Chapter 9: Water and Sewer Infrastructure

9.1 Introduction

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

As described in Chapter 1, "Project Description," the Proposed Action consists of zoning map and zoning text amendments within the East Midtown neighborhood of Manhattan Community Districts 5 and 6 and would establish the East Midtown Subdistrict. Under the reasonable worst-case development scenario (RWCDS), the Proposed Action would result in approximately 14,234,517 gross square feet (gsf) of new development, consisting of 13,394,777 gsf of office floor area, 601,899 gsf of retail floor area, and 237,841 gsf of residential floor area, on 16 Projected Development Sites distributed throughout the approximately 78-block area of the new Subdistrict.

According to the *CEQR Technical Manual*, actions that would increase density or change drainage conditions require a water and sewer infrastructure analysis. Specifically, developments that would result in an exceptionally large demand for water (more than one million gallons per day [mgd]) or that are located in an area that experiences low water pressure require an analysis of potential impacts on the water supply system. Additionally, projects involving development on a site five acres or larger where the amount of impervious surface would increase, or development located in a combined sewer area exceeding incremental development thresholds (above the predicted No-Action Condition) of 1,000 residential units or 250,000 square feet (sf) of commercial, public facility, and institution and/or community facility space or more in Manhattan, require an analysis of potential impacts on the wastewater and stormwater conveyance and treatment system.

The Proposed Action would result in a total daily water demand of 8.3 mgd an incremental increase of 1.39 mgd as compared with the predicted No-Action Condition water usage of 6.8 mgd. The Proposed Action would result in an incremental net increase of 6,720,882 gsf of commercial space in a combined sewer area as compared with the predicted No-Action Condition. Therefore, an analysis of the Proposed Action's potential impacts on the City's water distribution and sewer system is provided in this chapter.

Principal Conclusions

The Proposed Action would not result in a significant adverse impact on the City's water and sewer infrastructure. Based on the methodology set forth in the *CEQR Technical Manual*, although the Proposed Action would create new demand for water and treatment of sewage, the incremental increases would be well within the capacity of the City's systems, and the impacts would not be considered significant or adverse.

Water Supply

New York City consumes approximately 1.3 billion gallons of water per day from a reservoir system with a total storage capacity of approximately 550 billion gallons.[1, 2] The total water usage as a result of the Proposed Action is calculated to equal approximately 8.3 mgd which is an increment of 1.39 mgd (or 20.2 percent), compared to the No-Action Condition projected demand of 6.8 mgd. This incremental demand would represent 0.0002 percent of the City's overall water supply, distributed over a 78-block area. As changes of this magnitude would not be large enough to have a significant adverse impact on the City's water system, the incremental demand with the Proposed Action would not adversely affect the City's water supply or system water pressure.

Sanitary Sewage

Sanitary sewage generated by the Proposed Action would discharge to the Newtown Creek wastewater treatment plant (WWTP), which has a State Pollution Discharge Elimination System (SPDES)-permitted dry weather flow capacity of 310 mgd.[3] Between January 2015 and April 2016, the plant handled an average of 211.63 mgd of sewage flow.[4] The Proposed Action has the potential to result in a total generation of 4.5 mgd sanitary sewage discharge, an increment of 0.39 mgd (or 9.3 percent) over the No-Action total sewage generation which is estimated at 4.1 mgd. This incremental increase in sanitary flow would represent approximately 0.12 percent of the Newtown Creek WWTP's SPDES-permitted capacity. As the projected increase in sanitary sewage would not cause the Newtown Creek WWTP to exceed its operational capacity or SPDES-permitted capacity, the Proposed Action would not result in significant adverse impacts to sanitary sewage conveyance and treatment.

Stormwater Drainage and Management

The proposed rezoning area is served by a combined sewer system, collecting both dry-weather wastewater and stormwater. The Proposed Action would not result in an increase in impervious surfaces as compared to Existing Conditions and therefore is not expected to generate additional stormwater runoff. However, as the Proposed Action would result in increased sanitary sewage flows, the total volume to the combined sewer system would be increased. As noted previously, the incremental increase in sanitary flow is well within the capacity of the existing system and would not result in significant adverse impacts to the City's sewer infrastructure. Additionally, due to the New York City Department of Environmental Protection (DEP)'s current stormwater management requirements, stormwater runoff from new developments is expected to substantially decrease as compared to Existing Conditions. Based on the analysis pursuant to the *CEQR Technical Manual*, with Best Management Practices (described in Section 9.3) implemented on each Projected Development Site by its respective developer, it is concluded that the Proposed Action would not result in significant adverse impacts on stormwater conveyance and treatment infrastructure. DEP is currently working with other City agencies on City Hall's Rezoning coordination efforts, and it is expected that an Amended Drainage Plan (ADP) will be prepared for Greater East Midtown.

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1 Source: *New York City's Wastewater Treatment System*, New York City Department of Environmental Protection.

2 Source: *2014 CEQR Technical Manual*.

3 Source: *New York City's Wastewater Treatment System*, New York City Department of Environmental Protection.

4 Source: monthly average dry weather flow data provided by the New York City Department of Environmental Protection, July 2016.

9.2 Methodology

According to the *CEQR Technical Manual,* a preliminary water supply infrastructure analysis is needed if the project would result in an exceptionally large demand for water (e.g., more than 1 mgd), or is located in an area that experiences low water pressure (e.g., areas at the end of the water supply distribution system). Although the rezoning area is not located in an area that experiences low water pressure, the Proposed Action would result in an incremental water demand of 1.39 mgd as compared with the No-Action Condition (existing water use on the project sites + background growth + no-action known development projects), and therefore an assessment of water supply is warranted.

A preliminary sewer analysis is warranted if a project site is over five acres and would result in an increase of impervious surfaces on the site, or if a project is located in a combined sewer area in Manhattan and would result in incremental development in excess of 1,000 residential units or 250,000 sf of commercial, public facility and institution and/or community facility space. As described in Section 9.1, the Proposed Action would result in the net addition of 6,720,882 gsf of commercial space, and therefore a sewer analysis is warranted and is provided in this chapter.

As analyses of water demand and sewage generation are density-based technical analyses; only the anticipated development on the 16 Projected Development Sites form the basis for this assessment.

To assess the Proposed Action's potential impacts on water and sewer infrastructure, this chapter:

- Describes the existing water and sewer infrastructure serving the Projected Development Sites and estimates water demand and sewage and stormwater generation under Existing Conditions and in the No-Action Condition (for the 2036 analysis year). Existing and future water demands and sewage generation are calculated based on use generation rates provided in the *CEQR Technical Manual.* Stormwater runoff and sanitary flows are calculated using the DEP Flow Volume Calculation Matrix.
- Forecasts water demand and sewage and stormwater generation by the projected developments induced by the Proposed Action based on the methodology in the *CEQR Technical Manual* and DEP Flow Volume Calculation Matrix.
- Assesses the effects of the Proposed Action's water demand and sewage and stormwater generation on the City's water and sewer infrastructure, pursuant to *CEQR Technical Manual* guidelines.

9.3 Assessment

Existing Conditions

Water Supply

The New York City water supply system consists of a network of reservoirs, lakes, and aqueducts extending north into the Catskill region, and a grid of underground distribution mains that distributes

water within the City. Approximately 1.3 billion gpd of water are consumed by New York City through this water supply system.

Most of New York City obtains water from three surface water supply systems operated by DEP – Delaware, Catskill, and Croton. The watersheds of the three systems cover almost 2,000 square miles, with 19 reservoirs and three control lakes, which have a combined storage capacity of approximately 550 billion gallons. Additionally, a groundwater supply system in southeastern Queens provides drinking water.

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. From there, it is distributed to the City through three tunnels: City Tunnel 1, which runs through the Bronx and Manhattan to Brooklyn; City Tunnel 2, which goes through the Bronx, Queens, and Brooklyn (and from there through the Richmond Tunnel to Staten Island); and City Tunnel 3 (Stage 1), which goes through the Bronx and Manhattan and ends in Queens. Stage 2 of City Tunnel 3 is currently under construction in Queens and Brooklyn.

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. From there, it is distributed to the Bronx and Manhattan through the New Croton Aqueduct.

Once in the City, the aqueducts distribute water into a network of water mains. Water mains up to 96 inches in diameter feed smaller mains, such as 20, 12, and 8-inch mains, which deliver water to their final destination, including to fire hydrants along many of the City's streets. Nearly all of the water reaches consumers by gravity alone, with roughly four percent (generally located at the outer limits of the system where in-line pressure is lowest, at high elevations, or at pressure extremity such as Far Rockaway) being pumped to its final destination. Water pressure throughout the City's water supply system is monitored and controlled by pressure regulators.

As indicated in Chapter 1, "Project Description," an RWCDS has been developed in conjunction with the Proposed Action. Table 9.1 shows the applicable RWCDS water consumption and wastewater generation rates utilized in the analysis.

Table 9.1: Water Consumption and Wastewater Generation Rates

Land Use	Rate[1]	
	Domestic	Air Conditioning
Residential	100 gpd/person[2]	0 gpd/sf
Retail[3]	0.24 gpd/sf	0.17 gpd/sf
Commercial/Office	0.10 gpd/sf	0.17 gpd/sf
Hotel[4]	120 gpd/room/occupant	0.17 gpd/sf
Community Facility[6]	0.10 gpd/sf	0.17 gpd/sf

Notes:
1 Consumption rates obtained from the *CEQR Technical Manual* Table 13-2 "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise indicated.
2 The average household size for the proposed rezoning area is 1.59 persons per dwelling unit (2010 Census). This equates to 159 gpd/dwelling unit.
3 Use group comprises retail and restaurant space.
4 Assumes an average of 2.0 occupants per room.

Table 9.2 shows existing uses on the 16 Projected Development Sites, including 68 residential units (comprising approximately 50,813 gsf), 467,202 gsf of retail space, 6,856,059 gsf of commercial/office space, and 810,171 gsf of hotel uses (approximately 1,246 rooms).[5]

Based on these consumption rates, it is estimated that the existing uses on the 16 Projected Development Sites within the rezoning area currently consume approximately 1,107,686 gallons per day (gpd) of water for domestic uses and 1,382,683 gpd of water for air conditioning, for a total of 2,490,370 gpd (2.16 mgd) of water (Table 9.2).

Table 9.2: Existing Water Consumption and Wastewater Generation on Projected Development Sites

Land Use	Area (sf)	Dwelling Units / Hotel Rooms	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	50,813	68	10,812	0
Commercial—Retail	467,202		112,128	79,424
Commercial—Office	6,856,059		685,606	1,165,530
Hotel	810,171	1,246	299,140	137,729
Water Consumption Subtotals			1,107,686	1,382,683
Sewage Generation Subtotal			1,107,686	
Total Water Consumption			2,490,370	
Total Wastewater Generation			1,107,686	

Notes:
Refer to Table 9.1 for rate assumptions.
gpd = gallons per day

Wastewater Treatment

According to the *CEQR Technical Manual*, wastewater is considered to include sanitary sewage, wastewater generated by industries, and stormwater. Water used for air conditioning systems generates minimal volumes of wastewater due to the recirculation and evaporation processes and is considered to be negligible for the purposes of this analysis.

The majority of New York City's wastewater treatment system is comprised of a grid of sewers beneath the streets that send wastewater flows to 14 WWTPs located throughout the City that have a combined SPDES-permitted capacity to treat a total of approximately 1.8 billion gpd. The area served by each plant is called a "drainage area." Approximately 50 percent of the City's land is served by a combined sewer system, which collects both "dry-weather" wastewater (primarily sanitary sewage as well as wastewater from industries) and stormwater runoff. Some areas of the city, primarily in Queens and Staten Island, operate with separate systems for sanitary sewage and stormwater. In addition, small areas of Staten Island, Brooklyn, and Queens use septic systems to dispose of sanitary sewage.

During dry weather, combined sewers function as sanitary sewers, conveying all flows to the WWTPs for treatment. During wet weather, however, large volumes of stormwater runoff from impermeable surfaces can enter the system from building connections and through catch basins installed along the City's streets. During wet weather, rainfall runoff can reach 10 to 50 times the dry weather flow, which is well above the WWTP design capacity, which are designed to handle only twice their average design dry-weather flow. To avoid flooding the WWTPs, regulators built into the combined sewer system act as relief valves, directing excess water to an outfall, discharging into the nearest waterway. As a result, during such overflow periods, a portion of the sanitary sewage in the combined sewer system

[5] Assumed 650 sf per hotel room.

discharges untreated into the waterway, along with stormwater and debris washed from streets. This untreated overflow is known as "combined sewer overflow" (CSO). The City's wastewater treatment system contains approximately 450 CSOs located throughout the New York Harbor complex.[6]

The proposed rezoning area is located in Manhattan Community Districts 5 and 6 and is generally bounded by East 39th Street to the south, East 57th Street to the north, Second and Third Avenues to the east, and Fifth Avenue to the west. The entire rezoning area is served by the Newtown Creek WWTP, located in Greenpoint, Brooklyn. The Newtown Creek WWTP is the largest wastewater treatment facility in New York City, with a drainage area of 16,656 acres and a SPDES-permitted dry weather flow capacity of 310 mgd. The total sewer length, including sanitary, combined, and interceptor sewers, that feeds into the Newtown Creek WWTP is approximately 593 miles.[7]

As shown in Table 9.3, from January 2015 through April 2016, the Newtown Creek WWTP treated between 194 mgd and 230 mgd, averaging approximately 211.63 mgd with approximately 98 mgd available capacity.

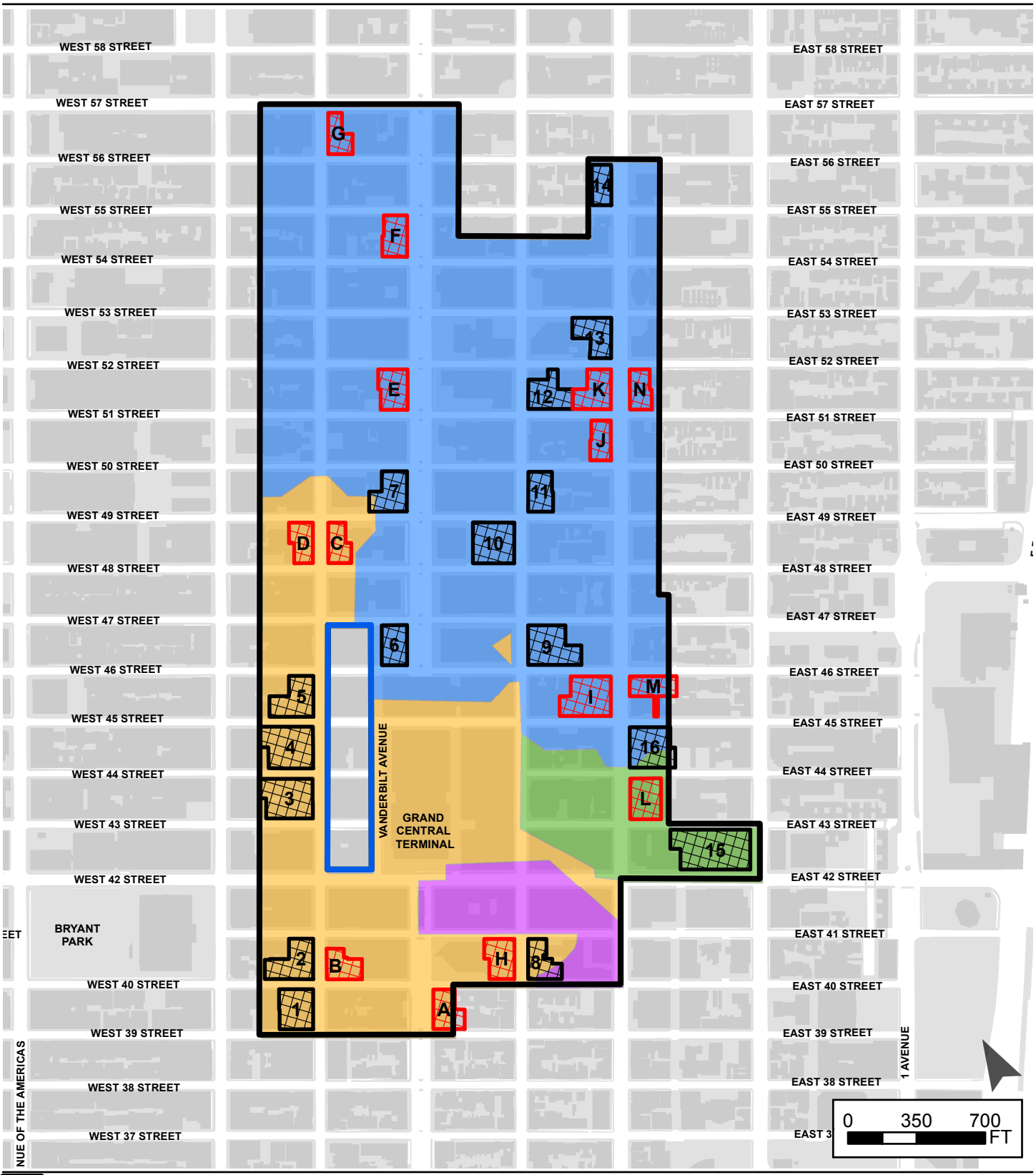
Table 9.3: Monthly Average Dry Weather Flows from the Newtown Creek WWTP

	Month	Newtown Creek WWTP (mgd)
2015	January	219
	February	214
	March	230
	April	201
	May	194
	June	228
	July	214
	August	209
	September	216
	October	220
	November	202
	December	211
2016	January	210
	February	223
	March	199
	April	196
	Annual Average	211.63

Source: DEP

The RWCDS Projected Development Sites are served by three of the Newtown Creek WWTP subcatchment areas: NCM-017, NCM-036, and NCM-037. As shown on Figure 9-1, the majority of the 16 Projected Development Sites are located in the NCM-036 and NCM-037 subcatchment areas; only one Projected Development Site is located in NCM-017. The DEP's operational bureaus report that regulator NCM45A (located at East 42nd Street) corresponds with subcatchment area NCM-017, regulator NCM47 (located at East 49th Street) corresponds with subcatchment area NCM-036 and regulator NCM45 (located at East 41st Street) corresponds with subcatchment area NCM-037 (refer to Figure 9-1).

[6] Source: *Newtown Creek Waterbody/Watershed Facility Plan Report*, New York City Department of Environmental Protection, June 2011.
[7] Source: Ibid.



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Subcatchment Areas

Figure 9-1

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Subcatchment area NCM-038 (shown in purple in Figure 9-1) does not contain any Projected Development Sites and is therefore excluded from this assessment. Subcatchment area NCM-017 (shown in green on Figure 9-1) contains Site 15, for a total land area of approximately 76,318 sf. Subcatchment area NCM-036 (shown in blue on Figure 9-1) contains nine Projected Development Sites (Sites 6, 7, 9, 10, 11, 12, 13, 14, and 16) for a total land area of approximately 296,985 sf.[8] Subcatchment area NCM-037 (shown in orange on Figure 9-1) contains six Projected Development Sites (Site 1, 2, 3, 4, 5 and 8[9]) for a total land area of approximately 228,596 sf.

Table 9.4 shows the estimated existing wastewater generated on the 16 Projected Development Sites within each of the affected subcatchment areas.

Table 9.4: Existing Wastewater Generation on Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (mgd)[1]
NCM-017	115,688
NCM-036	614,516
NCM-037	377,483

Notes:
[1] Derived using the same methodology used in Table 9.2.

Stormwater and Drainage Management

As described previously, stormwater runoff from impervious surfaces in the proposed rezoning area is collected by on-site stormwater systems and catch basins located within the roadway, which is then conveyed by the City's combined sewer system to the Newtown Creek WWTP. During dry weather, regulators direct flows to interceptor sewers leading to the WWTP. During wet weather, however, the regulators are calibrated to allow only twice the dry weather design flow into the interceptor sewers and the remaining flow is discharged via outfalls into the East River (Figure 9-1).

The analysis of stormwater management typically focuses on the body of water into which the stormwater is discharged during a CSO event—in this case, the East River. However, actions that do not involve the addition of impermeable surfaces (or those that do not direct additional volume to storm sewers) are not usually considered to have a potential to increase CSO occurrences.

In the Existing Condition, the total lot area of the Projected Development Sites consists of 601,899 sf, comprised entirely of rooftop. Approximately 76,318 sf (12.7 percent) of the total Projected Development Site lot area is located within Subcatchment Area NCM-017. Subcatchment Area NCM-036 contains approximately 296,985 sf (49.3 percent). The balance of the lot area (approximately 228,596 sf, or 38.0 percent) is located within Subcatchment Area NCM-037. As shown in Table 9.5, the surface type for all three Subcatchment Areas is 100 percent rooftop area.

[8] While a portion of one lot on Projected Development Site 16 falls within subcatchment area NCM-017, the majority of the lot is located in subcatchment area NCM-036 and therefore it is assumed that wastewater generated on Projected Development Site 16 would be discharged into subcatchment area NCM-036.

[9] While a portion of one lot on Projected Development Site 8 falls within subcatchment area NCM-038, the majority of the lot is located within subcatchment area NCM-037 and therefore it is assumed that wastewater generated on Projected Development Site 8 would be discharged into subcatchment area NCM-037.

Table 9.5: Existing Stormwater Runoff to the Newtown Creek WWTP

	Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Newtown Creek WWTP (NCM-017)	Area (%)	100.0	0.0	0.0	0.0	100%
	Surface Area (sf)	76,318	0.0	0.0	0.0	76,318
	Runoff Coefficient[1]	1.0	0.85	0.85	0.20	1.0
Newtown Creek WWTP (NCM-036)	Area (%)	100.0	0.0	0.0	0.0	100%
	Surface Area (sf)	296,985	0.0	0.0	0.0	296,985
	Runoff Coefficient[1]	1.0	0.85	0.85	0.20	1.0
Newtown Creek WWTP (NCM-037)	Area (%)	100.0	0.0	0.0	0.0	100%
	Surface Area (sf)	228,596	0.0	0.0	0.0	228,596
	Runoff Coefficient[1]	1.0	0.85	0.85	0.20	1.0

Source: DCP Building Footprint and PLUTO data; aerial photographs

Notes:
[1] Runoff coefficients for each surface type as per the DEP.

For this analysis, the standard DEP runoff coefficients were used to calculate the amount of stormwater runoff using the 3-month, 6-month, and 12-month storm events, with rainfall averaging from 0.00 to 2.50 inches over durations of 3.80 to 19.50 hours. Table 9.6 shows the existing combined stormwater runoff and wastewater generation for the existing uses on the Projected Development Sites. As indicated in the table, the Projected Development Sites currently generate between 0.00 and 0.94 mgd of stormwater within the Newtown Creek WWTP subcatchment areas for different rainfall intensities.

Table 9.6: Existing Combined Stormwater Runoff and Wastewater Generation to the Newtown Creek WWTP

	Storm Event Type	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient	Stormwater Runoff (MG)	Sanitary to CSS (MG)[1]	Total Volume to CSS (MG)
Newtown Creek WWTP (NCM-017)		0.00	3.80	1.75	1.0	0.00	0.02	0.02
	3-Month	0.40	3.80	1.75	1.0	0.02	0.02	0.04
	6-Month	1.20	11.30	1.75	1.0	0.06	0.06	0.12
	12-Month	2.50	19.50	1.75	1.0	0.12	0.10	0.22
Newtown Creek WWTP (NCM-036)		0.00	3.80	6.82	1.0	0.00	0.10	0.10
	3-Month	0.40	3.80	6.82	1.0	0.07	0.10	0.17
	6-Month	1.20	11.30	6.82	1.0	0.22	0.29	0.51
	12-Month	2.50	19.50	6.82	1.0	0.46	0.50	0.96
Newtown Creek WWTP (NCM-037)		0.00	3.80	5.25	1.0	0.00	0.06	0.06
	3-Month	0.40	3.80	5.25	1.0	0.06	0.06	0.12
	6-Month	1.20	11.30	5.25	1.0	0.17	0.18	0.35
	12-Month	2.50	19.50	5.25	1.0	0.36	0.30	0.66

Notes:
[1] Derived from Table 9.2.
MG = million gallons

Individual development projects are required to manage on-site stormwater runoff in accordance with DEP requirements to ensure that a development properly regulates its stormwater runoff corresponding to the City's 5-year storm. Currently, all of the Projected Development Sites within the proposed rezoning area are covered by rooftop, an impervious surface with a high runoff coefficient. Since many of the buildings in the area likely pre-date DEP requirements, it is expected that there is little or no on-site detention of stormwater on any of the Projected Development Sites.

Water Conservation and WWTP Load Reduction

During the 1990s, the City implemented a number of water conservation measures in response to inspections by federal and state agencies having jurisdiction, who found that the City's WWTPs were exceeding the dry weather flows allowed in their respective SPDES permits. Measures included equipping fire hydrants with locks to prevent illegal uses and requiring that all new plumbing fixtures in the City (including replacements in existing structures and new fixtures in new structures) be of a low-flow design (Local Law No. 29, 1989). The City also implemented a metering program, installing water meters at thousands of properties where water fees had previously been based on property frontage rather than usage. This metering provided a new financial incentive to identify and repair leaks in the water distribution system. Additionally, provisions were incorporated into the SPDES permits requiring DEP bring all CSO-related matters into compliance with the provisions of the Federal Clean Water Act (CWA) and New York State Environmental Conservation Law.

These programs have reduced water demand and load in the City's WWTPs. At many WWTPs, this reduction has been on an order of magnitude of several million gallons per day. Such is the case at the Newtown Creek WWTP, where flows have declined substantially since the early 1990s. DEP anticipates that over the next decade the savings from the continued implementation of these conservation measures would exceed (or offset) any increases in water demand from consumers.

The Future without the Proposed Action (No-Action Condition)

As described in Chapter 2, "Land Use," in the future without the Proposed Action, it is anticipated that the primary study area will experience some overall growth mostly concentrated in non-office uses, including hotels and mixed-use residential buildings. As identified in Chapter 1, "Project Description," the future development on the Projected Development Sites without the Proposed Action would consist of 163 dwelling units (approximately 316,120 gsf), 462,874 gsf of retail space, 6,812,920 gsf of commercial/office space, and 810,171 gsf of hotel uses (approximately 1,246 rooms[10]).

Additionally, as described in Chapter 2, "Land Use," 37 No-Action development projects are expected to be completed in the primary and secondary study areas by 2036, including twelve hotels, many of which would be developed as mixed hotel/residential buildings, and residential and commercial buildings. These 37 No-Action development projects are listed in Table 2-4 and mapped in Figure 2-9.

Water Supply

Per the *CEQR Technical Manual*, the preliminary analysis for water supply assesses the likely water usage on the project site for the future No-Action Condition, which includes existing water uses on the 16 Projected Development sites, plus background growth, plus anticipated water demand from 37 No-Action known development projects within the same affected water distribution system. As indicated on Figure 2-9 in Chapter 2, "Land Use," 27 of these known development projects fall outside of the Greater East Midtown Rezoning Boundary and 10 fall within.

As indicated in Table 9.7, water consumption on the 16 Projected Development sites plus water consumption for 37 No-Action development projects within the primary and secondary study areas would total approximately 6,870,737 gpd (6.87 mgd) in the future without the Proposed Action. This

[10] Assumed 650 sf per hotel room.

represents an increase of 4,380,367 gpd (4.38 mgd) over existing conditions (refer to Table 9.2). As noted previously, New York City consumes approximately 1.3 billion gallons of water per day. Given this level of consumption, this incremental demand would not be large enough to significantly affect the ability of the City's water system to deliver water in the future without the Proposed Action.

Table 9.7: No-Action Water Consumption and Wastewater Generation

Land Use	Area (sf)	Dwelling Units / Hotel Rooms	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	316,120*	9,493*	1,509,387	0
Commercial—Retail	1,659,748		398,340	282,157
Commercial—Office	11,604,627		1,160,463	1,972,787
Hotel	2,870,021	4,415	1,059,700	487,904
		Water Consumption Subtotals	4,127,889	2,742,847
		Sewage Generation Subtotal	4,127,889	
		Total Water Consumption	6,870,737	
		Total Wastewater Generation	4,127,889	

Notes:
Refer to Table 9.1 for rate assumptions.
gpd = gallons per day
* Residential square footage for 37 known development projects is unknown and has not been included in table (only the number of residential units associated with the 37 known development projects has been provided. Refer to Chapter 2, "Land Use," for additional information on known development projects within the study area).

Wastewater Treatment

In the future without the Proposed Action, wastewater generation on the 16 Projected Development sites plus wastewater generation for 37 No-Action development projects within the primary and secondary study areas would total approximately 4,127,889 gpd (4.13 mgd) (refer to Table 9.7), an incremental increase of 3,020,203 gpd (3.02 mgd) over existing conditions. This additional sanitary discharge would be well within the 98 mgd average available capacity at the Newtown Creek WWTP and therefore it is anticipated that the WWTP would continue to operate within its design capacities.

Stormwater and Drainage Management

In the No-Action Condition, stormwater runoff would continue to be collected and directed through the existing combined sewer system and then conveyed to the Newtown Creek WWTP for treatment. Without the Proposed Action, the majority of the Projected Development Sites would experience negligible growth in commercial uses and modest growth in residential uses (as described in Chapter 1, "Project Description"). Of the 16 Projected Development Sites, 14 sites would not be developed in the No-Action Condition.

As noted previously, DEP requires stormwater detention in compliance with the applicable drainage plan for new developments if the developed site's storm flow is expected to exceed the allowable flow of the drainage plan. Given that the existing development sites are predominantly covered with impervious surfaces, likely do not provide detention and that new development on these sites would require incorporation of the latest detention and retention measures, such as detention tanks, green roofs, blue roofs, or seepage basins, it is expected that there would be a modest reduction in uncontrolled runoff in the No-Action Condition. However, no improvements to stormwater detention

are expected on the 14 Projected Development Sites that would remain unchanged in the No-Action Condition.

The Future with the Proposed Action (With-Action Condition)

The Proposed Action would facilitate more commercial development than would occur in the No-Action Condition. As indicated in Chapter 1, "Project Description," it is anticipated that development on the 16 Projected Development sites would add a net total of 139,025 gsf of retail space and 6,720,882 gsf of commercial/office space. The Proposed Action would result in a 78,279 gsf decrease of residential uses (approximately 44 units) and a reduction of 810,171 gsf (1,246 rooms) of hotel uses, compared to the No-Action Condition.

Water Supply

In the Future with the Proposed Action, water supply demand would total approximately 8,260,960 gpd (8.26 mgd) – an increase of 1,390,224 gpd (1.39 mgd), or approximately 20.2 percent – compared to the demand in the No-Action Condition. Future demand from the projected development sites in the With-Action Condition would be dispersed throughout the approximately 78-block rezoning area and would represent approximately 0.0002 percent of the City's water supply. In addition, the majority of the incremental increase in water consumption (approximately 1,004,821 gpd, 72 percent) would be generated by air conditioning uses (Table 9.8). Though not included in this analysis, in the 2036 future condition, it is anticipated that air conditioning technology would improve and would use less water, resulting in decreased future water consumption than the amount predicted in Table 9.8.

Given the anticipated incremental pace of development on the 16 Projected Development Sites, their dispersed locations throughout an area of Manhattan well-served by water infrastructure, and potential future improvements in air conditioning technology, the incremental demand with the Proposed Action is not expected to adversely affect the City's water supply or system water pressure.

Wastewater Treatment

In the With-Action Condition, wastewater from the study area would continue to be treated by the Newtown Creek WWTP. The capacity of the plant would not change as a result of the Proposed Action, and the facility would continue to operate within its SPDES-permitted capacity of 310 mgd.

As indicated in Table 9.8, in the Future with the Proposed Action, total sanitary sewage generation is expected to be approximately 4,513,292 gpd. Of this amount, only 1,502,852 gpd (1.5 mgd or 33 percent) is expected to be generated by development on the 16 Projected Development sites as a result of the Proposed Action; the majority (3,010,410 gpd or 67 percent) is expected to be generated by the 37 known development projects located within the study area. In total, the sanitary sewage generation in the Future with the Proposed Action would represent an increase of 385,403 gpd (0.39 mgd) to the Newtown Creek WWTP over No-Action conditions (Table 9.8).

With an existing average dry weather flow of 211.63 mgd to the Newtown Creek WWTP (Table 9.3) and the addition of approximately 0.39 mgd of sanitary sewage in the With-Action Condition, the Newtown Creek WWTP would continue to have ample reserve capacity with this anticipated new demand.

Table 9.8: Water Consumption and Wastewater Generation in the No-Action and With-Action Conditions

	No-Action Condition			With-Action Condition			Incremental Changes with the Proposed Action		
Land Use	Area (sf)	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)
Residential	316,120* (9,493 DU)	1,509,387	0	237,841* (9,449 DU)	1,502,378	0	-78,279 (-44 DU)	-7,009	0
Commercial—Retail	1,659,748	398,340	282,157	1,798,773	431,706	305,791	139,025	33,366	23,634
Commercial—Office	11,604,627	1,160,463	1,972,787	18,186,484	1,818,648	3,091,702	6,581,857	658,186	1,118,916
Hotel	2,870,021 (4,415 rooms)	1,059,700	487,904	2,059,850 (3,169 rooms)	760,560	350,175	-810,171 (-1,246 rooms)	-299,403	-137,729
Water Consumption Subtotals		4,127,889	2,742,847		4,513,292	3,747,668		385,403	1,004,821
Sewage Generation Subtotal		4,127,889			4,513,292			385,403	
Total Water Consumption		6,870,737			8,260,960			1,390,224	
Total Wastewater Generation		4,127,889			4,513,292			385,403	

Notes:
Refer to Table 9.1 for rate assumptions.
DU = dwelling unit
* Residential square footage for 37 known development projects is unknown and has not been included in table (only the number of residential units associated with the 37 known development projects has been provided. Refer to Chapter 2, "Land Use", for additional information on known development projects within the project study area).

Stormwater and Drainage Management

In the With-Action Condition, the Projected Development Sites would total 601,899 sf of lot area. For conservative analysis purposes, it is assumed that all of the Projected Development Sites' surface areas would comprise roofs which have the highest stormwater runoff coefficient. Consequently, the stormwater runoff would be similar to that under Existing and No-Action Conditions.

Table 9.9 shows the estimated combined flow volumes (stormwater runoff and sanitary flows) to the combined sewer system. As shown in the table, depending on the rainfall volume and duration, the total volume to the combined sewer system from the 16 Projected Development Sites could be between 0.24 and 2.16 MG for all subcatchment areas, combined.

Table 9.9: Combined Stormwater Runoff and Wastewater Generation Flow Volume to the Combined Sewer System in the Proposed Rezoning Area—With-Action Condition

	Storm Event Type	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient	Stormwater Runoff (MG)	Sanitary to CSS (MG)[1]	Total Volume to CSS (MG)
Newtown Creek WWTP (NCM-017)		0.00	3.80	1.75	1.0	0.00	0.03	0.03
	3-Month	0.40	3.80	1.75	1.0	0.02	0.03	0.05
	6-Month	1.20	11.30	1.75	1.0	0.06	0.09	0.15
	12-Month	2.50	19.50	1.75	1.0	0.12	0.15	0.27
Newtown Creek WWTP (NCM-036)		0.00	3.80	6.82	1.0	0.00	0.12	0.12
	3-Month	0.40	3.80	6.82	1.0	0.07	0.12	0.19
	6-Month	1.20	11.30	6.82	1.0	0.22	0.35	0.57
	12-Month	2.50	19.50	6.82	1.0	0.46	0.61	1.07
Newtown Creek WWTP (NCM-037)		0.00	3.80	5.25	1.0	0.00	0.09	0.09
	3-Month	0.40	3.80	5.25	1.0	0.06	0.09	0.15
	6-Month	1.20	11.30	5.25	1.0	0.17	0.27	0.44
	12-Month	2.50	19.50	5.25	1.0	0.36	0.46	0.82

Notes:
[1] Derived from Table 9.8.
MG = million gallons

Table 9.10 shows the incremental difference between Existing and With-Action Conditions. As shown in the table, the Proposed Action would result in an incremental increase of approximately 0.06 to 0.32 MG within the three combined Newtown Creek subcatchment areas, depending on the rainfall volume and duration. The corresponding percent change in flow volumes to the combined sewer system over Existing Conditions are also shown in the table.

Table 9.10: Incremental Increase in Combined Stormwater Runoff and Wastewater Generation Flow Volumes to the Combined Sewer System in the Proposed Rezoning Area

	Rainfall (inches)	Duration (hours)	Total Volume to Combined Sewer System (MG)			Percentage Change (%)
			Existing Conditions	With-Action Condition	Increment	
Newtown Creek WWTP (NCM-017)	0.00	3.80	0.02	0.03	0.01	50.0
	0.40	3.80	0.04	0.05	0.01	25.0
	1.20	11.30	0.12	0.15	0.03	25.0
	2.50	19.50	0.22	0.27	0.05	22.7
Newtown Creek WWTP (NCM-036)	0.00	3.80	0.10	0.12	0.02	20.0
	0.40	3.80	0.17	0.19	0.02	11.8
	1.20	11.30	0.51	0.57	0.06	11.8
	2.50	19.50	0.96	1.07	0.11	11.5
Newtown Creek WWTP (NCM-037)	0.00	3.80	0.06	0.09	0.03	50.0
	0.40	3.80	0.12	0.15	0.03	25.0
	1.20	11.30	0.35	0.44	0.09	25.7
	2.50	19.50	0.66	0.82	0.16	24.2

Notes:
MG = million gallons

Increased volumes and flows would be conveyed to the Newtown Creek WWTP, or discharged directly to the East River, dependent on the storm event. As indicated previously, regulator NCM45A corresponds with Subcatchment Area NCM-017, regulator NCM47 corresponds with Subcatchment Area NCM-036, and regulator NCM45 corresponds with Subcatchment Area NCM-037. Any developments resulting from the proposed rezoning in those subcatchment areas would also affect these regulators.

As shown in Table 9.10, new flow volumes would be introduced to the combined sewer system as a result of the Proposed Action. However, the table presents only total volume to the City's combined sewer system and does not account for stormwater flow rate. As described in the following section, with the incorporation of stormwater best management practices, and adherence to the new DEP regulations governing the flow rate of stormwater, the rate of discharge to the combined sewer system would be improved over Existing Conditions. As such, the Proposed Action would not result in a significant adverse impact to stormwater and drainage management.

As noted previously, DEP requires substantial stormwater detention in compliance with the drainage plan for new developments or building alterations on lots fronting on streets with sewers if the developed site's storm flow exceeds the allowable flow of the drainage plan. As a result of these requirements, given that the existing development sites are mostly covered with impervious surfaces and currently provide limited detention, if any, it is expected that there would be substantial reduction in stormwater discharge from private development sites in the future with the Proposed Action, as these new developments would be required to incorporate stormwater detention or retention measures such as detention tanks, green roofs, blue roofs, or seepage basins to handle stormwater runoff from the developed site.

DEP amended Chapter 31 of Title 15 of the Rules of the City of New York (RCNY), which are those which govern house and site connections to the City's sewer system. The rule amendment modifies the flow rate of stormwater to the City's combined sewer system for new and existing development, as part of sewer availability and connection approvals, and applies to development lots for new buildings or alterations of existing buildings where an expansion of building footprints or impervious surfaces

is proposed. The rule was promulgated on January 4, 2012, and went into effect on July 4, 2012. For a new development, the stormwater release rate is now the greater of 0.25 cubic feet per second (cfs), or 10 percent of the allowable flow, unless the allowable flow is less than 0.25 cfs, in which case the stormwater release rate is equal to the allowable flow. For alterations, the stormwater release rate for the altered area 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 developments or alterations under the proposed rezoning requiring a connection to the sewer system 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 including subsurface and rooftop systems. Joint DEP and New York City Department of Buildings (DOB) guidelines[11] 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.

To be issued a permit to connect to the 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, sewer improvements and/or incorporation of Best Management Practices (BMPs) that will be required of the applicant at the time of the house or site connection proposal.

With the 2012 RCNY amendment, self-certification of house or site connection proposals is not permitted in connection with any proposed new development or expansions of existing developments as per Title 15, Chapter 31, "Rule Governing House/Site Connections to the Sewer System." 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. DEP is currently working with other City agencies on City Hall's Rezoning coordination efforts, and it is expected that an Amended Drainage Plan (ADP) will be prepared for Greater East Midtown.

Stormwater Best Management Practices

A broad range of BMPs could be implemented on the development lots within the proposed rezoning area to facilitate stormwater source controls during site planning and building design phases of the projected developments to 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 Proposed Action. The implementation of low-flow fixtures, as per the New York City Plumbing Code, Local Law 33 of 2007 and the US Environmental Protection Agency's WaterSense Program, would help to control sanitary flows. To further offset these increases, onsite stormwater source controls or BMPs would be implemented to retain or release stormwater runoff slowly with controlled discharge rates to the City's combined sewer system.

Enhanced stormwater management throughout the City is consistent with recent policies, including the *NYC Green Infrastructure Plan*, *PlaNYC 2030* and *Sustainable Stormwater Management Plan*. The *NYC Green Infrastructure Plan*, released September 2010 and updated in 2012, includes a goal of constructing green infrastructure citywide that will manage 10 percent of the runoff from impervious surfaces by

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

2030. In addition to advancing design and construction of green infrastructure practices, in 2015 DEP also began a Research and Development Program that will build on existing monitoring and expand DEP's ability to collect new data on green infrastructure performance. The performance data will be integrated into the concurrent modeling and analysis effort to develop CSO volume reduction performance metrics for the program.

The following typical BMP measures would help to avoid an exacerbation of existing CSO discharge to the East River: the implementation of BMPs described in the *NYC Green Infrastructure Plan*, including blue and green roofs, subsurface detention, porous pavement, enhanced tree pits, and rain cisterns, depending on site conditions.

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 or a combination of detention or infiltration techniques identified in the *NYC Green Infrastructure Plan*. Green technologies, such as green and blue roofs, subsurface detention and infiltration, and permeable pavement, would retain or release stormwater with slowed discharge rates to control peak runoff rates. Trees planted per the City's street tree requirements could also be utilized to capture and store water below an enhanced tree pit.

The Proposed Action would increase flows into the City's combined sewer system that may be discharged as CSOs into the East River during rain events. Because of the available assimilative capacity of Newtown Creek WWTP, the projected increased flow to the combined sewer system would not have a significant adverse impact on water quality. Based on the analysis and with the required BMP measures that would be implemented on each Projected Development Site by their respective developer in accordance with City site connection requirements, it is concluded that the Proposed Action would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure. However, as noted previously, DEP is currently working with other City agencies on City Hall's Rezoning coordination efforts, and it is expected that an Amended Drainage Plan (ADP) will be prepared for Greater East Midtown.