential impacts of increased impervious surface coverage from the Proposed Project. The Proposed Project also includes the creation of freshwater wetlands and tidal wetland jurisdictional area enhancements in accordance with U.S. Army Corps of Engineers (USACE) wetlands restoration guidance and consultation with the New York State Department of Environmental Conservation (NYSDEC). These proposed wetland improvements are intended to compensate for the loss of freshwater wetlands and would potentially improve existing habitat to the benefit of wildlife, waterfowl, and songbirds. Displacement of some wildlife would occur as a result of the Proposed Project, but the shoreline, the area of highest wildlife utilization, would remain undeveloped or enhanced in some locations with native vegetative plantings that would provide food and cover for wildlife. Habitat would remain onsite directly adjacent to the Development Area on the Proposed Project Site to support potentially displaced wildlife.

Threatened or endangered species with the potential to occur in the area are limited to piping plover and roseate tern. The piping plover and roseate tern both utilize wide, flat, open sandy beaches with very little grass and other vegetation which is not found within or adjacent to the Proposed Project.

Overall, it is concluded that with the proposed wetlands enhancement and restoration, the Proposed Project would not result in any significant adverse impacts to natural resources, and may improve water quality by enhancing tidal wetlands and improving stormwater capture and treatment.

B. METHODOLOGY

STUDY AREA

The approximately 33.68-acre Proposed Project is currently a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. The property is bordered by the Arthur Kill along the west and south, residences and commercial buildings to the east, and the Outerbridge Crossing to the north. Aquatic, wetland, and terrestrial natural resources were evaluated within the boundaries of the Proposed Project, and a map showing the ecological communities was developed. Threatened, endangered, and special concern species were also evaluated for a distance of 0.5 miles from the Proposed Project site.

CEA Engineers, P.C (CEA) conducted a natural resource inventory including vegetative identification and enumeration point stations.¹ A total of 30 sample plant communities were situated along 7 transects mapped throughout the property.² The transect method is based on the 1987 Corps of Engineers Wetland Delineation Manual.³ At each sample point, tree, shrub, and herbaceous vegetation were identified and documented. In addition to the sample points, CEA conducted general surveys of each distinct vegetative community to ensure a thorough examination of all vegetative species present onsite. Baseline evaluations for vegetation and

¹ NYC Mayor's Office of Environmental Coordination; 2014 *CEQR Technical Manual* (March Addition). Chapter 11 – Natural Resources.

² NYC Mayor's Office of Environmental Coordination; 2014 *CEQR Technical Manual* (March Addition). Chapter 11 – Natural Resources; 323.2; pg. 11-17.

³ Environmental Laboratory. (1987). *Corps of Engineers Wetlands Delineation Manual*, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

wildlife were conducted by CEA and Capital Environmental Consultants (Capital) from August 2007 through May 2008.⁴ CEA and Capital continued to conduct seasonal field surveys and site walks from 2013 to 2016 to confirm continued presence of identified vegetation and wildlife species as well as to identify any potential new species. The seasonal field surveys and site walks were conducted for both the NRI transects as well as each distinct vegetative community to ensure a thorough re-examination of all vegetative and wildlife species present onsite.⁵

EXISTING CONDITIONS

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

- Existing information identified in literature and obtained from governmental and nongovernmental sources (see **Appendix C**, “Natural Resources Correspondence”), such as the:
 - U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species Report, National Wetland Inventory (NWI) maps, Critical Habitat Mapper, Information, Planning and Consultation system, and Classification of Wetlands and Deepwater Habitats of the United States;
 - U.S. Army Corps of Engineers (USACE) 1987 Wetlands Delineation Manual, 2012 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, and Northcentral-Northeast 2012 Final Regional Wetland Plant List;
 - Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) and Revised Preliminary FIRMs;
 - United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Web Soil Survey (WSS) National Cooperative Soil Survey, Plant Fact Sheets, and NRCS New York City (NYC) Reconnaissance Soil Survey (RSS) map;
 - New York State Department of Environmental Conservation’s (NYSDEC) Environmental Resource mapper (ERM), 1987 Freshwater Wetland Maps, 1974 Tidal Wetland Maps, Infrared aerials, Critical Environmental Areas, Comprehensive Wildlife Conservation Strategy (CWCS) Plan, Natural Heritage Program (NHP) Ecological Communities of New York State Online Conservation Guide and New York Nature Explorer, Breeding Bird Atlas (2000-2005), Herpetological Atlas Project, Open Space Conservation Plan, List of protected fish and wildlife (6 NYCRR Part 182), and List of protected plants and trees (6 NYCRR Part 193);
 - New York State Department of State (DOS) Significant Coastal Fish and Wildlife Habitats (SCFWHs);
 - New York City’s Comprehensive Waterfront Plan, New Waterfront Revitalization Program (WRP), Coastal Erosion Hazard Area (CEHA) Maps, and Zoning Maps;
 - New York City’s Significant, Sensitive, and Designated Resources;⁶

⁴ CEA – NRI Field Surveys; 2007 – 8/29, 8/31, 9/11, 9/13, 9/21, 10/31, 11/28, 12/20; 2008 – 1/29, 2/25, 3/25, 3/31, 4/24, 4/30, 5/27, 5/29

⁵ CEA & Capital – NRI Field Surveys; **2013**-6/19, 7/31, 8/20, 10/22; **2015**-1/20, 3/3, 3/30, 5/13, 6/3; **2016**-4/13, 5/4, 6/22, 7/14.

⁶ NYC Mayor’s Office of Environmental Coordination; 2014 *CEQR Technical Manual* (March Addition). Chapter 11 – Natural Resources; Attachment.

- New York/New Jersey Harbor Estuary Program (HEP);
- New York City Audubon Society, “An Islanded Nature: Natural Area Conservation and Restoration in Western Staten Island, including the Harbor Herons Region,” (2001);
- New York City Department of Environmental Protection (DEP) Harbor Water Quality Survey reports
- USFWS Significant Habitats and Habitat Complexes of the New York Bight Watershed
- Responses to requests for information on rare, threatened, or endangered species in the vicinity of the Project Site from the NHP (see Appendix C).
- Observations made during the NRI conducted within the Project Site⁷, and confirmatory seasonal field survey updates.⁸

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 (2019), land cover type and human activity would not differ from the present. The Project Site would remain a mix of forested upland and wetlands.

Redevelopment projects elsewhere in the study area that are expected to be completed by 2019 would not significantly alter natural resources from their current state. Water quality in the Arthur Kill is likely to continue gradually improving as a result of the City’s Staten Island Bluebelt program and continued updates to the New York State Stormwater Management Design Manual (January, 2015).

The Staten Island Bluebelt provides ecologically sound and cost-effective stormwater management for approximately one third of Staten Island’s land area, and includes the Mill Creek Watershed. The program preserves natural drainage corridors, called Bluebelts, including streams, ponds, and other wetland areas. Preservation of these wetland systems allows them to perform their functions of conveying, storing, and filtering stormwater. In addition, the Bluebelts provide important community open spaces and diverse wildlife habitats.

The *New York State Stormwater Management Design Manual* provides standards and specifications for selection and design of stormwater management practices to comply with State stormwater management performance standards for new construction projects of over one acre. The purpose of the Manual is to protect the waters of the State of New York from the adverse impacts of urban stormwater runoff by, among other measures, the use of green infrastructure techniques. The State updates the Manual every few years to keep pace with changes to the General Permit for Stormwater Discharges from Construction Activity and new and improved Best Management Practices.

Other than the above, 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.

⁷ CEA – NRI Field Surveys; 2007 – 8/29, 8/31, 9/11, 9/13, 9/21, 10/31, 11/28, 12/20; 2008 – 1/29, 2/25, 3/25, 3/31, 4/24, 4/30, 5/27, 5/29; 2013 – 6/19 & 7/31.

⁸ CEA & Capital – NRI Field Surveys; **2013**-6/19, 7/31, 8/20, 10/22; **2015**-1/20, 3/3, 3/30, 5/13, 6/3; **2016**-4/13, 5/4, 6/22, 7/14.

THE FUTURE WITH THE PROPOSED PROJECT

Potential impacts in the With Action condition were assessed by considering aspects of Proposed Project operation, such as stormwater management, disturbances to wetlands and wildlife, and proposed habitat improvements (e.g., tidal wetland enhancements, improved terrestrial habitat from landscaping and green roofs). Potential impacts to natural resources during construction of the Proposed Project are evaluated in Chapter 18, “Construction.”

C. REGULATORY CONTEXT

The following sections identify the federal, state, and city 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 of pollutants 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.

MAGNUSON-STEVENSON 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 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 impacts that reduce the quality and/or quantity of EFH. Adverse impacts may include:

Riverside Galleria EIS

- Direct impacts, such as physical disruption or the release of contaminants;
- Indirect impacts, such as the loss of prey or reduction in the fecundity (number of offspring produced) of a managed species; and
- Site-specific or habitat-wide impacts that may include individual, cumulative, or synergistic 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 prevent undesirable activities within 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 construction that disturbs an acre or more of land, 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 State, tidal wetlands occur along the salt-water shore, bays, inlets, canals, and estuaries of Long Island, New York City and Westchester County, and the tidal waters of the Hudson River up to the salt line. NYSDEC administers the tidal wetlands regulatory program and the mapping of the state’s tidal wetlands. A permit is required for most activities that would alter wetlands or the adjacent areas (up to 300 feet inland from wetland boundary or up to 150 feet inland within New York City).

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

These 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. Plants listed in 6 NYCRR Part 193 and animals listed in 6 NYCRR Part 182 are protected by State law: it is illegal to pick, damage, or destroy any protected plants on property not owned by the individual, to apply any defoliant or herbicide, or to carry these plants away without the owner's consent; it is also illegal to hunt, import, export, or possess protected animals.

NEW YORK CITY

WATERFRONT REVITALIZATION PROGRAM (WRP).

The City's WRP established a Coastal Zone, within which all discretionary waterfront projects must be reviewed for consistency with coastal zone policies. This program is administered by the New York City Department of City Planning (DCP).

D. EXISTING CONDITIONS

INTRODUCTION

The *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 considers 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: groundwater, floodplains, wetlands, vegetation and ecological communities, wildlife, and threatened, endangered, and special concern species.

A total of 10 ecological communities were identified on the project site based on the Ecological Communities of New York State (see **Figures 8-1a** and **8-1b**).⁹ As the site has been historically disturbed and shaped by both internal and surrounding development activities, a number of ecological communities, of varying size and characteristics were identified based on the 12-month NRI survey; Classification system outlined in the *Ecological Communities of New York State* (Edinger *et al.* 2014);¹⁰ wetland delineation; and the investigating team's experience and familiarity with the site.¹¹ Estuarine, palustrine, and terrestrial communities were determined to be present and characterized the various wetland and upland vegetative cover types found throughout the Project Site. Utilizing NRI data collected at the 30 sample points, a detailed ecological communities map was generated.

GROUNDWATER

Groundwater is first encountered at approximately +/- elevation 2.0 and +/- elevation 10 (NAVD88) throughout upland portions of the site. It was observed that the water table gradually raised toward Arthur Kill Road. Fluctuations in groundwater levels can occur due to variations in season, rainfall, snowmelt, surface infiltration, temperature, construction activities, pumping of dewatering systems, leakage from utilities and other factors. Groundwater in Staten Island is not used as a source of potable water (the municipal water supply uses upstate reservoirs).

FLOODPLAINS

The southern and western portions of the property fall within the 100-year floodplain (an area which has a one percent chance of flooding in a given year) and the 500-year floodplain (an area with a 0.2 percent chance of flooding in a given year) or 100-year floodplain with average depths of less than 1 foot or with drainage areas less than 1 square mile; the remainder of the site is outside of any currently effective floodplain boundary (see **Figure 8-2**).

Based on FEMA 2007 FIRM maps, the 100-year flood elevation along the western and southern shorelines is at 10 feet National Geodetic Vertical Datum 1929 (NGVD 29), or approximately 8.9 feet when referenced to the North American Vertical Datum of 1988 (NAVD88) and 6.8 feet when referenced to the Staten Island Datum (SID). The 500-year floodplain marginally extends landward of the 100-year floodplain along the northwestern and southern shorelines.¹²

⁹ Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, D.M. Hunt, and A.M. Olivero (editors). 2014. *Ecological Communities of New York State*. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program, NYSDEC, Albany, NY.

¹⁰ Edinger *et al.* 2014

¹¹ CEA – NRI Field Surveys; 2007 – 8/29, 8/31, 9/11, 9/13, 9/21, 10/31, 11/28, 12/20; 2008 – 1/29, 2/25, 3/25, 3/31, 4/24, 4/30, 5/27, 5/29. CEA & Capital – NRI Field Surveys; **2013**-6/19, 7/31, 8/20, 10/22; **2015**-1/20, 3/3, 3/30, 5/13, 6/3; **2016**-4/13, 5/4, 6/22, 7/14.

¹² In June 2013, FEMA released Preliminary FIRMs (revised December 5, 2013) that replaced the ABFE maps for areas in New York City, including Staten Island. The City of New York reviewed FEMA's updated Preliminary FIRMs, and filed an appeal released January 2015, noting some errors. In October 2016, FEMA announced that it agreed with the City's findings, and that it would work with the City to revise the 2015 Preliminary FIRMs and issue new maps in the coming years that better reflect current flood risk. Until the new flood maps are issued, flood insurance rates in New York City will continue to be based on the 2007 Effective FIRMs.



Legend

- Property Boundary
- Study Area Boundary

Transect Locations

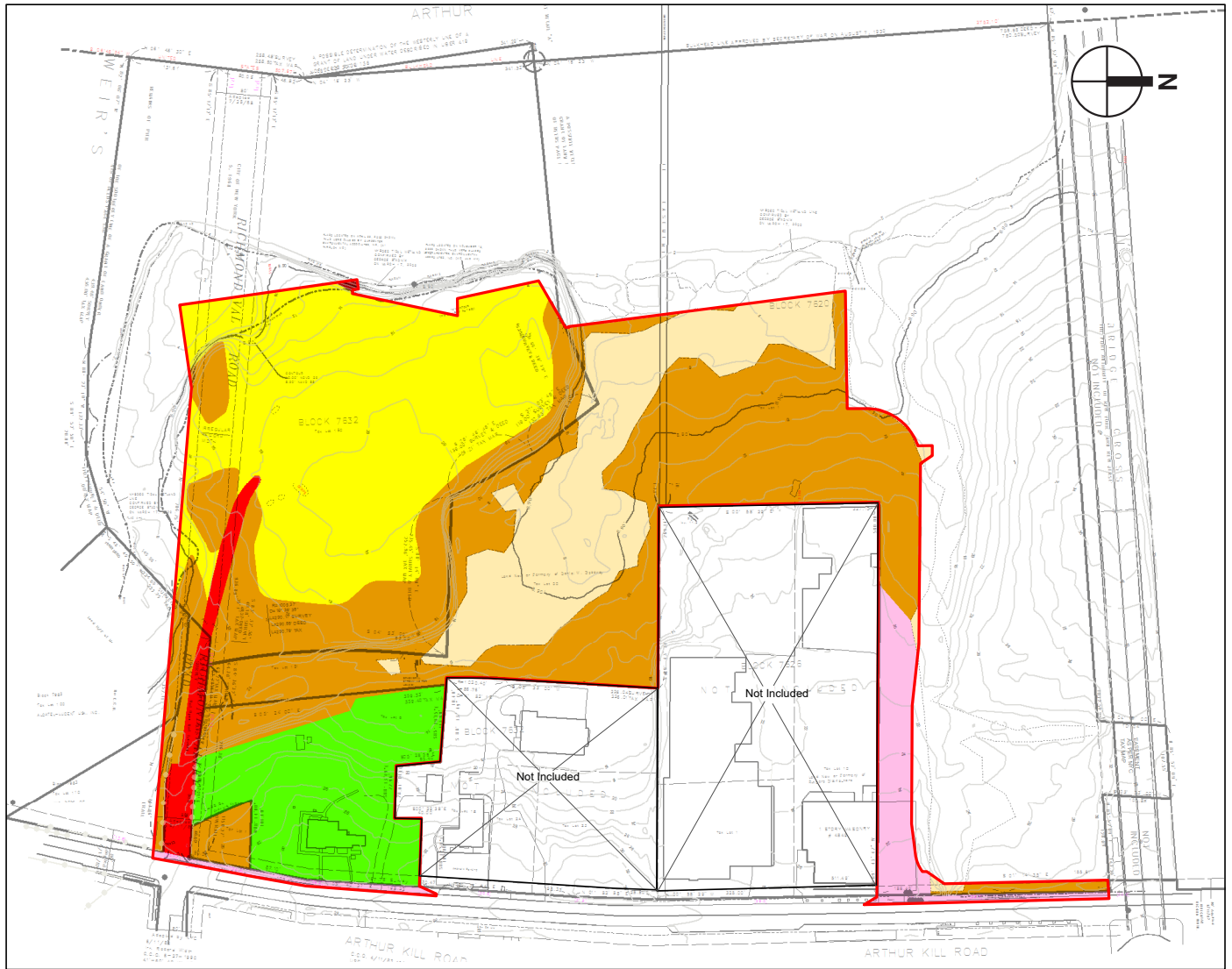
Riverside Galleria
 Block 7620, Lot 1
 Block 7632, Lots 1,6,50, 150 & 151
 Staten Island, New York



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Transect Locations
Figure 8-1a



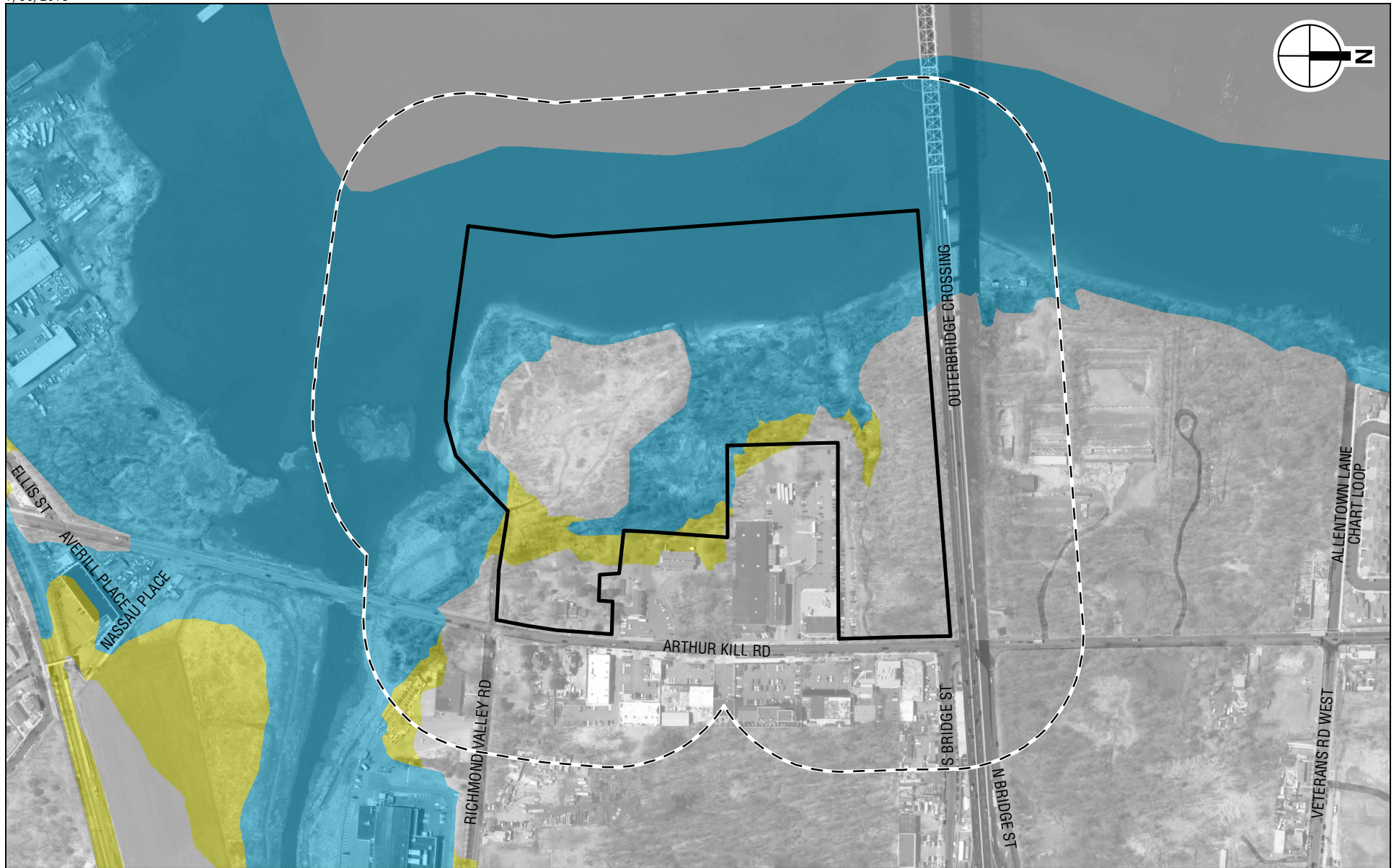
Project Disturbance Limit



Ecological Communities

Description

- Reedgrass/Purple Loosestrife Marsh
- Estuarine Riprap/Artificial Shore
- Successional Old Field
- Successional Maritime Forest
- Unpaved Road/Path
- Paved Road/Path
- Mowed Lawn with Trees



-  Proposed Development Site
-  Study Area (400-foot boundary)
-  100-Year Floodplain
-  500-Year Floodplain

0 400 FEET

FEMA Preliminary
Flood Hazard Areas
Figure 8-2

AQUATIC RESOURCES

SURFACE WATER RESOURCES

The Proposed Project is located along the Arthur Kill, which is tidally influenced. The Arthur Kill is a tidal strait connecting the Kill van Kull and Newark Bay to the north with Raritan Bay and the Raritan River to the south. Tidal surges come from both ends, with an average flushing time of two weeks and an average semi-diurnal tidal range of 5.3 feet (1.6 meters). The salinity of the Arthur Kill varies from 17 to 27 parts per thousand at the southern end to nearly freshwater in some of the tributary mouths.

WATER QUALITY

Title 6 of the New York Code of Rules and Regulations (NYCRR) Part 701 includes classifications for surface waters and groundwater. The Arthur Kill is Use Classification I saline surface waters. Best usages for Use Classification I saline surface waters are secondary contact recreation and fishing. Water quality should be suitable for fish propagation and survival (see **Table 8-1**).

Table 8-1
DEP Water Quality 2012 Data for the Tottenville Station (K-5)

Parameter – [Use Class I Standard]	Top Waters Avg.	Bottom Waters Avg.
Fecal coliform (colonies per 100mL) [Monthly geometric mean less than or equal to 200 cells/100 milliliters (mL) from five or more samples]	53.21	NS
Enterococcus (colonies per 100mL) [Monthly geometric mean less than 35 cells/100 milliliters (mL) from five or more samples]	10.29	NS
Dissolved oxygen (DO) (mg/L) [Never less than 4mg/L]	7.34	6.57
Secchi transparency (ft.) [No standard]	3	NA
Chlorophyll a (µg/L) [No standard]*	4.8	NA
<p>Notes: * = Total avg. for all Inner Harbor sampling locations combined. NA=Not available. NS=Not sampled.</p> <p>Source: DEP 2012.</p>		

The Arthur Kill, residing between the borders of New York and New Jersey, is surrounded by one of the most densely populated coastal areas in the world and suffers from many use impairments including heavy industry and major shipping vessel traffic. Historically, water problems included high levels of organics and metals contaminants.

The results of the Harbor Surveys conducted by DEP show that the water quality of the Arthur Kill, has improved significantly since the 1970s as a result of measures undertaken by New York City (e.g., infrastructure improvements such as major improvements to wastewater treatment plants and increased capture of stormwater runoff). Water quality data (2012) from the DEP Harbor Survey station at Tottenville (Station K5), the station closest to the Proposed Project, indicate that the water quality averages in this part of the Arthur Kill are good and meet the water quality standards for Use Classification I saline surface waters. Chlorophyll-a

concentrations were not indicative of high nutrient concentrations during the sampling year.¹³ Secchi transparency was indicative of low water clarity, likely due to high suspended solid concentrations of surface waters.¹⁴

SEDIMENT QUALITY

The Proposed Project is located along the shore of the Arthur Kill. The sediments within the Arthur Kill are primarily comprised of silt with some clay and sand. Although sediments in the Arthur Kill can be toxic to a variety of organisms, benthic organisms thrive by scouring the sediment interface in search of other benthic invertebrates to consume.¹⁵

AQUATIC BIOTA

The Arthur Kill supports a diverse and productive aquatic community consisting of a variety of phytoplankton and zooplankton, invertebrate species, and finfish. The following sections provide a brief description of the primary groups of aquatic biota found in the Arthur Kill.

Phytoplankton & Zooplankton

Phytoplankton and zooplankton are a taxonomic group of microscopic plants and animals whose movements within the system are largely governed by prevailing tides and currents. Light penetration, turbidity, and nutrient concentrations are important factors in determining plankton productivity and biomass. The Arthur Kill has zooplankton populations that are indicative of low light penetration and pollution. The most abundant microzooplankton species in the area are crustaceans, while the macrozooplankton are dominated by larval mud crabs and grass shrimp (*Palaemonetes spp.*).¹⁶

Aquatic Vegetation

Aquatic vegetation within the project area consists primarily of species that inhabit the subtidal and intertidal zones along the mudflats and shorelines of the Arthur Kill. The subtidal region is characterized by species of algae and sea lettuce (*Ulva lactuca*). The intertidal zone is populated by patches of smooth cordgrass (*Spartina alterniflora*) which are limited in growth due to wave action associated with high volumes of commercial boat traffic and storm events.

¹³High 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 (DEP 2010b).

¹⁴Secchi 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) (DEP 2010b).

¹⁵U.S. Fish and Wildlife. Significant Habitats and Habitat Complexes of the New York Bight Watershed; Arthur Kill Complex – Complex #18; http://nctc.fws.gov/resources/knowledge-resources/pubs5/web_link/text/akc_form.htm.

¹⁶Ibid.

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.

There are a number of benthic species present within the Arthur Kill including fiddler crab (*Uca spp.*), ribbed mussels (*Geukensia demissa*), and marsh snails (*Melampus bidentatus*).¹⁶ The intertidal mudflat communities located below the high marsh areas are populated by a variety of worms, shellfish, snails, sponges, and jellyfish.¹⁶

Fish

The fish fauna of the Arthur Kill consists of number of species of fish including, but not limited to, year-round residents mummichog and grubby sculpin (*Myoxocephalus aeneus*); migratory species bay anchovy (*Anchoa mitchilli*), Atlantic silverside (*Menidia menidia*), Alewife (*Alosa pseudoharengus*); and predatory species bluefish (*Pomatomus saltatrix*), striped bass (*Morone saxatilis*), weakfish (*Cynoscion regalis*), and hakes (*Urophycis spp.*).¹⁶

ESSENTIAL FISH HABITAT (EFH)

The NMFS designates EFH within 10' x 10' squares identified by latitude and longitude coordinates. The waters offshore from the Proposed Project 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°10.0' W, (South) 40°30.0' N, (West) 74°20.0' 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, east around to Great Kills South Harbor of Great Kills, NY, south of Bayonne, NY.¹⁷

The Proposed Project is located along the shore of the Arthur Kill. This area has been identified as EFH for several species of fish (see **Table 8-2**). The designations are as follows: red hake (*Urophycis chuss*), winter flounder (*Pseudopleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), Atlantic butterflyfish (*Peprilus triacanthus*), Atlantic mackerel (*Scomber scombrus*), summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel *Scomberomorus maculatus*), cobia (*Rachycentron canadum*), and sandbar shark (*Carcharhinus plumbeus*).¹⁸

¹⁷Summary of Essential Fish Habitat (EFH) Designation;
http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40307410.html

¹⁸Summary of Essential Fish Habitat (EFH) Designation;
http://www.nero.noaa.gov/hcd/STATES4/new_jersey/40307410.html

Table 8-2
Essential Fish Habitat Species

Species	Eggs	Larvae	Juveniles	Adults
red hake (<i>Urophycis chuss</i>)	X	X	X	
winter flounder (<i>Pseudopleuronectes americanus</i>)	X	X	X	X
windowpane flounder (<i>Scophthalmus aquosus</i>)	X	X	X	X
Atlantic sea herring (<i>Clupea Harengus</i>)		X	X	X
bluefish (<i>Pomatomus Saltatrix</i>)			X	X
Atlantic butterfish (<i>Peprilus triacanthus</i>)		X	X	X
Atlantic mackerel (<i>Scomber scombrus</i>)			X	X
summer flounder (<i>Paralichthys dentatus</i>)		X	X	X
scup (<i>Stenotomus chrysops</i>)	X	X	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
sandbar shark (<i>Carcharhinus plumbeus</i>)		X		X

Some of the above referenced fish species are not resident to the Arthur Kill estuarine system; therefore, these species would only utilize this area on a seasonal basis. Fish species found within the estuarine system would not be impacted by project construction or operation as very minimal in-water work is proposed along the immediate property shoreline for four stormwater outfall installations.

VEGETATION AND ECOLOGICAL COMMUNITIES

The estuarine communities identified onsite include: Tidal river, Low salt marsh and Estuarine riprap/artificial shore. Hydrology, hydric soil characteristics, vegetation and landscape position were the determinant factors in establishing upland and wetland community types. Provided below is a description of each of the ecological communities, as provided by Edinger *et al.* (2014), their location, and an inventory of the vegetative species observed within each of these community types during site surveys.

Tidal River

Tidal river is an aquatic community of continuously flooded substrates that support no emergent vegetation. (Edinger *et al.* 2014). Tidal river is found along the western and southern portions of the property boundaries, within the Arthur Kill.

Low salt marsh

Low salt marsh is a marsh community that occurs in sheltered areas along the coast. Low salt marsh is found about two meters below mean high tide and is regularly flooded by semidiurnal tides. The vegetation within this community is mainly cordgrass (*Spartina alterniflora*) (Edinger *et al.* 2014).

Low salt marsh is found along the western tidal shore of the Project. Although historically disturbed and currently impacted by wave action from passing tankers in the Arthur Kill, the patches of *S. alterniflora* provide quality habitat for resident and migratory wildlife species within the intertidal zone.

The vegetation noted in the vicinity of the low salt marsh included, but was not limited to, smooth cordgrass (*Spartina alterniflora*).

Estuarine riprap/artificial shore

Estuarine riprap/artificial shore is a wetland community of a constructed estuarine shore in which the substrate is composed of broken rocks, wooden bulkheads, or concrete that is placed as a means of reducing erosion. Vegetation and species diversity are low compared to natural estuarine shorelines (Edinger *et al.* 2014).

Estuarine riprap/artificial shore are found along the southern and western shores of the Project Site. The southern and southwestern shorelines also contain large concrete slab remnants.

The vegetation noted in the vicinity of the estuarine riprap/artificial shore included, but was not limited to, black locust (*Robinia pseudoacacia*), sumac (*Rhus spp.*), bayberry (*Myrica pennsylvanica*), mugwort (*Artemisia vulgaris*), raspberry (*Rubus spp.*), Canada thistle (*Cirsium arvense*), common reed (*Phragmites australis*), seaside goldenrod (*Solidago semipervens*) and Japanese knotweed (*Polygonum cuspidatum*).

WETLANDS

A detailed wetland delineation was conducted on the Project Site in accordance with both the USACE as well as the NYSDEC guidelines.^{19,20} The USACE Wetland Delineation Manual (Environmental Laboratory, 1987) was used to delineate federal wetlands pursuant to the USACE.¹⁹ The NYSDEC Freshwater Wetland Delineation Manual (1995) was used to delineate state wetlands.²⁰

As recommended in the guidelines, available data on the site were obtained from US Geological Survey quadrangle maps, U.S. Fish and Wildlife Service National Wetlands Inventory Maps (NWI), NYSDEC Freshwater and Tidal Wetland Maps, US Department of Agriculture—NRCS New York City Soil Survey map, aerial imagery, and other relevant sources.^{21,22,23,24}

The NWI maps show the general configuration, location, and category of wetlands found within a given area of coverage.²⁵ A wetland delineation map for the site is provided on **Figure 8-3**. Because the NWI maps are limited in precision by their scale and by the identification method used, the presence and boundaries of wetlands shown on the NWI maps need to be more precisely verified in the field. Commonly, small wetland areas, and, less frequently, large wetland areas are not precisely located on NWI maps and may not be wetlands that exhibit the

¹⁹Environmental Laboratory. (1987). Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

²⁰New York State Department of Environmental Conservation. 1995. Freshwater Wetlands Delineation Manual.

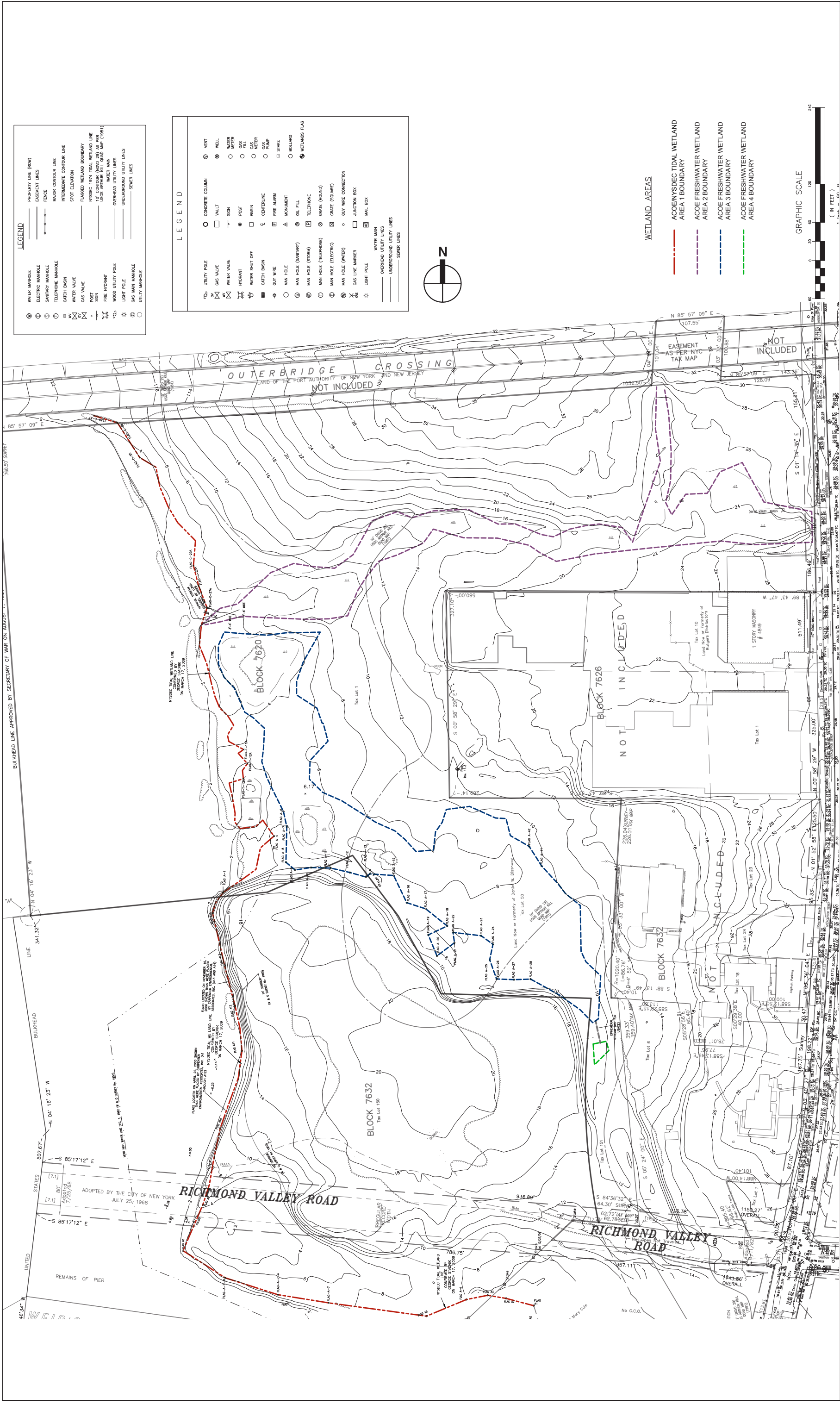
²¹USGS 7.5 Min. Quadrangle Map – Arthur Kill; NY-NJ; 1975.

²²U.S. Fish and Wildlife Service – National Wetlands Inventory; Wetlands Mapper June 3, 2013;<http://www.fws.gov/wetlands/data/Mapper.html>.

²³New York State Department of Environmental Conservation; Online Environmental Resource Mapper; June 3, 2013; <http://www.dec.ny.gov>.

²⁴New York City Soil Survey Staff. 2005. New York City Reconnaissance Soil Survey. United States Department of Agriculture, Natural Resource Conservation Service, Staten Island, NY.

²⁵Cowardin, L.M., V.Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.



Wetland Delineation
Figure 8-3

three parameters set forth in USACE guidance. The freshwater and tidal wetland boundaries were field confirmed by Stacey Jensen of the USACE on July 10, 2008.

The NYSDEC is responsible for mapping larger freshwater wetlands that are 12.4 acres in size or greater, or some smaller wetlands that are of unusual local importance (Environmental Conservation Law, Article 24). NYSDEC Freshwater Wetlands Map for the Project Site is provided in Appendix C. The NYSDEC Freshwater Wetlands Map identifies two wetlands (AR-14 and AR-30) near the site. No portions of NYSDEC freshwater wetlands AR-14 and AR-30 or their associated 100-foot wetland adjacent areas are located within or extend into the project boundaries. This was field confirmed with NYSDEC Region 2.

The NYSDEC is also responsible for mapping tidal wetlands which border on or lie beneath tidal waters or reside in the intertidal and high marsh areas subject to tidal action (Environmental Conservation Law, Article 25). NYSDEC Tidal Wetlands Maps for the Project Site (Map Nos. 564-484 & 564-486) are included in Appendix C.²⁶ The NYSDEC Tidal Wetlands Maps identifies two different types of tidal wetland areas categorized as SM (Coastal shoals, Bars and Mudflats) and LZ (Littoral Zone) associated with the Arthur Kill along the Proposed Project’s western and southern shorelines. Portions of the NYSDEC tidal wetlands and their associated tidal wetland adjacent areas are located within or extend into the Proposed Project’s boundaries. The extent of the tidal wetland boundary was field confirmed by NYSDEC Region 2 Marine Resources staff member George Stadnik on March 17, 2009.

All freshwater and tidal wetland areas within the boundaries of the Project Site have been flagged in the field on April 26, May 17, 18, & 23, 2006, and September 21, and December 20, 2007. Rogers Surveying, P.L.L.C, has surveyed the flagged locations and depicted the precise freshwater and tidal wetland boundaries on the Proposed Project’s survey titled South Richmond Survey dated February 26, 2006, last revised June 1, 2016 (see Figure 8-3).

There are a total of three freshwater and one tidal wetland area delineated within the boundaries of the Project Site. Tidal Wetland Area 1, associated with the Arthur Kill shoreline, falls under the jurisdiction of both USACE and NYSDEC. Freshwater Wetland Areas 2, 3, and 4 (totaling 3.58 acres of stormwater fed, inland freshwater wetlands) fall under the jurisdiction of USACE only. All wetlands were delineated in accordance with accepted USACE methodology and are considered to be “jurisdictional wetland” subject to the policies, regulations, and procedures established by 33 CFR Parts 320, 323, and 325, respectively, all as administered by USACE. A description of each area mapped is as follows (see below). Together, these existing wetlands and wetland adjacent areas total 9.54 acres of the Project Site. Benefits from the tidal and freshwater wetlands areas are shown in **Tables 8-3 and 8-4**.

**Table 8-3
Assessment of On-site Tidal Wetland Benefits**

Tidal Wetland Benefit	Wetland 1
1) Marine food production.	High
2) Wildlife habitat.	High
3) An element of flood and storm control.	High
4) A source of recreation, education and research.	Low
Source: Environmental Conservation Law, Article 25, Title 3, Section 25-0302-1 & CEA 2013.	

²⁶NYSDEC Tidal Wetland Maps 564-484 & 564-486; Prepared by Earth Satellite Corporation – Mark Hurd Aerial Surveys; August 10, 1974-October 9, 1974.

Table 8-4
Assessment of On-site Freshwater Wetland Benefits

Freshwater Wetland Benefit	Wetland 2	Wetland 3	Wetland 4
1) Flood and storm control by the hydrologic absorption and storage capacity of freshwater wetlands.	Medium	Medium	Low
2) Wildlife habitat by providing breeding, nesting and feeding grounds and cover for many forms of wildlife, wildfowl and shorebirds, including migratory wildfowl and rare species such as the bald eagle and osprey.	Medium	Medium	Low
3) Protection of subsurface water resources and provision for valuable watersheds and recharging groundwater supplies.	Low	Low	Low
4) Recreation by providing areas for hunting, fishing, boating, hiking, bird watching, photography, camping and other uses.	Medium	Low	Low
5) Pollution treatment by serving as biological and chemical oxidation basins.	Low	Medium	Low
6) Erosion control by serving as sedimentation areas and filtering basins, absorbing silt and organic matter and protecting channels and harbors.	Medium	Medium	Low
7) Education and scientific research by providing readily accessible outdoor biophysical laboratories, living classrooms and vast training and education resources.	Low	Low	Low
8) Open space and aesthetic appreciation by providing often the only remaining open areas along crowded riverfronts and coastal regions.	Low	Low	Low
9) Sources of nutrients in the freshwater food cycles and nursery grounds and sanctuaries for freshwater fish.	N/A	N/A	N/A
Source: Environmental Conservation Law, Article 24, Title 1, Section 24-0105-7, 6 NYCRR Part 664 & CEA 2013.			

TIDAL WETLAND AREA 1

Wetland Area 1, which comprises 0.95 acres of NYSDEC tidal wetland and associated with 6.03 acres of NYSDEC tidal wetland adjacent area, is located along the western and southern shores of the Project Site.²⁷ The tidal wetland area was populated by patches of saltmarsh cordgrass (*Spartina alternifolia*, OBL), groundsel-tree (*Baccharis halimifolia*, FACW), common reed (*Phragmites australis*, FACW), mugwort (*Artemisia vulgaris*, UPL) and beach grass (*Ammophila breviligulata*, FACU). Upland vegetation residing above the wetland/upland interface included black locust (*Robinia pseudo-acacia*, FACU), cottonwood (*Populus deltoides*, FAC), red maple (*Acer rubrum*, FAC), white mulberry (*Morus alba*, UPL), Tree-of-Heaven (*Ailanthus altissima*, UPL), Virginia creeper (*Parthenocissus quinquefolia*, FAC), common reed, and greenbrier (*Smilax rotundifolia*, FAC).²⁸

FRESHWATER WETLAND AREA 2

Wetland Area 2 comprises approximately 1.32 acres of USACE jurisdictional freshwater wetland and emanates from the northeast corner of the Project Site. This wetland has dominant freshwater wetland characteristics associated with a freshwater discharge from a culvert under

²⁷ Includes tidal wetland adjacent area located on the adjacent property, within the boundaries of the Proposed Project.

²⁸ Wetland Indicator Status – OBL (Obligate Wetland); FACW (Facultative Wetland); FAC (Facultative); FACU (Facultative Upland); UPL (Obligate Upland)

Arthur Kill Road. Although the wetland is classified as estuarine, E2EM5P on the NWI map, it appears to have little if any mixing between tidal and freshwaters at the discharge point along the Arthur Kill shoreline. The wetland was dominated by common reed (*Phragmites australis*, FACW) and common greenbrier (*Smilax rotundifolia*, FAC).

FRESHWATER WETLAND AREA 3

Wetland Area 3, which comprises 2.25 acres of USACE jurisdictional wetland and emanating from the center of the Project Site, also had dominant freshwater wetland characteristics. The USFWS classification system typifies this community as an estuarine intertidal wetland (E2EM5P). Although the wetland is classified as estuarine, it has very little mixing between tidal and freshwaters and is palustrine in nature. Repeated site visits have confirmed that the freshwater wetland is separated from the tidal shore by a berm and infrequently discharges freshwater for a brief period of time (<1 month) via a small depression following snowmelt in the spring. Along the shoreline in front of the berm, the vegetation consisted primarily of groundsel-tree (*Baccharis halimifolia*, FACW), common reed, mugwort (*Artemisia vulgaris*, UPL) and beach grass (*Ammophila breviligulata*, FACU-). Landward, behind the berm, vegetation was most closely associated with a degraded freshwater wetland including dominant species such as common reed and Tree-of-Heaven (*Ailanthus altissima*, NI). Additional species identified include Virginia creeper, poison ivy, and sparse amounts of sensitive fern (*Onocleus sensibilis*, FACW).

FRESHWATER WETLAND AREA 4

Wetland Area 4 comprises 0.01 acres of USACE jurisdictional freshwater wetland that is not identified on NWI maps. Wetland Area 4 is a very small, wet depression that shares an ephemeral connection with Wetland 3. The wetland was dominated by common reed (*Phragmites australis*, FACW) and common greenbrier (*Smilax rotundifolia*, FAC).

TERRESTRIAL RESOURCES

VEGETATION AND ECOLOGICAL COMMUNITIES

These resources are characterized according to their vegetation, potential for wildlife habitat, current use, and, as appropriate, the environmental systems that support it. The palustrine and terrestrial communities identified onsite include: Reedgrass/purple loosestrife marsh, Maritime beach, Successional old field, Disturbed successional maritime forest, Unpaved road/path, Paved road/path and Mowed lawn with trees. Hydrology, hydric soil characteristics, vegetation and landscape position were the determinant factors in establishing upland and wetland community types (see Figure 8-3). Provided below is a description of each of the ecological communities, as provided by Edinger *et al.* (2014), their location, and an inventory of the vegetative species observed within each of these community types during site surveys.

Reedgrass/purple loosestrife marsh

Reedgrass/purple loosestrife marsh is a marsh that has been disturbed by draining, filling, road salts, etc. in which reedgrass (*Phragmites australis*) or purple loosestrife (*Lythrum salicaria*) is the dominant species (Edinger *et al.* 2014).

A *Phragmites australis* (Phragmites) dominated reedgrass/purple loosestrife marsh is present within the center of the Project Site and in the drainage area extending from under Arthur Kill

Road towards the western boundary of the property. The Phragmites monoculture situated in the center of the site is the result of historical disturbances related to commercial and industrial activities on the site dating back to the 19th century. The monoculture does not provide significant freshwater wetland functions or values as it is hydrologically supported primarily by runoff from adjacent residential and commercial properties and provides limited habitat for native and migratory wildlife.

The stormwater discharge area extending outward from under Arthur Kill Road is intermittent in nature. It provides a seasonally limited source of hydrology to the Phragmites dominated freshwater wetland that has formed along the drainage course. The wetland functions primarily to attenuate and filter stormwater prior to it being discharged to the Arthur Kill shoreline. The higher elevation northern upland forested portion of the property transitions to the lower elevations of the Phragmites-dominated drainage course. The geomorphic positioning of the drainage course at the bottom of the forested upland slope provides for distinct vegetation zones that provide high value food and cover for native and migratory wildlife species.

The primary vegetation found within this community included common reed (*Phragmites australis*), raspberry (*Rubus spp.*), poison ivy (*Toxicodendron radicans*), field bindweed (*Convolvulus arvensis*), and greenbrier (*Smilax rotundifolia*).

Maritime beach

Maritime beach communities have extremely sparse vegetation which occurs on unstable sand, gravel, or cobble ocean shores above mean high tide, where the shore is modified by storm waves and wind erosion. Characteristic vegetation found within these communities include beachgrass (*Ammophila breviligulata*), sea-rocket (*Cakile edentula* spp. *Edentula*), seaside atriplex (*Atriplex patula*), seabeach atriplex (*A. arenaria*), seabeach sandwort (*Honkenya peploides*), salsola (*Salsola kali*), seaside spurge (*Chamaesyce polygonifolia*), and seabeach knotweed (*Polygonum glaucum*) (Edinger *et al.* 2014).

Maritime beach was found along the western and southern boundaries of the Proposed Project. The beach functions primarily as a barrier to wave action and coastal storms. In conjunction with the intertidal marsh, it provides limited habitat for both native and migratory wildlife due to the presence of large stands of Phragmites interspersed with native shrubs and grasses.

Species noted included, but were not limited to beachgrass (*Ammophila breviligulata*), seaside goldenrod (*Solidago semipervens*), groundsel-bush (*Baccharis halimifolia*), marsh elder (*Iva frutescens*), and spike grass (*Distichlis spicata*).

Successional old field

Successional old field communities are meadows dominated by forbs and grasses that occur on sites that have been cleared and plowed for farming and development and then abandoned. Characteristic herbs which inhabit these areas include goldenrod (*Solidago spp.*), poa species (*Poa spp.*), Timothy (*Phleum pretense*), Quackgrass (*Agropyron repens*), Brome grass (*Bromus spp.*), Orchard grass (*Dactylis glomerata*), Old-field cinquefoil (*Potentilla simplex*), Wild strawberry (*Fragaria virginiana*), Queen-Anne's lace (*Daucus carota*), and ragweed (*Ambrosia artemisiifolia*). Common shrub species which may be present include dogwood species (*Cornus spp.*), raspberries (*Rubus spp.*), and sumacs (*Rhus spp.*) (Edinger *et al.* 2014).

Disturbed successional old fields are one of the dominant community types found on the southern half of the Project Site. Historical disturbances are the result of commercial and industrial activities on the site dating back to the 19th century and filling of the site in the early

to mid-20th century. The vegetation assemblage present is typical of disturbed settings on Staten Island. Species present were a mix of non-native and native plants that are well adapted to surviving in a disturbed environment that is hydrologically supported by seasonal precipitation.

Species noted within the successional old field community included, but were not limited to, crabgrass (*Digitaria sanguinalis*), common reed (*Phragmites australis*), deer-tongue grass (*Panicum clandestinum*), eastern blue-eyed grass (*Sisyrinchium atlanticum*), fescue (*Festuca spp.*), switch grass (*Panicum virgatum*), upland bentgrass (*Agrostis perennans*), foxtail (*Alopecurus spp.*), little bluestem (*Andropogon scoparius*), poa species (*Poa spp.*), red fescue (*Festuca rubra*), slender (path) rush (*Juncus tenuis*), soft rush (*Juncus effusus*), unnamed sedge (*Carex scoparia*), poison ivy (*Toxicodendron radicans*), autumn wild onion (*Allium stellatum cernuum*), common milkweed (*Asclepias syriaca*), common mugwort (*Artemisia vulgaris*), common mullein (*Verbascum thapsus*), common plantain (*Plantago major*), common St. John's wort (*Hypericum perforatum*), daisy fleabane (*Erigeron annuus*), hemp dogbane (*Apocynum cannabinum*), king devil (*Hieracium pretense*), oxeye daisy (*Chrysanthemum leucanthemum*), queen Anne's lace (*Daucus carota*), red clover (*Trifolium pretense*), violet species (*Viola spp.*), white clover (*Trifolium repens*), goldenrod (*Solidago spp.*). Common shrub and tree species present include indigo bush (*Amorpha fruticosa*), multiflora rose (*Rosa multiflora*) black willow (*Salix nigra*), cottonwood (*Populus deltoides*), and black locust (*Robinia pseudoacacia*).

Successional maritime forest

Successional maritime forest is a successional hardwood forest that occurs in low areas near the seacoast. This type of forest community is developed after vegetation has been burned or land has been cleared. The trees may be stunted and flat-topped due to salt spray. The forest may be dominated by a single species, or there may be two or three codominant species. Characteristic trees include black oak (*Quercus velutina*), post oak (*Quercus stellata*), white oak (*Quercus alba*), black cherry (*Prunus serotina*), black gum (*Nyssa sylvatica*), sassafras (*Sassafras albidum*), and red maple (*Acer rubrum*). Common shrub and herbaceous species include poison ivy (*Toxicodendron radicans*), Virginia creeper (*Parthenocissus quinquefolia*), greenbrier (*Smilax spp.*), bayberry (*Myrica pensylvanica*), black locust (*Robinia pseudoacacia*), privet (*Ligustrum spp.*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*).

A disturbed successional maritime forest-like community best describes the vegetation found along the northern half and east central sections of the Project Site. Both sections of this community have been impacted by historical disturbances. The mix of native and non-native vegetation species present are well adapted to surviving in a disturbed environment that is hydrologically supported by seasonal precipitation.

Species noted within the successional maritime forest included, but were not limited to, black cherry (*Prunus serotina*), sassafras (*Sassafras albidum*), pin oak (*Quercus palustris*), hackberry (*Celtis occidentalis*), princess-tree (*Paulownia tomentosa*), sweetgum (*Liquidambar styraciflua*), tree-of-heaven (*Ailanthus altissima*), and red maple (*Acer rubrum*). Common shrub and herbaceous species include blackberry (*Rubus allegheniensis*), black snakeroot (*Cimicifuga racemosa*), poison ivy (*Toxicodendron radicans*), Japanese knotweed (*Polygonum cuspidatum*), Virginia creeper (*Parthenocissus quinquefolia*), greenbrier (*Smilax spp.*), Japanese honeysuckle (*Lonicera japonica*), and multiflora rose (*Rosa multiflora*).

Unpaved road/path

Unpaved road/path is a sparsely vegetated pathway with gravel, bare soil, or bedrock outcrop. These roads or pathways are maintained by regular trampling or scraping of the land surface. The substrate consists of the soil or parent material at the site. One characteristic plant is path rush (*Juncus tenuis*) (Edinger *et al.* 2014).

Unpaved roads and pathways were found within the southern half of the property primarily within the successional old field community.

Species noted included, but were not limited to common mugwort (*Artemisia vulgaris*), common reed (*Phragmites australis*), slender (path) rush (*Juncus tenuis*), common plantain (*Plantago major*), Japanese knotweed (*Polygonum cuspidatum*), red clover (*Trifolium pretense*), and black locust (*Robinia pseudoacacia*).

Paved road/path

Paved road/path is 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.

A small, paved parking area is found within the northeastern portion of the property adjacent to Arthur Kill Road and within an easement located beneath the Outerbridge Crossing.

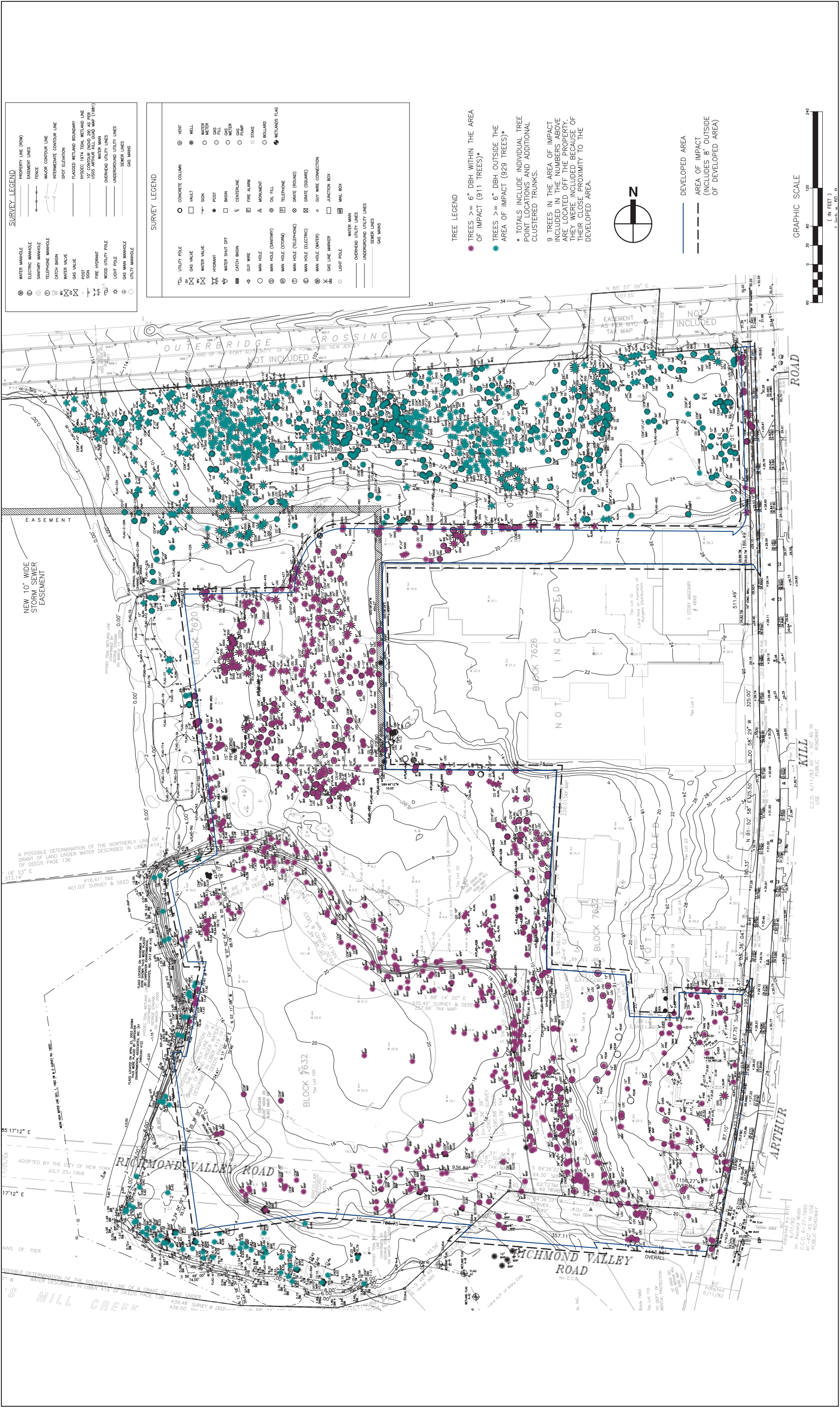
Mowed lawn with trees

Mowed lawn with trees is a residential, recreational, or commercial land in which the groundcover is dominated by clipped grasses and forbs, and it is shaded by at least 30 percent cover of trees. Ornamental and/or native shrubs may be present, usually with less than 50 percent cover. The groundcover is maintained by mowing and broadleaf herbicide application (Edinger *et al.* 2014).

Mowed lawn with trees is found within the southeastern portion of the property and is associated with the area surrounding the existing Cole House, fronting Arthur Kill Road.

Species noted included, but were not limited to Poa species (*Poa* spp.), sycamore (*Platanus occidentalis*), black cherry (*Prunus serotina*), black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), callery pear (*Pyrus calleryana*), pin oak (*Quercus palustris*), white pine (*Pinus strobus*), sugar maple (*Acer saccharum*), Norway maple (*Acer platanoides*), flowering dogwood (*Cornus florida*), and littleleaf linden (*Tilia cordata*).

Table 8-5 lists the observed species of vegetation identified within the wetland and terrestrial ecological communities during the natural resource inventory. Ecological community types are provided on Figure 8-1 and a tree survey of the existing conditions at the site is provided on **Figure 8-4**.



Existing Tree Survey
Figure 8-4

Table 8-5

Observed Vegetation Species Common name (Scientific name)

Trees	
American Beech (<i>Fagus grandifolia</i>)	Norway Maple (<i>Acer platanoides</i>)
Black Cherry (<i>Prunus serotina</i>)	Pin Oak (<i>Quercus palustris</i>)
Black Locust (<i>Robinia pseudoacacia</i>)	Princess Tree (<i>Paulownia tomentosa</i>)
Black Willow (<i>Salix nigra</i>)	Red Maple (<i>Acer rubrum</i>)
Callery Pear (<i>Pyrus calleryana</i>)	Sassafras (<i>Sassafras albidum</i>)
Common Cottonwood (<i>Populus deltoides</i>)	Sugar Maple (<i>Acer saccharum</i>)
Eastern Red Cedar (<i>Juniperus virginiana</i>)	Sweetgum (<i>Liquidambar styraciflua</i>)
Flowering Dogwood (<i>Cornus florida</i>)	Sycamore (<i>Platanus occidentalis</i>)
Gray Birch (<i>Betula populifolia</i>)	Tree-of-Heaven (<i>Ailanthus altissima</i>)
Hackberry (<i>Celtis occidentalis</i>)	White Mulberry (<i>Morus alba</i>)
Littleleaf Linden (<i>Tilia cordata</i>)	White Pine (<i>Pinus strobus</i>)
Shrubs	
Blackberry (<i>Rubus spp.</i>)	Multiflora Rose (<i>Rosa multiflora</i>)
Bayberry (<i>Myrica pennsylvanica</i>)	Northern Arrowwood (<i>Viburnum recognitum</i>)
Groundsel Bush (<i>Baccharis halimifolia</i>)	Raspberry (<i>Rubus spp.</i>)
Indigo Bush (<i>Amorpha fruticosa</i>)	Spicebush (<i>Lindera benzoin</i>)
Marsh Elder (<i>Iva frutescens</i>)	
Herbs	
Autumn Wild Onion (<i>Allium stellatum cernuum</i>)	Greenbrier (<i>Smilax rotundifolia</i>)
Black Snakeroot (<i>Cimicifuga racemosa</i>)	Hemp Dogbane (<i>Apocynum cannabinum</i>)
Bleeding Hart (<i>Dicentra eximia</i>)	Horsetail (<i>Equisetum fluviatile</i>)
Canada Thistle (<i>Cirsium arvense</i>)	Japanese Barberry (<i>Berberis thunbergii</i>)
Columbine (<i>Aquilegia Canadensis</i>)	Japanese Knotweed (<i>Polygonum cuspidatum</i>)
Common Burdock (<i>Arctium minus</i>)	Jimsonweed (<i>Datura stramonium</i>)
Common Milkweed (<i>Asclepias syriaca</i>)	King Devil (<i>Hieracium pratense</i>)
Common Mugwort (<i>Artemisia vulgaris</i>)	Oxeye Daisy (<i>Chrysanthemum leucanthemum</i>)
Common Mullein (<i>Verbascum thapsus</i>)	Queen Anne's Lace (<i>Daucus carota</i>)
Common Plantain (<i>Plantago major</i>)	Red Clover (<i>Trifolium pratense</i>)
Common St. John's Wort (<i>Hypericum perforatum</i>)	Seaside Goldenrod (<i>Solidago semipervirens</i>)
Daisy Fleabane (<i>Erigeron annuus</i>)	Spiderwort (<i>Tradescantia virginiana</i>)
Field Bindweed (<i>Convolvulus arvensis</i>)	Jewelweed (<i>Impatiens capensis</i>)
Fireweed (<i>Epilobium angustifolium</i>)	Violets (<i>Viola spp.</i>)
Garlic Mustard (<i>Alliaria petiolata</i>)	White Clover (<i>Trifolium repens</i>)
Goldenrod (<i>Solidago spp.</i>)	
Vines	
Bittersweet (<i>Celastrus orbiculatus</i>)	Poison Ivy (<i>Toxicodendron radicans</i>)
Field Bindweed (<i>Convolvulus arvensis</i>)	Summer Grape (<i>Vitis argentifolia</i>)
Japanese Honeysuckle (<i>Lonicera japonica</i>)	Virginia Creeper (<i>Parthenocissus quinquefolia</i>)
Ferns	
Cinnamon Fern (<i>Osmunda cinnamomea</i>)	Sensitive Fern (<i>Onoclea sensibilis</i>)
Grasses	
American Beachgrass (<i>Amophilia brevifolulata</i>)	Poa Species (<i>Poa spp.</i>)
Crabgrass (<i>Digitaria sanguinalis</i>)	Red Fescue (<i>Festuca rubra</i>)
Common Reed (<i>Phragmites australis</i>)	Salt Meadow Grass (<i>Spartina patens</i>)
Deer-Tongue Grass (<i>Panicum clandestinum</i>)	Smooth Cordgrass (<i>Spartina alterniflora</i>)
Eastern Blue-Eyed Grass (<i>Sisyrichium atlanticum</i>)	Spike Grass (<i>Distichlis spicata</i>)
Fescue (<i>Festuca spp.</i>)	Switch Grass (<i>Panicum virgatum</i>)
Foxtail (<i>Alopecurus spp.</i>)	Upland Bentgrass (<i>Agrostis perennans</i>)
Little Bluestem (<i>Andropogon scoparius</i>)	
Sedges/Rushes	
Slender (Path) Rush (<i>Juncus tenuis</i>)	Unnamed Sedge (<i>Carex stipata</i>)
Soft Rush (<i>Juncus effusus</i>)	Unnamed Sedge (<i>Carex vulpinoidea</i>)
Unnamed Sedge (<i>Carex scoparia</i>)	
Source: CEA and Capital.	

WILDLIFE

Prior to initiating field efforts, a literature search was performed to identify wildlife species common to the area that might be expected to utilize the Project Site.^{29,30,31} NHP, National Marine Fisheries Service (NMFS) (Northeast Region) National Oceanic and Atmospheric Administration (NOAA) and the USFWS were also contacted for a listing of wildlife species of concern which have been reported within the area. A baseline wildlife survey of the Project Site was performed focusing on the presence/absence of avian, mammalian, reptilian, and amphibian species.³² That assessment was conducted in conjunction with vegetation identification using the same transects and sampling protocols. Survey methods included direct and indirect observations (i.e., tracks, droppings, hair, feathers, etc.). Visual observations using binoculars, spotting scopes and detailed inspections under logs, forest floor litter, and rocks were conducted. Audible indicators were used to identify both avian and amphibian species. All observations were identified by staff scientists and recorded. Additionally, early morning and late evening surveys were conducted to identify wildlife that may not be observed or heard during the day. Early morning surveys were conducted on August 31 and September 11, 2007 and March 31, April 24, and May 27, 2008. Evening surveys were conducted on August 29 and September 13, 2007 and March 25, April 30, and May 29, 2008. Since then, seasonal field surveys and site walk overs have been conducted for both the NRI transects as well as each distinct vegetative community (through 2016) to monitor any changes to wildlife populations associated with the project site.

The various ecological communities that exist on the Project Site provide habitat for a variety of wildlife. Based on the location, environmental characteristics, and site surveys, wildlife species that inhabit or are expected to inhabit the aforementioned ecological communities are listed below.

Birds

Large bird species observed along the shoreline of the Arthur Kill and tidal waters adjacent to the Proposed Project include Canada geese (*Branta canadensis*), red-tailed hawk (*Buteo jamaicensis*), great blue heron (*Ardea herodias*), mallard (*Anas platyrhynchos*), turkey vulture (*Cathartes aura*), black-crowned night heron (*Nycticorax nycticorax*), brant (*Branta bernicla*), cattle egret (*Bubulcus ibis*), double-crested cormorant (*Phalacrocorax auritus*), great egret (*Ardea alba*), laughing gull (*Larus atricilla*), mute swan (*Cygnus olor*), osprey (*Pandion haliaetus*), and the American black duck (*Anas rubripes*).

Smaller passerine and piciforme species of birds observed on the Project Site include the Baltimore oriole (*Icterus galbula*), brown-headed cowbird (*Molothrus ater*), European starling

²⁹ NYSDEC New York Nature Explorer; County – Richmond.

³⁰ NYSDEC Breeding Bird Atlas 200-2005; Block 5548B Summary;
<http://www.dec.ny.gov/cfm/xtapps/bba/index.cfmXRequestTimeout=250>.

³¹ Blanchard III, Peter P., Kerlinger Ph.D., Paul; The Trust for Public Land and The New York City Audubon Society; *An Islanded Nature- Natural Area Conservation and Restoration in Western Staten Island, including the Harbor Herons Region*; 2001

³² CEA – NRI Field Surveys; 2007 – 8/29, 8/31, 9/11, 9/13, 9/21, 10/31, 11/28, 12/20; 2008 – 1/29, 2/25, 3/25, 3/31, 4/24, 4/30, 5/27, 5/29. CEA & Capital – NRI Filed Surveys; 2013-6/19, 7/31, 8/20, 10/22; 2015-1/20, 3/3, 3/30, 5/13, 6/3; 2016-4/13, 5/4, 6/22, 7/14.

(*Sturnus vulgaris*), house finch (*Carpodacus mexicanus*), American crow (*Corvus brachyrhynchos*), blue jay (*Cyanocitta cristata*), black-capped chickadee (*Poecile atricapilla*), American robin (*Turdus migratorius*), downy woodpecker (*Picoides pubescens*), gray catbird (*Dumetella carolinensis*), hairy woodpecker (*Picoides villosus*), American woodcock (*Philohela minor*), mourning dove (*Zenaida macroura*), redwing blackbird (*Agelaius phoeniceus*), common grackle (*Quiscalus quiscula*), house wren (*Troglodytes aedon*), seaside sparrow (*Ammodramus maritimus*), tree swallow (*Tachycineta bicolor*), northern flicker (*Colaptes auratus*), white-throated sparrow (*Zonotrichia albicollis*), willow flycatcher (*Empidonax traillii*), yellow warbler (*Dendroica petechia*), yellow rumped warbler (*Dendroica coronata*), northern mockingbird (*Mimus polyglottos*), and the northern cardinal (*Cardinalis cardinalis*).

Other common bird species that should be expected to be present on site include flycatchers, sparrows, thrushes, goldfinches, meadowlark, and warblers, and grackles to name a few. Other common species to New York State may also utilize the Project Site for various reasons, including foraging and breeding.

Mammals

White-tailed deer (*Odocoileus virginianus*) were observed during most site visits. A herd of eight white-tailed deer seen during the February 2006 site survey between the C and D-transects was the largest group witnessed at one time.

Smaller mammals regularly observed onsite include the following: eastern gray squirrels (*Sciurus carolinensis*), woodchucks (*Marmota monax*), house mouse (*Mus musculus*), common muskrat (*Ondatra zibethicus*), striped skunk (*Mephitis mephitis*), and raccoons (*Procyon lotor*).

Other mammals which should be expected to be present based on the ecological characteristics of the Project Site include meadow vole (*Microtus pennsylvanicus*), deer mouse (*Peromyscus spp.*) and various other species of mice, voles and shrews (*Sorex spp.*).

Reptiles and Amphibians

Reptiles observed onsite include the eastern box turtle (*Terrapene Carolina*) and the snapping turtle (*Chelydra serpentina*). The eastern box turtle, a New York State species of special concern, was observed within the common reed monoculture within the center of the Project Site near the B-2 transect point on August 31, 2007. The snapping turtle was observed within the common reed monoculture near the D-2 transect point on April 24, 2008. Amphibians heard onsite were limited to a few spring peeper calls in the vicinity of the phragmites monoculture.

All of the dominant species at the site are considered to be highly mobile and generally adaptable to the existing suburban setting of the region. The observed wildlife population densities at the Project Site are considered to be in the low to normal range. This is attributable to the size, isolated nature, proximity to major roadways and predominantly low quality vegetation on the site which limits the diversity and value of the on-site wildlife habitat.

Table 8-6 provides a complete listing of the wildlife species identified on the Project Site. No federal or state-listed rare plant or animal species, habitats or significant natural communities were identified on the Project Site by staff biologists.

Table 8-6

Observed Wildlife Species Common name (Scientific name)

Mammals	
Common Muskrat (<i>Ondatra zibethicus</i>)	Striped Skunk (<i>Mephitis mephitis</i>)
Eastern Gray Squirrel (<i>Sciurus carolinensis</i>)	White-tailed Deer (<i>Odocoileus virginianus</i>)
House Mouse (<i>Mus musculus</i>)	Woodchuck (<i>Marmota monax</i>)
Raccoon (<i>Procyon lotor</i>)	
Birds	
American Black Duck* (<i>Anas rubripes</i>)	Great Egret* (<i>Ardea alba</i>)
American Crow (<i>Corvus brachyrhynchos</i>)	Hairy Woodpecker (<i>Picoides villosus</i>)
American Robin (<i>Turdus migratorius</i>)	House Finch (<i>Carpodacus mexicanus</i>)
American Woodcock (<i>Philohela minor</i>)	House Wren (<i>Troglodytes aedon</i>)
Baltimore Oriole (<i>Icterus galbula</i>)	Laughing Gull* (<i>Larus atricilla</i>)
Belted Kingfisher (<i>Ceryle alcyon</i>)	Mallard* (<i>Anas platyrhynchos</i>)
Black-capped Chickadee (<i>Poecile atricapilla</i>)	Mourning Dove (<i>Zenaidra macroura</i>)
Black-crowned Night Heron* (<i>Nycticorax nycticorax</i>)	Mute Swan* (<i>Cygnus olor</i>)
Blue Jay (<i>Cyanocitta cristata</i>)	Northern Mockingbird (<i>Mimus polyglottos</i>)
Brant* (<i>Branta bernicla</i>)	Northern Flicker (<i>Colaptes auratus</i>)
Brown-headed Cowbird (<i>Molothrus ater</i>)	Osprey* (<i>Pandion haliaetus</i>)
Canada Goose* (<i>Branta canadensis</i>)	Red-tailed Hawk* (<i>Buteo jamaicensis</i>)
Cardinal (<i>Cardinalis cardinalis</i>)	Redwing Blackbird (<i>Agelaius quiscula</i>)
Cattle Egret* (<i>Bubulcus ibis</i>)	Seaside Sparrow (<i>Ammodramus maritimus</i>)
Common Grackle (<i>Quiscalus quiscula</i>)	Tree Swallow (<i>Tachycineta bicolor</i>)
Double-crested Cormorant* (<i>Phalacrocorax auritus</i>)	Turkey Vulture* (<i>Cathartes aura</i>)
Downy Woodpecker (<i>Picoides pubescens</i>)	White-throated Sparrow (<i>Zonotrichia albicollis</i>)
European Starling (<i>Sturnus vulgaris</i>)	Willow Flycatcher (<i>Empidonax traillii</i>)
Gray Catbird (<i>Dumetella carolinensis</i>)	Yellow Warbler (<i>Dendroica petechial</i>)
Great Blue Heron* (<i>Ardea herodias</i>)	Yellow-rumped Warbler (<i>Dendroica coronate</i>)
Insects/Butterflies/Arachnids	
Deer Tick (<i>Ixodes scapularis</i>)	Lady Bug (Lady Beetle) (<i>Coccinella novemnotata</i>)
Field Cricket (<i>Gryllus spp.</i>)	Monarch Butterfly (<i>Danaus plexippus</i>)
Gypsy Moth (<i>Lymantria dispar</i>)	Wood Tick; American Dog Tick (<i>Dermacentor variabilis</i>)
Reptiles/Amphibians	
Box Turtle (<i>Terrapene c. carolina</i>)	Snapping Turtle (<i>Chelydra serpentina</i>)
Note: * Species identified offsite in adjacent tidal wetland.	
Source: CEA & Capital.	

TOPOGRAPHY AND SOILS

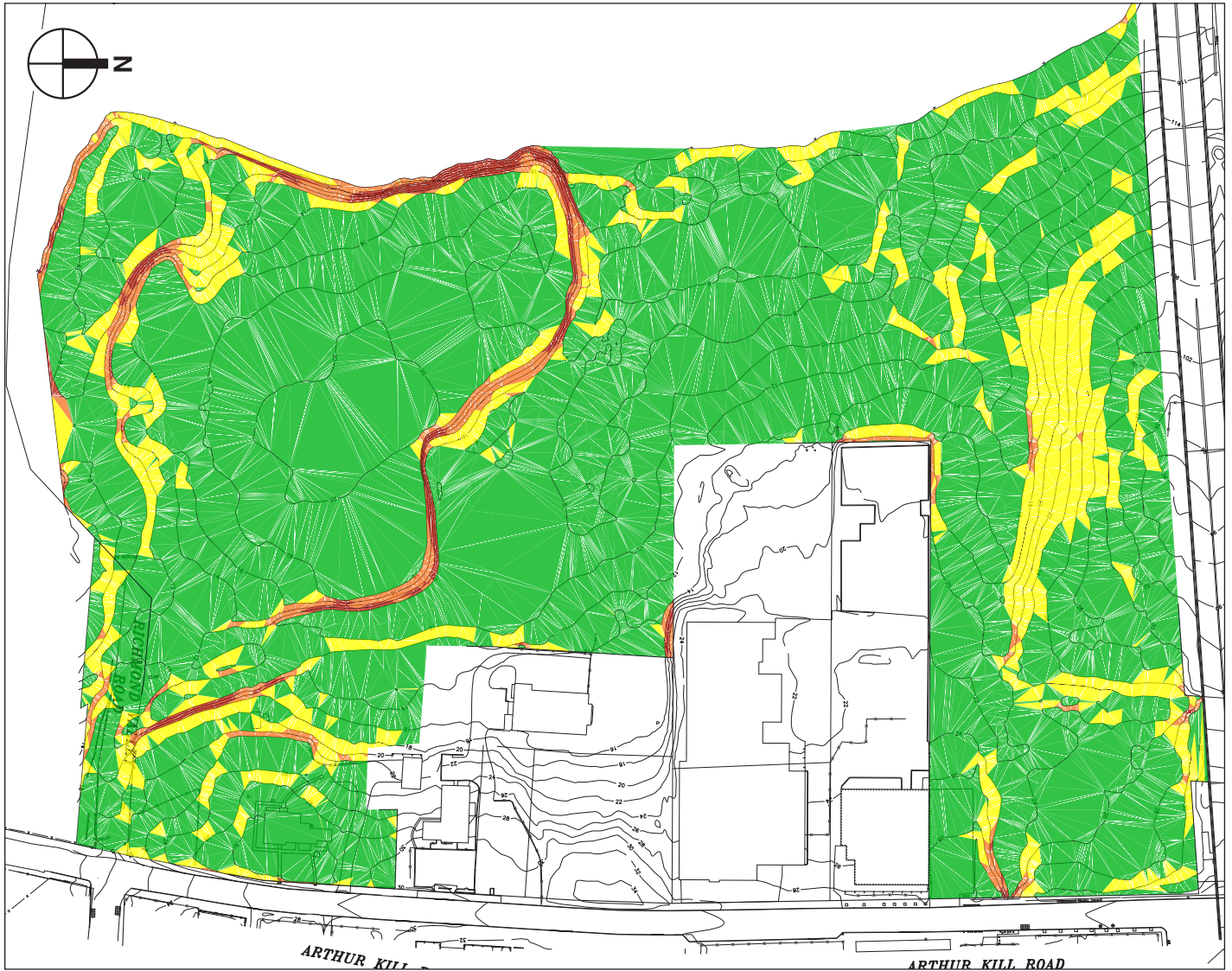
Topographic and soil conditions on the proposed project site are shown on **Figures 8-5** and **8-6**, respectively. The Proposed Project is located on the southern end of Staten Island within the Sandy Hook-Staten Island watershed. Topography varies throughout the site with the southern half of the Project Site being relatively flat, sloping slightly toward the western and southern boundaries. The northern half of the Project Site slopes from the east-northeast towards the western boundary of the property. The center of the Proposed Project's western edge does have steep slopes that drop off towards the Arthur Kill shoreline (see Figure 8-5).

The majority of the Project Site, or approximately 19.66 acres, has gradual slopes of less than 10 percent, located primarily in the southern and eastern portion of the property as well as the western portion of the property, up to the upland edge on the Arthur Kill shoreline. Slopes in excess of 10 percent comprise a small portion of the Project Site (approximately 4.39 acres), and



Soil Survey Legend

MUSYM	Description
ApA	Appoquinimink mucky peat, 0 to 1 percent slopes, very frequently flooded
BHBu	Boonton-Haledon complex, 0 to 8 percent slopes
BtA	Boonton loam, 0 to 3 percent slopes
BtB	Boonton loam, 3 to 8 percent slopes
GbA	Greenbelt loam, 0 to 3 percent slopes
GbB	Greenbelt loam, 3 to 8 percent slopes
HHA	Haledon-Hasbrouck complex, 0 to 3 percent slopes, frequently ponded
UGBl	Urban land-Greenbelt complex, 3 to 8 percent slopes, low impervious surface
UTA	Urban land, till substratum, 0 to 3 percent slopes
W	Water



Slopes	Area (SF)	Area (Acres)
0% - 10%	856,387	19.66
10% - 25%	152,591	3.50
25% - 50%	24,999	0.57
50%+	13,763	0.32

0 300 FEET

are located in areas primarily along the western central edge adjacent to the Arthur Kill and a small hill-slope in the center of the property.

The highest elevations on the Project Site are found in the south central portion of the site at an elevation of 20 feet (NAVD88). The lowest elevations on the site are located in the tidal wetland area on the western property boundary adjacent to the Arthur Kill at an approximate elevation of 0 feet (NAVD88). **Table 8-7** summarizes the slope data for the proposed project site by slope range: 0-10 percent, 10-25 percent, 25-50 percent, and slopes greater than 50 percent.

**Table 8-7
Existing Slopes**

Slope Category	Approximate Acres Existing
0% to 10%	19.66
10% to 25%	3.50
25% to 50%	0.57
> 50%	0.32
TOTAL	24.05
Source: Capital Environmental Consultants, Inc.	

The Project Site does not contain any prominent or unique geologic features.

Soil Types

The soils on the Project Site have been identified and described using the soil classifications of the USDA Natural Resources Conservation Service (NRCS). The site is underlain by nine (9) soil types and/or complexes: Appoquinimink mucky peat, 0 to 1 percent slopes, Boonton-Haledon complex, 0 to 8 percent slopes, Boonton loam, 0 to 3 percent slopes, Boonton loam, 3 to 8 percent slopes, Greenbelt loam, 0 to 3 percent slopes, Greenbelt loam, 3 to 8 percent slopes, Haledon-Hasbrouck complex, 0 to 3 percent slopes, Urban land-Greenbelt complex, 3 to 8 percent slopes, and Urban land, till stratum, 0 to 3 percent slopes.³³ The distribution of the soil types on the Project Site is shown on the soils map illustrated in Figure 8-5. The characteristics of each soil type are described below.

Appoquinimink mucky peat

The soil is described as areas of tidal marshes and are very frequently flooded. Soils are derived from loamy fluviomarine deposits over herbaceous organic material.³⁴

Boonton

The soil is described as areas of ground moraine. Soils are derived from red coarse-loamy till derived from sedimentary rock.³⁵

Greenbelt

Soils are derived from loamy human transported material.³⁶

³³ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Online Mapper.

³⁴ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Map Unit Description: Appoquinimink mucky peat, 0 to 1 percent slopes

³⁵ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Map Unit Description: Boonton-Haledon complex, 0 to 8 percent slopes,

³⁶ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Map Unit Description: Greenbelt loam, 0 to 3 percent slopes,

Haledon

The soil is described as areas of ground moraine. Soils are derived from red coarse-loamy till derived from sedimentary rock.³⁷

Hasbrouck

The soil is described as areas of ground moraine. Soils are derived from red fine-loamy till derived from sedimentary rock.³⁸

Urban land, Till Stratum

The soil is described as asphalt over human-transported material.

Soil characteristics are described in **Table 8-8**. This information has been compiled from data available from the *USDA NRCS Web Soil Survey*.

Table 8-8
Soil Characteristics

Soil Series	Hydrologic Group ¹	Permeability	Drainage Class
Appoquinimink mucky peat	B/D	Moderately low to moderately high	Very poorly drained
Boonton	C	Very low to moderately low	Well drained
Greenbelt	B	Moderately high	Well drained
Haledon	C	Very low to moderately low	Somewhat poorly drained
Hasbrouck	C/D	Very low to moderately low	Poorly drained
Urban land, Till stratum	N/A	Very low	N/A

Note: 1. Hydrologic groups are used to estimate runoff from precipitation; they range from high infiltration (A) to low infiltration (D).

Hydrologic soils are grouped in to A, B, C, D; Group A soils have a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. Group B soils have a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. Group C soils have a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission. Group D soils have a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

³⁷ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Map Unit Description: Boonton-Haledon complex, 0 to 8 percent slopes,

³⁸ USDA. NRCS. Web Soil Survey. National Cooperative Soil Survey. Map Unit Description: Haledon-Hasbrouck complex, 0 to 3 percent slopes.

SIGNIFICANT, SENSITIVE, OR DESIGNATED RESOURCES

CONSERVATION AREAS

A number of groups and organizations have expressed interest in preserving and protecting the Outerbridge Shorelands—an area on the Arthur Kill, west of Arthur Kill Road, and is bisected by the Outerbridge Crossing. It is bounded by Allentown Lane to the north and by a small embayment, part of the Mill Creek outlet, to the south. An additional parcel of vacant land east of Arthur Kill Road is included because of potential habitat value and potential linkage with other areas of open space. The total undeveloped area of the Proposed Project site is approximately 30 acres. The groups/organizations and their publications are as follows:

Waterfront Revitalization Program - Recognized Ecological Complex (REC)

New York City's New Waterfront Revitalization Program (WRP) has designated a number of Recognized Ecological Complexes (RECs) (Policy 4). Projects located within RECs should consider identification of natural resources, use of design features to incorporate restoration objectives, and remediation, protection, and restoration of ecological complexes. The Project Site is located within the NYC WRP designated REC titled *Outerbridge Shorelands*.³⁹

The New York-New Jersey Harbor Estuary Program

In 2006, Habitat Workgroup nominated and approved Outerbridge Shorelands as an acquisition site.

2009 New York State Open Space Conservation Plan

The Regional Open Space Advisory Committee's (Region 2) 2009 priority projects narrative listed Outerbridge Shorelands.

The Trust for Public Land and the New York City Audubon Society

In 2001, the groups jointly published *An Islanded Nature: Natural Area Conservation and Restoration in Western Staten Island, including the Harbor Herons Region*. Outerbridge Shorelands was described as having good salt marsh restoration and shoreline enhancement potential.

One New York – Coastal Defense

In 2015, New York City published *One New York: The Plan for a Strong and Just City*. Under the Coastal Defense subsection, resiliency measures related to flooding and protection from coastal erosion were addressed.

As designed, all retail space within the Proposed Project would be located at an elevation of at least 17 feet NAVD88, or 2-4 feet above the preliminary BFE range of 13-15 feet NAVD88. The internal streets in the Proposed Project would also be located at elevations ranging from 16 to 30 feet NAVD88. Only the below-grade parking level(s) of the Proposed Project would be located below the preliminary BFE range of 13-15 NAVD88 and these levels would be protected using wet floodproofing measures consistent with the requirements of the Building Code. Compliance with City Building Code requirements would substantially reduce the risk of damage from

³⁹ Department of City Planning of New York City. The New York City Waterfront Revitalization Program. October 30, 2013.

coastal flood hazards. In coordination with NYSDEC staff, the proposed wetland enhancement and restoration plan calls for enhancing the tidal shoreline with native plantings and rip-rap revetments to better protect the site from coastal erosion (see the discussion below).

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

The NHP was contacted in September of 2007 and again in May 2015 for the presence of rare or state-listed species that may be present within or adjacent to the Proposed Project (see Appendix C). NHP records did not indicate any state-listed species on the Project Site; however, some state-listed plant and wildlife species were located within 0.5 miles of the Project Site (see Appendix C).

USFWS databases were reviewed in February 2012, June 2013, and March 2015 for federally listed threatened and endangered species in Richmond County (see Appendix C).

The NMFS was contacted in March of 2015 and concluded that the project would not affect any listed species.

VEGETATION

NHP's records indicate one state-listed plant species found within the vicinity of the Proposed Project area; Torrey's mountain-mint (*Pycnanthemum torrei*).

The NHP also provided historical records (c.1869-1902) for American Ipecac (*Euphorbia ipecacuamhae*), American strawberry-bush (*Euonymus americanus*), bead pinweed (*Lechea pulchella* var. *moniliformis*), primrose-leaf violet (*Viola primulifolia*), soapwort gentian (*Gentiana saponaria*), and whorled mountain-mint (*Pycnanthemum verticillatum* var. *verticillatum*). None of these plants were identified during site vegetation surveys during the four season natural resource inventory. Table 8-5 lists the observed species of vegetation identified during the NRI. No state listed rare or endangered plant species or communities identified on the site by the NHP as occurring within areas adjacent to the Project Site were observed during visits to the site.

Torrey's mountain-mint (Pycnanthemum torrei) – State-listed Endangered Species

The Project Site was surveyed for Torrey's mountain-mint during all the NRI site visits in 2007, 2008, and 2013 to ensure the best chance of identification (the plant flowers from mid-July through August and the fruits persist to early October). The entire Project Site, especially the dry upland segments, was examined for the presence of Torrey's mountain-mint. Torrey's mountain-mint was not observed on the Project Site.

According to NHP, Torrey's mountain-mint "has been found in dry, open habitats, including red cedar barrens, rocky summits, trails, and roadsides" (NHP 2007). The NHP report indicated Torrey's mountain-mint was identified on August 12, 2003, in the vicinity of Clay Pit Ponds Bloomingdale Road along a vegetated roadside about 4–6 feet wide. The area is over one mile from the project site.

WILDLIFE

Correspondence with NHP in September of 2007 and again in March 2013 indicated that the State-listed endangered peregrine falcon (*Falco peregrinus*) has been found within 0.5 miles of the Project Site (see Appendix C). The NHP also indicated that the comet darter (*Anax longipes*), not a state or federally listed species, but which is considered rare by the NHP, was

identified near Comet Pond. Comet Pond is not within or adjacent to the Project Site. No suitable habitat for the comet darter, such as ponds with floating and emergent vegetation, was present on or near the Project Site. The USFWS identified one threatened bird species, piping plover (*Charadrius melodus*), and one endangered bird species, roseate tern (*Sterna dougallii dougallii*).⁴⁰

Peregrine Falcon (Falco peregrinus) – State-listed Endangered Species

No peregrine falcons were observed or identified on or adjacent to the Project Site during NRI field visits. According to the NHP, peregrine falcons often nest on ledges or holes in the faces of rocky cliffs.⁴¹ They will also nest on manmade structures such as bridges and tall buildings, especially near or in urban areas.⁴² Wintering birds frequent buildings, towers, and steeples in urban areas, and open areas with plentiful prey in more natural settings.⁴³ Peregrine falcons are known to currently nest in three areas near Staten Island; atop the Verrazano-Narrows Bridge, Marine Parkway-Gil Hodges Memorial, and the Throgs Neck bridges.⁴⁴ There have been peregrine falcon nests documented intermittently on the Outerbridge Crossing along the northern end of the Project Site. The northern end of the Project Site closest to the Outerbridge Crossing will be left in its natural state and enhanced with native vegetative plantings. This will likely attract passerine birds and waterfowl that will provide additional foraging opportunities for any falcons that may take up residence on the bridge structure in future years.

Eastern Box Turtle (Terrapene carolina) - State-listed Special Concern Species

One specimen of the eastern box turtle, listed as a Species of Special Concern by the NYSDEC, was identified onsite. A single individual was observed in the wooded area along the eastern boundary of the site (near the veterinary hospital). A Species of Special Concern is defined by NYSDEC as “any native species for which a welfare concern or risk of endangerment has been documented in New York State.” The major threats to box turtles appear to be pesticide poisoning and collection as pets. Special Concern species are not afforded any specific protection under State Law and are listed for informational purposes only. Eastern box turtles are versatile animals and inhabit a wide variety of habitats from wooded swamps to dry, grassy fields. Although these turtles can live in a variety of habitats, they are most abundant and healthy in moist forested areas with plenty of underbrush. While not aquatic, box turtles will often venture into shallow water at the edge of ponds or streams or in puddles. Box turtles typically have small home ranges and may be sustained within areas of appropriate habitat as small as one acre.

⁴⁰ USFWS. Information, Planning, and Conservation System (IPAC). Trusted Resources List. Accessed April 7, 2015.

⁴¹ New York Natural Heritage Program. 2013. Online Conservation Guide for *Falco peregrinus*. Available from: <http://www.acris.nynhp.org/guide.php?id=6824>. Accessed May 29, 2013.

⁴² New York Natural Heritage Program. 2013. Online Conservation Guide for *Falco peregrinus*. Available from: <http://www.acris.nynhp.org/guide.php?id=6824>. Accessed May 29, 2013.

⁴³ New York Natural Heritage Program. 2013. Online Conservation Guide for *Falco peregrinus*. Available from: <http://www.acris.nynhp.org/guide.php?id=6824>. Accessed May 29, 2013.

⁴⁴ Dominowski, Michael W.; *High atop Verrazano-Narrows Bridge, new NYC residents make a home*; Sllive.com; June 1, 2011.

Piping plover (Charadrius melodus)

No piping plovers were observed or identified on or adjacent to the Project Site during NRI field visits. Piping plovers are shorebirds that arrive at breeding grounds in New York around early to mid-March. Breeding grounds are typically grassless, dry, sandy beaches or in areas that have been filled with dredged sand, above the high tide mark.⁴⁵ Within New York, this species breeds on Long Island's sandy beaches, from Queens to the Hamptons, in the eastern bays and in the harbors of northern Suffolk County, although a single pair was also recorded in 1984 at Sandy Pond, Lake Ontario in Oswego County.⁴⁶ Continued human pressures such as coastal development, recreational activities, and disturbance by off-road vehicles have reduced the available suitable breeding habitat for these birds.⁴⁷ Although not a suitable habitat, the western edge of the Project Site along the Arthur Kill shoreline will be left in its natural state and enhanced with native vegetative plantings. This would provide shoreline resting areas for any piping plovers that may make their way into the Arthur Kill.

Roseate tern (Sterna dougallii dougallii)

In New York, roseate terns are always found nesting with common terns.⁴⁸ The nest may be only a depression in sand, shell or gravel, and may be lined with bits of grass and other debris.⁴⁹ It is usually placed in dense grass clumps, or even under boulders or rip-rap.⁵⁰ In New York, this species breeds only at a few Long Island colonies.⁴⁸ Threats to roseate tern populations include vegetational changes on the breeding areas, competition with gulls for suitable nesting areas, and predation.⁵¹ Although breeding habitat, the western edge of the Project Site along the Arthur Kill shoreline will be left in its natural state and enhanced with native vegetative plantings. This would provide shoreline resting areas for any roseate terns that may make their way into the Arthur Kill.

E. THE FUTURE WITHOUT THE PROPOSED PROJECT

The following assessment of natural resources in the No Action condition assumes that by the build year (2019), land cover type and human activity would not differ from the present condition. The site would remain a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. Development projects elsewhere in the study area that are expected to be completed by 2019 will not significantly alter natural resources from their current state.

GROUNDWATER

The No Action condition would involve the Project Site remaining as mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. Subsequently, no change to the existing condition of groundwater is expected in the No Action condition.

⁴⁵ NYSDEC; *Piping Plover Fact Sheet*; Available from: <http://www.dec.ny.gov/animals/7086.html>

⁴⁶ NYSDEC; *Piping Plover Fact Sheet*; Available from: <http://www.dec.ny.gov/animals/7086.html>

⁴⁷ NYSDEC; *Piping Plover Fact Sheet*; Available from: <http://www.dec.ny.gov/animals/7086.html>

⁴⁸ NYSDEC; *Roseate Tern Fact Sheet*; Available <http://www.dec.ny.gov/animals/7084.html>

⁴⁹ NYSDEC; *Roseate Tern Fact Sheet*; Available <http://www.dec.ny.gov/animals/7084.html>

⁵⁰ NYSDEC; *Roseate Tern Fact Sheet*; Available <http://www.dec.ny.gov/animals/7084.html>

⁵¹ NYSDEC; *Roseate Tern Fact Sheet*; Available <http://www.dec.ny.gov/animals/7084.html>

FLOODPLAINS

The No Action condition would involve the Project Site remaining as a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. Subsequently, no change to the existing condition of floodplains is expected in the No Action condition.

AQUATIC RESOURCES

SURFACE WATER RESOURCES

The No Action condition would involve the Project Site remaining as a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore and would maintain the onsite hydrological balance. Subsequently, no significant change to the existing condition of the Arthur Kill is expected in the No Action condition.

WATER QUALITY

The No Action condition would involve the Project Site remaining as a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. The onsite freshwater wetlands, Wetlands 2 and 3, would continue to attenuate and filter stormwater prior to it being discharged to the Arthur Kill shoreline.

SEDIMENT QUALITY

The No Action condition would involve the Project Site remaining as a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. Subsequently no change to the existing conditions, with regards to sediment quality in the Arthur Kill, is expected in the No Action condition.

AQUATIC BIOTA

The No Action condition would involve the maintenance of the onsite hydrological balance. Subsequently, no change to the existing aquatic habitat is expected in the No Action condition.

WETLANDS

The No Action condition would involve the Project Site remaining as a mix of forested land, and disturbed open field with smaller areas of wetlands and tidal shore. Wetlands 2 and 3 would also continue to attenuate and filter stormwater flows. Wetland 4 would continue to be as very small, wet depression that shares an ephemeral connection with Wetland 3. Subsequently, no change to the existing freshwater wetlands present on site is expected in the No Action condition.

The wetlands present in the study area are mud flats and 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.⁵²

⁵² NYSDEC. Tidal Wetland Categories. Available at <http://www.dec.ny.gov/lands/5120.html>

TERRESTRIAL RESOURCES

VEGETATION AND ECOLOGICAL COMMUNITIES

The vegetation and ecological communities of the Project Site would remain largely unchanged in the No Action condition. There may be some spread of invasive/non- native species which are currently found on site including tree-of-heaven, white mulberry, Japanese knotweed, and common reed; but likely 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 Site.

WILDLIFE

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, therefore, the same species of wildlife currently present are expected to remain. The Project Site will continue to support the same communities of urban-adapted, generalist wildlife such as American crow, European starling, gray squirrel and raccoon.

SIGNIFICANT, SENSITIVE, OR DESIGNATED RESOURCES

Habitat and land cover type are not expected to change under the No Action condition. As the Project Site is of interest to a number of groups and organizations, acquisition of the site for preservation is possible under the No Action condition.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

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 will continue to have the potential to occur in the Arthur Kill and onsite and with the same likelihood as at present.

F. THE FUTURE WITH THE PROPOSED PROJECT

The Proposed Project would develop the mix of forested land, disturbed open field, and smaller areas of wetlands and tidal shore into a new commercial development (destination retail, restaurants, family entertainment uses, a recreation use, a cinema, private drives, private decks and overlooks, the Cole House, accessory spaces, public road improvements to Richmond Valley Road and Arthur Kill Road, waterfront open space (including a publicly accessible walkway and beach area) with tidal and freshwater wetlands restoration and enhancement.

GROUNDWATER

Groundwater in Staten Island is not used as a source of potable water (the municipal water supply uses upstate reservoirs) and as such the groundwater onsite would not be used as a source of drinking water. The proposed underground parking garage would be located below the existing water table. The flow of groundwater may be minimally altered within the vicinity of the proposed underground parking garage. It is anticipated that the majority of existing groundwater would continue to flow south and west towards the shoreline of the Arthur Kill following completion of site construction. Therefore, the Proposed Project is not anticipated to affect onsite groundwater flow due to underground garage construction or stormwater management practices, nor is it anticipated to affect groundwater flow on adjacent properties.

FLOODPLAINS

The channels and floodways of the Arthur Kill and Mill Creek would not be impacted by the Proposed Project. The Proposed Project would result in the loss of some of the 100 Year Floodplain along the Arthur Kill due to filling of the USACE-regulated wetlands at the west-center of the Project Site.⁵³ To compensate for the lost floodplain area and associated flood storage and attenuation functions, the Proposed Project includes the development of a SWPPP to collect and treat stormwater as well as the creation of freshwater wetlands within the northern portion of the Project Site that would aid in stormwater storage and minimize the risk of flooding. In addition, significant tidal wetland enhancements would serve to improve protection and provide an added measure of flood storage and wave attenuation along the Arthur Kill and Mill Creek shorelines. The proposed stormwater management practices and created wetlands would maintain critical flood and stormwater control functions by absorbing, storing, and slowing down the movement of flood, rain, and melt water, minimizing flooding and stabilizing water flow both onsite and along the Arthur Kill and Mill Creek shorelines.

As designed, all retail space within the Proposed Project would be located at an elevation of at least 17 feet NAVD88, or 2-4 feet above the preliminary BFE range of 13-15 feet NAVD88. The internal streets in the Proposed Project would also be located at elevations ranging from 16 to 30 feet NAVD88. Only the below-grade parking level(s) of the Proposed Project would be located below the preliminary BFE range of 13-15 NAVD88 and these levels would be protected using wet floodproofing measures consistent with the requirements of the Building Code. Compliance with City Building Code requirements would substantially reduce the risk of damage from coastal flood hazards.

AQUATIC RESOURCES

WATER QUALITY

As explained below, because the Proposed Project would, at at minimum, maintain current stormwater quality and wetlands functionality, the Proposed Project would not cause or contribute to a violation of Use Classification I saline surface waters when the Proposed Project is in operation. The Proposed Project includes the conservation of natural areas, installation of approximately 4.52 acres of green roof, and enhancement of wetland and buffer plantings to maintain the water balance to the tidal wetlands allowing the wetland to continue to filter the site's stormwater runoff and preserve pre-construction water quality associated with the Arthur Kill. In addition, utilization of structural stormwater controls, such as drywells and sand filters would ensure compliance with the post construction requirements of the SPDES General Permit for Stormwater Discharges from Construction Activity GP-0-15-002. Finally, the tidal wetlands would continue to act as a natural filter for the Proposed Project's stormwater runoff.

The Proposed Project would not significantly adversely impact the water quality of the Arthur Kill through the construction of four stormwater outfalls to the Arthur Kill, including one new outfall at the end of Richmond Valley Road (to be designed and built to DEP standards and proposed to be part of the City sewer system), and three private outfalls on the commercial property. The outfalls would convey stormwater runoff from a larger watershed east of Arthur

⁵³ Preliminary Firm GIS Data 1/30/2015.

Kill Road. Runoff from the Proposed Project itself would also be discharged to these outfalls after it is captured/treated in the Proposed Project's stormwater management system.

The three private outfalls would discharge stormwater from the private development and have been designed in accordance with the NYSDEC State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002). All three outfalls are located landward of the tidal wetland, inland from the shoreline, and the design includes a sand filter to collect pollutants and rip-rap outlet protection. The proposed sand filters and rip-rap outlet protections would ensure that NYSDEC water quality standards are maintained. The rip-rap is also designed to integrate as seamlessly as possible with the existing shoreline grades so as not to be an impediment to any species of terrestrial wildlife or aquatic biota.

During construction, upland portions of the proposed outfalls would be properly protected by erosion and sediment control measures as part of the SWPPP. During installation, construction equipment would be kept entirely within the uplands of the site with careful attention to minimizing the footprint of disturbance in regulated wetland/waters. Turbidity curtains may be used if it is determined the outfalls construction would cause sediment disturbance which could increase turbidity locally in the waters of the Arthur Kill. Due to the comparatively minor amount of shoreline work and small size of the outfalls footprint (0.02 acres), it is expected that construction for this project component would occur over a short period of time, thereby minimizing the potential for erosion and turbidity.

In combination, the four outfalls would result in only minor impacts to the physical shoreline landscape and would not impact the water quality of the Arthur Kill. In addition, the proposed tidal wetlands restoration and enhancement would enhance and improve the ecology of the shoreline by providing food and cover habitats for wildlife.

Richmond Valley Road Stormwater Outfall

A small area of NYSDEC and USACE tidal wetland area (0.02 acres) would be disturbed for the installation of four stormwater outfalls inclusive of a proposed DEP storm sewer outfall that would extend outward from under Richmond Valley Road to the Arthur Kill and three private outfalls. The outfalls would impact a nominal amount of bottom substrate just off shore of the Project Site. Macroinvertebrates and fish species present in the vicinity of the proposed outfalls would not be impacted as they can move to identical habitat nearby. Under the proposed design, the rip-rap outlet protection, consisting of two layers of 1-foot diameter armor stones overlaid on geotextile fabric, extends from the outfall to mean high water. The rip-rap would impact approximately 0.06 acres of existing shoreline and is designed to integrate as seamlessly as possible with the existing shoreline grades so as not to impact wildlife or the ecology of the shoreline. All stormwater flowing from the outfalls to the Arthur Kill would meet NYSDEC and DEP standards for water quality and would be constructed using Best Management Practices (BMPs).

Stormwater Pollution Prevention Plan—SWPPP

As part of the Proposed Project, coverage under a NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-15-002) would be required. In accordance with NYSDEC SPDES (GP-0-15-002), a Stormwater Pollution Prevention Plan (SWPPP) consisting of both temporary erosion and sediment controls and post-construction stormwater management practices would be prepared. Water quality treatment would be

designed to meet the NYSDEC design criteria and treat stormwater runoff from the Proposed Project into the Arthur Kill (see **Appendix D**).

Construction Erosion and Sediment Control Plan

The Proposed Project would require a NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities (Permit No. GP-0-15-002) as more than one acre of land would be disturbed. Erosion and sedimentation would be controlled during the construction period by temporary devices in accordance with the construction Erosion and Sediment Control (ESC) plan developed specifically for the Project Site (see also Chapter 18 “Construction”).

Post-Construction Permanent Control Measures

Post-construction stormwater management measures that would be integrated into the Proposed Project would include green roofs, sand filters, infiltration basins, 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.

The permanent stormwater control measures would incorporate the standards presented in the latest *New York State Stormwater Management Design Manual* (January 2015). All water discharged from the stormwater management devices would flow in a pattern similar to the pre-development drainage condition of the site.

SEDIMENT QUALITY

A small area of NYSDEC and USACE tidal wetland bottom substrate (0.02 acres) would be disturbed for the installation of four stormwater outfalls inclusive of a proposed DEP storm sewer outfall that would extend outward from under Richmond Valley Road to the Arthur Kill and three private outfalls. The shoreline beyond the outfalls would be protected by installing the outfall/apron and associated rip-rap outlet protection. During installation, construction equipment would be kept entirely within the uplands of the site with careful attention to minimizing the footprint of disturbance in regulated wetland/waters. Operation of the outfalls would not result in an impact on the sediment quality of the Arthur Kill. Due to the comparatively minor amount of shoreline work and small size of the outfalls footprint (0.02 acres), it is expected that construction for this project component would occur over a short period, thereby minimizing the potential for erosion and turbidity.

AQUATIC BIOTA

Because the Proposed Project would, at at minimum, maintain current stormwater quality and wetlands functionality, the Proposed Project would not result in significant adverse impacts to aquatic biota from the discharge of stormwater. Implementation of stormwater management practices identified in the SWPPP, including drywells, sand filters, and green roofs (see Figure 10-1), would minimize the potential for operation of the Proposed Project to adversely affect the quality of stormwater discharged to the Arthur Kill.

EFH

Species designated within the EFH associated with the project area are both resident and seasonal to this estuarine system. As such a small area of tidal wetland would be disturbed (0.02 acres) for such a short period of time, no adverse impacts to the EFH are expected. Based on the

project design, there are no short or long-term impacts anticipated to EFH in association with the Proposed Project.

WETLANDS

WETLAND AND WETLAND BUFFER DISTURBANCES

Impact Summary

The Proposed Project, would temporarily impact approximately 0.55 acres of regulated NYSDEC tidal wetland, and approximately 5.14 acres of regulated NYSDEC tidal wetland adjacent area, and 2.28 acres of USACE regulated freshwater wetlands. In addition, a small area of NYSDEC and USACE tidal wetland area (0.02 acres) would be disturbed for the installation of a proposed DEP storm sewer outfall that would extend outward from under Richmond Valley Road to the Arthur Kill and three private outfalls that are proposed to be located within the Project Site. In developing the proposed site plan, disturbance to the federally regulated freshwater wetlands were minimized to the maximum extent possible. However, given the centralized location of the wetlands on the Project Site, certain impacts were unavoidable. To compensate for the loss of NYSDEC tidal wetland adjacent area and USACE freshwater wetland, the Proposed Project also includes 3.00 acres of tidal wetland enhancement and 2.90 acres of freshwater wetland creation. This wetlands enhancement and restoration is described below and is shown on **Figure 8-7**. It is the conclusion of this analysis that by implementing the proposed wetland enhancement and restoration plan (described below), the proposed project would avoid any significant adverse impacts on wetlands.

Proposed Wetland Creation and Restoration Design

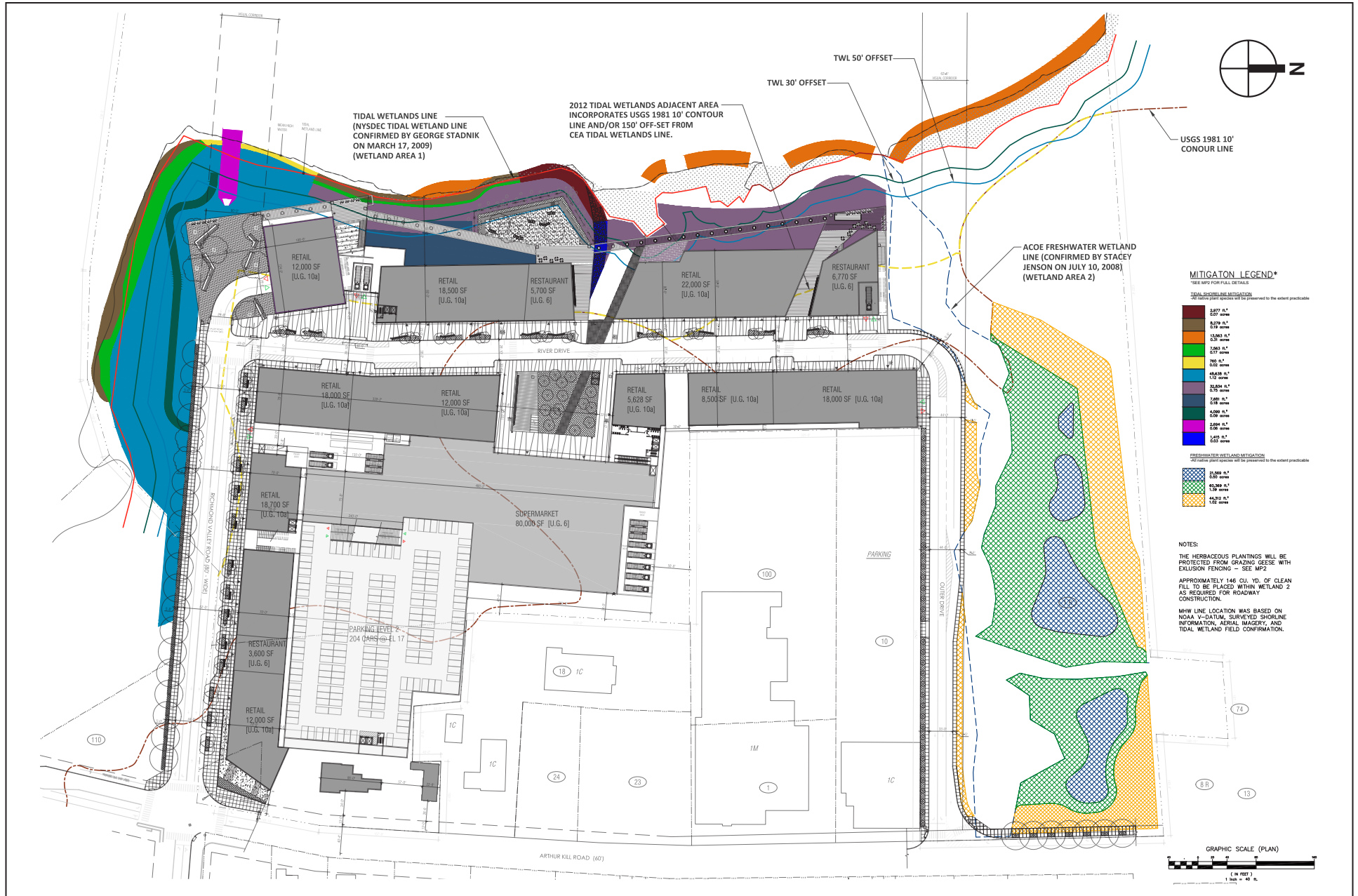
Proposed Freshwater Wetland Creation and Restoration

The focus of the proposed wetland creation and restoration design is to improve onsite habitat for resident and migrating wildlife species through the provision of tidal and freshwater wetland habitats. Improving this area would provide both food and cover for area wildlife and serve to enhance the subject area providing for more diverse flora and fauna.

The proposed 2.90-acre (126,250 square feet) freshwater wetland creation area would be primarily located along the upland northern boundary of the site. The existing grade and contours served as the basis for the wetland creation.

To promote habitat continuity, the proposed freshwater wetland creation areas would be excavated and graded with downward sloping contours to accommodate different planting zones thereby facilitating connections with adjacent freshwater and tidal waters. Large native trees within the proposed freshwater wetland restoration area would be preserved to the extent possible. Planting zones within the created freshwater wetlands would be covered with six inches of screened, weed-free topsoil. The soil substrate would provide the necessary mechanical support and nutrients to aid in the establishment of the proposed wetland plantings and associated microbial populations.

The proposed wetland creation zones have been designed to utilize existing and natural hydrology to approximate a natural hydroperiod. To assess the hydrological characteristics of the site, surface runoff, average rainfall, evapotranspiration rates, average temperatures and amount of treated roof runoff were calculated. Seasonal rainfall variations will result in temporal fluctuations of the water table within the created freshwater wetland areas. Therefore, the



proposed wetland construction would have adequate hydrology to support the proposed mitigative plantings and the development of hydric soils.

Three planting zones would be established within the proposed freshwater wetland restoration area: Emergent Marsh vegetation; Scrub-shrub vegetation, and tree vegetation (see **Table 8-9**).

**Table 8-9
Proposed Wetland Restoration Plantings**

Freshwater Wetland Restoration	
<i>Emergent Marsh Vegetation</i>	
	Soft Rush (<i>Juncus effusus</i>)
	Hardstem bulrush (<i>Scirpus acutus</i>)
	Common Three-square (<i>Scirpus pungens</i>)
	Fox Sedge (<i>Carex vulpinoidea</i>)
	Lurid Sedge (<i>Carex lurida</i>)
<i>Scrub-Shrub</i>	
	Specialized seed mix: Fox Sedge, Soft Rush, Many-leaved Bulrush, Cosmos Sedge, Lurid Sedge, Duck Potato, Hop Sedge, Fringed Sedge, Three-way Sedge, Canadian Rush, Virginia Wild Rye, Eastern Lesser Bur-Reed, Sensitive Fern, Umbrella Aster, Wood Reedgrass and Marsh Marigold.
	Arrowwood (<i>Viburnum recognitum</i>)
	Elderberry (<i>Sambucus canadensis</i>)
	Red Chokeberry (<i>Photinia pyrifolia</i>)
	Northern Bayberry (<i>Myrica pennsylvanica</i>)
	Gray Dogwood (<i>Cornus racemosa</i>)
<i>Trees</i>	
	Black willow (<i>Salix nigra</i>)
	Red Maple (<i>Acer rubrum</i>)
	Sweetgum (<i>Liquidambar styraciflua</i>)
	Blackgum (<i>Nyssa sylvatica</i>)
	Pin Oak (<i>Quercus palustris</i>)
Tidal Wetland and Adjacent Area	
<i>Planting Area 1 (Intertidal Marsh)</i>	
	Smooth Cordgrass (<i>Spartina alterniflora</i>)
<i>Planting Area 2 (High Marsh)</i>	
	Black Grass (<i>Juncus girardi</i>)
	Saltmarsh Bulrush (<i>Scirpus robustus</i>)
	Little Bluestem (<i>Schizachyrium scoparium</i>)
	Groundsel-tree (<i>Baccharis halimifolia</i>)
	Northern Bayberry (<i>Myrica pennsylvanica</i>)
	Northern Blackberry (<i>Rubus allegheniensis</i>)
	Beach Plum (<i>Prunus maritima</i>)
<i>Planting Area 3 (Upper edge of the High Marsh)</i>	
	Black Grass (<i>Juncus girardi</i>)
	Saltmarsh Bulrush (<i>Scirpus robustus</i>)
	Seaside Goldenrod (<i>Solidago semipervens</i>)

**Table 8-9, cont'd
Proposed Wetland Restoration Plantings**

Tidal Wetland and Adjacent Area, cont'd
<i>Planting Area 4 (Above the top-of-slope irregularly impacted by salt spray)</i>
Little Bluestem (<i>Schizachyrium scoparium</i>)
Indian Grass (<i>Sorghastrum nutans</i>)
Switchgrass (<i>Panicum virgatum</i>)
Groundsel-tree (<i>Baccharis halimifolia</i>)
Northern Bayberry (<i>Myrica pennsylvanica</i>)
Beach plum (<i>Prunus maritima</i>)
Arrowwood (<i>Viburnum recognitum</i>)
Elderberry (<i>Sambucus canadensis</i>)
Pin Oak (<i>Quercus palustris</i>)
Hackberry (<i>Celtis occidentalis</i>)
Common Serviceberry (<i>Amelanchier arborea</i>)
American Holly (<i>Ilex opaca</i>)
Black Cherry (<i>Prunus serotina</i>)
Eastern Red Cedar (<i>Juniperus virginiana</i>)
<i>Planting Area 5 (Above the top-of-slope irregularly impacted by salt spray)</i>
Groundsel-tree (<i>Baccharis halimifolia</i>)
Northern Bayberry (<i>Myrica pennsylvanica</i>)
Beach plum (<i>Prunus maritima</i>)
Arrowwood (<i>Viburnum recognitum</i>)
Elderberry (<i>Sambucus canadensis</i>)
Pin Oak (<i>Quercus palustris</i>)
Hackberry (<i>Celtis occidentalis</i>)
Common Serviceberry (<i>Amelanchier arborea</i>)
American Holly (<i>Ilex opaca</i>)
Black Cherry (<i>Prunus serotina</i>)
Eastern Red Cedar (<i>Juniperus virginiana</i>)
<i>Planting Area 6 (Above the top-of-slope irregularly impacted by salt spray)</i>
Ernst Northeast Native Wildflower Mix (Little Bluestem, Sideoats Grama, Virginia wild rye, Tall White Beardtongue, Partridge pea, purple coneflower, Marsh Blazing Star, Butterfly milkweed, Lanceleaf Coreopsis, Oxeye Sunflower, Blackeyed Susan, New England Aster, Smooth Blue Aster, Ohio Spiderwort, Bentgrass, Browneyed Susan)

Zone 1: Emergent Marsh Vegetation

The Emergent Marsh Vegetation Zone would include areas that regularly flood to a depth of one to three feet. The total area of Zone 1 is 21,569 square feet (0.50 acres). This area would be planted with a variety of herbaceous plants including:

- Soft Rush (*Juncus effusus*): *J. effusus* provides a food source to wildlife and can tolerate regular inundation.
- Hardstem bulrush (*Scirpus acutus*): *S. acutus* can withstand up to three feet of inundation, provides cover and food for birds and mammals, is quick to establish and good for sediment stabilization and control.
- Common Three-square (*Scirpus pungens*): *S. pungens* can withstand up to two and one-half feet of inundation. The rhizomes are preferred by muskrat and snow goose, the achenes are eaten by waterfowl and it provides food and cover for many birds and small mammals.

- Fox Sedge (*Carex vulpinoidea*) and Lurid Sedge (*Carex lurida*): *C. vulpinoidea* and *C. lurida* can tolerate regular inundation, is quick to establish, and good for sediment stabilization and control.

Zone 2: Scrub-Shrub

This area would be periodically inundated. Plants established in this area must be able to withstand both wet and dry periods, with periods of complete inundation. The total area of Zone 2 is 60,369 square feet (1.39 acres). Species chosen for this area include:

Specialized Wetland Seed Mix: This freshwater wetland seed mix includes a wide variety of species that can tolerate periods of inundation. This seed mix also provides food and cover for birds throughout the year. Included in the seed mix are: Fox Sedge, Soft Rush, Many-leaved Bulrush, Cosmos Sedge, Lurid Sedge, Duck Potato, Hop Sedge, Fringed Sedge, Three-way Sedge, Canadian Rush, Virginia Wild Rye, Eastern Lesser Bur-Reed, Sensitive Fern, Umbrella Aster, Wood Reedgrass and Marsh Marigold.

Arrowwood (*Viburnum recognitum*): *V. recognitum* can tolerate seasonal flooding and provides cover and fruit for birds. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Elderberry (*Sambucus canadensis*): *S. canadensis* can tolerate periodic inundation and provides food and cover for birds and mammals. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Red Chokeberry (*Photinia pyrifolia*): *P. pyrifolia* can tolerate periodic inundation and provides food and cover for birds and mammals. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Northern Bayberry (*Myrica pennsylvanica*): *M. pennsylvanica* can tolerate periodic inundation and provides food and cover for birds and mammals. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Gray Dogwood (*Cornus racemosa*): *C. racemosa* can tolerate periodic inundation and provides food and cover for ducks, shorebirds and mammals. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Zone 3: Trees

This area is along the wetland rim. Species planted in this area would be tolerant to occasional flooding. The total area of Zone 3 is 44,312 square feet (1.02 acres). Species chosen for this area include:

- Black willow (*Salix nigra*): *S. nigra* can tolerate periodic inundation, is rapid growing and can be utilized to stabilize sloped areas. Willows also provide nesting areas for birds. Plants with a 3-inch caliper would be planted at a distribution of one per 100 square feet.
- Red Maple (*Acer rubrum*): *A. rubrum* can tolerate periodic inundation and is well adapted to moist soils. This species' seeds provide food for squirrels and some birds.⁵⁴ Plants with a 3-inch caliper would be planted at a distribution of one per 100 square feet.

⁵⁴ USDA–NRCS Plant Fact Sheet; Red Maple (*Acer rubrum*); John Dickerson; USDA NRCS, New York State Office, Syracuse, New York; January 31, 2002 – rev May 24, 2006.

- Sweetgum (*Liquidambar styraciflua*): *L. styraciflua* is tolerant of flooding and can populate seaside sites. This species' seeds are eaten by birds, squirrels and chipmunks.⁵⁵ Plants with a 3-inch caliper would be planted at a distribution of one per 100 square feet.
- Blackgum (*Nyssa sylvatica*): This deciduous tree can withstand periods of flooding. Provides both food and shelter for wildlife specifically herons and egrets. Plants with a 3-inch caliper would be planted at a distribution of one per 100 square feet.
- Pin Oak (*Quercus palustris*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species' seeds provide food for small mammals and deer. Plants with a 3-inch caliper would be planted at a distribution of one per 100 square feet.

Proposed Tidal Wetland Creation and Restoration

Based upon the proposed site plan, the tidal wetland and adjacent area restoration proposes to disturb approximately 3.00 acres of the Proposed Project area. Ecological communities that would be directly impacted include estuarine rip-rap/artificial shore, low salt marsh, maritime beach, reedgrass/purple loosestrife marsh successional maritime forest, successional old field, and tidal river.

The proposed tidal wetland planting zones to be established within the restoration area along the northwestern, western, and southern shores of the property total 2.64 acres (115,138 square feet). An additional 0.35 acres (15,365 square feet) would be restored through the removal of superficial concrete and other debris. The existing grade and contours served as the basis for the restoration areas. The tidal wetland and adjacent area restoration and enhancement has been designed to utilize the natural shoreline substrates and tidal regime to maintain the proposed mitigative plantings.

Planting areas would be established within the restoration and enhancement areas: Intertidal marsh vegetation; High marsh vegetation, and tree and shrub vegetation.

Planting Area #1

The Intertidal Marsh planting area would include the areas regularly inundated by mean high water (mhw). The proposed wetland enhancement within the intertidal zone focuses on the intertidal areas where native plant growth is already well established and not impacted by wave action. The planting areas have been selected to utilize spaces between adjacent mats of *Spartina alterniflora*. The total planting area is 13,563 square feet (0.31 acres). This area would be planted as applicable with smooth cordgrass (*Spartina alterniflora*) as patches of this species are currently present. Smooth cordgrass would tolerate regular inundations with 0 to 35 parts per thousand salinity and provide shoreline protection. *S. alterniflora* provides food and cover to a number of marsh birds and mammals.⁵⁶

The wetlands enhancement in these areas will focus on the creation of marsh mats through the use of coir logs to facilitate accretion of sediment and soils suitable to substrate formation. The selected intertidal enhancement areas are directly positioned in areas that will ensure direct contact with existing marsh mats populated with *Spartina alterniflora* and ribbed mussels (*Geukensia demissus*).

⁵⁵ USDA–NRCS Plant Fact Sheet; Sweetgum (*Liquidambar styraciflua*); USDA NRCS National Plant Materials Center, Beltsville, Maryland; February 5, 2002.

⁵⁶ USDA–NRCS Plant Fact Sheet; Smooth Cordgrass (*Spartina alterniflora*); Tony Bush; USDA NRCS Rose lake Plant Materials Center; East Lansing, Michigan; February 5, 2002 – rev. May 24, 2006.

Planting Area #2

Shrubs to be planted in the upper edge of the High Marsh along the top-of-slope would include areas that would be irregularly impacted by salt spray. The total planting area of is 7,563 square feet (0.17 acres). This area would be planted with a variety of species including:

Specialized Seed Mix (0.5 lbs/MSF): This seed mix includes a wide variety of species that can tolerate salt spray. This seed mix would provide food, and cover for birds and small mammals throughout the year. Included in the seed mix are: black grass (*Juncus Girardi*), saltmarsh bulrush (*Scirpus robustus*), and little bluestem (*Schizachyrium scoparium*).

Groundsel-tree (*Baccharis halimifolia*): *B. halimifolia* is highly resistant to salt spray and flooding and provides nesting habitat for marsh wrens and other small birds.⁵⁷ Plants with a height of 18” to 24” would be planted at a distribution of one per 25 square feet.

Northern Bayberry (*Myrica pennsylvanica*): *M. Pennsylvanica* is tolerant of salty soil and water³, can tolerate periodic inundation, and has a high wildlife value in that berries last into winter. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Northern Blackberry (*Rubus allegheniensis*): *R. allegheniensis* provides shoreline erosion control and dense ground cover. This species provides refuge for both small mammals and birds and also provides nesting habitat for various species of birds. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Beach plum (*Prunus maritima*): *P. maritima* is tolerant of salty soil and water. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.

Planting Area #3

Seed mix and containers to be placed along the upper edge of the High Marsh along would include areas that would be irregularly impacted by salt spray. The total planting area of is 760 square feet (0.02 acres). This area would be planted with a variety of species including:

Specialized Seed Mix (0.5 lbs./MSF): This seed mix includes a wide variety of species that can tolerate salt spray. This seed mix provides food and cover for birds and small mammals throughout the year. Included in the seed mix are: black grass (*Juncus Girardi*), and saltmarsh bulrush (*Scirpus robustus*). Seaside goldenrod (*Solidago semipervens*) 2-gallon containers would be planted at a distribution of one per 35 square feet.

Planting Area #4

Shrubs and trees to be planted above the top-of-slope includes areas irregularly impacted by salt spray. The total planting area of is 48,638 square feet (1.12 acres). This area would be planted with a variety of species including:

Specialized Seed Mix (0.5 lbs/MSF): This seed mix includes a wide variety of species that can tolerate salt spray. This seed mix provides food and cover for birds and small mammals throughout the year. Included in the seed mix are: little bluestem (*Schizachyrium scoparium*), Indian grass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*).

⁵⁷ USDA–NRCS Plant Fact Sheet; Eastern Baccharis (*Baccharis halimifolia*); Christopher Miller and William Skaradek; USDA NRCS, Somerset, New Jersey and Cape May Plant Materials Center Cape May Court House, New Jersey; January 31, 2002.

Shrubs to be planted would include areas that are expected to be irregularly influenced by salt spray. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet. This area would be planted with a variety of species including:

- Groundsel-tree (*Baccharis halimifolia*): *B. halimifolia* is highly resistant to salt spray and flooding and provides nesting habitat for marsh wrens and other small birds.⁵⁸
- Northern Bayberry (*Myrica pennsylvanica*): *M. Pennsylvanica* is tolerant of salty soil and water³, can tolerate periodic inundation, and has a high wildlife value in that berries last into winter.
- Beach plum (*Prunus maritima*): *P. maritima* is tolerant of salty soil and water.
- Arrowwood (*Viburnum recognitum*): *V. recognitum* can tolerate seasonal flooding and provides cover and fruit for birds.
- Elderberry (*Sambucus canadensis*): *S. canadensis* can tolerate periodic inundation and provides food and cover for birds and mammals.

Tree plantings are proposed in areas that would be irregularly impacted by salt spray. Trees with a 3-inch caliper are proposed to be planted at a distribution of one per 100 square feet. This area would be planted with a variety of species including:

- Pin Oak (*Quercus palustris*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Hackberry (*Celtis occidentalis*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Common Serviceberry (*Amelanchier arborea*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- American Holly (*Ilex opaca*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Black Cherry (*Prunus serotina*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Eastern Red Cedar (*Juniperus virginiana*): This coniferous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.

⁵⁸ USDA–NRCS Plant Fact Sheet; Eastern Baccharis (*Baccharis halimifolia*); Christopher Miller and William Skaradek; USDA NRCS, Somerset, New Jersey and Cape May Plant Materials Center Cape May Court House, New Jersey; January 31, 2002 – rev. May 31, 2006.

Planting Area #5

Shrubs and trees to be planted above the top-of-slope would include areas that would be irregularly impacted by salt spray. The total planting area of is 32,834 square feet (0.75 acres). This area would be planted with a variety of species including:

Shrubs to be planted would include areas that would be irregularly impacted by salt spray. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet. This area would be planted with a variety of species including:

- Groundsel-tree (*Baccharis halimifolia*): *B. halimifolia* is highly resistant to salt spray and flooding and provides nesting habitat for Marsh wrens and other small birds.⁵⁹
- Northern Bayberry (*Myrica pennsylvanica*): *M. Pennsylvanica* is tolerant of salty soil and water³, can tolerate periodic inundation, and has a high wildlife value in that berries last into winter.
- Beach plum (*Prunus maritima*): *P. maritima* is tolerant of salty soil and water. Plants with a height of 18 to 24 inches would be planted at a distribution of one per 25 square feet.
- Arrowwood (*Viburnum recognitum*): *V. recognitum* can tolerate seasonal flooding and provides cover and fruit for birds.
- Elderberry (*Sambucus canadensis*): *S. canadensis* can tolerate periodic inundation and provides food and cover for birds and mammals.

Trees to be planted include those irregularly impacted by salt spray. Trees with a 3-inch caliper would be planted at a distribution of one per 100 square feet. This area would be planted with a variety of species including:

- Pin Oak (*Quercus palustris*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Hackberry (*Celtis occidentalis*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Common Serviceberry (*Amelanchier arborea*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- American Holly (*Ilex opaca*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.
- Black Cherry (*Prunus serotina*): This deciduous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.

⁵⁹ USDA –NRCS Plant Fact Sheet; Eastern Baccharis (*Baccharis halimifolia*); Christopher Miller and William Skaradek; USDA NRCS, Somerset, New Jersey and Cape May Plant Materials Center Cape May Court House, New Jersey; January 31, 2002 – rev. May 31, 2006.

- Eastern Red Cedar (*Juniperus virginiana*): This coniferous tree can tolerate periodic inundation and is well adapted to moist soils. This species seeds provide food for small mammals and deer.

Planting Area #6

Herbaceous vegetation to be planted above the top-of-slope include those that would be irregularly impacted by salt spray. The total planting area of is 7,681 square feet (0.18 acres). This area would be planted with a variety of species including:

Ernst Northeast Native Wildflower and Grass Mix (0.5 lbs/MSF): This wildflower seed mix includes a wide variety of species that can tolerate the seasonal site conditions. This seed mix would provide food, and cover for birds throughout the year. Included in the seed mix are: Little Bluestem, Sideoats Grama, Virginia wild rye, Tall White Beardtongue, Partridge pea, purple coneflower, Marsh Blazing Star, Butterfly milkweed, Lanceleaf Coreopsis, Oxeye Sunflower, Blackeyed Susan, New England Aster, Smooth Blue Aster, Ohio Spiderwort, Bentgrass, Brown-eyed Susan.

Planting Area #7

A 10-foot wide maintenance access pathway, leading from Richmond Valley Road to the proposed 48-inch outfall, has been provided with the Proposed Project plans, as required by NYCDEP. The access pathway would be constructed of grass pavers properly rated to support DEP maintenance and construction vehicles. The access pathway would be free of trees, shrubs or other obstructions as required. The total pathway area is 4,099 square feet (.09 acres).

Restoration Area #1

Within this area surficial concrete is proposed to be removed and replaced with armor stone. Any stained concrete pieces located below the MHW line with sea lettuce or ribbed mussels present, would remain. The total restoration area is 2,977 square feet (0.07 acres).

Restoration Area #2

Within this area surficial concrete is proposed to be removed and replaced with rip-rap. The rip-rap is proposed to have an approximate 5-10-foot width, variable based on topography and stability of underlying soils. The toe of slope would be at the edge of the beach sand. Any stained concrete pieces located below the MHW line with sea lettuce or ribbed mussels present, would remain. The total restoration area is 8,279 square feet (0.19 acres).

Restoration Area #3

Within this area surficial concrete would be removed and replaced with rip-rap. The width of the new rip-rap would vary based on topography, stability of underlying soils and the placement of the proposed sand filter. Any stained concrete pieces located below the MHW line with sea lettuce or ribbed mussels present, would remain. The total restoration area is 1,415 square feet (0.03 acres).

Restoration Area #4

Within this area rip-rap would be placed on top of geotextile fabric extending from the headwall of the proposed DEP outfall at the western end of Richmond Valley Road to the vicinity mean high water line within the Arthur Kill. This area is necessary and would serve to dissipate stormwater prior to reaching the Arthur Kill. The total rip-rap area is 2,694 square feet (.06 acres).

TERRESTRIAL RESOURCES

ECOLOGICAL COMMUNITIES

Commercial Development Area

Based upon the proposed site plan, the commercial development portion of the project proposes to permanently disturb approximately 12.55 acres (37.2 percent) of the Proposed Project area (see **Table 8-10**). Ecological communities that would be directly impacted include mowed lawn with trees, paved road/path, reedgrass/purple loosestrife marsh, successional maritime forest, successional old field and unpaved road/path (see **Figure 8-8**). The 12.55 acres of proposed commercial development would result in the following habitat reductions:

- 1.56 acres of mowed lawn with trees,
- 0.54 acres of paved road/path,
- 2.11 acres of reedgrass/purple loosestrife marsh,
- 5.27 acres of successional maritime forest,
- 3.50 acres of successional old field, and
- 0.03 acres of unpaved road/path.

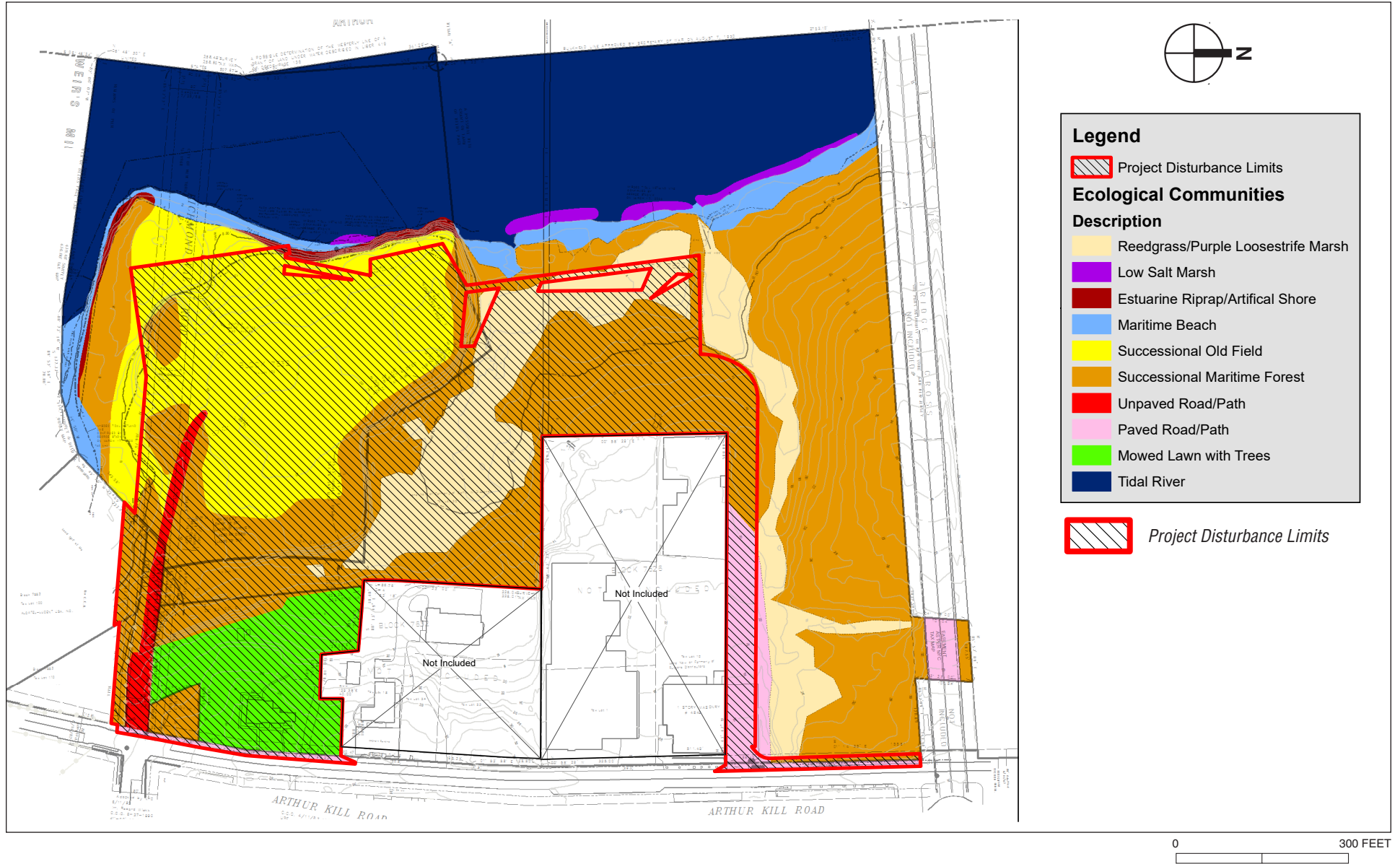
Public Road Improvements

The Proposed Project includes the public road improvements along both Richmond Valley Road and Arthur Kill Road that would permanently disturb approximately 1.42 acres (4.2 percent) of the Proposed Project area. Ecological communities that would be directly impacted include mowed lawn with trees, paved road/path, successional maritime forest, successional old field and unpaved road/path. The 1.42 acres of proposed public road improvements would result in the following habitat reductions:

- 0.07 acres of mowed lawn with trees,
- 0.21 acres of paved road/path,
- 0.60 acres of successional maritime forest,
- 0.24 acres of successional old field, and
- 0.30 acres of unpaved road/path.

Construction Easement South of Richmond Valley Road

The Proposed Project includes a construction easement south of Richmond Valley Road which would permanently disturb approximately 0.14 acres (0.4 percent) of the Proposed Project area all of which is currently successional maritime forest habitat.



Ecological Communities with the Proposed Project
Figure 8-8

**Table 8-10
Proposed Project Site Plan Land Area**

1. Commercial development	Acres
1a. Commercial Building	5.07
1b. Private drives (including sidewalks and pedestrian walkways)	2.79
1c. Private decks/overlooks	0.31
1d. Cole House	0.05
1e. Accessory spaces (loading, storage, utility area, parking etc.)	3.49
1f. Waterfront landscaping	0.43
1g. Street and yard landscaping	0.40
Subtotal 1.	12.55
2. Public Road Improvements	
2a. Richmond Valley Road	1.13
2b. Street landscaping	0.10
2c. Arthur Kill Road	0.19
Subtotal 2.	1.42
3. Waterfront Open Space	
3a. Tidal wetland and adjacent area restoration/enhancement and preserved area	2.81
3b. Publicly accessible trail	0.82
3c. Beach	0.12
Subtotal 3.	3.75
4. Preserved and Restored Areas	
4a. Tidal wetland and adjacent area restoration/enhancement and preserved area	4.42
4ai. Overlap with private decks/overlooks	0.07
4aii. Overlap with publicly accessible walkway	0.12
4aiii. Overlap with freshwater wetlands	0.16
4aiv. Overlap with lands underwater	0.25
4av. Overlap with construction easements south of Richmond Valley Road	0.07
4avi. Overlap with tidal wetland and adjacent area open space	2.81
4avii. Overlap with waterfront landscaping	0.15
4b. Freshwater wetlands restoration/enhancement and preserved area	4.22
4bi. Overlap with private decks/overlooks	0.01
4bi. Overlap with private drive	0.06
4c. Other upland preserved areas	1.65
4d. Easement areas under Outerbridge Crossing	0.25
Subtotal 4.	6.84
5. Underwater lands	8.98
6. Construction easements south of Richmond Valley Road	0.14
Total Project Site	33.68

Waterfront Open Space

The Proposed Project would permanently disturb approximately 3.75 acres (11.1 percent) of the Proposed Project area for the proposed waterfront open space.⁶⁰ Ecological communities that would be directly impacted include estuarine rip-rap/artificial shore, low salt marsh, maritime beach, reedgrass/purple loosestrife marsh, successional maritime forest, and successional old field. These proposed improvements would result in the following habitat impacts:

- 0.21 acres of estuarine rip-rap/artificial shore
- 0.01 acres of low salt marsh,
- 0.69 maritime beach,
- 0.19 acres of reedgrass/purple loosestrife marsh,
- 1.01 acres of successional maritime forest, and
- 1.18 acres of successional old field.

Preserved and Restored Areas

Preserved and restored areas include areas of tidal wetlands, tidal wetlands enhancement, freshwater wetland, and freshwater wetland creation, and uplands to be preserved including the easements under the Outerbridge Crossing.⁶¹ Based upon the proposed site plan, the Proposed Project would further preserve and restore approximately 6.84 acres (20.3 percent) of the Proposed Project area. Ecological communities that would be preserved or restored maritime beach, paved road/path, reedgrass/purple loosestrife marsh, and successional maritime forest. The 6.84 acres of the proposed preserved and restored area would result in the following habitat preservation:

- 0.33 acres of maritime beach,
- 0.28 acres of paved road/path,
- 1.27 acres of reedgrass/purple loosestrife marsh, and
- 4.96 acres of successional maritime forest.

Underwater Lands

Based upon the proposed site plan, underwater lands would protect approximately 8.98 acres (26.7 percent) of the Proposed Project area. Ecological communities that would be preserved include estuarine rip-rap/artificial shore, low salt marsh, maritime beach, successional maritime forest, and tidal river. The 8.98 acres of proposed underwater lands would result in the following underwater lands preservation:

- 0.01 acres of estuarine rip-rap/artificial shore,
- 0.26 acres of low salt marsh,
- 0.04 acres of maritime beach,

⁶⁰ 2.81 acres of the 3.75 acres of Waterfront Open Space would be impacted by tidal wetland and adjacent area restoration/enhancement and preserved area.

⁶¹ Preserved and Restored areas do not include the 2.81 acres of tidal wetland enhancement within the Waterfront Open Space.

- 0.03 acres of successional maritime forest, and
- 8.64 acres of tidal river.

VEGETATION

Trees

As shown on Figure 8-4, 916 trees, ranging from of 6 to 48 inches or greater diameter at breast height (dbh) would be preserved on site and clearing and development would result in the loss of approximately 919 trees; 30 to 49 percent of which are non-native/invasive species (see also **Table 8-11**).

**Table 8-11
Tree Clearing Impacts with the Proposed Project**

Species	Number	Description
Ailanthus	153	Invasive*
Beech	2	American beech - Native** (only species identified on site)
Birch	31	Gray birch - Native** (only species identified on site)
Cherry	25	Black Cherry - Native** (only species identified on site)
Dogwood	36	Flowering Dogwood - Native** (only species identified on site)
Evergreen	10	Eastern red cedar - Native** (only species identified on site)
Locust	98	Black locust - Invasive*.*.*.* (only species identified on site)
Maple	380	Norway maple - Invasive*.*.*.*; Sugar maple - Native**; Red maple - Native** (ornamental)
Mulberry	2	White mulberry - Invasive** (only species identified on site)
Oak	71	Pin oak - Native** (only species identified on site)
Pear	6	Callery pear - Introduced** (only species identified on site)
Pine	6	White Pine - Native** (only species identified on site)
Sassafras	80	Native**
Sweetgum	9	Native**
Sycamore	8	Native**
Willow	2	Black willow - Native** (ornamental) (only species identified on site)
Notes: *NYS DOT **USDA ***NYS DEC		

With the Proposed Project there would be substantial new native plantings which are included in the Proposed Project design. Tree protection measures would also be implemented during construction to protect trees that are located near the limits of disturbance on the boundaries of the proposed development.

The loss of the onsite forested and unforested uplands, disturbed old fields, freshwater wetlands, and tidal wetland adjacent area would alter the movement of most of the wildlife that may use the Project Site to access the adjacent forested and wetland areas. It would also result in the loss of habitat for those individuals that currently on the site. Existing habitat along the southern and western tidal shore and within the freshwater wetlands and successional maritime forest in the northern portion of the Project Site would remain undisturbed. These areas would continue to provide resident and local wildlife populations the opportunity to move around the development to access other undisturbed shoreline, wetland, and forest lands in the vicinity.

Planting Plan with Native Vegetation

Native species would be used for planting purposes and for revegetating the portions of the Project Site. This preference is based on native plant adaptability to local climatic conditions, including temperature, precipitation, and length of the growing season. Many native species selected for planting may also be beneficial to indigenous wildlife, especially birds, by providing wildlife benefits such as nesting, cover, and food. Typical plantings that may be chosen for their hardiness to the local climate and to the proposed settings on the site include native or regionally adaptable landscaping species.

With the Proposed Project there would be substantial tree plantings that would be supplemented with the planting of shrubs and herbaceous plants that would provide a variety of foraging, nesting, and shelter benefits for the wildlife that repopulates the site.

The existing, disturbed woodland vegetation would be supplemented by native plants and associated landscaping within the Project Site. This would include removal of invasive or nonnative plant species. The introduced plantings would likely be used as forage by wildlife, and many of the shrub species chosen for landscaping would provide immediate habitat for songbirds and other avian species. Trees that are planted would mature in the long-term and would provide roosting and nesting opportunities for birds that are adaptable to shoreline and urban conditions. Grasses and low-growing shrub plantings provide cover for ground-nesting birds.

In addition to their value as hardy plantings, some of the native plant species are berry and seed-bearing trees and shrubs that would offer songbirds and mammals seasonal food sources incidental to their use as landscape plantings. In addition to providing food sources, native plantings provide good nesting habitat for many birds and arboreal mammals.

The following groups and plants develop seasonal fruiting characteristics that are useful as food for wildlife:

Deciduous Fruiting Trees:

- Black willow
- Red maple
- Sweetgum
- Blackgum
- Pin oak
- Black cherry
- Hackberry
- Common serviceberry
- American holly

Coniferous Fruiting Trees:

- Eastern red cedar

Shrubs:

- Arrowwood
- Elderberry
- Red chokeberry
- Northern bayberry
- Gray dogwood

Groundsel-tree
Northern blackberry
Beach plum

The proper bedding and positioning of plantings is important, as each of the species used would not thrive in all of the soils or exposures presented by the developed site. Particular plant requirements regarding planting, soil, water, and sun/shade preferences would be used in determining final plant positioning.

The replacement of invasive plants with native plants would be beneficial to most wildlife species that would repopulate the site. Certain of the invasive species present such as garlic mustard, multiflora rose, and Japanese barberry would be eliminated on mitigated portions of the Project Site.

Proposed Measures to Protect Trees to Remain

No trees in healthy condition beyond the field-identified limits of disturbance would be disturbed. Tree protection measures would conform with the International Society of Arboriculture recommendations. This would include delineating limits of disturbance and drip line with snow fencing or similar methods, limiting equipment operation and pruning, and irrigating as necessary. Additionally, trees near working areas may be wrapped at the base by snow fencing to avoid accidental damage to trunks and roots. No disturbance is planned within the projected root zone of these trees or within the drip line of the tree foliage. Snow fencing or other highly visible means of marking should be placed around the maximum area of the root system to prevent the destruction of roots by exposure or through the compaction of soils. Construction crews would be notified to exclude all equipment from these protected areas. If necessary, trees would be protected by tree wells in fill areas, and retaining walls in cut areas.

One large sycamore tree of substantial size adjacent to the southern side of the Cole House is scheduled to be preserved. Project design may impede into the root zone and drip line of the tree. This tree would be protected to the extent practicable as described above and efforts would be made to preserve the tree and integrate it into the final landscape design.

WILDLIFE

No significant adverse environmental impacts to wildlife are anticipated. Nearby residential and commercial buildings along Arthur Kill Road and the restricted access roadway under the Outerbridge Crossing separate the site from the freshwater wetland and forested habitat areas in the area. Due to the mix of urban and suburban landscape that borders the eastern edge of the site, the overall diversity of wildlife in the area is expected to be low and dominated by generalist species capable of tolerating human contact. Such species include small mammals like gray squirrel, raccoon, opossum, deer mouse, and woodchuck. With the Proposed Project, it is likely that deer would occur less frequently on the site due to the reduction in browsing and the increased human activity. Deer would continue to pass through neighboring properties to the north.

The old field habitat that predominates on the site is of marginal value to wildlife, as it consists of historically disturbed areas of poor soils and low plant diversity. Areas along the western shoreline tidal wetland and northern freshwater wetland provide a more diverse plant community that is not to be directly impacted by the Proposed Project.

In general, as a project site is developed and habitat is reduced, some species would relocate to similar habitats off-site. The composition of the wildlife population on the Project Site may be altered immediately adjacent to developed areas, as species able to adapt to a suburban environment (such as raccoons, opossum, woodchucks, mice, songbirds, etc.) would have a greater ecological advantage in comparison to species that are less tolerant of human activity.

An indirect and unavoidable impact of wildlife dispersal could be increased competitive interactions with other individuals of the same species on adjacent properties. It is not anticipated that there would be a loss of species from the area or significant impacts to existing populations.

Wildlife currently use the Project Site to access and travel between undeveloped forested areas to the north of the site but it is not likely a significant wildlife corridor to off-site habitat areas due to the surrounding developed properties and roadways. Traffic on Arthur Kill Road and the security fencing associated with the Outerbridge Crossing already impede wildlife from traveling to and from the site.

SIGNIFICANT, SENSITIVE, OR DESIGNATED RESOURCES

CONSERVATION AREAS

As stated above, the southern, western, and northern portions of the proposed Project Site would provide the proposed waterfront open space and also be used for the freshwater and tidal wetlands restoration and enhancement (see also the discussion above). The designated open space would total about 3.75 acres and would be a landscaped waterfront open area with a beach and a publicly accessible walkway. The northern portion of the site is more wooded and would provide natural preservation areas and freshwater wetland creation areas. The tidal enhancement and freshwater native wetland creation area would create a contiguous protected shoreline area between Mill Creek, the tidal wetlands along the Arthur Kill shoreline, the Outerbridge Crossing, and undeveloped areas north of the Outerbridge Crossing.

SPECIAL NATURAL WATERFRONT AREA

Consistent with Policy 4 of the NYC WRP, the Proposed Project has identified the natural resources, uses design features to incorporate restoration objectives, and remediates, protects, and restores portions of the of the Outerbridge Shorelands REC.

The proposed waterfront open space and freshwater and tidal wetlands restoration and enhancement would also provide remediation, protection, and restoration of the Outerbridge Shorelands REC. The focus of the wetland creation and restoration design is to improve onsite habitat for resident and migrating wildlife species through the provision of tidal and freshwater wetland habitats that provide both food and cover for area wildlife and serve to enhance the subject area providing for more diverse flora and fauna. Particularly along the Arthur Kill shoreline, where broken concrete and debris currently litter the area and have degraded wetland values, the Proposed Project would result in clean, stable and revegeted tidal wetlands habitat with higher wildlife habitat, cleansing, and aesthetic values.

THREATENED, ENDANGERED, AND SPECIAL CONCERN SPECIES

No species of plants or wildlife identified on the Project Site are listed as endangered or threatened by Federal, State or County government.

PROTECTED PLANT SPECIES

No species of plants identified on the Project Site are listed as endangered or threatened by Federal, State or County government, thus no impact to threatened or endangered plant species are anticipated.

PROTECTED WILDLIFE SPECIES

No species of wildlife listed as threatened or endangered were observed on the Project Site, thus no impact to threatened or endangered wildlife species are anticipated.

The eastern box turtle is listed as a NYS Species of Special Concern in the area. Clearing of vegetation would result in loss of potential box turtle habitat. Eastern box turtles are versatile animals and since the Proposed Project would maintain blocks of habitat within the freshwater wetlands on the northern edge of the site, it is expected that this species' habitat requirements can continue to be met. No impacts to box turtles are anticipated.

Prior to site disturbance, an environmental monitor familiar with the eastern box turtle would conduct an inventory of the Project Site to find and relocate individual turtles to protected areas of the Project Site or an appropriate offsite location (see also Chapter 18, "Construction"). *