CHAPTER 11: WATER AND SEWER INFRASTRUCTURE

A. INTRODUCTION

New York City's water and sewer network is fundamental to the operation, health, safety, and quality of life of the City and its surrounding environment, and it must be sized to fit the users and surface conditions in order to function adequately. Ensuring these systems have adequate capacity to accommodate land use or density changes and new development is critical to avoid environmental and health problems, such as sewer back-ups, street flooding, or pressure reductions.[1]

The purpose of a water and sewer infrastructure analysis is to assess whether a proposed project may adversely affect the City's water distribution or sewer system and, if so, assess the effects of such a project to determine whether its impact will be significant.[2] As described in Chapter 1, "Project Description," the Proposed Actions would facilitate a net increase of approximately 2,553,585 square feet (sf) of residential use (2,557 dwelling units), 275,348 sf of commercial use, and 46,799 sf of community facility use as compared to the No-Action Condition on the 30 Projected Development Sites identified in the Reasonable Worst Case Development Scenario (RWCDS).

This chapter assesses the potential effects of the Proposed Actions on the City's water supply, wastewater treatment, and stormwater management in accordance with the 2014 *CEQR Technical Manual* guidance.

B. PRINCIPAL CONCLUSIONS

WATER SUPPLY

The Proposed Actions are not anticipated to result in any potentially significant adverse impacts on the City's water supply or water distribution system. According to the *CEQR Technical Manual*, a preliminary water infrastructure assessment is needed if the project would result in an exceptionally large demand for water (*e.g.,* those that are projected to use more than 1 million gallons per day (mgd) or is located in an area that experiences low water pressure). It is expected that, under the RWCDS, the 30 Projected Development Sites would consume approximately 892,344 gallons per day (gpd) of water in the With-Action Condition, which is a net increase of approximately 757,213 gpd (0.76 mgd) over the No-Action Condition. Future incremental water demand on the Projected Development Sites would be distributed over an approximately 20-block area and would represent less than 0.08 percent of New York City's average daily water supply of approximately one billion gpd.[3] Because the incremental water demand created by the Proposed Actions would be less than 1 mgd, and would not be in an area that experiences low water pressure, the Proposed Actions are not anticipated to result in any potentially significant adverse impacts to New York City's water supply or water distribution infrastructure.

[1] *CEQR Technical Manual* (2014), Chapter 13, "Water and Sewer Infrastructure."
[2] Ibid.
[3] Ibid.

WASTEWATER TREATMENT

The Proposed Actions are not anticipated to result in any potentially significant adverse impacts on the City's wastewater infrastructure or treatment facilities. According to the *CEQR Technical Manual*, a preliminary sewer infrastructure analysis is needed if the project is in a combined sewer area and would exceed the incremental development of 400 residential units or 150,000 square feet (sf) or more of commercial, public facility, and institutional and/or community facility space in the Bronx, Brooklyn, Staten Island, or Queens. The Proposed Actions are expected to facilitate a net increase of 2,557 dwelling units, 275,348 sf of commercial space, and 46,799 sf of community facility space in Staten Island. Therefore, a preliminary infrastructure analysis was conducted. In the With-Action Condition, wastewater from the Projected Development Sites would continue to be treated by the Port Richmond Waste Water Treatment Plant (WWTP), which processed an average of 24.58 mgd of dry weather flow between September 2015 and August 2016; the Port Richmond WWTP is designed to treat approximately 60 mgd of wastewater. Based on water usage and sewage generation rates in Table 13-2 of the *CEQR Technical Manual*, the development in the With-Action Condition would generate approximately 772,789 gpd of wastewater, which is a net increase of approximately 702,448 gpd (0.70 mgd) over the development in the No-Action Condition. This incremental generation of 702,448 gpd of wastewater represents approximately 1.17 percent of the Port Richmond WWTP wastewater capacity. Because the incremental wastewater generated by the Proposed Actions would not cause the Port Richmond WWTP to exceed its operational capacity, it is anticipated that the Proposed Actions would not result in significant adverse impacts to New York City's wastewater infrastructure or treatment facilities.

STORMWATER AND DRAINAGE MANAGEMENT

The Proposed Actions are not anticipated to result in any potentially significant adverse impacts on New York City's stormwater infrastructure or treatment facilities.

The Project Area is within subcatchment areas PR-011, PR-013, PR-014, and PR-031 of the Port Richmond WWTP. Compared to existing conditions, it is anticipated that, under the RWCDS, the With-Action Condition would generate an increase in stormwater volumes flowing to the combined sewer system during rainfall events of less than 0.01 mg in subcatchment area PR-013; a decrease of up to 0.01 mg in subcatchment area PR-014; and an increase of up to 0.08 mg in subcatchment area PR-031. As no new development would occur on the Projected Development Site located in subcatchment area PR-011 (City Disposition Site 1), no changes to stormwater flows in that subcatchment area would occur as a result of the Proposed Actions.

A portion of the Project Area is within a direct drainage area, where all stormwater runoff would be discharged directly into the Upper New York Bay. Compared to existing conditions, it is anticipated development in the With-Action Condition would generate a potential decrease in stormwater volumes directly discharged into the Upper New York Bay during rainfall events of approximately between 0.02 and 0.11 mg.

If increased combined flows to the City's combined sewer system occur during storm events that surpass the design capacity, the potential excess combined flow would be discharged into the Upper New York Bay through combined sewer outfalls (CSOs). The incremental stormwater flows created

by the Proposed Actions would not cause the Port Richmond WWTP to exceed its operational capacity. Therefore, it is not anticipated that the Proposed Actions would result in significant adverse impacts to New York City's stormwater infrastructure or treatment facilities.

C. METHODOLOGY

A preliminary water infrastructure analysis is needed if a proposed project would result in an exceptionally large demand for water (*e.g.,* those that are projected to use more than 1 mgd) or is in an area that experiences low water pressure (*e.g.,* areas at the end of the water supply distribution system).[4] Because the Project Area is not within an area that experiences low water pressure and would not incrementally require 1 mgd of water more, a preliminary water infrastructure analysis is not necessary.

A preliminary sewer infrastructure analysis is needed if a proposed project is in a combined sewer area and would exceed 400 residential units or 150,000 square feet (sf) of commercial, public facility, and institutional and/or community facility space in the Bronx, Brooklyn, Staten Island or Queens.[5] The Project Area is within an area served by combined sewers, and the Proposed Actions would result in a net increase of approximately 2,557 dwelling units and 322,147 sf of commercial and community facility uses; therefore, a preliminary sewer infrastructure analysis is necessary.

A preliminary sewer infrastructure analysis of City WWTPs and sewer capacity is performed by using rates defined in Table 13-2 of the *CEQR Technical Manual* to determine the existing sanitary flows or treated wastewater flows resulting from the area of the proposed project.[6] Using Table 13-2 in the *CEQR Technical Manual*, the anticipated sanitary flows or treated wastewater flows should be determined for the No-Action and With-Action conditions. The effect of the incremental sanitary flows or treated wastewater flows should be considered regarding the capacity of the applicable WWTP.

A preliminary sewer infrastructure analysis of combined sanitary and stormwater drainage is performed using the New York City Department of Environmental Protection (DEP) Flow Calculation Matrix to determine the changes to surfaces and drainage patterns between the existing conditions and the With-Action Condition for stormwater drainage, and between the No-Action and With-Action conditions for sanitary drainage. The Flow Calculation Matrix is used to determine the volume and peak discharge rates of stormwater expected from the sites in the With-Action Condition for a variety of rainfall events. If the matrix analysis shows either (i) an increase of 2 percent or more over existing conditions for dry and wet weather flows from the development sites for any rainfall event that would discharge to a drainage area of concern; or (ii) an increase of 5 percent or more over existing conditions for dry and wet weather flows from the development sites for any rainfall event in all other drainage areas, then the matrix should be reviewed by DEP. If the matrix indicates the increase in dry and wet weather flows would not surpass these thresholds, no further analysis is needed.[7]

[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.

The preliminary sewer infrastructure analysis in this chapter describes:

- Existing water and sewer infrastructure serving the Project Area;
- Existing water demand and wastewater generation, as well as existing volume and peak stormwater discharge rates, for Projected Development Sites;
- Anticipated water demand and wastewater generation in the No-Action Condition; and
- Anticipated water demand and wastewater generation for Projected Development Sites in the With-Action Condition, as well as the anticipated volume and peak stormwater discharge rates.

D. EXISTING CONDITIONS

WATER SUPPLY

Most of New York City obtains water from three surface water supply systems operated by DEP that form a network of reservoirs, aqueducts, and tunnels extending as far as 125 miles north of the City. The watersheds of the three systems cover almost 2,000 square miles, with 19 reservoirs and three controlled lakes, which have a storage capacity of approximately 550 billion gallons. Two of the three surface water systems, the Delaware and Catskill systems, collect water from watershed areas in the Catskill Mountains and deliver it to the Hillview Reservoir in Yonkers. The third surface water system, the Croton system, collects water from watershed areas in Dutchess, Putnam, and Westchester Counties and delivers it to the Jerome Park Reservoir in the Bronx. The water flows to the City through aqueducts, reaching most consumers by gravity alone; only some 4 percent of the City's water must be pumped to its final destination.[8]

Within the City, a grid of underground distribution mains brings water to consumers. Large mains—up to 96 inches in diameter—feed smaller mains (such as 20, 12 and 8 inch mains) that distribute water to individual locations. These mains also provide water to fire hydrants along many of the City's streets. Water pressure throughout the City water supply system is controlled by pressure regulators.[9]

As described in Chapter 1, "Project Description," a RWCDS was prepared for the Proposed Actions. Table 11-1 shows the existing uses on the 30 Projected Development Sites in the Project Area and their associated water consumption and wastewater generation rates, which are based on Table 13-2 in the *CEQR Technical Manual*. Based on the water consumption and wastewater generation rates, the existing uses have a cumulative water demand of approximately 132,306 gpd, including 65,528 gpd for domestic uses and approximately 66,778 gpd for air conditioning use.

WASTEWATER TREATMENT

Sewers beneath the City's streets collect sewage from buildings as well as stormwater from buildings and catch basins in streets. Collection sewers can be 10 inches to 2 feet in diameter on side streets,

[8] Ibid.
[9] Ibid.

and larger in diameter under other roadways. They connect to trunk sewers, generally 5 to 7 inches in diameter, which bring the sewage to interceptor sewers. These large interceptor sewers (often 11 or 12 feet in diameter) bring the wastewater collected from the various smaller mains to the WWTPs for treatment.[10]

Table 11-1: Existing Water Consumption & Waste Generation

Land Use	Water Consumption & Wastewater Generation Rates	Area/ Dwelling Units	Domestic Water/Wastewater Generation (gpd)[1]	Air Conditioning (gpd)
Residential	Domestic 257 gpd/ DU[2]	6 DU	1,542	-
Retail[3]	Domestic 0.24 gpd/sf A/C 0.17 gpd/sf	95,274 sf	22,866	16,197
Commercial/Office[4]	Domestic 0.10 gpd/sf A/C 0.17 gpd/sf	196,730 sf	19,673	33,444
Community Facility[5]	Domestic 0.10 gpd/sf A/C 0.17 gpd/sf	13,090 sf	1,309	2,225
Industrial/Warehouse/ Auto-Related Garage	Domestic 10,000 gpd/acre A/C 0.17 gpd/sf[6]	87,720 sf	20,138	14,912
Total Water Demand (gpd)			**132,306**	
Total Wastewater Generation (gpd)			**65,528**	

Source: *Consumption rates obtained from the CEQR Technical Manual (2014), Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.*

Notes:

[1] Gallons per day (gpd).

[2] Approximately 2.57 residents per dwelling unit (DU) for residential development within Community District 1 (100 gpd per resident).

[3] Use group comprises retail, supermarket, and restaurant.

[4] Comprises commercial office and other commercial.

[5] Same rate as commercial/ office. Includes all community facility uses.

[6] Rate for industrial/warehouse/auto-related garage is from DEP's *Draft Rules and Regulations Governing the Construction of Private Sewers and Drains.*

During dry weather, combined sewers function as sanitary sewers, conveying all flows to the WWTPs for treatment. During wet weather, however, large volumes of rainfall runoff can enter the system from building connections and through catch basins along the City's streets. If this water were directly conveyed to the WWTPs, it would exceed their design capacity; the plants are designed to handle only twice their average design dry-weather flow. To avoid flooding, the WWTPs "regulators" are built into the combined sewers to act as relief valves. These are chambers set to divert two times the average design dry-weather flow into the interceptor; during storms, if a greater amount of combined flow reaches the regulator, the excess is directed to outfalls into the nearest waterway (*e.g.,* the Hudson River, East River). During such overflow periods, a portion of the sanitary sewage entering, or already in, the combined sewers discharges untreated into the waterway along with stormwater and debris washed from streets. This untreated overflow is known as CSO.[11]

Each of the City's WWTPs is regulated through a State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (NYSDEC) to ensure that water quality in the receiving water body is not adversely affected by WWTP effluent.

[10] Ibid.

[11] Ibid.

The SPDES permits specify the maximum average monthly dry-weather flow in mgd (based on the quantity of wastewater that the plants can adequately treat), and such effluent parameters as (i) the minimum percent (85 percent) of biological oxygen demand (BOD) that must be removed (BOD, a measure of the amount of oxygen consumed in decomposition of organic matter, is an indicator of the quantity of organic pollution in wastewater); (ii) the minimum percent of suspended solid loading that must be removed (85 percent); (iii) the maximum concentrations of suspended solids, fecal coliform, settleable solids, and other pollutants; and (iv) the range of acceptable pH levels. The SPDES permits also stipulate monitoring requirements for the regulated parameters, as well as for odor control, and require infiltration/inflow assessments and correction programs if the plants reach a certain percent of their permitted capacity.[12]

According to NYSDEC, Port Richmond WWTP, the municipal sewage treatment plant, is located at 1801 Richmond Terrace, Staten Island, NY 10310. Port Richmond WWTP was assigned DEC ID. 2-6401-00012 and SPDES No. NY0026107. According to the *New York City's Wastewater Treatment System* report, the catchment area for this WWTP is approximately 9,665 acres, servicing the northern section of Staten Island (Figure 11-1). [13]

The quality of the effluent from the Port Richmond WWTP is regulated through a SPDES permit issued by the NYSDEC. The permit specifies the maximum allowable limit for multiple effluent parameters including suspended solids, fecal coliform bacteria, and other pollutants. There are 37 CSOs from Port Richmond WWTP regulated under the SPDES Permit No. NY0026107.

According to New York City's Wastewater Treatment System report, the plant has been operating since 1953 and maintains a 60 mgd design capacity, which serves a population of approximately 198,128. Port Richmond was one of five new WWTPs constructed to meet the requirements of the population increase of New York City between 1945 and 1965.[14] As shown in Table 11-2 below, the Port Richmond WWTP has an operational capacity of approximately 60 mgd and currently operates with an average dry weather flow of approximately 24.58 mgd (between September 2015 and August 2016), maintaining an excess capacity of approximately 35.42 mgd.

Four CSOs serve the four subcatchment areas within the Project Area:

1. Hamilton Avenue CSO serves subcatchment area 11;
2. A 10-foot by 6-foot CSO on Victory Boulevard serves subcatchment area 13;
3. A 15.5-foot by 5-foot CSO on Baltic Street serves subcatchment area 14; and
4. A 12-foot by 8-foot CSO on Canal Street serves subcatchment area 31.

[12] Ibid.
[13] *New York City's Wastewater Treatment System*, New York City Department of Environmental Protection (DEP).
[14] Ibid.

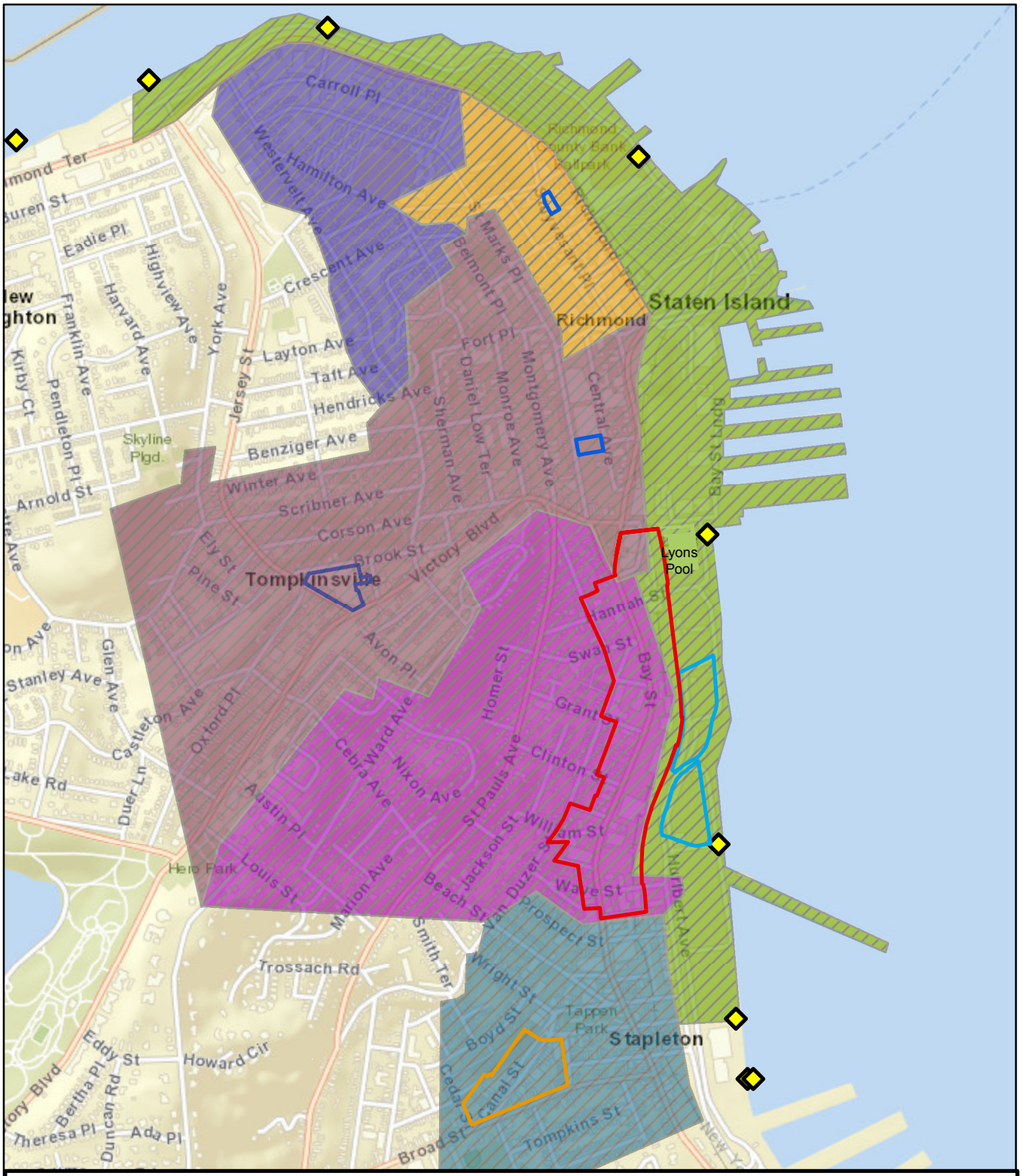

FIGURE 11-1: COMBINED SEWER OUTFALL & SUBCATCHMENT AREA MAP

BAY STREET CORRIDOR REZONING AND RELATED ACTIONS

STATEN ISLAND, NY

Prepared by Langan

0 625 1,250 2,500 Feet

N

- Direct Drainage Area
- PR-013
- PR-011
- PR-014
- PR-019
- PR-031
- City Disposition Sites
- Stapleton Waterfront Phase III Sites
- Bay Street Corridor Project Area
- Canal Street Corridor Project Area
- CSO Locations

Table 11-2: 2015-2016 Monthly Average Dry Weather Flows to Port Richmond WWTP

Month	Port Richmond WWTP (mgd)[1]
2015	
September	23
October	23
November	23
December	25
2016	
January	26
February	31
March	26
April	23
May	23
June	23
July	26
August	23
Average	**24.58**

Source: *New York City Department of Environmental Protection (DEP).*
Notes: *[1] mgd = million gallons per day.*

There is a monolithic intercepting sewer on Front Street; the sewer increases from a 60-inch diameter to a 66-inch diameter at regulator R-15 (approximately at the continuation of Baltic Street). The intercepting sewer diameter decreases to 42 inches at regulator R-13B at the intersection of Canal Street and Front Street.

According to the amended drainage plan in the Stapleton and Tompkinsville neighborhoods of the Borough of Richmond dated November 21, 1973, the following outfalls are abandoned:

1. The outfall along Victory Boulevard is shown to be abandoned and replaced by a 10-foot by 6-foot CSO; and

2. The outfall along Baltic Street is shown to be abandoned and replaced by a 15.5-foot by 5-foot CSO.

According to the amended drainage plan in the Stapleton and Tompkinsville neighborhoods of the Borough of Richmond dated November 21, 1973, the following outfalls are proposed:

1. A 14-foot by 5-foot CSO along Water Street.[15]

There are no DEP records to confirm whether the actions detailed in the amended drainage plan described above have been implemented.

[15] Amended drainage plan in the Stapleton and Tompkinsville neighborhoods of the Borough of Richmond dated November 21, 1973, was provided to Langan by Department of Environmental Protection (DEP).

The Project Area is served primarily by combined sewers, containing Cast Iron Pipe (CIP), Clay Pipe (CP), and Vitrified Clay Pipe (VCP) sanitary sewers. There is an existing interceptor sewer beneath Front Street receiving the majority of the existing Project Area stormwater and sanitary flows.

Two of the Projected Development Sites (Stapleton Waterfront Phase III Sites A and B1) are located within a direct drainage area. According to the New Stapleton Waterfront Development as-built survey dated November 18, 2013, there is an existing 48-inch storm sewer and a 12-inch sanitary sewer along Front Street. According to DEP Map BW50 Contract GE 343, there is a 60-inch water main (constructed in 2016) that extends from the intersection of Murray Hulbert Avenue and Victory Boulevard to the intersection of Swan Street and Bay Street, via Murray Hulbert Avenue and passes through the area between Murray Hulbert Avenue and Bay Street.

As described in Chapter 1, "Project Description," the RWCDS identified 30 Projected Development Sites in the Project Area. As shown in Figure 11-1, the Project Area spans four subcatchment areas (PR-011, PR-013, PR-014 and PR-031); all flow to the Port Richmond WWTP. Subcatchment area PR-011 contains one Projected Development Site; subcatchment area PR-013 contains three Projected Development Sites; subcatchment area PR-014 contains 16 Projected Development Sites; and PR-031 contains eight Projected Development Sites. In addition, two Projected Development Sites (Stapleton Waterfront Phase III Sites A and B1) exist in a direct drainage area that discharges directly into the Upper New York Bay.

Table 11-3 shows the approximate existing wastewater generated on the Projected Development Sites within each of the applicable subcatchment areas.

Table 11-3: Existing Wastewater Generation on the Projected Development Sites

Subcatchment Area	Wastewater Generated (gpd)[1]
PR-011	3,768
PR-013	13,575
PR-014	36,413
PR-031	6,772
Direct Drainage	5,000
Total	65,528

Source: *Consumption rates obtained from the CEQR Technical Manual* (2014*), Chapter 13, Table 13-2.*
Notes: *[1] Gallons per day (gpd).*

STORMWATER AND DRAINAGE MANAGEMENT

Stormwater runoff is generated by rainwater collecting across a variety of surfaces and built structures. The volume of runoff generated varies depending on the type of land cover, which can either be pervious or impervious. DEP defines runoff coefficients to correlate with the pervious or impervious qualities of the land cover. Grass and softscape have a runoff coefficient of 0.20 because their ability to absorb a portion of the rainfall, whereas roof area and pavement have much higher runoff coefficients of 1.00 and 0.85 respectively, due to their inability to absorb or sequester rainfall.

The majority of the Projected Development Sites are currently occupied by buildings or paved impervious surfaces. Some parcels within PR-031, however, are largely vacant and remain undeveloped. The total lot area of the Projected Development Sites is approximately 1,178,023 sf. Of

the Project Area's total surface area, approximately 1 percent is within subcatchment PR-011; 15 percent is within subcatchment area PR-013; 47 percent is within subcatchment area PR-014; 10 percent is within subcatchment area PR-031; and 27 percent is within the area that discharges directly into the Upper New York Bay.

The total lot area of the Projected Development Sites comprises approximately 26 percent roof area, 64 percent pavement and walkways, and 10 percent grass and softscape. As shown in Table 11-4, the existing weighted runoff coefficients for subcatchment areas PR-011, PR-013, PR-014, PR-031 and the direct drainage area are 0.78, 0.94, 0.85, 0.43 and 0.86, respectively.

Table 11-4: Existing Projected Development Sites Runoff Coefficients

Subcatchment Area	Surface Type	Roof	Pavement and Walks	Grass and Softscape	Total
PR-011	Area (%)	61	14	24	100
	Surface Area (sf)	7,040	1,664	2,796	11,500
	Runoff Coefficient[1]	1.00	0.85	0.20	0.78
PR-013	Area (%)	61	39	0	100
	Surface Area (sf)	107,546	69,601	0	177,147
	Runoff Coefficient	1.00	0.85	0.20	0.94
PR-014	Area (%)	27	67	6	100
	Surface Area (sf)	148546	374,094	34,179	556,819
	Runoff Coefficient	1.00	0.85	0.20	0.85
PR-031	Area (%)	22	8	69	100
	Surface Area (sf)	26,396	9,808	82,475	118,679
	Runoff Coefficient	1.00	0.85	0.20	0.43
Direct Drainage	Area (%)	6	94	0	100
	Surface Area (sf)	18,833	295,045	0	313,878
	Runoff Coefficient	1.00	0.85	0.20	0.86

Source: *Department City Planning (DCP) Footprint and PLUTO data; aerial photographs.*
Notes: [1] Runoff coefficients for each surface type as per Department of Environmental Protection (DEP).

As shown in Table 11-5, standard DEP runoff coefficients were used to determine the approximate amount of stormwater runoff generated during a variety of rainfall events over specified periods of time ranging from 3.8 to 19.5 hours. Depending on intensity and continuity during storm events with up to 2.5 inches of rainfall, the Projected Development Sites may generate up to 0.01 mg of stormwater within subcatchment area PR-011; 0.26 mg of stormwater within subcatchment area PR-013; 0.74 mg of stormwater within subcatchment area PR-014; 0.08 mg of stormwater within subcatchment area PR-031; and 0.42 mg of stormwater within the direct drainage area. Depending on intensity and continuity during storm events with up to 2.5 inches of rainfall, the total volumes (stormwater and sanitary sewage) flowing to the combined sewer system range from 0.00 to 0.01 mg in subcatchment area PR-011; 0.00 to 0.27 mg in subcatchment area PR-013; 0.00 to 0.77 mg in subcatchment area PR-014; 0.00 to 0.09 mg in subcatchment area PR-031; and 0.00 mg in the direct drainage area.

Table 11-5: Existing Combined Stormwater Runoff and Wastewater Generation from the Projected Development Sites

Subcatchment Area	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient[2]	Stormwater Runoff (mg)	Sanitary to CSS[1] (mg)[3]	Total Volume to CSS[1] (mg)[3]
PR-011	0.00	3.80	0.26	0.78	0.00	0.00	0.00
	0.40	3.80			0.00	0.00	0.00
	1.20	11.30			0.01	0.00	0.01
	2.50	19.50			0.01	0.00	0.01
PR-013	0.00	3.80	4.07	0.94	0.00	0.00	0.00
	0.40	3.80			0.04	0.00	0.04
	1.20	11.30			0.12	0.00	0.12
	2.50	19.50			0.26	0.01	0.27
PR-014	0.00	3.80	12.82	0.85	0.00	0.01	0.01
	0.40	3.80			0.12	0.01	0.13
	1.20	11.30			0.35	0.02	0.37
	2.50	19.50			0.74	0.03	0.77
PR-031	0.00	3.80	2.72	0.43	0.00	0.00	0.00
	0.40	3.80			0.01	0.00	0.01
	1.20	11.30			0.04	0.00	0.04
	2.50	19.50			0.08	0.01	0.09
Direct Drainage	0.00	3.80	7.21	0.86	0.00	0.00	0.00
	0.40	3.80			0.08	0.00	0.00
	1.20	11.30			0.24	0.00	0.00
	2.50	19.50			0.50	0.00	0.00

Source: *Calculated using DEP runoff coefficients*
Notes:
[1] Combined sewer system (CSS).
[2] Refer to Table 11-4.
[3] Derived from Table 11-3; million gallons (mg).

E. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO-ACTION CONDITION)

As described in Chapter 1, "Project Description," the development under the No-Action Condition is expected to result in an incremental increase over existing conditions of approximately 6 residential units and 24,789 sf of additional community facility space; and a net decrease of 36,489 sf of commercial space. In total, the resulting development absent the Proposed Actions would comprise 12 dwelling units, 343,235 sf of commercial uses, and 37,879 sf of community facility space.

WATER SUPPLY

As shown in Table 11-6, development under the No-Action Condition would generate a water demand of approximately 135,130 gpd, an increase of approximately 2,825 gpd over existing conditions.

Table 11-6: No-Action Water Consumption

Land Use	Water Consumption & Wastewater Generation Rates	Area/ Dwelling Units	Domestic Water/Wastewater Generation (gpd)[1]	Air Conditioning (gpd)[1]
Residential[2]	Domestic 257 gpd/ DU[2]	12	3,084	-
Retail[3]	Domestic 0.24 gpd/sf A/C 0.17gpd/sf	208,183	49,964	35,391
Commercial/Office[4]	Domestic .10 gpd/sf A/C .17gpd/sf	135,052	13,505	22,959
Community Facility[5]	Domestic 0.10 gpd/sf A/C 0.17gpd/sf	37,879	3,788	6,439
Total Water Demand (gpd)			**135,130**	
Total Wastewater Generation (gpd)			**70,341**	

Source: *Consumption rates obtained from the 2014 CEQR Technical Manual Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment."*
Notes:
[1] Gallons per day (gpd).
[2] Approximately 2.57 residents per dwelling unit (DU) for residential development within Community District 1 (100 gpd per resident).
[3] Use group comprises retail, supermarket, and restaurant.
[4] Comprises commercial office and other commercial.
[5] Same rate as commercial/ office. Includes all community facility uses.

WASTEWATER TREATMENT

In the No-Action Condition, wastewater generated on the 30 Projected Development Sites would total approximately 70,341 gpd, which is an increase of approximately 4,814 gpd over the existing conditions. As shown in Table 11-7, approximately 5 percent (3,768 gpd) would be generated within subcatchment area PR-011; 17 percent (11,767 gpd) would be generated within subcatchment area PR-013; 55 percent (38,695 gpd) would be generated within subcatchment area PR-014; 23 percent (16,112 gpd) would be generated within subcatchment area PR-031; and 0 percent (0 gpd) would be generated within the direct drainage area. Because the Port Richmond WWTP currently operates with an excess capacity of approximately 35.42 mgd, this increase of 4,814 gpd of wastewater in the No-Action would not over burden the Port Richmond WWTP.

Table 11-7: No-Action Wastewater Generation on the Projected Development Sites

Subcatchment Area	Wastewater Generated (gpd)[1]
PR-011	3,768
PR-013	11,767
PR-014	38,695
PR-031	16,112
Direct Drainage	0
Total	70,341

Source: *Consumption rates obtained from the CEQR Technical Manual* (2014*), Chapter 13, Table 13-2.*
Notes: *[1] Gallons per day (gpd).*

STORMWATER AND DRAINAGE MANAGEMENT

In the No-Action Condition, stormwater runoff would continue to be captured and conveyed through the existing combined sewer system to be processed at the Port Richmond WWTP. Because development anticipated in the No-Action Condition would occur on previously developed lots, a significant change to stormwater runoff as compared to existing conditions is not anticipated. Further, in the No-Action Condition, stormwater runoff would continue to be captured and conveyed through the existing combined sewer system to be processed at the Port Richmond WWTP. In addition, all new development within the Project Area under the No-Action Condition would be subject to DEP review for compliance with the existing drainage plan; therefore, if a site's storm water runoff is expected to exceed the allowable flow, then mitigation measures, such as onsite stormwater detainment, may be necessary.

F. THE FUTURE WITH THE PROPOSED ACTIONS (WITH-ACTION CONDITION)

As described in Chapter 1, "Project Description," the development in the With-Action Condition would result in approximately 2,568,971 sf of residential use (approximately 2,569 dwelling units); 618,583 sf of commercial uses, including 316,939 sf of office use, 230,644 sf of retail use, and 71,000 sf of restaurant use; and 84,678 sf of community facility use. This represents a net increase over the No-Action Condition of 2,553,585 sf of residential use (2,557 dwelling units), 275,348 sf of commercial use, and 46,799 sf of community facility use.

WATER SUPPLY

Under the RWCDS, future development in the With-Action Condition is anticipated to consume approximately 892,344 gpd of water, which is an approximately 757,213 gpd increase over the No-Action Condition (refer to Table 11-8), or less than 0.08 percent of New York City's average daily water supply of approximately one billion gpd. This incremental demand of 757,213 gpd of water is less than the one mgd that necessitates a detailed analysis of water supply pursuant to *CEQR Technical Manual* guidance. In addition, the incremental water demand would not occur in an area that experiences low water pressure. Based on this information, further assessment of the Proposed Actions potential effect on water supply is not necessary; therefore, the Proposed Actions are not anticipated to result in any potentially significant adverse impact to New York City's water supply or water distribution infrastructure.

WASTEWATER TREATMENT

The wastewater generated from the development in the With-Action Condition would continue to be treated by the Port Richmond WWTP, which has an operating capacity of approximately 60 mgd.

Under the RWCDS, future development on the 30 Projected Development Sites in the With-Action Condition is expected to generate approximately 772,789 gpd of wastewater, which is an increase of approximately 702,448 gpd of wastewater over the No-Action Condition (refer to Table 11-8). As shown in Table 11-9, approximately 1 percent (3,768 gpd) would be generated within subcatchment area PR-011; 12 percent (92,647 gpd) would be generated within subcatchment area PR-013; 56 percent (433,009 gpd) would be generated within subcatchment area PR-014; 9 percent (71,906

gpd) would be generated within subcatchment area PR-031; and 22 percent (171,459 gpd) would be generated within the direct drainage area.

Table 11-8: With-Action Water Consumption

Land Use	Water Consumption & Wastewater Generation Rates	Area/Dwelling Units	Domestic Water/Wastewater Generation (gpd)[1]	Air Conditioning (gpd)[1]
Residential[2]	Domestic 257 gpd/ DU[2]	2,569	660,233	-
Retail[3]	Domestic 0.24 gpd/sf A/C 0.17gpd/sf	301,644	72,395	51,279
Commercial/Office[4]	Domestic 0.10 gpd/sf A/C 0.17gpd/sf	316,939	31,694	53,880
Community Facility[5]	Domestic 0.10 gpd/sf A/C 0.17gpd/sf	84,678	8,468	14,395
Total Water Demand (gpd)			**892,344**	
No-Action to With-Action Incremental Water Demand (gpd)			**757,213**	
Total Wastewater Generation (gpd)			**772,789**	
No-Action to With-Action Incremental Wastewater Generation (gpd)			**702,448**	

Source: *Consumption rates obtained from the CEQR Technical Manual (2014), Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment."*
Notes:
[1] Gallons per day (gpd).
[2] Approximately 2.57 residents per dwelling unit (DU) for residential development within Community District 1 (100 gpd per resident).
[3] Use group comprises retail, supermarket, and restaurant.
[4] Comprises commercial office and other commercial.
[5] Same rate as commercial/ office. Includes all community facility uses.

Table 11-9: With-Action Wastewater Generation on the Projected Development Sites

Subcatchment Area	Wastewater Generated (gpd)[1]
PR-011	3,768
PR-013	92,647
PR-014	433,009
PR-031	71,906
Direct Drainage	171,459
Total	772,789

Source: *Consumption rates obtained from the CEQR Technical Manual (2014), Chapter 13, Table 13-2.*
Notes: [1] Gallons per day (gpd).

The Port Richmond WWTP has an operational capacity of approximately 60 mgd and currently operates with an average dry weather flow of approximately 24.58 mgd, maintaining an excess capacity of approximately 35.42 mgd. The incremental 702,448 gpd (0.70 mgd) of wastewater generated by the Projected Development Sites in the With-Action Condition would represent approximately 1.17 percent of Port Richmond WWTP's total capacity. The development in the With-Action condition would result in an increased flow of approximately 0.70 mgd, therefore, it is anticipated Port Richmond WWTP would process approximately 25.28 mgd of wastewater with an excess capacity of approximately 34.72 mgd.

The wastewater generated by the RWCDS in the With-Action Condition would not cause the Port Richmond WWTP to operate over capacity; therefore, the Proposed Actions are not anticipated to result in any potentially significant adverse impacts to the City's wastewater treatment infrastructure.

STORMWATER AND DRAINAGE MANAGEMENT

Under the RWCDS, future development on the 30 Projected Development Sites in the With-Action Condition is expected to result in a decrease of impervious surface in subcatchment area PR-014 and the direct drainage area, and would result in an increase of impervious surface in subcatchment areas PR-011, PR-013 and PR-031. The increase of impervious surface in subcatchment areas PR-011, PR-013 and PR-031 is anticipated because the development in the With-Action Condition would improve underutilized or undeveloped lots with new, less pervious surfaces. As shown in Table 11-10, it is anticipated that the roof area on the Projected Development Sites would comprise 61 percent of subcatchment area PR-011; 68 percent of subcatchment area PR-013; 62 percent of subcatchment area PR-014; 70 percent of subcatchment area PR-031; and 37 percent of the direct drainage area.

Future development in the With-Action Condition would improve previously undeveloped lots with structures that are expected to result in a greater runoff coefficient for subcatchment areas PR-011, PR-013 and PR-031. As shown in Table 11-10, the weighted runoff coefficients for the Projected Development Sites would be 0.78 in subcatchment area PR-011; 0.95 in subcatchment area PR-013; 0.82 in subcatchment area PR-014; 0.86 in subcatchment area PR-031; and 0.64 in the direct drainage area.

Table 11-10: With-Action Projected Development Sites Runoff Coefficients

Subcatchment Area	Surface Type	Roof	Pavement and Walks	Grass and Softscape	Total
PR-011	Area (%)	61	14	24	100
	Surface Area (sf)	7,040	1,664	2,796	11,500
	Runoff Coefficient[1]	1.00	0.85	0.20	0.78
PR-013	Area (%)	68	32	0	100
	Surface Area (sf)	119,782	57,365	0	177,147
	Runoff Coefficient[1]	1.00	0.85	0.20	0.95
PR-014	Area (%)	62	19	19	100
	Surface Area (sf)	347,321	104,749	104,749	556,819
	Runoff Coefficient[1]	1.00	0.85	0.20	0.82
PR-031	Area (%)	70	15	15	100
	Surface Area (sf)	82,980	17,850	17,850	118,679
	Runoff Coefficient[1]	1.00	0.85	0.20	0.86
Direct Drainage	Area (%)	37	23	40	100
	Surface Area (sf)	116,040	70,551	127,287	313,878
	Runoff Coefficient[1]	1.00	0.85	0.20	0.64

Source: *NYC Department City Planning (DCP) Footprint and PLUTO data; aerial photographs.*
Notes: [1] Runoff coefficients for each surface type provided by NYC Department of Environmental Protection (DEP).

As shown in Table 11-11, combined stormwater runoff and wastewater generation was calculated using standard DEP runoff coefficients to determine the approximate amount of stormwater runoff generated during a variety of rainfall events over specified periods of time ranging from 3.8 to 19.5

hours. Depending on intensity and continuity during storm events with up to 2.5 inches of rainfall, the development on the Projected Development Sites would generate up to 0.01 mg of stormwater runoff within subcatchment area PR-011; 0.26 mg of stormwater runoff within subcatchment area PR-013; 0.71 mg of stormwater runoff within subcatchment area PR-014; 0.16 mg of stormwater runoff within subcatchment area PR-031; and 0.31 mg of stormwater runoff within the direct drainage area.

Depending on intensity and continuity during storm events with up to 2.5 inches of rainfall, the total volumes (stormwater and sanitary sewage) flowing to the combined sewer system range from 0.00 to 0.01 mg in subcatchment area PR-011; from 0.01 to 0.33 mg in subcatchment area PR-013; from 0.07 to 1.06 mg in subcatchment area PR-014; from 0.01 to 0.22 mg in subcatchment area PR-031; and from 0.02 to 0.13 mg in the direct drainage area.

Table 11-11: With-Action Combined Stormwater Runoff and Wastewater Generation from the Projected Development Sites

Subcatchment Area	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient[3]	Stormwater Runoff (mg)[2]	Sanitary to CSS[1] (mg)[2]	Total Volume to CSS[1] (mg)[2]
PR-011	0.00	3.80	0.26	0.78	0.00	0.00	0.00
	0.40	3.80			0.00	0.00	0.00
	1.20	11.30			0.01	0.00	0.01
	2.50	19.50			0.01	0.00	0.01
PR-013	0.00	3.80	4.07	0.95	0.00	0.01	0.01
	0.40	3.80			0.04	0.01	0.05
	1.20	11.30			0.13	0.04	0.17
	2.50	19.50			0.26	0.07	0.33
PR-014	0.00	3.80	12.82	0.82	0.00	0.07	0.07
	0.40	3.80			0.11	0.07	0.18
	1.20	11.30			0.34	0.20	0.54
	2.50	19.50			0.71	0.35	1.06
PR-031	0.00	3.80	2.72	0.86	0.00	0.01	0.01
	0.40	3.80			0.03	0.01	0.04
	1.20	11.30			0.08	0.03	0.11
	2.50	19.50			0.16	0.06	0.22
Direct Drainage	0.00	3.80	7.21	0.64	0.00	0.02	0.02
	0.40	3.80			0.05	0.02	0.02
	1.20	11.30			0.15	0.08	0.08
	2.50	19.50			0.31	0.13	0.13

Notes: [1] Combined sewer system (CSS).
[2] Million gallons (mg).
[3] Refer to Table 11-9.

Depending on the rainfall event, combined stormwater flows from the RWCDS development generated in the With-Action Condition would increase by between 0.01 and 0.06 mg in subcatchment area PR-013; between 0.05 and 0.29 mg in subcatchment area PR-014; between 0.01 to 0.13 mg in subcatchment area PR-031; and between approximately 0.02 and 0.13 mg of combined stormwater. As no additional floor area or changes to surface area would occur on the Projected

Development Site in subcatchment area PR-011 (City Disposition Site 1), no changes to stormwater flows in the subcatchment area would occur as a result of the Proposed Actions.

STORMWATER BEST MANAGEMENT PRACTICES

The increased stormwater flows generated by the development in the With-Action Condition would continue to be conveyed to the Port Richmond WWTP. Stormwater Best Management Practices (BMPs) would be implemented to create opportunities for Projected Development Sites to incorporate on-site stormwater source controls during site planning and building design phases of development.

Pursuant to Chapter 31 of Title 15 of the Rules of the City of New York (RCNY) for a new development, the stormwater release rate is the greater of 0.25 cubic feet per second (cfs) or 10 percent of the allowable flow. For alterations, the stormwater release rate for the altered areas will be directly proportional to the ratio of the altered area to the total site area, and no new points of discharge are permitted. Therefore, any new developments or alterations in the With-Action Condition requiring a connection to the sewer system would be required to achieve a new flow rate. Flexibility in achieving this rate is provided to the development community through a variety of approvable systems, including subsurface and rooftop systems. Joint DEP and New York City Department of Buildings (DOB) guidelines are available to ensure the proper design and construction in the early stages of site planning and building design. This performance standard allows for a wide range of management techniques, costs, and space considerations.

A variety of BMPs could be implemented on the Projected Development Sites to facilitate stormwater source controls and limit the stormwater release rate to the required 0.25 cfs or 10 percent of the allowable flow per the drainage plan, whichever is greater.

The increased flow to the combined sewer system would be a direct result of the increased densities and sanitary flows associated with the development in the With-Action Condition. The implementation of low-flow fixtures, as per the New York City Plumbing Code, Local Law 33 of 2007, and the U.S. Environmental Protection Agency's WaterSense Program, would help to potentially reduce sanitary flows. To further offset these increases, on-site stormwater control measures of BMPs would be implemented to retain or slowly release stormwater runoff with controlled discharge rates to the City's combined sewer system in accordance with Chapter 31 of Title 15 of the Rules of the City of New York (RCNY).

Enhanced stormwater management throughout the City is consistent with recent government initiatives, including the *New York City Green Infrastructure Plan* and *PlaNYC*. The *New York City Green Infrastructure Plan*, released in September 2010, includes a goal of capturing the first inch of rainfall on 10 percent of the impervious areas in combined sewer watersheds through detention or infiltration techniques over a 20-year period.

For each Projected Development Site, developers would be required to incorporate BMPs to limit stormwater from the site to the sewer system to the greater of 0.25 cfs or 10 percent of the allowable flow. To achieve this release rate, stormwater could be managed by utilizing one of a combination of detention or infiltration techniques identifies in the *New York City Green Infrastructure Plan*. Green technologies, such as green roofs and blue roofs, subsurface detention and infiltration, and

permeable pavement, would retain or release stormwater with stifled discharge rates to control peak runoff rates. Trees planted per the City's street tree requirement could also be utilized to capture and store water below an enhanced tree pit. These BMPs, among other potential measures, would help to avoid excessive stormwater flow to the Port Richmond WWTP.

Under the RWCDS, future development in the With-Action Condition would result in an increase of flows to the City's combined sewer system that may be discharged through CSOs into the Upper New York Bay. Because the Port Richmond WWTP currently operates with a 35.42-mgd excess capacity, the anticipated flow increase into the combined sewer system is not anticipated to adversely affect water quality. Based on the DEP matrix and the required BMP measures that would be implemented on each Projected Development Site to ensure runoff requirements are upheld, the Proposed Actions are not anticipated to result in any potentially significant adverse impacts to New York City's stormwater infrastructure or treatment facilities.