Chapter 10: Natural Resources

A. INTRODUCTION

The *City Environmental Quality Review (CEQR) Technical Manual* (2001) defines natural resources as "plant and animal species and any area capable of providing habitat for plant and animal species or capable of functioning to support ecological systems and maintain the city's environmental balance." The purpose of this chapter is to describe the natural resources conditions that occur at the project site and to assess potential impacts on these resources as a result of the proposed project.

The approximately 3-acre project site is bounded by Carroll Street to the north, Bond Street to the west, 2nd Street to the south, and the Gowanus Canal to the east. The project site is currently used for light industrial purposes, e.g. warehousing and open vehicle storage. The surrounding area includes predominantly residential and industrial development, with some commercial and institutional uses, open space, and vacant land. Generally, residential uses are located to the north and west of 3rd and Bond Streets and industrial uses predominate along the waterfront of the canal.

The proposed project would construct a predominantly residential development on the project site comprising residential housing units with some community facility, commercial uses, and accessory parking for the residents. In addition, the proposed project would create approximately 0.7 acres of publicly-accessible waterfront open space along the Gowanus Canal. This publicly-accessible waterfront open space would provide a view of the canal and would be landscaped and equipped with amenities for passive recreational opportunities. In addition, the proposed project would also provide 0.27 and 0.43 acres (0.7 acres) of private open space in the form of courtyards. Occupancy of the proposed project would be completed by 2011.

The proposed project would involve the following activities:

- Demolition of existing structures.
- Removal and disposal of any underground storage tanks, the closure of such tanks, and implementation of a remedial action plan for hazardous materials.
- The protection of the existing bulkhead through the installation of a new steel sheet pile bulkhead for the entire length of the project site's waterfront (555 linear feet).
- Construction of new separated sanitary sewers, and storm sewers within 1st and 2nd Streets terminating at two new stormwater outfalls to the Gowanus Canal at the end of these streets.
- Site grading and construction of new buildings or the two project blocks, and the proposed publicly-accessible waterfront open space along the Gowanus Canal waterfront.
- Streetscape improvements including street trees and other ornamental plantings.

PRINCIPAL CONCLUSIONS

GROUNDWATER

The proposed project would not result in any significant adverse impacts on groundwater including groundwater conditions, flow or quality. Rather, as described in detail in Chapter 11, "Hazardous Materials," as part of the remediation of the project site prior to construction, the proposed project would remove on-site sources of groundwater contamination, thus providing a benefit with respect to local groundwater quality. In addition, the proposed bulkhead would have more than enough capacity to accommodate the projected flow of groundwater from stormwater recharge on the project site. Therefore, it can be concluded that the proposed project would not adversely impact groundwater conditions along the canal or in the surrounding area.

WETLANDS

The proposed project would install approximately 555 linear feet of steel sheet pile bulkhead either in place of or against the existing timber sheathing along the Gowanus Canal. An intertidal area in the vicinity of the end of Second Street where the canal overtops the bulkhead would, subject to New York State Department of Environmental Conservation (DEC) and United States Army Corps of Engineers (ACOE) approval, be maintained and upgraded. Installation of the new sheet pile bulkhead may result in minimal loss (i.e., approximately 300 square feet) of DEC littoral zone tidal wetlands that may be located within the footprint of the new bulkhead. Therefore, a *de minimis* impact on littoral zone wetlands would occur as a result of bulkhead installation. This impact would be minimized to the extent possible through the implementation of measures identified during the permitting process for these shoreline improvements by federal and state agencies. This *de minimis* impact would not be considered a significant impact on tidal wetlands that would require mitigation. In addition, any *de minimis* filling would be offset by the creation of a tidal wetland area of the same square footage and transitional plantings in the vicinity of the end of 2nd Street).

TERRESTRIAL RESOURCES

No significant adverse impacts would occur with respect to terrestrial resources. Currently, the project site is 95 percent impervious surface cover with scattered invasive plants indicative of disturbed conditions. The construction of the proposed project would create approximately 0.7 acres of waterfront open space that would be planted with a variety of native and ornamental trees, shrubs, grasses, and herbaceous perennials. More than 30 trees would be planted including American redbud (*Cercis Canadensis*), oaks (*Quercus* spp.), and beech (*Fagus* spp.*)* (the applicant will consult with the New York City Department of Parks and Recreation (DPR) to ensure that all street tree and publicly-accessible open space tree species planted on-site are appropriate for the project area and are not known Asian Longhorn Beetle (ALB) host species). This habitat enhancement along the water's edge would provide potential habitat for common songbirds, small mammals, and pollen-dependent species (e.g., honeybee and butterfly species).

AQUATIC RESOURCES

Water Quality

Currently, approximately one-third of the project site's stormwater runoff is untreated and discharged to the combined sewer in Bond Street. Under the proposed project, no stormwater

from the project site would be discharged to this combined sewer and all stormwater from the two project blocks would be collected, treated, and discharged to new storm sewers to be constructed beneath 1st and 2nd Streets, which would then outlet into the Gowanus Canal. Stormwater pollutant loads from the project site would be reduced in the proposed project condition due to the conversion of industrial uses and existing paved surfaces to residential uses and proposed landscaped areas, the latter of which would also reduce the amount of total runoff from the project site. With the proposed project relative to site-generated runoff, there would be a reduction in existing pollutant loads to the canal of approximately 21 percent of biochemical oxygen demand (BOD), 44 percent of the total phosphorus, 47 percent of the total nitrogen, and 38 percent of total suspended solids (TSS). Stormwater would be treated through the use of best management practices (BMPs). Therefore, the proposed project is expected to improve water quality conditions near the project site with the resulting benefits for aquatic biota. In addition, the proposed project would not result in significant adverse impacts on CSO flow, and the number of CSO events in the downstream combined sewer system, and therefore would not adversely impact the water quality of the canal. Water quality modeling results show the proposed project would not result in any water quality impacts on the Gowanus Canal for principal water quality parameters such as dissolved oxygen and pathogens.

Aquatic Biota

The installation of the steel sheet pile bulkhead either in place of or against the existing timber sheathing has the potential to result in short-term construction related impacts to water quality and aquatic biota that would not be significant. These impacts may include localized increases in suspended sediment and re-suspension of contaminated sediments, temporary loss of fish habitat, and a *de minimis* disturbance to benthic communities during the installation of the existing shoreline stabilization features. Because the increase in suspended sediment would be localized and temporary, no significant adverse impacts would occur to aquatic biota. The loss of some benthic habitat and some macroinvertebrates during the removal of portions of the existing timber bulkhead and installation of the new bulkhead would not result in significant adverse impacts to populations of macroinvertebrates, as limited populations have been observed using this portion of the Gowanus Canal, nor would it significantly impact the food supply for fish foraging in the area. Encrusting organisms and benthic macroinvertebrates would be expected to recolonize the new bulkhead shortly after construction is completed. In addition, based on water quality modeling results, no significant adverse impacts to water quality are expected, and therefore no residual or secondary impacts on aquatic resources would occur. It should be noted however, that although not significant, the impacts associated with an in-place replacement of the bulkhead would be greater than with the preferred design (new sheet pile placed against the existing timber sheathing).

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

No threatened, endangered, or special concern species have been identified on or in the immediate vicinity of the project site. Therefore, no significant adverse impacts to threatened or endangered species or special concern species would occur as a result of the proposed project.

ESSENTIAL FISH HABITAT

No significant adverse impacts on fish listed by the National Marine Fisheries Service (NMFS) as having essential fish habitat (EFH) for this area would result from the proposed project.

B. METHODOLOGY

REGULATORY CONTEXT

Waterfront projects in the City of New York typically include activities that have runoff to surface waters, wetlands, and require compliance with the following federal and state legislation and regulatory programs. A summary of those regulations follows.

FEDERAL

Clean Water Act (33 USC §§ 1251 to 1387)

The Clean Water Act (CWA), also known as the Federal Water Pollution Control Act, is intended to restore and maintain the chemical, physical, and biological integrity of U.S. waters. It regulates point sources of water pollution (i.e., discharges of municipal sewage, industrial wastewater, stormwater; and, the discharge of dredged or fill material into navigable waters and other waters of the U.S.) and non-point source pollution (i.e., runoff from streets, agricultural fields, construction sites, and mining that enter waterbodies, from other than the end of a pipe).

Coastal Zone Management Act of 1972 (16 USC §§ 1451 to 1465)

The Coastal Zone Management Act of 1972 established a voluntary participation program to encourage coastal states to develop programs that manage land and water uses within coastal areas and to reduce conflicts between development and the protection of natural resources of the coastal zone. Federal permits for activities in the coastal zone issued in New York must be accompanied by a Coastal Zone Consistency Determination that evaluates consistency with New York's federally approved coastal zone management program. Since New York City has an approved local program, that consistency determination must be made in accordance with the City Waterfront Revitalization Program (WRP).

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

The Endangered Species Act of 1973 recognizes that endangered wildlife and plant species are of aesthetic, ecological, educational, historical, recreational, and scientific value. 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 and 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 STATE

Protection of Waters, Article 15, Title 5, New York State Environmental Conservation Law (ECL), Implementing Regulations 6 NYCRR Part 608.

DEC is responsible for administering Protection of Waters regulations to prevent undesirable activities on surface waters (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 CWA.

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 the SPDES to regulate discharges to the State's waters. Activities requiring a SPDES permit include point source discharges of wastewater into surface or ground waters of the State, including the intake and discharge of water for cooling purposes, constructing or operating a disposal system, discharge of stormwater, and construction activities that disturb one acre or more.

Waterfront Revitalization of Coastal Areas and Inland Waterways Act (Sections 910-921, Executive Law, Implementing Regulations 6 NYCRR Part 600 et seq.)

Under the Waterfront Revitalization of Coastal Areas and Inland Waterways Act, the New York State Department of State (NYSDOS) is responsible for administering the Coastal Management Program (CMP). The Act also authorizes the State to encourage local governments to adopt Waterfront Revitalization Programs (WRPs) that incorporate the State's policies. New York City has a WRP administered by the Department of City Planning (DCP). Chapter 12, "Waterfront Revitalization Program," describes the proposed project's consistency with the City's WRP.

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. 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 state line. DEC administers the tidal wetlands regulatory program and the mapping of the state's tidal wetlands. A permit is required for almost any activity that would alter wetlands or the adjacent areas (up to 150 feet inland within New York City).

Endangered and Threatened Species of Fish and Wildlife; Species of Special Concern (ECL, Sections 11-0535[1]-[2], 11-0536[2], [4], Implementing Regulations 6 NYCRR Part 182)

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

SITE DESCRIPTION

The eastern shoreline of the project site is defined by the Gowanus Canal, once referred to as Gowanus Creek. The Gowanus Canal was originally a tidal creek approximately 0.75 miles wide, with numerous small tributaries, which wound northeast from the Lower New York Bay south of Red Hook.

Gowanus Creek was channelized into a canal ("Gowanus Canal" or "canal") from the 1850s through the 1860s and by the 1880s the banks of the Gowanus Canal were developed with industrial and shipping uses, including coal yards, foundries, paint and ink factories, electroplating shops, and paper mills transforming the area into one of Brooklyn's industrial centers. Discharges from these industries combined with restricted tidal exchange with the Upper New York Bay at its only open end transformed the canal into one of the City's most polluted waterways.

As described in Chapter 2, "Land Use, Zoning, and Public Policy," in 1911, the 6,280-foot Gowanus Canal Flushing Tunnel to Buttermilk Channel was constructed to increase circulation within the canal and improve water quality by pumping water from the canal to Buttermilk Channel. However, this facility proved to be inadequate and became inoperable in the early 1960s, resulting in further degradation of water quality. By the late 1970s, an estimated 50 percent of the property around the canal was unused and derelict. Since the 1970s, the implementation of environmental laws and the regulation of discharges coupled with significant declines in industrial processing operations along the canal have greatly diminished the volume of pollutants that are discharged to the canal.

In 1999, as part of DEP's Inner Harbor CSO Facility Plan, the Gowanus Canal Flushing Tunnel was reactivated, resulting in an additional improvement in the canal's water quality. Components of the Gowanus Canal Flushing Tunnel include a 600 hp motor, shaft, bearings, and propeller that are designed to convey water at a rate of up to 300 million gallons per day (mgd). In addition, unrelated to the flushing system itself, the Gowanus Canal Flushing Tunnel contains a 33-inch abandoned force main which was intended to convey flow directly to the Columbia Street Interceptor, and eventually to Red Hook WPCP (currently, this force main is not operational and DEP has since diverted flow to the Bond-Lorraine Sewer [see Chapter 13, "Infrastructure"]). Currently, the tunnel conveys an average of 154 mgd of water from Buttermilk Channel to the canal (DEP 2007a). This water exchange with Buttermilk Channel waters has resulted in improved water quality. However, as discussed below under "Aquatic Resources," waters within the canal remain impaired and further efforts are being proposed to improve water quality and aquatic habitat.

IMPACT ASSESSMENT METHODOLOGY

This section presents the methodology used to describe natural resources conditions at and around the project site under existing and future conditions, and to assess potential impacts to these resources from the proposed actions for the 2011 Build year.

STUDY AREA

As described in Chapter 2, "Land Use, Zoning, and Public Policy," the area surrounding the project site includes predominantly residential uses to the west and industrial uses along the canal as well as vacant land. Because the proposed project would not significantly impact the terrestrial or wetland resources in the vicinity of the project site either directly or indirectly

during construction or operation, the study area for these resources is limited to the project site. An exception was made for the identification of threatened or endangered species, which were evaluated for a distance of 0.5 miles from the project site. For aquatic resources, the study area includes the Gowanus Canal and Gowanus Bay and since this is the geographic area for which the data is defined by, the nearest water quality sampling locations.

EXISTING AND FUTURE CONDITIONS

Existing natural resources within the project site were summarized from the following database, reports, maps, and other sources:

- Field observations during a March 5, 2008 site visit to ascertain the existing natural resources of the project site and adjacent canal. The project site was investigated by a field team, and observations of flora and fauna were recorded. Habitat classifications were made based on the field surveys and Edinger et al. (2002) dominant cover types, as well as current and past uses of the site. The site visit also characterized dominant plant species/communities and recorded observations of birds and other wildlife on the project site.
- Ecological Communities of New York State (Reschke (1990), Edinger et al. (2002)).
- United States Geological Survey (USGS)—topographic quadrangle map for the Brooklyn quadrangle.
- DEC—Breeding Bird Atlas, Critical Environmental Areas of Kings County, Tidal Wetlands Maps, Amphibian and Reptile Atlas Project.
- United States Fish & Wildlife Service (USFWS) National Wetland Inventory (NWI) map for the USGS Brooklyn topographic quadrangle.
- Information on rare, threatened and endangered species or special habitats within the vicinity of the study area as obtained from the NMFS, USFWS, New York National Heritage Program (NYNHP), and NYSDOS.
- New York City Department of Environmental Protection (DEP)-Harbor Survey Program water quality data and reports.
- DEP-"City-Wide Long Term CSO Control Planning Project Gowanus Canal Waterbody/Watershed Facility Plan Report" and the "City-Wide Long Term CSO Control Planning Project Receiving Water Quality Modeling Report Volume 4 Gowanus Canal."
- United States Army Corps of Engineers (ACOE)-Gowanus Canal and Bay Restoration Study (a follow up study to the Hudson-Raritan Estuary Environmental Restoration Feasibility Study) reports, related to current ecological problems, potential solutions, and restoration through dredging, capping of sediments, contaminant reduction measures, wetlands creation, and water quality improvements.

The future conditions without the proposed project ("No Build") were determined by considering potential changes in the study area conditions through the 2011 analysis year.

ASSESSMENT OF IMPACTS ON NATURAL RESOURCES

Probable impacts to natural resources from the proposed project were assessed by considering the following:

- Development of new structures and the potential impacts on existing natural resources on the project site and adjacent areas.
- The results of the assessment of the No Build condition.
- Temporary construction period impacts to aquatic resources from in-water activities associated with the installation of a new steel sheet pile bulkhead and two new storm sewer outfalls.
- Future operational effects to water quality and aquatic biota of the Gowanus Canal resulting from the proposed stormwater discharges of the proposed project.
- Future long-term impacts to wetlands, aquatic resources, terrestrial resources, as a result of the proposed structures and physical changes at the site.

C. EXISTING CONDITIONS

GROUNDWATER

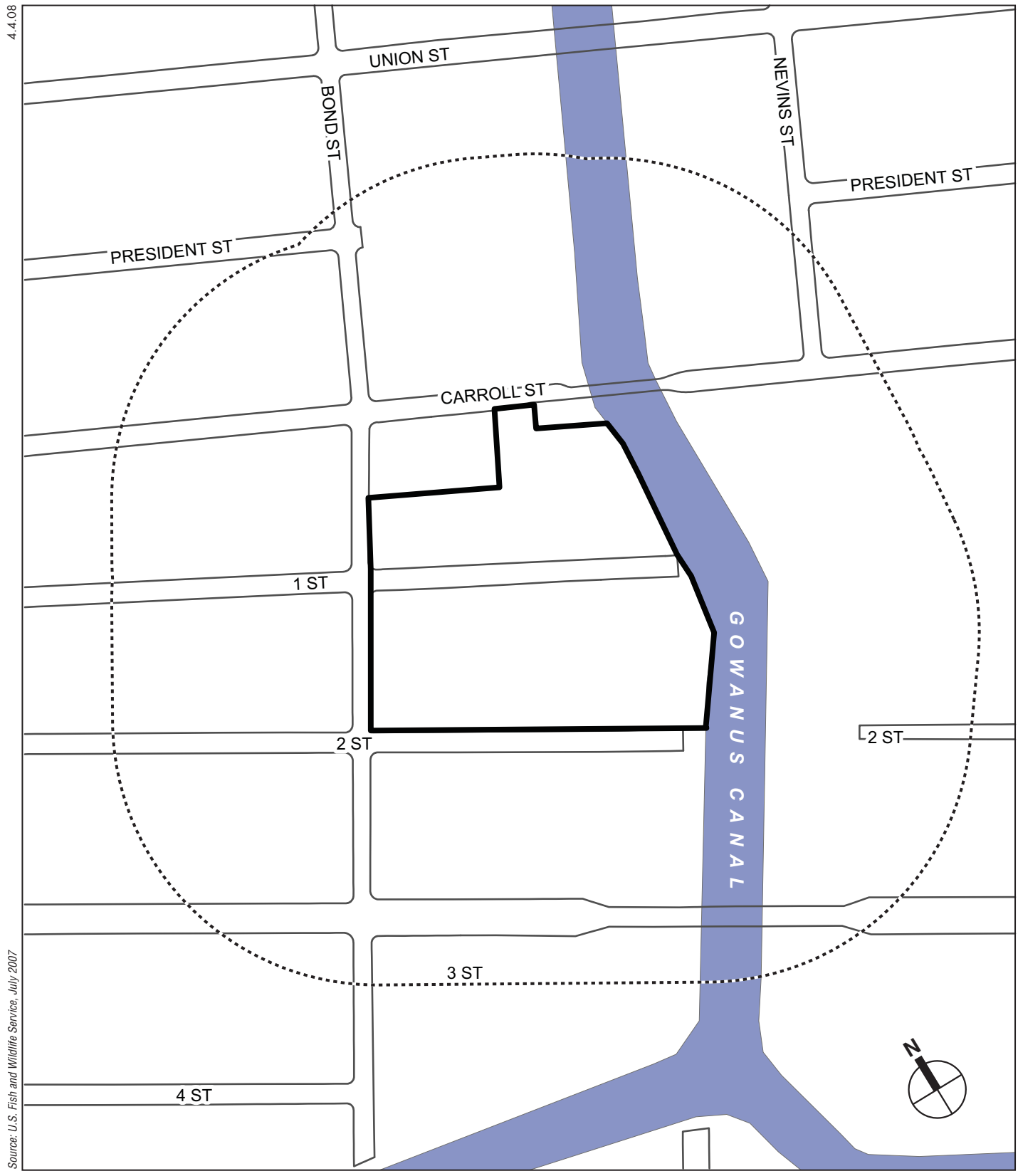
As presented in Chapter 11, "Hazardous Materials," groundwater is expected to be close to the ground surface, at depths of between 2 and 7 feet and generally flows towards the Gowanus Canal. Groundwater depth and flow direction vary with tidal cycles. Samples collected from the project site indicate that a variety of volatile organic compounds (VOC), semi-volatile organic compounds (SVOC), pesticides, and metals are present in groundwater (see Chapter 11, "Hazardous Materials," for more information). The project site is within the area designated for the Brooklyn Queens Sole Source Aquifer. However, groundwater is not used as a potable water supply in this part of Brooklyn, and non-potable use is limited.

WETLANDS

The entire shoreline within the project area is engineered with 555 linear feet of wood sheeting and/or concrete bulkheads that limit the potential for tidal marsh plants or submerged aquatic vegetation (SAV). The bulkhead is in poor condition. Rubble and concrete debris are noticeable in the substrate along some portions of the project site. No tidal wetland vegetation or SAV were observed in the substrate along the bulkhead or in the inshore waters of the project site. Although algae were present on the bulkhead, no encrusting organisms were observed during the field investigation. However, the bulkhead has the potential to provide habitat to a variety of bivalves found in New York waters including ribbed (*Geukensia demissa*) and blue (*Mytilus edulis*) mussels.

The USFWS National Wetlands Inventory (see Figure 10-1) classifies the waters surrounding the project site as estuarine subtidal wetlands with an unconsolidated bottom that have been excavated (E1UBLx). Subtidal estuarine wetlands are continuously submerged areas with low energy and variable salinity, influenced and often enclosed by land. Unconsolidated bottoms have at least 25 percent cover of particles smaller than 6 or 7 cm, and less than 30 percent vegetative cover. Because the waters along the project area do not contain tidal wetland plants, ACOE would likely regulate them as waters of the United States and would not be expected to classify portions of the project area as wetlands.

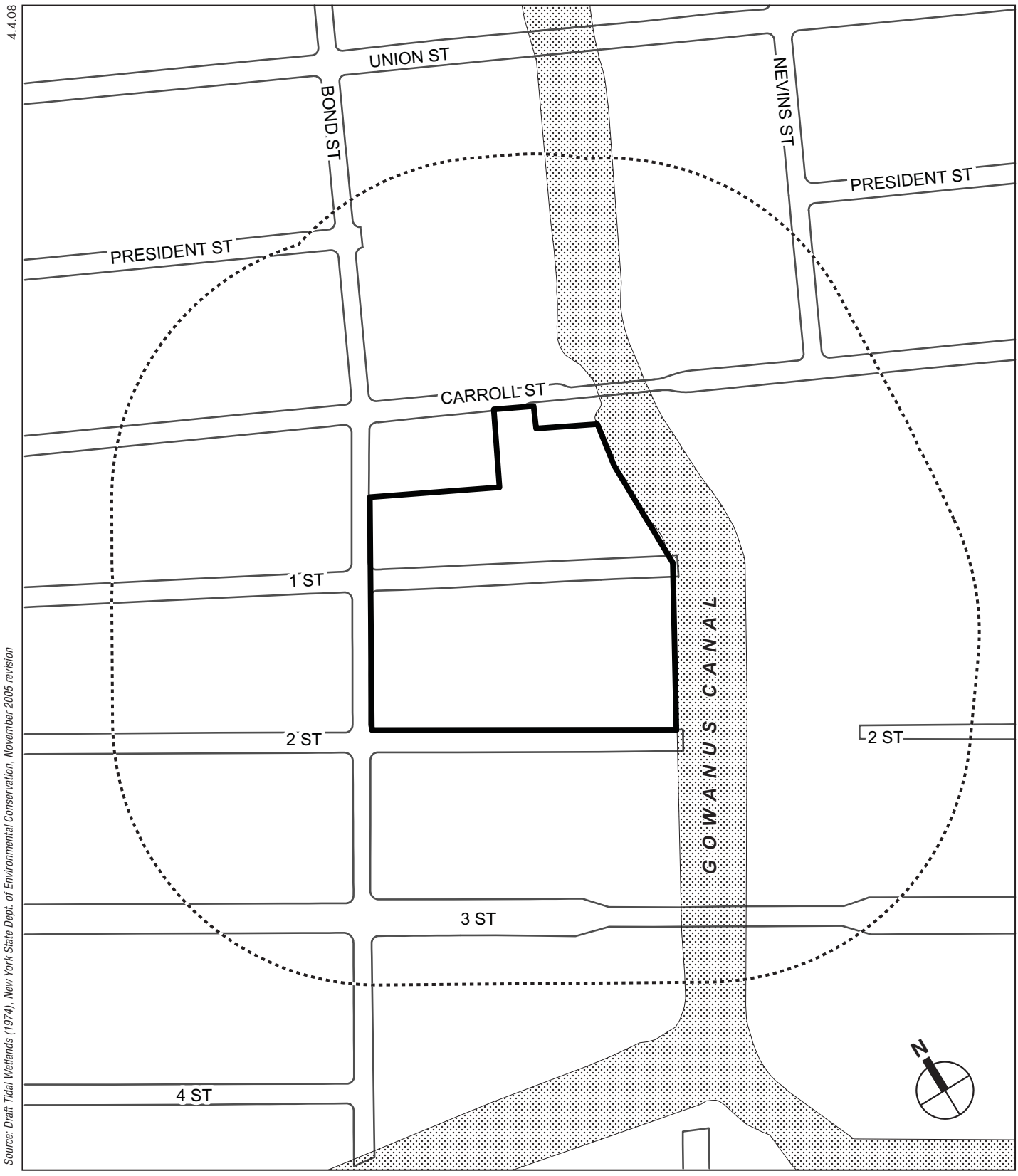
DEC designates the Gowanus Canal as littoral zone (shallow waters six feet or less in depth that are not included in other DEC tidal wetland categories [Figure 10-2]). DEC regulations state that actual water depths determine whether or not an area is a littoral zone. Water depths recorded within the portion of the Gowanus Canal surrounding the project site range from 4 to 16 feet



National Wetlands Inventory

363-365 BOND STREET

Figure 10-1



363-365 BOND STREET

NYS DEC Tidal Wetlands
Figure 10-2

MLW (DEP 2007b). Water depths measured at the existing bulkhead range from 1.28 to 7.78 ft at MLW, indicating that portions of the Gowanus Canal adjacent to the current bulkhead may be classified as littoral zone tidal wetlands by DEC (i.e., less than or equal to 6 feet at MLW).

TERRESTRIAL RESOURCES

As noted in Chapter 13, "Infrastructure," and indicated in Figure 10-3, and Figures 10-3a through 10-3e, approximately 95 percent of the project site is covered with impervious surfaces associated with buildings and surface parking. Block 452 Lot 15, along the Gowanus Canal consists of offices, vacant land, and a yard area. The yard area consists of gravel and pervious surfaces containing a small stand of cottonwood trees (*Populus deltoids*). A narrow band of vegetation (<4 feet wide) consisting of tree and herbaceous species typical of disturbed areas borders the bulkhead along the canal. This vegetative community resembles that of an urban vacant lot whereby "vegetation may be sparse, with large areas of exposed soil, and often with rubble or other debris" (Edinger et al. 2002). Small pockets of this vegetative community are present in undeveloped spaces throughout the project site. Tree species include cottonwood, smooth sumac (*Rhus glabra*), and tree-of-heaven (*Ailanthus altissima*). Herbaceous species include common mugwort (*Artemesia vulgaris*), common reed (*Phragmites australis*), Queen Anne's lace (*Daucus carota*), and foxtail sp. (*Setaria* sp.). This narrow band of vegetation provides limited terrestrial habitat for urban birds and other wildlife. Bordering the project site, at the end of 2nd Street, there are two NYC Department of Parks and Recreation Greenstreet planters containing a small number of common ornamental shrubs, trees, and herbaceous plantings. Reptiles and amphibians are not expected to utilize the project site. Mammals with the potential to use the project site are limited to small rodents such as mice and Norway rat, and feral cat. Due to the urbanized conditions within the project site, birds expected to occur would be limited to rock pigeon (*Columba livia*), mourning dove (*Zenaida macroura*), European starling (*Strunus vulgaris*), house sparrow (*Passer domesticus*), and gull (*Larus* sp.) species. Two gulls were observed during the site visit.

AQUATIC RESOURCES

SURFACE WATER RESOURCES

The eastern shoreline of the project site is located along the Gowanus Canal. The Gowanus Canal is a tidal waterbody experiencing a semi-diurnal tidal cycle varying between 4.7 and 5.7 feet (DEP 2007b). The Gowanus Canal can be characterized as having two reaches: Gowanus Canal Proper (from the head-end of the canal south to one-mile south of Hamilton Avenue) and the region downstream that empties into Gowanus Bay and Upper New York Bay (DEP 2007b). The Upper New York Bay is the portion of the New York-New Jersey Harbor Estuary ("Harbor Estuary") enclosed by the New York and New Jersey shorelines from the Battery at the tip of Manhattan south to the Verrazano-Narrows Bridge. The shoreline of the Gowanus Canal and this portion of the Harbor Estuary are almost entirely developed with bulkheads, piers (usable and dilapidated), pile fields, commercial and industrial waterfront facilities, and military installations (ACOE 1998).

The project site is located along the Gowanus Canal Proper which is 5,600 feet long and 100 feet wide with depths ranging from 4 to 16 feet MLW (DEP 2007b). This reach is narrow, bulkheaded, and shallow with water quality greatly influenced by overflow conveyed by a number of of SPDES-permitted CSO outfalls and stormwater outfalls (DEP 2007b) (see Figure 10-4). In total there are 11 active CSO outfalls that discharge to the Gowanus Canal: eight active

Natural Resources Photo Key

363-365 BOND STREET

Figure 10-3

View from Carroll Street Bridge facing southwest towards project site (Block 452, Lot 15) **1**

View of DEP outfall #OH-005 (in the Owl's Head WPCP Area) on east side of Gowanus Canal at Carroll Street Bridge **2**

View from First Street facing east towards the Gowanus Canal **3**

Facing southeast towards the Gowanus Canal at the end of First Street **4**

Natural Resources Photographs

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Figure 10-3b

Facing south into truck storage lot on First Street **5**

Facing north at the end of Second Street to back side of vehicle storage lot **6**

Facing east towards Gowanus Canal from the end of Second Street **7**

Facing north from end of Second Street **8**

Natural Resources Photographs

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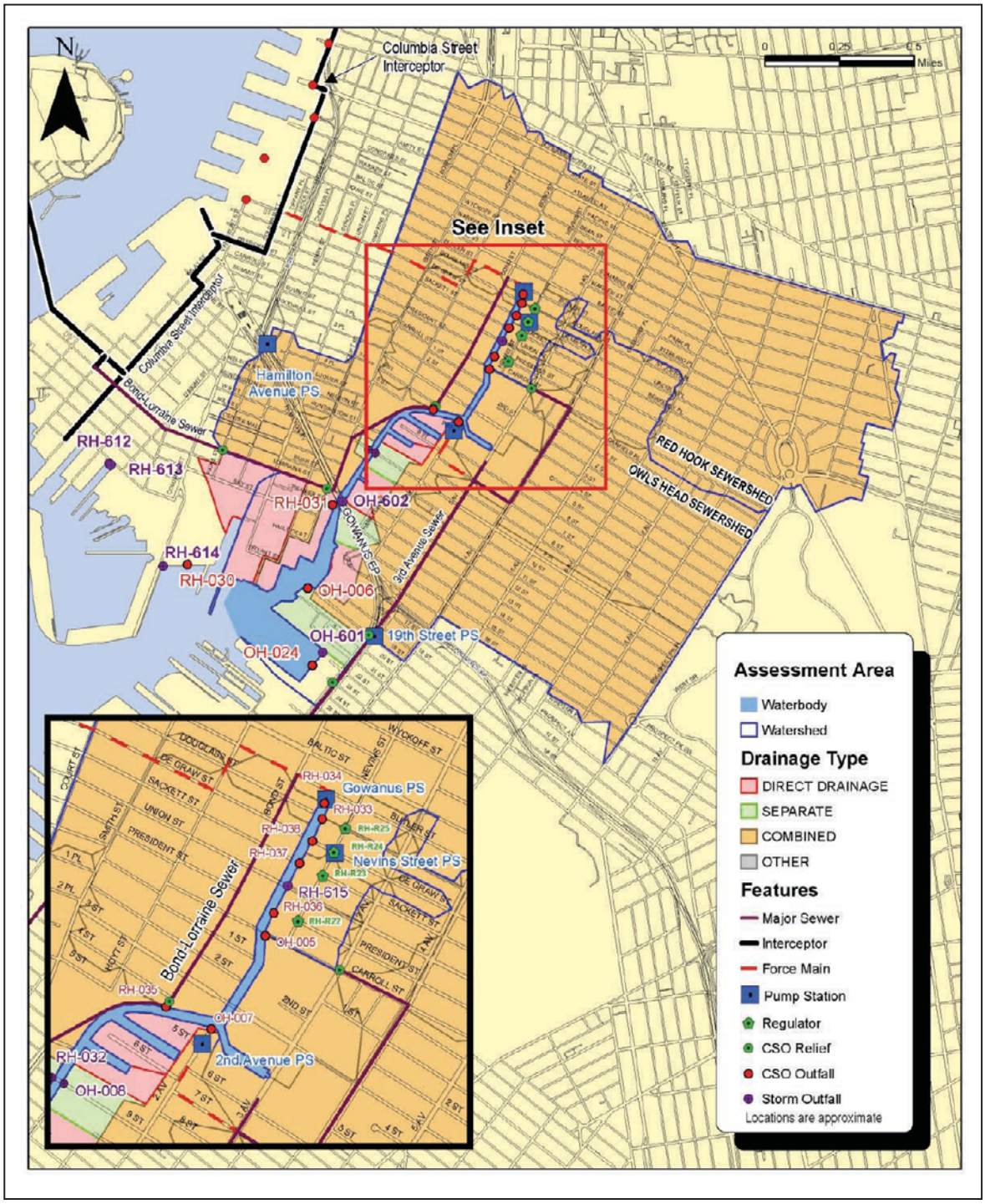
Figure 10-3d

Facing west towards project site (Block 458, Lot 1) from east side of Gowanus Canal **9**

Facing west towards project site (end of Second Street) from east side of Gowanus Canal **10**



Source: New York City Department of Environmental Protection. "City-Wire Long Term CSO Control Planning Project Receiving Water Quality Modeling Report Volume 4 Gowanus Canal." September 2007.

NYCDEP Major Sewer System Components

outfalls are located within the Gowanus Canal Proper (six in the Red Hook portion and two in the Owl's Head portion of the Gowanus Canal Sewershed) and three active CSO outfalls are located in the region downstream that empties into Gowanus Bay and Upper New York Bay (one in the Red Hook portion and two in the Owl's Head portion of the Gowanus Canal Sewershed). Approximately 92 percent of the Gowanus Canal Proper watershed is served by combined sewers, 2 percent is served by storm sewers, and 6 percent is unsewered (which contributes non-point source runoff) (DEP 2007b). Stormwater inputs from storm sewers and overland runoff contribute 74 million gallons (mg) per year, or roughly 16 percent of the total wet-weather discharge volume to the canal (DEP 2007b). Pollutant discharges, and limited freshwater inflow, has allowed heavy organic material and grit to settle to the bottom of the canal. This has resulted in a sediment mound that is exposed at low tide at the head-end of the canal. This limited freshwater flow combined with the canal's narrow configuration makes water quality dependent on tidal flushing with the lower section of the canal and Upper New York Bay (DEP 2007a). For all of these reasons, water quality of the canal is impaired.

As mentioned above under "Site Description," the Gowanus Canal Flushing Tunnel was restored by DEP in 1999 as part of its Inner Harbor CSO Facility Plan. The reactivation of the Gowanus Canal Flushing Tunnel has greatly improved water quality and habitat conditions for the aquatic community in the canal. Currently, the Gowanus Canal Flushing Tunnel provides artificial circulation and conveys an average of 154 mgd of harbor water from Upper New York Bay to the head-end of the Gowanus Canal (DEP 2007a). The operation of the Gowanus Canal Flushing Tunnel changes the hydrodynamics of the canal by creating an atypical salinity gradient and circulation pattern (DEP 2007a). These factors influence water quality and the presence and spatial distribution of aquatic biota within the canal (DEP 2007a).

WATER QUALITY

Gowanus Canal

The Gowanus Canal is subject to Title 6 of the NYCRR Part 703 which includes surface water standards for each Use Class of New York State surface waters. Gowanus Canal Proper has been designated Use Class SD (see Figure 10-5), which indicates that waters are suitable for fish survival as described in Title 6 NYCRR Part 701. The SD classification may be given to those waters that, because of natural or man-made conditions, cannot meet the requirements for primary or secondary contact and fish propagation. Water quality standards for Use Class SD waters require that dissolved oxygen concentrations (DO) be greater than or equal to 3.0 mg/L at all times. The normal range for pH levels shall not be extended by more than 0.1 of a pH unit. Given the limited uses of SD waters, there are no numerical criteria applied to other parameters (*i.e.* fecal coliform and total coliform) associated with water quality.

The area south of the Gowanus Canal Proper and Gowanus Bay, consists of deeper waters, ranging from 16 to 35 ft MLW, and experiences greater flow exchange with Upper New York Bay. This area is designated Use Class I, which indicates that the waters are suitable for finfish propagation and survival as described in Title 6 NYCRR Part 701. Water quality standards for fecal and total coliform, DO, and pH for Use Class I waters are as follows: fecal coliform monthly geometric mean less than or equal to 2,000 colonies/100mL from 5 or more samples; DO concentrations must be greater than or equal to 4.0 mg/L at all times; the normal range for pH levels shall not be extended by more than 0.1 of a pH unit.

The City of New York has monitored New York Harbor water quality for over 95 years through the Harbor Survey Program. DEP evaluates surface water quality of four designated regions:

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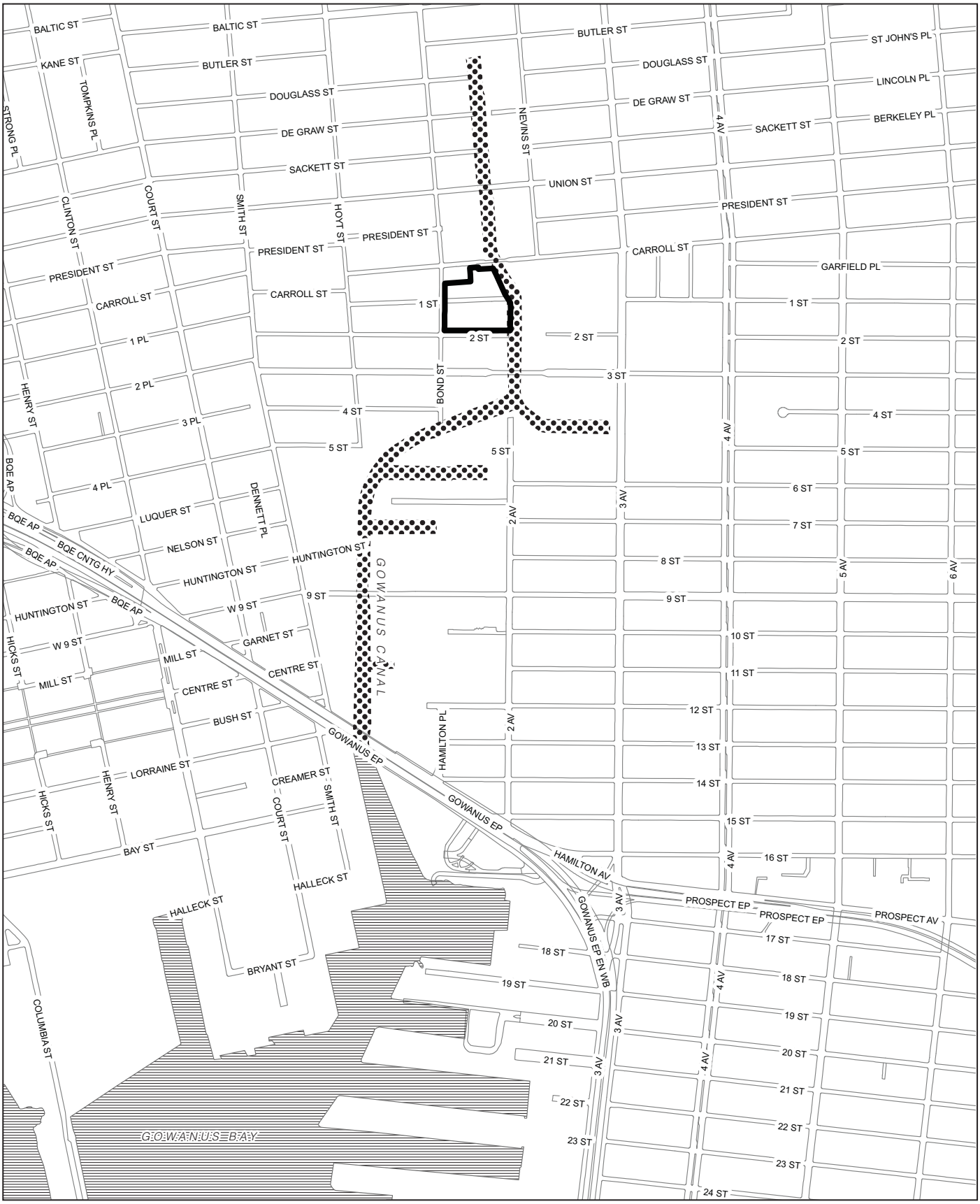


Project Sites

Use Class SD (Gowanus Canal Proper)

Use Class I

0 1000 FEET

SCALE

NYSDEC Water Use Classification

Figure 10-5

363-365 BOND STREET

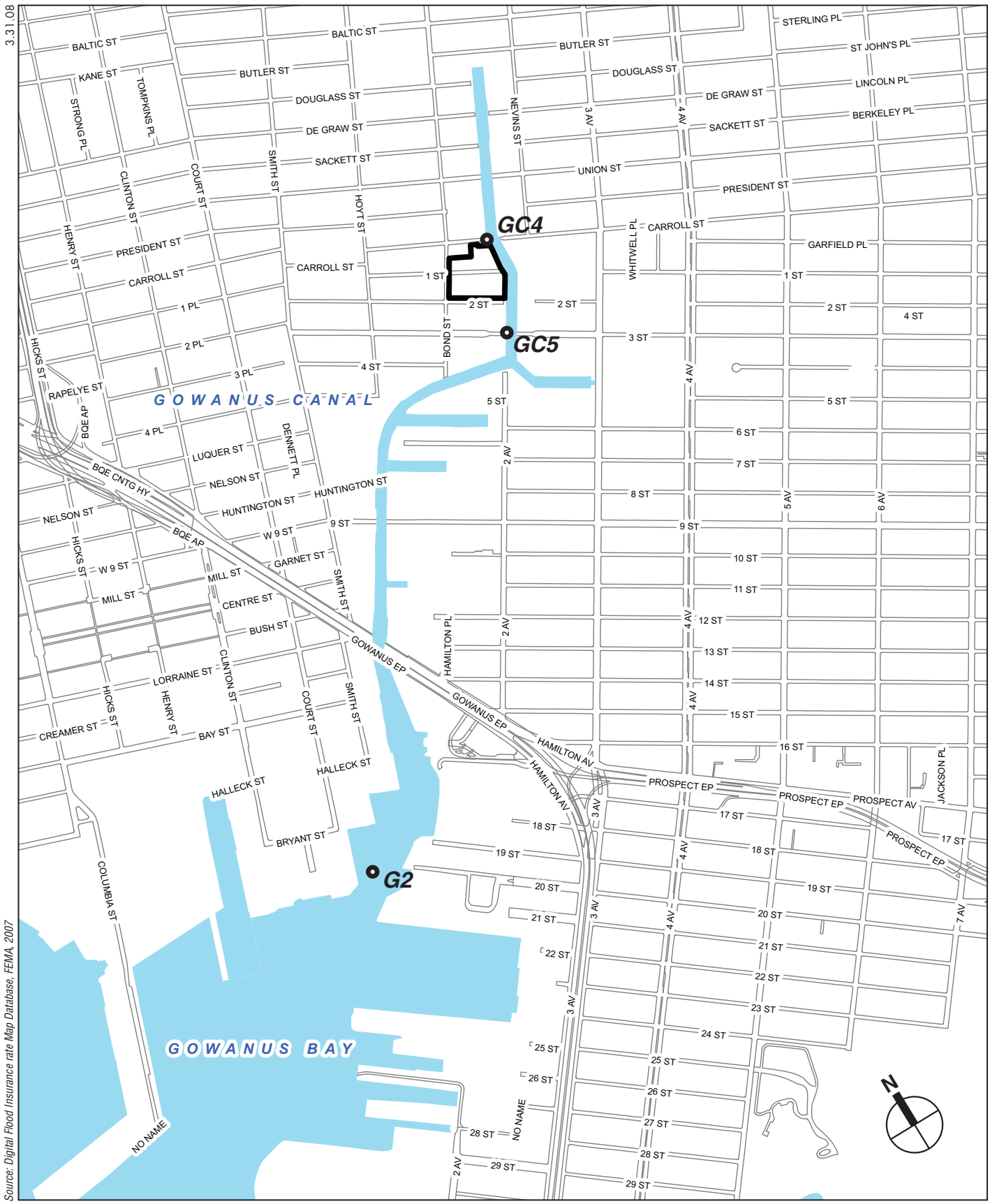
Inner Harbor Area ("Upper Bay"), Upper East River-Western Long Island Sound, Lower New York Bay-Raritan Bay, and Jamaica Bay (DEP undated [2007c]). The Gowanus Canal is connected to the Gowanus Bay, which in turn is connected to the Upper Bay. Two DEP Harbor Survey stations are located in the vicinity of the proposed project: station GC4 is located north of the project site near Carroll Street and station GC5 is located south of the project site at 3rd Street (see Figure 10-6). Recent survey data, collected between May and September 2007, from Harbor Survey stations GC4 and GC5 indicate that the water quality in this part of the Gowanus Canal near the project site is impaired. Station G2 is located downstream of Gowanus Canal Proper in the open waters of Gowanus Bay. Survey data collected from station G2, between February and December of 2006, indicate that water quality in Gowanus Bay is generally good. A summary of Harbor Survey results for stations GC4, GC5, and G2 are discussed below.

In 2007, average coliform counts at the top of the water column for stations GC4 and GC5 were elevated well above levels indicative of good water quality. Coliform counts in 2007 occurred as high as 109,000 per 100 mL, but also occurred as low as 4 per 100 mL in surface waters at station GC4 and GC5 (DEP 2008). High coliform counts are often associated with pathogens and other disease-causing organisms. In general, total fecal coliform concentrations decrease closer to the mouth of the canal in Gowanus Bay where there is higher exchange with Upper Bay waters (DEP 2005, 2006, 2007d, 2008). Total fecal coliform concentrations recorded for Gowanus Bay station G2 in 2006 show that the waterbody was well in attainment of Class I waters on all but two occasions (total fecal coliform counts were recorded at 4,001 and 2,200 per 100 mL). These total fecal coliform results are similar to past year's data for station G2 (DEP 2005, 2006).

DO in the water column is necessary for respiration by all aerobic forms of life, including fish and invertebrates. The bacterial breakdown of high organic loads from various sources can deplete DO to low levels. Persistently low DO can degrade habitat and cause a variety of sublethal or, in extreme cases, lethal effects. Consequently, DO is one of the most universal indicators of overall water quality in aquatic systems. DO concentrations in the Upper Bay have increased over the past 30 years from an average that was below 3 mg/L in 1970 to above 5 mg/L in 2006, a value fully supportive of ecological productivity (DEP undated [2007c]). DO concentrations at Station GC4 and GC5 averaged 4.0 mg/L, above the 3 mg/L standard for Use Class SD waters. Surface and bottom water DO concentrations were at times below the standard (DEP 2008). Data recorded for Station G2 in Gowanus Bay between February and September 2006 produced DO concentrations ranging between 4.7 and 11.5 mg/L in surface waters and 4.0 and 11.0 mg/L in bottom waters (DEP 2007d). Records for station G2 indicate that DO concentrations were in attainment of Class I waters on all but one monitoring occasion in 2006 (DEP 2007d).

High levels of nutrients can lead to excessive plant growth (a sign of eutrophication) and depletion of DO. Concentrations of the plant pigment chlorophyll-a in water can be used to estimate productivity and the abundance of phytoplankton. Chlorophyll-a concentrations greater than 20 micrograms per liter (µg/L) are considered suggestive of eutrophic conditions. Chlorophyll-a concentrations recorded at stations GC4 and GC5 in 2007 averaged 0.9 µg/L and never exceeded 2.4 µg/L (DEP 2008). At station G2, chlorophyll-a concentrations averaged 4.25 µg/L and never exceeded 10.6 µg/L (DEP 2007d).

Secchi transparency is a measure of the clarity of surface waters. Transparency greater than 5 feet (1.5 meters) is indicative of clear water in turbid estuaries. Decreased clarity can be caused by high suspended solid concentrations or blooms of plankton. Secchi transparencies less than 3


3.31.08
GC4
GC5
G2
GOWANUS CANAL
GOWANUS BAY
BALTIC ST
BUTLER ST
DOUGLASS ST
DE GRAW ST
SACKETT ST
UNION ST
PRESIDENT ST
CARROLL ST
STERLING PL
ST JOHN'S PL
LINCOLN PL
BERKELEY PL
GARFIELD PL
KANE ST
STRONG PL
TOMPKINS PL
CLINTON ST
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RAPELYE ST
BQE AP
BQE CNTG HY
DENNETT PL
LUQUER ST
NELSON ST
HUNTINGTON ST
W 9 ST
GARNET ST
MILL ST
CENTRE ST
BUSH ST
LORRAINE ST
CREAMER ST
BAY ST
HALLECK ST
BRYANT ST
COLUMBIA ST
NO NAME
2 AV
5 AV
6 AV
7 AV
HAMILTON PL
GOWANUS EP
HAMILTON AV
PROSPECT EP
PROSPECT AV
JACKSON PL
N
Source: Digital Flood Insurance rate Map Database, FEMA, 2007
Project Sites
Sampling Location
0
1000 FEET
SCALE
NYCDEP Harbor Survey Program
Sampling Locations
Figure 10-6
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feet (0.9 meters) are generally indicative of poor water quality conditions. Average Secchi transparency near the project site in 2007 was 6.6 feet (2.0 meters) (DEP 2008) and downstream at station G2 Secchi readings averaged 6.3 feet (1.9 meters). In 2006, average Secchi readings in the Upper Bay, 4.6 feet (1.4 meters) (DEP 2007d), were similar to previous years (DEP 2007c).

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

Within Gowanus Bay, surface water and bottom water temperatures recorded from October 2003 to June 2004 during sampling for the Gowanus Bay and Canal Ecosystem Restoration Program were similar to the Upper Bay.[1] Surface waters ranged from 4 to 22°C (39.2 to 71.6°F) [LMS 2004]. However, in 2007, surface water and bottom water temperatures recorded between May and September at stations GC4 and GC5 ranged from 15.2 to 24.3°C (59.4 to 75.7°F) and 15.2 to 24.1°C (59.4 to 75.4°F) respectively (DEP 2008). This homogeneity between temperatures at the surface and bottom are most likely due to the relatively shallow depth of the canal at these sampling locations.

Surface and bottom water salinities recorded in Gowanus Bay and Canal from October 2003 to June 2004 during sampling conducted for the Gowanus Bay and Canal Ecosystem Restoration Program ranged from about 10 to 22 parts per thousand (ppt) (LMS 2004). Salinity levels were similar between surface and bottom waters, except for the areas in Gowanus Bay where partially stratified conditions were observed (LMS 2004). (Partially stratified—higher salinity water originating from the Atlantic Ocean at the mouth of the estuary tends to remain toward the bottom, while freshwater from the rivers draining to the estuary remain toward the top.) Similar surface and bottom salinities were observed in 2007; surface water and bottom water salinities recorded between May and September at stations GC4 and GC5 ranged from 19.3 to 25.8 ppt and 19.4 to 26.0 ppt, respectively (DEP 2008).

In general, results of recent Harbor Surveys (DEP 2005, 2006, undated [2007c]) show that water quality of New York Harbor has improved significantly since the 1970s as a result of measures undertaken by the city. These measures include eliminating 99 percent of raw dry-weather sewage discharges, reducing illegal discharges, increasing the capture of wet-weather related floatables, and reducing toxic metals loadings from industrial sources by 95 percent (DEP 2002). The 2007 Interstate Environmental Commission (IEC) Annual Report also indicates that the year-round disinfection requirement for discharges to waters within its district (including New York Harbor) has contributed significantly to water quality improvements since the requirement went into effect in 1986 (IEC 2008). The following efforts are being implemented to further improve water quality within the Gowanus Canal.

[1] Average temperatures within the Upper Bay range from about 3.7 to 23.8°C (38.7 to 74.8°F) (ACOE 1999a). Within the Upper Bay, higher salinity bottom waters tend to be somewhat warmer than the less saline surface waters during the winters months, with the opposite being true during the summer.

Gowanus Ganal Waterbody/Watershed Facility Plan

The Gowanus Canal is identified on New York State's Draft 2008 Section 303(d) list of impaired waters (DEC 2008). The 303(d) list identifies waters that do not support appropriate uses. This list requires development of a Total Maximum Daily Load (TMDL) for pollutants or other restoration strategies to reduce the input of the specific pollutant(s) that restrict water body uses and to restore and protect such uses. The Gowanus Canal requires TMDL development for DO levels and DO demand that have originated from CSO and urban and stormwater sources. Although the Final 2008 Section 303 (d) list has the Gowanus Canal as requiring TMDL measures, DEP and DEC have agreed to defer the development of separate TMDLs for CSO-impacted waterbodies, including the canal, due to a 2005 CSO Consent Order signed by DEC and the City of New York (DEC 2008).

The 2005 Consent Order directs the City to develop and implement watershed and facility plans to address CSO discharges and bring waters into compliance with the CWA (DEP 2007a). The Gowanus Canal Waterbody/Watershed Facility Plan includes some of the following measures proposed to be completed in 2013:

- *Rehabilitation of the Gowanus Canal Flushing Tunnel*—This rehabilitation will increase the tunnel's average capacity from 154 mgd to 215 mgd, enhancing circulation from the Upper Harbor of New York Bay to the head of the Gowanus Canal.
- *Reconstruction of the Gowanus Pump Station*—This reconstruction would result in the expansion of the capacity of the Gowanus Pump Station through the installation of four new pumps. An element of this measure would also include the replacement of the force main that currently runs along the inside of the Flushing Tunnel. Because the current force main is not operational, flow is being diverted to the Bond-Lorraine Sewer. The new force main would pump flow directly to the Columbia Street Interceptor, and eventually to the Red Hook WPCP (flow would no longer be re-routed to the Bond-Lorraine Sewer, thereby relieving some of the capacity of the sewer and reducing the potential for CSO discharges into the canal). The reconstruction of the Pump Station and replacement of the force main is projected to reduce the annual volume of CSO discharges to the canal by 34 percent;
- *Floatables Controls*—This measure would involve the implementation of floatables controls at two CSO locations. Period skimming would also be implemented.
- *Dredging*—Dredging the upper 750 feet of the Gowanus Canal will eliminate exposed sediment mounds.

With these measures in place, DO criteria are projected to meet state standards for Use Class SD waters 100 percent of the time. Furthermore, upgrades to the Gowanus Canal Flushing Tunnel would increase flushing rates by approximately 40 percent. For floatables, the plan would complement the City-Wide Comprehensive CSO Floatables Plan, by providing additional floatables controls at two major CSOs representing 78 percent of the CSO discharges. The elements of the plan are proposed to be implemented by December 2013 (DEP 2007a), two years after the proposed project build year. [2] The draft Gowanus Canal Waterbody/Watershed Facility Plan was submitted to DEC in June 2007 (see also Chapter 13, "Infrastructure").

[2] Dredging is contingent on the issuance of permits by DEC.

SEDIMENT QUALITY

The Gowanus Canal Proper contains contaminated sediments and a poor benthic community structure as a result of heavy industrial uses. As previously stated in Chapter 11, "Hazardous Materials," the Gowanus Canal has provided commercial shipping access for a variety of industries, including oil refineries, machine shops, manufactured gas plants (MGP), chemical plants, soap makers, and tanneries. Industries with the greatest amount of environmental impact, as indicated through sediment sampling, included MGP facilities, petroleum bulk-storage facilities, chemical manufacturers, metal smelters, and coal yards. As a result, the majority of the bottom of the Gowanus Canal can be characterized as a soft, dark gray to black, highly plastic layer of clay having a decaying odor and weak petroleum-type sheens (ACOE 2004). Just south of the Carroll Street Bridge, the sediment can be characterized as a stiff black silt with a moderate petroleum odor having some organic debris (DMA and AMEC 2006).

In 2003, the ACOE assessed sediment quality of the canal in its Gowanus Bay and Gowanus Canal Ecological Restoration feasibility study. The results of the study indicated that a variety of organic and inorganic constituents are present within the Gowanus Canal and Bay, with higher concentrations present in the upper portions of the Gowanus Canal. The sampling program identified twenty-four SVOCs within the Gowanus Canal (many of which are polycyclic aromatic hydrocarbons [PAHs]), five pesticides, including DDT, PCBs, and thirteen metals including mercury, arsenic, and cadmium. For these reasons, ACOE has characterized the sediments of Gowanus Bay and Gowanus Bay Proper as ranging from fair, consistent with Upper Bay sediments, to very poor, respectively. However, sediment quality at the head-end of the canal has improved as a result of the Gowanus Canal Flushing Tunnel (ACOE 2004).

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

AQUATIC BIOTA

The Harbor Estuary supports a diverse and productive aquatic community of over 100 species of finfish, more than 100 invertebrate species, and a variety of phytoplankton and zooplankton. The following sections provide a brief description of the aquatic biota found in the Gowanus Canal as well as species of the Harbor Estuary that may have the potential to occur in the canal.

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

SAV are rooted aquatic plants that are often found in shallow areas of estuaries. They are important because they provide nursery and refuge habitat for fish. Benthic macroalgae are large multicellular algae that are important primary producers in the aquatic environment. Benthic macroalgae occur on rocks, jetties, pilings, and sandy or muddy bottoms. Species of macroalgae that occur in the Harbor Estuary include sea lettuce, green fleece, and brown algae ([*Fucus* spp.] PBS&J 1998). Since these organisms require sunlight as their primary source of energy, the limited light penetration in waters of the Harbor Estuary limits their distribution to shallow areas. No SAV is present within the Gowanus Canal or Bay (DEP 2007a).

Zooplankton are an integral component of aquatic food webs—they are primary grazers on phytoplankton and detritus material, and are themselves used by organisms of higher trophic levels as food. The higher-level consumers of zooplankton typically include forage fish, such as bay anchovy, as well as commercially and recreationally important species, such as striped bass and white perch during their early life stages. Crustacean taxa (copepods *Acartia tonsa*, *Acartia hudsonica*, *Eurytemora affinis*, and *Temora longicornis)* dominate the zooplankton community, with the dominant species changing with the season (Stepien et al. 1981, Lonsdale and Cosper 1994, Perlmutter 1971, Lauer 1971, Hazen and Sawyer 1983).

The major groups of benthic invertebrates collected in the Harbor Estuary include aquatic earthworms (oligochaetes), segmented worms (polychaetes), snails (gastropods), bivalves, barnacles, cumaceans, amphipods, isopods, crabs, and shrimp (EEA 1988, EA Engineering Science and Technology 1990, Coastal 1987, and PBS&J 1998). The benthic community sampled in DEP's Gowanus Canal Use and Standards Attainment (USA) project conducted in 2003, found seventeen taxa. Dominate invertebrates were annelid worms (polychaetes and oligochaetes, followed by amphipods and small mollusks (DEP 2007a). Fewer taxa were observed in samples collected further downstream near 4th Street and Hamilton Avenue which suggests a spatial response to the reactivation of the Gowanus Canal Flushing Tunnel (DEP 2007a). However, sediment sampling conducted just downstream of the Carroll Street Bridge in 2003 revealed no benthic invertebrates (DMA and AMEC Earth and Environmental 2006). Invertebrate sampling conducted in 2003 and 2004 as part of the Gowanus Bay and Canal Ecosystem Restoration Studies (LMS 2004) found mussels and barnacles, followed by tube dwelling amphipods and polychaetes to be the dominant invertebrates to colonize artificial substrates deployed within Gowanus Bay. The lowest abundance occurred in December and greatest abundance in June. Mussels, barnacles, or other encrusting organisms were not observed on the bulkhead during the March field investigation.

New York City is located at the convergence of several major river systems, all of which connect to the New York Bight portion of the Atlantic Ocean. This convergence has resulted in a mixture of habitats in the Harbor Estuary that support marine, estuarine, anadromous (fish that migrate up rivers from the sea to breed in freshwater), and catadromous fish (fish that live in freshwater but migrate to marine waters to breed). Sampling conducted as part of the Gowanus Bay and Canal Ecosystem Restoration Program (LMS 2004) found that bay anchovy, Atlantic menhaden,

members of the family Labridae (parrotfishes, rainbowfishes, and wrasses), windowpane flounder, and members of the family Gadidae (cod, haddock, whiting, and pollock eggs) dominated the ichthyoplankton community. Low numbers of yolk-sac larva were collected in Gowanus Bay (i.e., only two grubby and one weakfish). For post yolk-sac larvae, windowpane flounder and Atlantic menhaden were collected in October, bay anchovy in December, grubby and winter flounder in March, and bay anchovy, and Atlantic menhaden in June. The results of the ichthyoplankton sampling suggest that some spawning occurs in Gowanus Bay. Adult fish collected within Gowanus Bay during this same study comprised striped bass (80 percent), winter flounder, and white perch in December, and Atlantic tomcod (76 percent), spotted hake, bay anchovy, and winter flounder in June. Species richness values for adult fish were lower in the canal reaches with small numbers of white perch, striped bass, cunner, American eel, and Atlantic silversides collected during the sampling period (LMS 2004). The fish community characterized for Gowanus Bay and canal by results of sampling conducted for the Gowanus Bay and Canal Ecosystem Restoration Program was dominated by migratory species common to the Harbor Estuary, with few individuals of species known to reside in the Harbor Estuary year round (i.e., cunner and tautog) (LMS 2004). Appendix B, "Natural Resources," lists fish species known to occur within the Harbor Estuary and have the potential to occur in the vicinity of Gowanus Canal and Bay. According to Woodhead (1990), populations of numerically dominant fish within the Harbor Estuary (hogchoker, tomcod, winter flounder, white perch and striped bass) remain relatively stable from year to year.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

Requests for information on rare, threatened or endangered species within the immediate vicinity of the project site were submitted to USFWS, NMFS, and NYNHP in March 2008. According to the USFWS the endangered shortnose sturgeon (*Acipenser brevirostrum*) is listed as occurring in Kings County, but primarily occurs in the Hudson River (Papa 2008). No habitats designated or proposed as "critical habitat," in accordance with provisions of the Endangered Species Act, are listed as occurring in Kings County. NMFS indicated that no species listed under the jurisdiction of the agency are known to occur in the Gowanus Canal (Colligan 2008). According to DEC, there were no records of rare or state-listed animals or plants, significant natural communities, or other significant habitats on or in the immediate vicinity of the site (Seoane 2008).

Shortnose sturgeon is an anadromous bottom-feeding fish that can be found throughout the Hudson River system, but it spawns, develops, and overwinters well north of the project area in the Hudson River, and prefers colder, deeper waters for all lifestages. While documented as occurring below the Tappan Zee Bridge in the Hudson River and collected in the Manhattan area during an annual striped bass survey (annual survey conducted from July through December) in 2003, 2005, and 2006 (Colligan 2007), this portion of the river is not considered optimal shortnose sturgeon habitat (Bain 2004), and sturgeon would be expected to occur rarely south of the southern tip of Manhattan (Bain 1997). Therefore, individuals are only expected to use the Upper Bay in the vicinity of Gowanus Bay when traveling to or from the upriver spawning nursery and overwintering areas on the Hudson River. In addition, fish that may occur in the Upper Bay would be expected to use the deeper channel areas as opposed to the near-shore areas. For these reasons, the shortnose sturgeon would not be expected to occur within the Gowanus Canal.

ESSENTIAL FISH HABITAT

The NMFS designates EFH (i.e., waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity) for fish species actively managed under Federal Fishery Management Plans. Federal agencies are required to consult with NMFS (using existing consultation processes for NEPA, the Endangered Species Act, or the Fish and Wildlife Coordination Act) on any action that they authorize, fund, or undertake that may adversely impact EFH. The entire canal is designated as EFH, but divided between two NMFS 10'x10' squares. The project site is within a portion of the Harbor Estuary EFH that is situated in the NMFS 10'x10' square having the coordinates (North) 40° 50.0' N, (East) 73° 50.0' W, (South) 40° 40.0' N, (West) 74° 00.0' W (see additional data in Appendix B, "Natural Resources"). The lower portion of the Gowanus Canal is within a portion of the Harbor Estuary EFH that is situated in the NMFS 10' x 10' square having the coordinates (North) 40° 40.0' N, (East) 74° 00.0' W, (South) 40° 30.0' N, (West) 74° 10.0' W (see additional data in Appendix B). EFH fish species observed in sampling for the Gowanus Bay and Canal Ecosystem Program (LMS 2004) include winter flounder (*Pleuronectes americanus*) and windowpane flounder (*Scopthalmus aquosus*) (see Appendix B, "Natural Resources") for the full list of fish species designated in the Harbor Estuary EFH quadrangles noted above).

D. THE FUTURE WITHOUT THE PROPOSED PROJECT

The future without the proposed project ("No Build") condition is a projection of natural resources in the vicinity of the project site independent of the proposed project. Without the proposed project, the existing conditions described above would remain essentially the same and the project site would likely continue to be used for commercial purposes, warehousing, light manufacturing, and open vehicle storage.

Elements of the New York/New Jersey Harbor Estuary Program (HEP) and other programs that are specifically directed at improving biological resources and habitats would be expected to result in some improvements to natural resources over time. These programs are described briefly below.

NEW YORK/NEW JERSEY HARBOR ESTUARY PROGRAM PROJECTS

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

The HEP Habitat Workgroup developed watershed-based priorities for acquisition, protection, and restoration. The ACOE New York District began a feasibility study in 2001 to assess potential sites for habitat restoration in New York Harbor. In May 2003, the Regional Plan Association (RPA) identified needs and opportunities for environmental restoration in the

Hudson-Raritan Estuary. These sites are not local to the project site but involve the preservation and enhancement of tidal wetlands that will provide improved habitat for fish and macroinvertebrates as well as the birds, mammals, and reptiles that depend on these habitats. HEP Acquisition and Restoration Sites in closest proximity to the Gowanus Canal are listed below. HEP actions taken with respect to these sites would occur with or without the proposed project.

- *Liberty State Park*—Located in the Upper Bay, it has been identified for restoration, including permanent protection of natural areas, enhancement of emergent habitat, and restoration of oyster beds.
- *Bush Terminal*—Located in Upper Bay on the Brooklyn shoreline, south of the project site, it was chosen as a priority restoration site for salt marsh restoration.

EPA's National CSO Strategy of 1989 requires states to eliminate dry weather overflows of sewers, meet federal and state water quality standards for wastewater discharges, and minimize impacts on water quality, plant and animal life, and human health. New York City committed $1.5 billion for construction of CSO abatement facilities over the period 1998-2008. This should result in some future improvement in coliform, DO, and floatables levels in the Harbor Estuary. The City also recently completed improvements to its wastewater treatment plants, which should lead to further decreases in coliform counts and floatables levels.

NEW YORK CITY PROJECTS

As required by EPA's CSO Control Policy, DEP initiated the development of the Long Term Control Plan (LTCP) Project in 2004. The LTCP Project will integrate CSO Facility Planning Projects and the Comprehensive City-Wide Floatables Abatement Plan, incorporate ongoing Use and Standards Attainment Program (USA) Project work, and will develop Waterbody/Watershed Facility Plan Reports and the LTCP for each waterbody area. The LTCP Project monitors and assures compliance with applicable Administrative Consent Orders between DEC and New York City for the CSO Abatement Program. Additionally, DEP plans to increase identification and control of pollutants of concern, including mercury, PCBs, and solvents.

As discussed under "Aquatic Resources," the City is developing the Gowanus Canal Waterbody/Watershed Facility Plan (DEP 2007a). Measures of the plan include: rehabilitation of the Gowanus Canal Flushing Tunnel to increase its average capacity from 154 mgd to 215 mgd; reconstruction of the Gowanus Pump Station to reduce the annual volume of CSO discharges by 34 percent; implementation of floatables controls at 2 CSO locations; and dredging the upper 750 feet of the Gowanus Canal to eliminate exposed sediment mounds. With these measures in place, DO criteria are projected to meet state standards for Use Class SD waters 100 percent of the time. Furthermore, upgrades to the Gowanus Canal Flushing Tunnel would increase flushing rates by approximately 40 percent. For floatables, the plan would complement the City-Wide Comprehensive CSO Floatables Plan, by providing additional floatables controls at two major CSOs representing 78 percent of the CSO discharges. Except for dredging, which is contingent on the issuance of permits by DEC, the elements of the plan would be implemented by December 2013 (DEP 2007a), two years after the proposed project build year.

STATE AND REGIONAL PROJECTS

The Hudson-Raritan Estuary Ecosystem Restoration Project is a cooperative project being led by the ACOE that was funded by a House of Representatives Resolution on 15 April 1999.

PANYNJ is a co-sponsor of this project. Other agencies involved in this project include EPA, USFWS, NOAA, National Resource Conservation Service, New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (Office of Maritime Resources), DEC, NYSDOS, DEP, New York City Parks and Recreation, and New Jersey Meadowlands Commission. The focus of the study is to identify the actions needed to restore the Hudson-Raritan Estuary and develop a plan for their implementation. The study area for the program includes all the waters of the New York and New Jersey Harbor and the tidally influenced portions of all rivers and streams that empty into the Harbor and ecologically influence the Harbor. The program would identify measures and plans to restore natural areas within the estuary and enhance their ecological value, and address habitat fragmentation and past restoration and mitigation efforts that were piecemeal in nature. Thirteen initial representative restoration sites in New York and New Jersey have been targeted as the first sites for inclusion as potential restoration projects for feasibility level analysis. It is anticipated that expedited restoration of these representative restoration sites would provide substantial immediate value to the ecosystem. None of these sites occurs in the vicinity of the of the project site. Therefore, actions taken by the Hudson-Raritan Estuary Ecosystem Restoration Project with respect to these sites would occur with or without the proposed project.

In addition to the 13 representative sites, three spin-off sites have been identified. These are restoration sites being evaluated in parallel to the representative sites. Gowanus Canal has been identified as one of these spin-off sites. Additionally, the Gowanus Canal and Bay Ecosystem Restoration Project was authorized by a U.S. House of Representatives Committee on Transportation and Infrastructure Resolution in 1999 (Docket Number 2596). The goal of this study, jointly funded by ACOE and DEP, is to assess the environmental problems and potential solutions to restore the ecological health of the Gowanus Canal and complement other activities focused on improving this portion of the Upper Bay.

DEC and NJDEP, in coordination with the IEC, would continue to develop total maximum daily loads (TMDLs) and to identify priority waterbodies in bi-annual 305(b) reports to EPA. TMDLs, once implemented, would reduce the daily inputs of various contaminants in an effort to improve water quality. New York State provided $255 million to implement wastewater improvements, nonpoint source abatement and aquatic habitat restoration projects in 1998. The State intends to continue water quality improvement projects in the Harbor for the foreseeable future.

E. PROBABLE IMPACTS OF THE PROPOSED PROJECT

GROUNDWATER

The contaminants detected in the groundwater at the site would not affect the proposed project. In the future with the proposed project, future residents would never be in contact with the groundwater beneath the site, and the groundwater would not be used as a potable water supply. As discussed in Chapter 11, “Hazardous materials,” since dewatering may be required for construction, groundwater recovered during dewatering would be tested to ensure compliance with applicable regulatory discharge requirements prior to discharge to the combined sewer or to the canal (those of DEP for disposal in the city sewer system and/or DEC for disposal in the canal). If necessary, pre-treatment of VOCs, SVOCs, pesticides, and metals present in groundwater would be conducted prior to discharge. Also, as part of the remediation of the project site, prior to construction, the proposed project would remove sources of contaminated groundwater from the project site.

Based on detailed groundwater studies (see Appendix D), it is estimated that the existing average infiltration of storm water to the groundwater for the 3.36 acre project site is about 2,504 gallons per day based upon a typical infiltration rate of 22 inches per year for permeable surfaces. With the proposed project, the area available for stormwater infiltration to the groundwater will decrease, thereby decreasing the infiltration to approximately 670 gallons per day. The typical seepage rate through standard sheet piling is at least 1.5 gallons per hour per square foot of wall per foot of net head across the wall. The proposed bulkhead would allow approximately 180,000 gallons per day to flow across it, which is more than enough capacity to accommodate the projected 670 gallons per day resulting from stormwater recharge on the project site. Therefore, it can be concluded that the proposed project would not adversely impact groundwater conditions along the canal or in the surrounding area.

WETLANDS

The applicant proposes to install approximately 555 linear feet of steel sheet pile bulkhead either in place of or against the existing timber bulkhead, which is in poor condition. The preferred design (see Chapter 1, Project Description," would require the removal of existing whalers and piles from the existing bulkhead. In addition for any new installation, an anchoring system consisting of "deadmen" and steel "tie rods" would be installed upland below-grade, and inland of the existing cribwork (or approximately 40 feet upland). The tie rods would run from the new sheeting to the deadmen approximately every eight to ten feet for the length of the bulkhead. The installation of the tie rods would require four to five foot-deep trenches. The installation of the tie rods could potentially require removal of portions of the cribwork sufficient to allow the steel tie rods to pass through the area. An intertidal area in the vicinity of the end of Second Street where the canal overtops the bulkhead would, subject to DEC and ACOE approval, be maintained and upgraded. Since all construction activities would be land-based, the installation of the new sheet pile would result in minimal loss (i.e., approximately 300 square feet) of DEC littoral zone tidal wetlands that may be located in the area within the footprint of the new bulkhead.

Implementation of the Stormwater Pollution Prevention Plan (SWPPP) prepared for the project, as described in this section under "Aquatic Resources," would minimize erosion and deposition of soil into surface waters and littoral zone tidal wetlands of the canal during construction of the proposed project. Potential impacts would be minimized through the implementation of measures identified during the permitting process for these shoreline improvements by federal and state agencies. For these reasons, there would be a *de minimis* impact on littoral zone wetlands as a result of the installation. This *de minimis* impact would not be considered a significant impact on tidal wetlands that would require mitigation. In addition, any *de minimis* filling would be offset by the creation of a tidal wetland area of the same square footage and transitional plantings in the vicinity of the end of 2nd Street.

TERRESTRIAL RESOURCES

The construction of the proposed project would result in the creation of 0.7 acres of publicly-accessible waterfront open space. The proposed project would landscape and improve the entire waterfront along the eastern project site boundary including the street ends of 1st and 2nd Streets. These areas will receive landscape treatment which will include a variety of native and ornamental tree, shrub, grasses, and herbaceous perennials. More than 30 trees including American redbud (*Cercis Canadensis*), oaks (*Quercus* spp.), and beech (*Fagus* spp.*)* would be planted within open space areas. Shrubs would include a variety of viburnum and rhododendron

species, northern bayberry, winterberry, and yew species. Specific species such as American redbud among others attract songbirds, honeybees, and other pollen-dependent species (Petrides 1972). Oaks and American beech provide a food source for a variety of herbivorous birds and small mammals such as raccoon and opossum. Herbaceous perennials and grasses would include a number of hosta species, coral bells, and fountain grass. The applicant will consult with DPR to ensure that all street tree and publicly-accessible open space tree species planted on-site are appropriate for the project area and are not known Asian Longhorn Beetle (ALB) host species. As this site is within the ALB Quarantine Zone, if any ALB host tree species are removed as part of the site reconstruction, they will be cut, chipped and disposed of in a manner that is consistent with all federal, state and local regulations.

The construction of the proposed project would result in the loss of a narrow band of low value herbaceous and woody vegetation found in scattered pockets and along the edge of the canal at the project site. Bird and other wildlife species expected to occur within the project site are those highly tolerant of urban conditions and the current uses of the site for commercial purposes, warehousing, light manufacturing, and open vehicle storage. Because structures that are about 500 feet or less in height (i.e., below the migratory altitude for most migratory songbirds) pose a lower risk to migratory songbirds due to collisions, the proposed building heights (between 43 and 125 feet) would not result in significant adverse impacts to populations of songbirds migrating through New York City.

In general, the wildlife species expected to occur within the project site are common to urban areas, and the relocation and/or loss of some individuals would not result in a significant adverse impact on the bird and wildlife community of the region. The current vegetative community is limited to weeds and invasive species that offer little habitat value. The proposed landscaping treatment for the open space areas with a variety of trees, shrubs, grasses and herbaceous perennials would improve terrestrial habitat on the project site. The proposed plants would be sufficient to provide limited food and shelter for a variety of birds and other wildlife commonly found within urban areas of the region. Therefore, the construction and operation of the proposed project would not result in significant adverse impacts on terrestrial resources.

AQUATIC RESOURCES

WATER QUALITY

Stormwater Runoff

The proposed project would be covered under the DEC SPDES General Permit for Stormwater Discharges from Construction Activity Permit (No. GP-08-001). In order to obtain coverage under this permit, a Notice of Intent would be submitted to DEC and a SWPPP would be prepared. The SWPPP would comply with all of the requirements of the construction activity permit, DEC's technical standard for erosion and sediment control presented in "New York Standards and Specifications for Erosion and Sediment Control," and DEC's technical standard for the design of water quantity and water quality controls (post-construction stormwater control practices) presented in *New York State Stormwater Management Design Manual*. Temporary structural measures for erosion and sediment control during construction, such as silt fences and straw bale dikes, would minimize potential water quality impacts associated with surface runoff.

As discussed in Chapter 11, "Hazardous Materials," remediation of hazardous materials and implementation of the Remedial Action Plan/Construction Health and Safety Plan (RAP/CHASP) during all soil disturbing activities would minimize the potential for adverse

impacts to water quality of the Gowanus Canal from the proposed project. Groundwater recovered during any construction dewatering would be treated, as necessary, prior to discharge to the canal or the combined sewer system.

As discussed in Chapter 13, "Infrastructure," currently, approximately one-third of the project site's stormwater runoff is untreated and discharged to the combined sewer in Bond Street. The proposed project would separate all stormwater generated within the project site from the combined sewer system, treat it on site, and discharge it to the canal. Furthermore, the proposed project would be expected to result in a decrease in stormwater runoff due to a change in land use. Some existing paved surfaces and structures would be replaced with landscaped open spaces that would allow for more water quality treatment and attenuation during peak flow than with the existing conditions. In addition to the planned open space areas, stormwater from the project site would also undergo treatment through the use of BMPs that would further reduce these suspended solid pollutant loads. As mentioned above, as part of the design of the proposed project, a SWPPP would be prepared in accordance with the DEC SPDES General Permit for Storm Water Discharges from Construction Activity. The SWPPP would include BMPs to be implemented on-site during and after construction to assist in erosion and sediment control and stormwater treatment, that would achieve sufficient performance of the DEC water quality requirements for stormwater discharge to the Gowanus Canal.

Hydrodynamic devices, which separate oils, grease, solids, particulates, and other pollutants from the stormwater would be installed to treat stormwater from both project blocks. These devices would be located on-site prior to discharge to the storm sewer and the Gowanus Canal, and would be sized accordingly to meet the NYSDEC standards for water quality based on the SPDES General Permit for Stormwater Discharges from Construction Activity requirements. A diversion chamber or flow splitter located within the hydrodynamic device would treat the required water quality volume and bypass larger flows, consistent with NYSDEC requirements.

Another BMP that would be utilized would be infiltration in the waterfront landscaped areas, which would reduce stormwater runoff volumes and peak flows, improve water quality, and promote groundwater recharge. Infiltration practices temporarily store stormwater and enable slow percolation into the underlying soil, physically filtering runoff in the process and enabling soil particles to absorb and biodegrade pollutants. In addition a planted roof system would be in place in both interior courtyard areas on Blocks 452 and 458. With this planted roof system, stormwater would infiltrate through soils and/or the underlying gravel layer which would be effective at reducing runoff volume, filtering metals, sediments, nutrients, bacteria, organics, oxygen demanding substances. There would also be evapotranspiration through plant uptake.

Stormwater runoff on both First Street and Second Street sidewalks would also be partially treated by means of infiltration and filtering through the proposed vegetative strips on both sides of the street. Due to limitations on the types of BMPs that can be installed within the NYC public right-of-way, stormwater runoff collected in the roadways cannot be treated with the hydrodynamic devices, but would be treated on both First Street and Second Street by Type II Catch Basins with 4-feet deep sumps and hoods. The sumps allow solids to settle out from the stormwater, and the hoods prevent floatables from entering the storm sewer.

With the proposed stormwater system improvements, the proposed stormwater sewers on both 1st and 2nd Streets would outfall directly into the Gowanus Canal. Stormwater pollutant loads from the project site would be reduced in the proposed project condition due to the conversion of existing industrial paved surfaces to proposed residential buildings and landscaped areas, which would reduce the amount of total runoff from the project site. Based on DEC's *Reducing the*

Impacts of Stormwater Runoff from New Development Guidelines, this would result in a reduction of approximately 21 percent of the existing BOD, 44 percent of the existing total phosphorus, 47 percent of the existing total nitrogen, and 38 percent of TSS into the Gowanus Canal. Prior to the discharge into the canal, stormwater would also undergo treatment through the use of BMP's that would further reduce these suspended solid pollutant loads. As a result, the stormwater generated and discharged through the proposed project would not result in adverse impacts on water quality of the canal or Harbor Estuary.

CSO Discharges

As discussed in Chapter 13, "Infrastructure," due to the Gowanus Canal's confined physical structure and limited circulation, CSO discharges have the potential to cause prolonged water quality impairments, with reduced levels of DO and elevated levels of coliform bacteria if adequate flushing with Upper Bay waters does not occur. This is particularly a concern at the head of the Gowanus Canal and less so near the outlet where tidal action mixing can better disperse CSO discharges.

Sanitary sewage from the proposed project would be conveyed via the combined sewer in Bond Street and then would be treated at the Red Hook WPCP. With efforts to eliminate current stormwater runoff contribution to the combined sewer system, two new storm sewers would be constructed for the proposed project as discussed above. With these infrastructure improvements, no stormwater runoff from the project site would be discharged to the combined sewer system. The total flow contribution to the combined sewer during storm and CSO events would be reduced from the current site condition.

In order to understand the potential for water quality impacts with the proposed project as it relates to CSO discharges, a modeling analysis was performed to assess the potential impacts of the proposed project on the local infrastructure systems and water quality of the Gowanus Canal. The analysis assessed conditions within the Red Hook WPCP service area that would be potentially affected by the proposed project, with a focus on the CSO system that drains to the Gowanus Canal. The modeling was performed for two scenarios; one scenario based on *CEQR Technical Manual* sanitary flow rate calculations (approximately 114,032 gpd), and a scenario based on proposed project-specific sanitary flow rates (56,200 gpd, about half of the CEQR-calculated rates). The modeling analysis showed that the proposed project would not result in significant adverse impacts on CSO flow, and the number of CSO events in the downstream combined sewer system (see Chapter 13, "Infrastructure.") The results of the water quality analysis on key water quality parameters (dissolved oxygen and pathogens) are summarized below (see Appendix C "Infrastructure and Water Quality Modeling," for the detailed results of the analysis).

Dissolved Oxygen

In the 2007 Existing condition, minimum dissolved oxygen concentrations were calculated to be about 3.2 mg/L in the canal (near Hamilton Avenue). Under the same conditions, the increased pollutant loadings determined under the 2011 No Build condition did not impact the calculated dissolved oxygen concentrations. Calculated minimum dissolved oxygen concentrations also remained unchanged with the 2011 Build (56,200 gpd) and 2011 Build (114,032 gpd) scenarios. A projected 0.8 MG/yr incremental increase in CSO discharged volume associated with the 2011 Build (114,032 gpd) condition, is not expected to impact dissolved oxygen concentrations in the Gowanus Canal. Moreover, the reduction in CSO volumes with the lower-flow assumptions (56,200 gpd) would not result in a water quality impact.

Pathogens

Model-calculated pathogen concentrations were also assessed for each scenario. Between the 2011 No Build and 2011 Build (114,032 gpd) conditions, pathogen concentrations differed most in the vicinity of outfall RH-035, the location where CSO volumes differed most. However, even at this location, the difference in pathogen concentrations is minor with the proposed project, and there would be virtually no difference between the scenarios. Similarly, there would be no difference in the projected attainment of pathogen criteria that are potentially applicable in the future condition. Secondary-contact criteria for fecal coliform and total coliform are expected to be attained for all months. With respect to enterococcus, the proposed project would not impact the expected attainment of the water quality criterion (a seasonal geometric mean of less than 35 cells/100 mL in either modeled scenario.

Bulkhead Improvements

The installation of the timber sheeting bulkhead has the potential to result in short-term construction related impacts to water quality due to increases in suspended sediment and re-suspension of contaminated sediments. Bottom disturbing activities associated with the installation of the bulkhead would include driving of the new sheet pile system. Water quality changes associated with these increases in suspended sediment would be expected to be temporary and limited to the immediate area of the activity. Suspended sediments would be expected to dissipate shortly after the shoreline improvements are completed and would not result in long-term adverse impacts to water quality. Measures to reduce and control increases in suspended sediment (e.g., silt curtains and erosion control) would be implemented where appropriate and consistent with any additional requirements identified by federal and state agencies during the permitting process. Therefore, no significant adverse impact on water quality as a result of bulkhead installation is expected to occur in the Gowanus Canal or Harbor Estuary.

AQUATIC BIOTA

Compliance with the terms and conditions of DEC General Permit described above would preclude the potential for significant adverse impacts on water quality and aquatic biota from the discharge of stormwater during and after construction of the proposed project.

As discussed above, the installation of the steel sheet pile bulkhead either in place of or against the existing timber cribwork has the potential to result in short-term construction related impacts to water quality and aquatic biota that would not be significant. These impacts may include localized increases in suspended sediment and re-suspension of contaminated sediments, temporary loss of fish habitat, and a *de minimis* disturbance to benthic communities during the installation of the existing shoreline stabilization features. Water quality changes associated with these increases in suspended sediment would be expected to be minimal and temporary, limited to the immediate area of the activity (ACOE 1993). Measures (e.g., silt curtains and erosion control) would be implemented where appropriate and as identified during the permitting process by federal and state agencies to reduce and control increases in suspended sediment in the vicinity of construction activity. Suspended sediments would dissipate shortly after the shoreline improvements are completed (ACOE 1993). Because the increase in suspended sediment would be localized and temporary, no significant adverse impacts would occur to aquatic biota.

The proposed bulkhead installation would permanently remove benthic habitat and some benthic macroinvertebrates unable to move from within the footprint of the new sheet pile bulkhead

structure. The loss of some benthic habitat and some macroinvertebrates during the removal of portions of the existing timber bulkhead and installation of the new bulkhead would not result in significant adverse impacts to populations of macroinvertebrates, as limited populations have been observed using this portion of the Gowanus Canal, nor would it significantly impact the food supply for fish foraging in the area. Encrusting organisms and benthic macroinvertebrates would be expected to recolonize the new bulkhead shortly after construction is completed.

Based on water quality modeling results described above, no significant adverse impacts to water quality are expected, and therefore no residual or secondary impacts on aquatic resources would occur with the proposed project. It should be noted however, that although not significant, the impacts associated with an in-place replacement of the bulkhead would be greater than with the preferred design (new sheet pile placed against the existing timber sheathing).

In addition, as described in Chapter 6, "Shadows," any potential for a minor hindrance on fish passage within the narrow band of shadow that would be cast across the canal by the proposed buildings would not be considered significant.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES

As discussed in Section C, "Existing Conditions," the Hudson River below the Tappan Zee Bridge is not considered optimal shortnose sturgeon habitat and this species would be expected to occur only rarely as a transient in the vicinity of the Gowanus Canal. Because water quality impacts associated with the construction of the new bulkhead would be localized and located in inshore shallow waters, the deep channel habitat preferred by this species while in transit to and from spawning and nursery habitat in the upper portion of the Hudson River would not be impacted during construction of the proposed project. In summary, significant adverse impacts on threatened or endangered species or special concern species would not be expected to occur as a result of the proposed project.

ESSENTIAL FISH HABITAT

Construction of the proposed project would not be expected to result in significant adverse impacts to any fish species identified for an EFH analysis as discussed under "Aquatic Biota."

F. REFERENCES

See Appendix B for the references associated with this chapter. ✷