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.

This chapter assesses the potential effects of the proposed action/RWCDS on the City's water supply, wastewater treatment, and stormwater management infrastructure. As outlined in Chapter 1, "Project Description," the proposed action/RWCDS would facilitate the development of 1,147,378 gross square feet (gsf) of residential space, comprising approximately 1,147 dwelling units (DUs) of which approximately 803 DUs would be market rate units and 344 DUs would be affordable housing, with approximately 4,072 residents; approximately 64,807 gsf of local retail space; approximately 427 accessory parking spaces; and a 26,000-sf of public accessible open space.

B. PRINCIPAL CONCLUSIONS

Based on the methodology set forth in the 2014 *City Environmental Quality Review* (CEQR) *Technical Manual*, the analysis finds that the proposed action/RWCDS would not result in a significant adverse impact on the City's water supply or wastewater and stormwater conveyance and treatment infrastructure.

Water Supply

The anticipated water usage of the proposed action is expected to total 433,771 gallons per day (gpd), which would represent less than 0.05 percent of the approximately one billion gallons of water supplied daily to New York City by DEP. Given this relatively minor incremental increase in water consumption as compared to citywide demand and that the project area is not in an area that experiences low water pressure, the proposed action/RWCDS is not expected to adversely affect the City's water supply or system water pressure.

Sanitary (Dry Weather) Flows

The estimated amount of sanitary sewage generated by the proposed action/RWCDS would be 422,754 gpd. This amount would represent approximately 0.2 percent of the average daily flow of 218 million gallons per day (mgd) at the Newtown Creek Wastewater Treatment Plant (WWTP) and would not result in an exceedance of the plant's permitted capacity of 310 mgd. 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, the proposed rezoning may result in development that is inconsistent with the design of the existing built sewer system. To be issued a permit to connect to the City sewer, a site-specific hydraulic analysis may be required to determine whether the existing sewer system is capable of supporting higher density development and related increases in sanitary flows. Sewer improvements and/or a new drainage plan, may also be required of the future site developer at the time of the house or site connection proposal. Therefore, the proposed action/RWCDS would not create a significant adverse impact on the City's sanitary sewage treatment system. In addition, per the New York City Plumbing Code (Local Law 33 of 2007), low-flow fixtures would be required to be implemented and would help to reduce sanitary flows from the proposed action/RWCDS.

Stormwater (Wet Weather) Flows

Compared to existing conditions, in the future with the proposed action/RWCDS, the combined wet weather flows from the project area would increase by 0.07 million gallons (mg) to 0.43 mg, depending on rainfall duration and intensity, over existing conditions. As a New York State Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) is required for any development that would involve soil disturbance of one or more acres, a Stormwater Pollution Prevention Plan (SWPPP), consisting of both temporary erosion and sediment controls and post-construction stormwater best management practices (BMPs), would be required of the future development on the project area blocks. Sewer improvements and/or a new drainage plan, may also be required to be completed at the time of the house or site connection proposal.

Accordingly, the proposed action/RWCDS would not result in any significant adverse water and sewer infrastructure impacts.

C. METHODOLOGY

Water Supply

The *CEQR Technical Manual* recommends a preliminary water analysis if a project would result in an exceptionally large demand of water (over one million gpd), or is located in an area that experiences low water pressure (i.e., in an area at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). The project area is not in an area that experiences low water pressure. While the proposed action/RWCDS would result in an incremental water demand of 433,771 gpd,[1] this would not represent a significant increase in demand on the New York City water supply system. Therefore, an analysis of water supply is not warranted since it is expected that there would be adequate water service to meet the incremental demand, and there would be no significant adverse impacts on the City's water supply.

[1] Refer to Table 10-3 which presents the calculations of the project area's water usage under RWCDS With-Action conditions.

Wastewater and Stormwater Conveyance and Treatment

For wastewater and stormwater conveyance and treatment, the *CEQR Technical Manual* indicates that a preliminary assessment would be needed if a project is located in a combined sewer area and would exceed the following incremental development of residential units or commercial space above the predicted No-Action scenario: (a) 1,000 residential units or 250,000 sf of commercial space or more in Manhattan; or (b) 400 residential units or 150,000 sf of commercial space or more in the Bronx, Brooklyn, Staten Island, or Queens. As the proposed action/RWCDS would result in a net increase of more than 400 DUs in Brooklyn, this chapter assesses the potential effects of the proposed action/RWCDS on the wastewater and stormwater conveyance and treatment system. Existing and future water demand and sanitary sewage generation are calculated based on use rates set by the *CEQR Technical Manual*.[2] The DEP Flow Volume Calculation Matrix is used to calculate the overall combined sanitary sewage and stormwater runoff volume discharged to the combined sewer system for four rainfall volume scenarios with varying durations. The ability of the City's sewer infrastructure to handle the anticipated demand from the proposed action/RWCDS is assessed by estimating existing sewage generation rates and comparing these existing rates with the With Action condition, per *CEQR Technical Manual* methodology.

D. EXISTING CONDITIONS

Sewer System

According to the *CEQR Technical Manual*, wastewater is considered to include sanitary sewage, wastewater generated by industries, and stormwater. Water used for air conditioning generates a negligible amount of wastewater as it recirculates or evaporates in the cooling and heating process. New York City's sewer system consists of a grid of sewers beneath the streets that send wastewater flows to fourteen different WWTPs. The City's WWPTs are regulated by NYSDEC, which issues a permit regulating discharge of treated effluent. Combined, all fourteen WWTPs in New York City have a SPDES permitted total capacity of 1.8 billion gpd. The area served by each plant is called a "drainage area" or "catchment area." The majority of New York City's sewers, including those serving the project area, are combined sewers, since they receive sanitary sewage, wastewater, and stormwater runoff.

In periods of dry weather, the combined sewers (sized to convey an amount of sanitary sewage that is based on density levels according to zoning regulations) in the adjacent streets convey only sanitary sewage to WWTPs and all wastewater is treated before being discharged to a receiving body of water. During wet weather, large volumes of rainfall runoff enter the combined system through storm drains and catch basins in streets and mix with sanitary sewage, then flow through regulators (relief valves), before being sent to the WWTPs through interceptor sewers. During such wet-weather events, excessive volumes of stormwater runoff (ten to 50 times the dry-weather flow) can enter the combined sewer system and, if transported to the WWTP, could exceed the treatment design capacity. For limited periods, WWTPs are designed for only twice the average dry-weather flow. Flow into the interceptor sewer is controlled by regulators along the length of

[2] 2014 *CEQR Technical Manual*, Table 13-2.

the interceptor sewer. The purpose of the regulator is to divert sanitary flow from the existing combined sewers to the interceptor sewer during normal flow periods (dry weather) and limit the flow to the interceptor sewer to twice dry weather flow during storm periods (wet weather). The existing tide gates placed on the combined sewer overflows (CSOs) downstream of the regulators are designed to keep tidal water from entering the existing combined sewers and the interceptor sewer. Tide gates can be part of the regulator structure or stand-alone chambers. New York City sewer system currently (in 2015) treats approximately 1.3 billion gpd of municipal wastewater and a portion of combined sewer flow during wet weather events.

Sanitary sewers can be one to two feet in diameter on side streets and three or four feet in diameter under larger roadways. They connect to trunk sewers, which are generally five to seven feet in diameter. Combined sewers discharge to regulators and the inceptors carry wastewater to the WWTPs for treatment.

The project area is served by the Newtown Creek WWTP, which is located in Greenpoint and is the largest of the City's 14 WWTPs, serving approximately 1 million residents in a drainage area of more than 15,000 acres (25 square miles). At the Newtown Creek WWTP, sewage flows conveyed there are fully treated by physical and biological processes before being discharged into Newtown Creek/East River. The quality of the treated wastewater (effluent) is regulated by a State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (DEC), which establishes limits for effluent parameters (i.e., suspended solids, fecal coliform bacteria, and other pollutants). Since the volume of flow to a WWTP affects the level of treatment a plant can provide, the maximum permitted capacity for the Newtown WWTP is 310 million gallons per day (mgd). The average monthly flow to the WWTP over the past 12 months is 218 mgd,[3] which is well below the maximum permitted capacity. The wastewater collection system in the vicinity of the project area is part of sub-catchment NBC-014 of the Newtown Creek WWTP.

Sanitary Flows (Dry Weather)

As the project area is currently vacant (apart from temporary storage), there is no sanitary sewage or wastewater generated in the project area.

Stormwater Flows (Wet Weather)

As outlined in Chapter 1, "Project Description," the project area totals approximately 182,366 sf, with the 71,322-sf Northern Block covered by grass and vegetation and the 111,044-sf Southern Block paved. Table 10-1 identifies the surfaces and surface areas as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff) for each surface type present on the project area. As indicated in the table, the project area consists of approximately 60.9 percent of pavement and walks and approximately 39.1 percent of grass and softscape. Based on the existing project site surface areas, the weighted runoff coefficient of the project area is 0.60

[3] 12-month period through July 2015.

Table 10-1, Existing Project Area Surface Areas and Runoff Coefficients

Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Area (%)	0.0%	60.9%	0.0%	39.1%	100.0%
Surface Area (sf)	0	111,044	0	71,322	182,366
Runoff Coefficient	1.00	0.85	0.85	0.20	0.60

[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual.*

For this analysis, the runoff coefficients were used to calculate the amount of stormwater runoff during a range of storm events, with rainfall averaging from 0.00 to 2.50 inches over durations of 3.80 to 19.50 hours. Table 10-2 shows the existing stormwater runoff for the project area. As indicated in the table, the project area currently generates between 0.00 and 0.17 mg of wet weather flows for different rainfall intensities. Stormwater flows generated in the project area are currently conveyed via the existing combined sewers adjoining the project area to the Newtown Creek WWTP or discharged to water bodies as CSOs, depending on rainfall intensity.

Table 10-2, Existing Project Site Stormwater and Sanitary Sewage Flow Volumes

Rainfall Volume (in)	Rainfall Duration (hr)	Runoff Volume Direct Drainage	Runoff Volume to CSS (MG)	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)
0.00	3.80	0.00	0.00	0.00	0.00
0.40	3.80	0.00	0.03	0.00	0.03
1.20	11.30	0.00	0.08	0.00	0.08
2.50	19.50	0.00	0.17	0.00	0.17

Notes: CSS = combined sewer system; MG = million gallons

E. FUTURE WITHOUT THE PROPSED ACTION (NO-ACTION)

Sewer System

The project area will continue to be served by the Newtown Creek WWTP in the future without the proposed action. There are no anticipated changes to the local sewer system serving the project area.

Sanitary Flows (Dry Weather)

As the project area is expected to remain vacant in the 2019 No-Action condition, as under existing conditions, it is anticipated that the project area would not generate any sanitary flows.

Stormwater Flows (Wet Weather)

No changes in the surface areas currently present in the project area are anticipated in the 2019 No-Action condition, and, therefore, no changes to the stormwater flows generated on the project area would occur. As under existing conditions, the project area would generate between 0.00 and

0.17 mg of wet weather flows, depending on rainfall duration and intensity. As such, the calculations presented in Tables 10-1 and 10-2 would continue to be applicable to the project area under No-Action conditions. Stormwater flows generated on the project area would continue to be conveyed via the existing combined sewers to the Newtown Creek WWTP or discharged to water bodies as CSOs, depending on rainfall intensity.

F. FUTURE WITH THE PROPSED ACTION (WITH-ACTION)

In the future with the proposed action (With-Action condition), the project area would be redeveloped with a new development pursuant to the proposed rezoning. The RWCDS for the proposed action includes the development of 1,147,378 gross square feet (gsf) of residential space, comprising approximately 1,147 dwelling units (DUs) of which approximately 803 DUs would be market rate units and 344 DUs would be affordable housing, with approximately 4,072 residents; approximately 64,807 gsf of local retail space; approximately 427 accessory parking spaces; and a 26,000-sf of public accessible open space.

Sewer System

Sanitary Flows (Dry Weather)

Table 10-3 summarizes the water demand and sewage generation of the proposed action/RWCDS. As indicated in the table, the proposed action would generate an estimated 422,754 gpd of daily sanitary sewage with a total water demand of 433,771 gpd. As the project area would remain vacant under No-Action conditions, this represents both the 2019 With-Action condition and the incremental sanitary sewage flows and water demand generated by the proposed action/RWCDS. This incremental increase in sewage generation would be approximately 0.19 percent of the average daily flow at the Newtown Creek WWTP (218 mgd) and would not result in an exceedance of the plant's permitted capacity of 310 mgd. 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, the proposed rezoning may result in development that is inconsistent with the design of the existing built sewer system. To be issued a permit to connect to the City sewer, a site-specific hydraulic analysis may be required to determine whether the existing sewer system is capable of supporting higher density development and related increases in sanitary flows. Completion of sewer improvements and/or a new drainage plan, may also be required at the time of the house or site connection proposal. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), the proposed action/RWCDS would be required to utilize low-flow plumbing fixtures, which would reduce sanitary flows to the plant. Therefore, the proposed action/RWCDS would not result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system.

Table 10-3, Project Area Water Demand and Sewage Generation:
2019 No-Action vs. 2019 With-Action Conditions

	Use	Area (gsf)	Domestic Use (gpd)[1]	Air Conditioning (gpd)[1]
No-Action Condition	No Active Use	N/A	0	0
	Total No-Action Water Supply Demand			0
	Total No-Action Sewage Generation			0
With-Action Condition	Residential	1,147,378	407,200	-
	Commercial – Retail	64,807	15,554	11,017
	Total With-Action Water Supply Demand			433,771
	Total With-Action Sewage Generation			422,754
Increment	***Incremental Water Supply Demand***			+433,771
	Incremental Sewage Generation			+422,754

Based on average daily water use rates provided in Table 13-2 of the *CEQR Technical Manual* (unless otherwise indicated)
- Residential use: 100 gpd per resident (1,147 DUs @ 3.55 residents/DU).
- Retail use: 0.24 gpd per sf, plus 0.17 gpd per sf for air conditioning.

Stormwater Flows (Wet Weather)

Based on the massing for the proposed action/RWCDS and the project commitment to include 26,000 sf of publicly-accessible open space, in the future With-Action condition, it is assumed that approximately 85.7 percent of the project area surfaces (156,366 sf) would be comprised of roof, with the remaining 14.3 percent (26,000 sf) comprised of grass and softscape (see Table 10-4). Based on these assumptions, the weighted runoff coefficient of the project area would increase from 0.60 under No-Action conditions to 0.89 under With-Action conditions.

Table 10-4, With-Action Project Area Surface Areas and Runoff Coefficients

Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Area (%)	85.7%	0%	0.0%	14.3%	100.0%
Surface Area (sf)	156,366	0	0	26,000	182,366
Runoff Coefficient	1.00	0.85	0.85	0.20	0.89

[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual.*

Using these sanitary and stormwater flow calculations, the DEP Flow Volume Calculation Matrix was completed for the future With-Action condition, and compared to the existing conditions presented in Table 10-2, above. The calculations from the Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from existing to With-Action conditions, based on four rainfall volume scenarios with varying durations. The drainage analysis assumes that all stormwater runoff from the project area would flow via the existing combined sewer infrastructure adjacent to the project area. The summary tables, taken from the DEP Flow Volume Calculation Matrix, are presented in Table 10-5.

Table 10-5,
Project Area Stormwater and Sanitary Sewage Flow Volumes – With-Action vs. Existing Conditions

Rainfall Volume (in)	Rainfall Duration (hr)	Runoff Volume Direct Drainage	Runoff Volume to CSS (MG)	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Incremental Volume to CSS over Existing Conditions (MG)[1]
0.00	3.80	0.00	0.00	0.07	0.07	0.07
0.40	3.80	0.00	0.04	0.07	0.11	0.08
1.20	11.30	0.00	0.12	0.20	0.32	0.24
2.50	19.50	0.00	0.25	0.34	0.60	0.43

Notes: CSS = combined sewer system; MG = million gallons; some sums may not appear to be correct due to rounding
[1] Refer to Table 10-2 for existing volumes to CSS

As shown in Table 10-5, in the future With-Action condition, approximately 0.00 to 0.25 mg of stormwater and approximately 0.07 to 0.34 mg of sanitary sewage would be conveyed to the existing combined sewers, for a total of 0.07 to 0.60 mg of combined volumes to the combined sewer system. Compared to existing conditions, with increases in stormwater and sanitary flows, there would be an incremental increase in total volumes of 0.07 to 0.43 mg to the combined sewer system. The Flow Volume Matrix calculations do not reflect the use of any sanitary and stormwater source control best management practices (BMPs) to reduce sanitary flow and stormwater runoff volumes to the combined sewer system.

Stormwater Release and Stormwater Management Measures

Pursuant to Chapter 31 of Title 15 of the Rules of the City of New York (RCNY), as amended in 2012, for a new development, the permitted stormwater release rate is the greater of 0.25 cubic feet per second (cfs) or ten 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. The proposed action/RWCDS would be required to achieve the new flow rate. Flexibility in achieving this rate is provided to the development community through a variety of approvable systems. The following typical BMP measures could be used to help manage stormwater flows: green technologies, such as blue and green roofs, subsurface detention and infiltration, porous pavement, enhanced tree pits, and rain cisterns, depending on site conditions. The design of detention tanks and/or green roofs, or other chosen stormwater control BMPs, would achieve the required overall release rate applicable to the project area. Joint DEP and New York City Department of Buildings (DOB) guidelines[4] 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.

In addition, as a NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) is required for any development that would involve soil disturbance of one or more acres. In accordance with NYSDEC SPDES (GP-0-10-001), a SWPPP, consisting of both

[4] See http://www.nyc.gov/html/dep/html/stormwater/stormwater_management_construction.shtml

temporary erosion and sediment controls and post-construction stormwater BMPs, would be required of the future site development.

Therefore, with the incorporation of appropriate BMPs that would be required as part of the site connection approval process to be reviewed and approved by DEP, the overall volume of sanitary sewer discharge and stormwater runoff and the peak stormwater runoff rate would comply with stormwater release rate requirements. Accordingly, there would not be any significant adverse impacts on wastewater treatment or stormwater conveyance infrastructure as a result of the proposed action/RWCDS.