Chapter 8: Water and Sewer Infrastructure

A. INTRODUCTION

This chapter considers the proposed development's potential effects on infrastructure. The *City Environmental Quality Review (CEQR) Technical Manual* outlines the following guidelines for an infrastructure assessment:

- *Water Supply*. An analysis of an action's impact on the New York City water supply system should be conducted only for actions that would have exceptionally large demand for water, such as power plants, very large cooling systems, or large developments (e.g., those that use more than 1 million gallons per day [mgd]). In addition, actions located at the extremities of the water distribution system should be analyzed.
- *Wastewater Treatment*. Because the City is committed to adequately treating all wastewater generated in the City and to maintaining its wastewater treatment plants at or below the capacity permitted by applicable state and federal permits, orders, and decrees, only unusual actions with very large flows could have the potential for significant impacts on sewage treatment.
- *Stormwater Management.* An assessment of stormwater is appropriate for actions that result in certain industrial activities; actions that greatly increase the amount of paved area on a site; actions that would be served by a separate storm system and that would involve construction activities such as clearing, grading, and excavation; and actions that involve construction of a new stormwater outfall.

Because the proposed development would not exceed any of the CEQR thresholds for water supply and wastewater treatment, this chapter discloses the proposed development's water demands and wastewater generation. The proposed development would involve the construction of new stormwater outfalls; therefore, an assessment of stormwater management is necessary.

As detailed in this chapter, there would be no potential for significant adverse impacts on infrastructure because the proposed development would not have an exceptionally large incremental demand for water or requirement for sanitary sewage and wastewater treatment when compared with the future without the proposed project. In addition, the Brooklyn Bay Center site ("project site") would incorporate stormwater Best Management Practices (BMPs) to ensure that the proposed development would not result in significant adverse impacts due to stormwater runoff.

PRINCIPAL CONCLUSIONS

Compared to the future without the proposed project, the future with the proposed project would create an incremental demand for 84,932 gallons per day (gpd). Overall, the proposed development's incremental demand for water would represent an insignificant increase in the total demand in Brooklyn. As a result, this added demand would not overburden the City's water supply or the local conveyance system. The proposed project would also comply with the City's

water conservation measures as mandated by Local Law 19. Therefore, the proposed project would not result in a significant adverse impact on the water supply system's ability to adequately deliver water to Brooklyn or New York City.

It is assumed that the proposed development would generate wastewater at a rate commensurate with domestic water consumption, or about 51,360 gpd. This amount of wastewater would not cause the Owl's Head Waste Water Treatment Plant (WWTP) to exceed its design capacity or State Pollutant Discharge Elimination System (SPDES) permit flow limit. Therefore, the proposed development would not result in a significant adverse impact on wastewater treatment.

In the existing condition, stormwater from buildings and parking lots is uncontrolled overland flow draining off-site and into Gravesend Bay. A couple of indeterminate storm drains are present and drainage is undetermined. The existing coverage is 70% impervious. Whereas no stormwater treatment is provided under existing conditions or in the future without the proposed project, with the development of the proposed project, stormwater collection, conveyance, and disposal would be improved and stormwater treatment would be implemented. In the proposed (Build) condition, impervious coverage would be 69%. Approximately 93% of the site area flow would be collected, conveyed, treated and discharged to the bay via one of two outfalls. There is a separate sewer system fronting the site. Approximately 7% of the site area flow (adjacent to the street) would be controlled and conveyed to the City's sewer. The amount has been designed to be within the amount allowed by DEP's regulations. The DEP allowable flow is calculated in an as-of-right fashion, based on either the current drainage plan or borough-wide parameters (a coefficient of 0.5 for 100' deep area along frontage). The application would be permitted during the DEP Site Connection Proposal process submitted once final design is completed. If flows were to exceed the requirements, detention would be installed accordingly to bring flow down the DEP-allowable flow rate.

Two methods of calculating total stormwater runoff from the existing and proposed development were prepared. Depending on the methodology utilized, the stormwater runoff coefficient would either slightly increase or slightly decrease in the future with the proposed project as compared to the existing conditions and conditions in the future without the proposed project. The proposed project includes increased roof surfaces but is offset by an overall reduction of impervious surfaces by approximately 1 percent over the existing site coverage and soil restoration to include better draining soils.

The proposed project incorporates a number of stormwater BMPs, including stormwater quality treatment devices, soil restoration practices and surface swales known as "rain gardens" that would serve as a natural means of bio-filtration to cleanse stormwater. In accordance with New York State Department of Environmental Conservation (NYSDEC) SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001), a Stormwater Pollution Prevention Plan (SWPPP) a SWPPP containing both temporary erosion and sediment controls and permanent water quality controls would be prepared before commencing any construction activities.

The majority of stormwater from the site would be collected, treated, controlled and discharged to Gravesend Bay, an improvement from the existing condition where stormwater runoff is uncontrolled and untreated. Through the incorporation of selected BMPs, stormwater runoff from the project site would not be expected to have any significant adverse impacts with respect to stormwater.

B. EXISTING CONDITIONS

WATER SUPPLY

New York City's water supply system is composed of three watersheds—Croton, Delaware, and Catskill—and extends as far north as the Catskill Mountains. In 2010, NYCDEP delivered an average of approximately 1.1 billion gallons of water per day (bgd) to the five boroughs and Westchester County. From these watersheds, water is carried to the City via a conveyance system made up of reservoirs, aqueducts, and tunnels extending as far as 125 miles north of the City. Within the City, a grid of water pipes distributes water to customers.

The Croton system collects water from Westchester and Putnam Counties and delivers it to the Jerome Park Reservoir in the Bronx. From that point, water is distributed to the Bronx and Manhattan through the New Croton Aqueduct, which travels beneath the Bronx and Manhattan. The Croton system has lower pressure than the Delaware and Catskill systems and supplies domestic uses primarily in the lower elevations of Manhattan and the Bronx. The higher-pressure Delaware and Catskill systems serve all five boroughs and higher elevations where the water pressure of the Croton system would be inadequate. The Delaware and Catskill water systems collect water from watershed areas in the Catskill Mountains and deliver it to the Kensico Reservoir in Westchester County. This reservoir acts as the seasonally balancing reservoir. Summer demand is usually greater than winter demand. From the Kensico Reservoir, water is sent to the Hillview Reservoir in Yonkers, which balances the daily fluctuations in water demand and pressure to the system. The Croton system supplies on average about 10 percent of the City's water needs, and the Catskill/Delaware systems supply the rest. However, depending on conditions, the Croton system can supply up to 40 percent of the City's needs.

Water is then distributed to the City through three tunnels: City Tunnel Nos. 1, 2, and 3. City Tunnel No. 1 carries water through the Bronx and Manhattan to Brooklyn; City Tunnel No. 2 passes through the Bronx, Queens, and Brooklyn, and then through the Richmond Tunnel to Staten Island; and City Tunnel No. 3 goes through the Bronx and Manhattan, terminating in Queens. An extension of Tunnel No. 3 is currently being built in Queens and Brooklyn.

As described in Chapter 1, "Project Description," the project site is currently occupied by a bus storage company and contains two buildings totaling approximately 10,400 square feet (sf). Therefore, using the *CEQR Technical Manual* water usage rate for commercial uses of 0.10 gpd per sf and 0.17 gpd per sf for air conditioning, the domestic water demand is 1,040 gpd and the air conditioning demand is 1,768 gpd. The total existing water demand on the project site is estimated to total approximately 2,808 gpd.

WASTEWATER TREATMENT

The project site is located in the service area of the Owl's Head WWTP. There are separate storm and sanitary sewer lines located beneath Shore Parkway South. The Owl's Head WWTP discharges treated wastewater flows, or "effluent," into New York's Upper Bay. Effluent discharged from the Owl's Head WWTP, like each of the City's WWTPs, is regulated by a SPDES permit issued by NYSDEC. The SPDES permit limit for flow at the Owl's Head WWTP is 120 million gallons per day (mgd).

As shown in **Table 8-1**, at the Owl's Head WWTP, the 12-month average dry weather flow for the most recent 12-month period for which data are available is 93 mgd, which is approximately 78 percent of the plant's treatment capacity.

Table 8-1
Average Daily Flows by Month at the Owl's Head WWTP

Year	Month	Owl's Head Flow (mgd)
2010	November	90
2010	October	91
2010	September	91
2010	August	89
2010	July	86
2010	June	87
2010	May	87
2010	April	96
2010	March	106
2010	February	105
2010	January	87
2009	December	101
12-Month Average		**93**

Source: NYCDEP, November 2010.

Based on the existing water demand, the existing business on the project site generates approximately 1,040 gpd of sanitary sewage. The water used by air conditioning evaporates into the air and does not become sanitary sewage.

STORMWATER MANAGEMENT

Under existing conditions, the project site does not contain an organized network of stormwater collection or disposal; all stormwater is either infiltrated or drains to the Gravesend Bay via direct overland flow. There are separate storm and sanitary sewer lines located beneath Shore Parkway South. As described in Chapter 1, "Project Description," the project site comprises distinct eastern and western portions. The western area of the project site (western plateau) extends approximately 600 feet into Gravesend Bay and is at a higher elevation than the eastern portion of the site. The western plateau features a vegetated berm located along its perimeter. The majority of the site is paved with asphalt. The existing impervious surface coverage of the site is 70%.

NYCDEP typically uses the Rational Method to calculate the amount and rate of stormwater runoff. The Rational Method is dependent on the site area, weighted runoff coefficient and rainfall intensity. For a given site and rainfall intensity, the stormwater runoff is therefore mainly a function of the land surface characteristics, which is estimated by the weighted runoff coefficient. Per the Rational Method for stormwater calculations, the existing weighted runoff coefficient of the project site is 0.71. The Soil Conservation Service (SCS) method to quantify land surface characteristics considers both surface coverage and soil type to calculate a runoff curve number (CN). Based on the SCS Method, the CN for the existing project site is 95. For both methodologies, a higher weighted runoff coefficient or runoff curve number would correspond to a higher percentage of impervious surfaces and therefore higher rates of stormwater runoff.

Runoff from the berms and existing slope on the project site sheet flows directly to the Gravesend Bay. Most of the runoff from the site sheet flows to the southern half of the eastern portion of the site. In this location, runoff either flows through a curb cut and down the existing

slope to the Bay, or is collected in a series of drains within the parking lot. As there is no evidence that the drains connect to the City infrastructure, they likely percolate stormwater into the soil.

C. THE FUTURE WITHOUT THE PROPOSED PROJECT

As described in Chapter 1, "Project Description," in the future without the proposed project the bus storage operation currently on the project site will remain. Therefore, the water demand and sanitary sewage generated on the project site will remain the same as in existing conditions. In addition, stormwater discharge from the project site is expected to remain the same as in existing conditions. No changes to the storm sewer system serving the project site would be required.

D. PROBABLE IMPACTS OF THE PROPOSED PROJECT

The proposed project would include retail uses, accessory and public parking, and a publicly accessible waterfront open space. The new retail use would place new demands on the City's infrastructure. This section discusses the approximate total future demand on water use and sanitary sewage that would be created by the proposed actions. It then compares the proposed development's demand on infrastructure services to the demand that would result from the continuation of the bus storage use on the project site in the future without the proposed project.

WATER SUPPLY

As shown in **Table 8-2**, the proposed actions would generate a total demand for 87,740 gpd of water.

Table 8-2
Proposed Development's Estimated Water Demand

Use	Size[1]	Domestic demand (gpd)[2,3]	Air Conditioning (gpd)[4]	Total (gpd)
Retail	214,000	51,360	36,380	87,740

Notes:
1. sf = square feet
2. gpd = gallons per day
3. Retail Domestic Demand rate= 0.24 gpd/sf
4. Retail Air Conditioning Usage rate= 0.17 gpd/sf

Source: 2010 *CEQR Technical Manual*, Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment."

Compared to the future without the proposed project, the proposed actions would create an incremental demand for 84,932 gpd. Overall, the proposed development's incremental demand for water would represent an insignificant increase in the total demand in Brooklyn. As a result, this added demand would not overburden the City's water supply or the local conveyance system. The proposed development would also comply with the City's water conservation measures as mandated by Local Law 19. Therefore, the proposed actions would not result in a significant adverse impact on the water supply system's ability to adequately deliver water to Brooklyn or New York City.

WASTEWATER TREATMENT

The proposed development is assumed to generate wastewater at a rate commensurate with domestic water consumption, or about 51,360 gpd. This amount of wastewater would not cause

the Owl's Head WWTP to exceed its design capacity or SPDES permit flow limit. Therefore, the proposed actions would not result in a significant adverse impact on wastewater treatment.

STORMWATER MANAGEMENT

Stormwater collection, conveyance, and disposal would be improved with the development of the proposed project. Whereas no stormwater treatment is provided under existing conditions or in the future without the proposed project, stormwater treatment would be implemented with the proposed actions. The proposed project includes the construction of two new 36-inch storm outfalls and a network of catch basins, roof leaders, and storm sewers to discharge stormwater runoff from the proposed development into Gravesend Bay. The existing conditions—uncontrolled runoff to the Gravesend Bay—would be replaced with controlled collection, discharge and water quality treatment of stormwater in conformance with NYSDEC SPDES GP-0-10-001 requirements.

Site-wide, the total stormwater runoff rate in the future with the proposed project would slightly increase or decrease, depending on which methodology is used to estimate land surface characteristics. Per the Rational Method, the weighted runoff coefficient for the proposed project site would increase from 0.71 in the existing condition to 0.79, however with the use of BMPs the effect of the higher weighted runoff coefficient would be reduced by slowing down the discharge rate. Per the SCS Method, the calculated CN would decrease from 95 in the existing condition to 91. The decrease of the CN is related to less differentiation between roof and pavement surfaces and the inclusion of soil restoration practices in the proposed project. Additionally, overall impervious surface coverage would decrease from 70% in the existing condition to 69%.

Localized drainage from a portion of the proposed loading dock area, directly adjacent to Shore Parkway South, would be captured and discharged to the existing NYCDEP storm sewer in Shore Parkway South, in accordance with NYCDEP rules and regulations. Because the City's sewers are sized and designed based on the designated zoning of an area, and related population density and surface coverage characteristics, proposed rezonings may result in development that is inconsistent with the design of the existing built sewer system. At this time, there are no plans to amend the drainage plan for the proposed affected area or upgrade to the affected sewer system. To be issued a permit to connect to a City sewer within the proposed rezoning area, an applicant proposing a new development or expansion of an existing development would be required to submit a site-specific hydraulic analysis to DEP for review and approval. The site-specific hydraulic analysis would establish the adequacy of the existing storm sewer system that would serve the development lot. Based on this site-specific hydraulic analysis, sewer improvements or onsite detention that account for downstream and upstream zoning may be required of the applicant at the time of the house or site connection proposal. Self-certification of house or site connection proposals will not be permitted by the Department of Buildings or DEP in connection with any proposed new developments or expansions of existing development for which sewer connections are required.

The proposed project incorporates a number of NYSDEC-compliant stormwater quality treatment devices. The proposed project would include BMPs such as surface swales known as "rain gardens" that would serve as a natural means of bio-filtration to cleanse stormwater. Soil restoration practices, including better draining soils, would improve on-site infiltration as compared to the existing condition and conditions in the future without the proposed project. Additionally, hydrodynamic separation devices would be installed to capture suspended solids,

such as sediment and other pollutants, prior to discharge to Gravesend Bay. In accordance with the SPDES GP-0-10-001, a SWPPP containing both temporary erosion and sediment controls and permanent water quality controls would be prepared before commencing any construction activities.

Through the incorporation of selected BMPs, stormwater runoff from the project site would not be expected to have any significant adverse impacts to the receiving waterbody or to the City's stormwater conveyance infrastructure. Furthermore, the proposed redevelopment of the project site with engineered stormwater control measures would be designed meet the requirements of the SWPPP which would reduce erosion and sediment transport into the Gravesend Bay. ✷