East New York Rezoning Proposal
Chapter 10: 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.

This chapter assesses the potential effects of the Proposed Actions on the City's water supply, wastewater treatment, and stormwater management infrastructure in accordance with the 2014 *City Environmental Quality Review* (CEQR) *Technical Manual*. As outlined in Chapter 1, "Project Description," under the reasonable worst-case development scenario (RWCDS), the Proposed Actions would facilitate the incremental development of 6,312 dwelling units (DU), including 3,447 affordable DU; 557,290 sf of commercial uses; 457,870 sf of community facility uses; and 1,138 accessory parking spaces; as well as a net reduction of 27,035 sf of industrial uses (compared to No-Action conditions).

B. PRINCIPAL CONCLUSIONS

Water Supply

The Proposed Actions would not result in significant adverse impacts on the City's water supply system. The 80 projected development sites are expected to generate a water supply demand of approximately 2,715,351gallons per day (gpd) in the 2030 With-Action condition, an increase of 2,168,163 gpd, or approximately 2.2 million gallons per day (mgd), compared to demand in the future without the Proposed Actions. Future incremental demand from the projected development sites in the With-Action condition would be dispersed throughout the 190-block rezoning area and would represent approximately 0.2 percent of the City's average daily water supply of approximately one billion gpd.

Wastewater Treatment

In the future with the Proposed Actions, wastewater from the projected development sites would continue to be treated by the 26th Ward Water Pollution Control Plant (WPCP). Under the RWCDS, development on the 80 projected development sites are expected generate a total of approximately 2,388,257 gallons per day (gpd) of sanitary sewage, an increase of 2,000,182 gpd over No-Action conditions. With an existing average dry weather flow of 47 mgd to the 26th Ward WPCP and the addition of approximately 2,000,182 gpd (2.0 mgd) on the 80 projected development sites in the 2030 With-Action condition (compared to the No-Action condition), the 26th Ward WPCP would continue to have ample reserve capacity. Therefore, no significant adverse impacts to wastewater treatment would occur as a result of the Proposed Actions.

Stormwater and Drainage Management

The 80 projected development sites identified in the RWCDS are located within three subcatchment areas of the 26th Ward WPCP: 26W-003, 26W-004, and 26W-005. Depending on rainfall volume and duration, the total volumes

to the 26W-003, 26W-004, and 26W-005 combined sewer systems would range from 0.03 to 0.35 million gallons, 0.03 to 0.44 million gallons, and 0.32 to 3.74 million gallons, respectively. Compared to existing volumes to the combined sewer system from the 80 projected development sites, subcatchment area 26W-003 flows would increase by 0.03 to 0.18 million gallons, subcatchment area 26W-004 flows would increase by 0.03 to 0.22 million gallons, and subcatchment area 26W-005 flows would increase by 0.30 to 1.96 million gallons during storm events with up to 2.5 inches of rainfall. These increased flows to the City's combined sewer system may be discharged as CSOs into Hendrix Creek, the Fresh Creek Basin, and/or Spring Creek during rain events.

Because of the available assimilative capacity of the 26th Ward WPCP, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality. Based on the analysis and the required best management practices (BMP) measures that would be implemented on each projected development site by their respective developer in accordance with the City's site connection requirements, it is concluded that the Proposed Actions would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure.

C. METHODOLOGY

According to the *CEQR Technical Manual*, a preliminary water supply infrastructure analysis is needed if a project would result in an exceptionally large demand for water (e.g., more than one 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 Actions would result in net water demand of approximately 2.4 mgd (compared to No-Action conditions) and, therefore, an assessment of water supply is warranted.

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 condition: (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 Actions would result in a net increase of more than 400 residential units and 150,000 sf of non-residential space compared to No-Action conditions, a preliminary assessment of wastewater and stormwater infrastructure is provided.

As analyses of water demand and sewage generation are density-based technical analyses, only the anticipated development on the 80 projected development sites form the basis for this assessment.

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

- Describes the existing water and sewer infrastructure serving the rezoning area and estimates water demand and sewage and stormwater generation on the projected development sites under existing and No-Action conditions. Existing and future water demands and sewage generation are calculated based on use generation rates provided in the *CEQR Technical Manual* and the 2005 *Greenpoint-Williamsburg FEIS*. Stormwater runoff and sanitary flows are calculated using the New York City Department of Environmental Protection's (DEP's) Volume Calculation Matrix;
- Describes planned No-Action infrastructure improvements in the rezoning area, project components, and current schedules;
- Forecasts water demand and sewage and stormwater generation by the projected developments induced by the Proposed Actions under the RWCDS based on *CEQR Technical Manual* guidelines; and
- Assesses the effects of the With-Action water demand and sewage and stormwater generation on the City's water and sewer infrastructure, pursuant to *CEQR Technical Manual* guidelines.

D. EXISTING CONDITIONS

Water Supply

The New York City water supply system comprises a network of reservoirs, lakes, and aqueducts extending into the Catskill region and a pipe network that distributes water within the City. Because the Hudson, Harlem, and East Rivers are not potable water sources, New York City obtains nearly all of its water from the Delaware, Catskill, and Croton watersheds, which are located within 125 miles of the City. Water from the watersheds are stored at 19 reservoirs and three control lakes, having a combined capacity of approximately 550 billion gallons. The water is then carried into the City by a number of aqueducts. The water enters the City via City Tunnel 1 (which runs through the Bronx, Manhattan, and Queens) and City Tunnel 2 (which runs through the Bronx, Queens, and Brooklyn). The partially completed City Tunnel 3 currently serves the Bronx, Manhattan, and Queens, and, when fully complete, will terminate in Brooklyn. Staten Island obtains its water via the Richmond Tunnel, which is an extension of City Tunnel 2.

Once in the City, the three aqueducts distribute water into a network of water mains. Water mains up to 96 inches in diameter feed smaller mains that deliver water to their final destination. These are the same mains that provide water to fire hydrants. Nearly all of the water reaches its consumers by gravity alone, although some four percent (generally located at the outer limits of the system where in-line pressure is lowest, at high elevations, or at a pressure extremity, such as Far Rockaway) is pumped to its final destination. Pressure regulators throughout the City monitor and control the water pressure.

As indicated in Chapter 1, "Project Description," a RWCDS has been developed in conjunction with the Proposed Actions. Table 10-1 shows the existing uses on the 80 projected development sites and their associated water consumption and wastewater generation rates. Based on the water consumption rates presented in Table 10-1, it is estimated that the existing uses on the 80 projected development sites within the rezoning area currently consume approximately 201,672 gpd, including approximately 125,729 gpd for domestic uses and approximately 75,943 gpd for air conditioning.

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 generates a negligible amount of wastewater as it recirculates or evaporates in the cooling and heating process.

The majority of New York City's wastewater treatment system comprises the sewer network beneath the streets and the 14 WPCPs located throughout the City. The majority of New York City's sewers are called "combined sewers," since they receive sanitary wastewater and stormwater runoff. Wastewater generated in a "drainage basin" (the area served by a WPCP) is conveyed through a network of combined sewers to the WPCP.

During dry weather, the WPCP primarily treats sanitary sewage. The average daily flow during dry weather is known as the average "dry-weather flow." WPCPs have treatment capacities set at twice their dry weather design flow for a limited amount of time. However, because the majority of New York City's sewers are combined sewers, they also receive stormwater and rainwater runoff from impermeable surfaces that generally contain pollutants such as oil and floatable debris. During wet weather, stormwater enters the combined sewer system along with sanitary sewage, and both are treated at a WPCP. During wet weather, rainfall runoff can reach ten to 50 times the dry weather flow, which is well above the WPCP design capacity. To avoid flooding the WPCPs, built-in regulators act as relief valves to direct the excess water to an outfall. During storm events, sanitary sewage entering, or already in, the combined sewer system and stormwater and debris can be discharged, untreated, into the nearest body of water. This untreated flow is known as "combined sewer overflow" (CSO).

TABLE 10-1
Existing Water Consumption

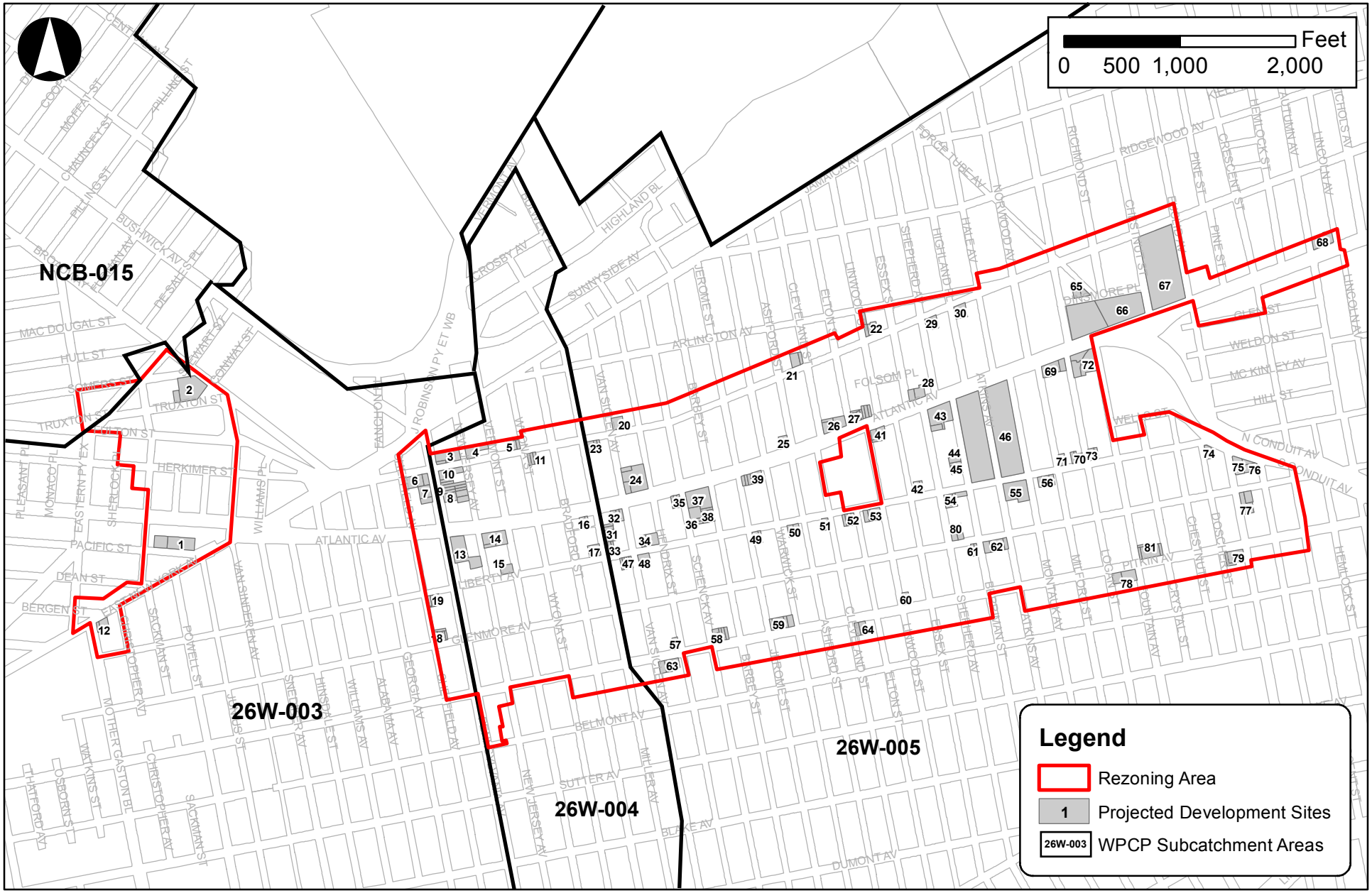
Land Use	Water Consumption & Wastewater Generation Rates[1]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpf/person[2]	98 DU	29,400	0
Commercial/Office	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	24,160 sf	2,416	4,107
Retail[3]	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	109,837 sf	26,361	18,672
Community Facility[4]	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	67,995 sf	6,800	11,559
Industrial/Warehouse/Auto-Related/Garage	Domestic: 10,000 gpd/acre[5] A/C: 0.17 gpd/sf	232,231 sf	53,313	39,479
Hotel	120 gpd/room/occupant[6] A/C: 0.17 gpd/sf	12,500 sf (31 rooms[7])	7,440	2,125
		Total Water Demand	***201,672***	
		Total Wastewater Generation	***125,729***	

Notes:
[1] Consumption rates obtained from the 2014 *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[2] Assumes 2.99 residents per DU for all residential development within Community District (CD) 5 and 2.75 residents per DU for all residential development within CD 16.
[3] Use group comprises retail, supermarket, and restaurant.
[4] Assumes same rate as commercial/office. Includes house of worship, day care, medical office, and community center uses.
[5] Based on 2005 *Greenpoint-Williamsburg Rezoning FEIS.* Calculated based on total building floor area, assuming no additional water demand from open storage.
[6] Assumes two occupants per hotel room.
[7] Assumes 400 sf per hotel room.

During the 1990s, the City instituted a range of water conservation measures in response to excess flows to the City's WPCPs that exceeded the dry weather flow allowed in accordance with their respective State Pollutant Discharge Elimination System (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. These programs have reduced water demand and load in the City's WPCPs. At many WPCPs, this reduction has been in the order of magnitude of several million gallons per day. Overall, actual water demand is down more than 30 percent since the 1990s, despite consistent increases in population. The DEP projects that savings from the continued implementation of these and other conservation measures over the next decade will exceed any increases in water demand from consumers.

As noted above, the majority of New York City wastewater is collected by a combined sewer system and treated by WPCPs. However, small areas of Brooklyn, Queens, and Staten Island either have separate sewer systems or use septic systems to dispose of sanitary waste.

The rezoning area is located within a combined sewer area, with the majority of the rezoning area served by the 26th Ward WPCP and a small portion of the Ocean Hill area of the rezoning area served by the Newtown Creek WPCP (refer to Figure 10-1). Combined, all 14 WPCPs in New York City have a SPDES-permitted total capacity of 1.8 billion gpd. The 26th Ward WPCP is regulated by SPDES permit to treat and discharge up to 85 mgd of wastewater, and the Newtown Creek WPCP is regulated by SPDES permit to treat and discharge up to 310 mgd. As shown in Table 10-2, in 2014, average flows to the 26th Ward WPCP ranged from 41 to 52 mgd and averaged 47 mgd, for an average of approximately 38 mgd of available capacity. Average flows to the Newtown Creek WPCP ranged from 210 to 227 mgd and averaged 219 mgd during the same period, for an average of 91 mgd of available capacity.



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Figure 10-1
Affected WPCP Subcatchment Areas

TABLE 10-2
2014 Monthly Average Flows to the 26th Ward and Newtown Creek WPCPs

Month	26th Ward WPCP	Newtown Creek WPCP
January	43	210
February	48	227
March	46	213
April	48	226
May	52	213
June	49	215
July	51	223
August	44	212
September	41	212
October	45	226
November	47	221
December	50	226
2014 Average	***47***	***219***

Source: DEP.

As presented in Figure 10-1, the 80 projected development sites are served by three of the 26th Ward WPCP subcatchment areas. The seven projected development sites located west of Pennsylvania Avenue (sites 1, 2, 6, 7, 12, 18, and 19) are located within subcatchment area 26W-003. The 26W-004 subcatchment area includes 12 projected development sites (sites 3-5, 8-11, and 13-17). The majority of the projected development sites (sites 20-80) are located within subcatchment area 26W-005. While a small portion of the rezoning area falls within the Newtown Creek WPCP, no projected development sites are located within its drainage area, and it is therefore excluded from this assessment (refer to Figure 10-1).

Table 10-3 shows the estimated existing wastewater generated on the 80 projected development sites within each of the affected subcatchment areas.

TABLE 10-3
Existing Wastewater Generation on the 80 Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)
26W-003	10,074
26W-004	11,530
26W-005	104,125
Total	***125,729***

Notes:
[1] Derived using the same methodology used in Table 10-1.

Stormwater and Drainage Management

Stormwater runoff from impermeable surfaces on the projected development sites is collected and conveyed by the City's combined sewer system to the 26th Ward WPCP, located to the south of the rezoning area (approximately 1.4 miles) at 122-66 Flatlands Avenue. As noted above, during dry weather, regulators built into the combined sewer system direct flows to interceptor sewers leading to the WPCP. However, during storm events, the regulators are calibrated to allow only twice the dry weather design flow into interceptor sewers, and the remaining flow is discharged into Hendrix Creek, the Fresh Creek Basin, and/or Spring Creek.

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 Hendrix Creek, the Fresh Creek Basin, and Spring Creek. 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.

Under existing conditions, the total lot area of the projected development sites consists of 1,817,411 sf. Approximately 145,920 sf (eight percent) of the projected development sites' lot area is located within subcatchment area 26W-003, subcatchment area 26W-004 contains approximately 184,867 sf (10.1 percent), and the remainder (1,486,624 sf, or 82 percent of the projected development sites' lot area) is located within subcatchment area 26W-005.

As shown in Table 10-4, the lot area of the projected development sites within subcatchment area 26W-003 is primarily comprised of paved areas (63,904 sf, or approximately 44 percent), reflecting the presence of multiple paved lots used for parking and vehicle storage. Twenty-nine percent (42,010 sf) of their lot area is comprised of grass and softscape, and the remaining 27 percent (40,006 sf) is comprised of roof area, resulting in a weighted runoff coefficient of 0.70. The projected development sites within subcatchment areas 26W-004 and 26W-005 include a greater percentage of roof area (39 percent and 41 percent, respectively), and both include a greater amount of paved areas than softscape; subcatchment area 26W-004's paved lot area is approximately double its grass and softscape lot area, with a more even distribution of paved areas and softscape present on subcatchment area 26W-005's projected development sites. The weighted runoff coefficients of the projected development sites in subcatchment areas 26W-004 and 26W-005 are 0.77 and 0.73, respectively.

TABLE 10-4
Existing Projected Development Site Surface Areas and Runoff Coefficients

Subcatchment Area	Surface Type	Roof	Pavement & Walks	Grass & Softscape	Total
26W-003	Area (%)	27	44	29	100
	Surface Area (sf)	40,006	63,904	42,010	145,920
	Runoff Coefficient[1]	1.00	0.85	0.20	0.70
26W-004	Area (%)	39	40	21	100
	Surface Area (sf)	72,401	73,992	38,475	184,867
	Runoff Coefficient[1]	1.00	0.85	0.20	0.77
26W-005	Area (%)	41	31	28	100
	Surface Area (sf)	615,478	458,113	413,033	1,486,624
	Runoff Coefficient[1]	1.00	0.85	0.20	0.73

Source: DCP Building Footprint and PLUTO data; aerial photographs
Notes:
[1] Runoff coefficients for each surface type as per DEP.

For this analysis, standard DEP runoff coefficients were used to calculate the amount of stormwater runoff during a range of storm events, with rainfall averaging from 0.0 to 2.5 inches over durations of 3.8 to 19.5 hours. Also, at DEP's request, the amount of stormwater runoff was calculated for rainfall events of 5.9 inches over durations of 1 and 4 hours (a "five-year storm event") for informational purposes only. Table 10-5 shows the existing combined stormwater runoff and wastewater generation for the existing uses on the 80 projected development sites, by subcatchment area. As indicated in the table, for storm events with up to 2.5 inches of rainfall, the projected development sites within subcatchment areas 26W-003, 26W-004, and 26W-005 generate up to 0.16 million gallons, 0.22 million gallons, and 1.69 million gallons of stormwater, respectively. Depending on rainfall intensity, during storm events with up to 2.5 inches of rainfall the total volumes (including both stormwater and sanitary sewage) to the combined sewer system range from 0.00 to 0.17 million gallons in subcatchment area 26W-003, from 0.00 to 0.23 million gallons in subcatchment area 26W-004, and from 0.02 to 1.78 million gallons in subcatchment area 26W-005. During five-year storm events, the total volumes (including both stormwater and sanitary sewage) to the combined sewer system would be up to 0.38 million gallons, 0.53 million gallons, and 4.01 million gallons in subcatchment areas 26W-003, 26W-004, and 26W-005, respectively.

TABLE 10-5
Existing Combined Stormwater Runoff and Wastewater Generation from the Projected Development Sites

Subcatchment Area	Rainfall (inches)	Duration (hours)	Total Area (Acres)	Weighted Runoff Coefficient[a]	Stormwater Runoff (MG)	Sanitary to CSS (MG)[b]	Total Volume to CSS (MG)
26W-003	0.00	3.80	3.35	0.70	0.00	0.00	0.00
	0.40	3.80			0.03	0.00	0.03
	0.20	11.30			0.08	0.01	0.09
	2.50	19.50			0.16	0.01	0.17
	5.90[c]	1.00[c]			0.38	0.00	0.38
	5.90[c]	4.00[c]			0.38	0.00	0.38
26W-004	0.00	3.80	4.24	0.77	0.00	0.00	0.00
	0.40	3.80			0.04	0.00	0.04
	0.20	11.30			0.11	0.01	0.12
	2.50	19.50			0.22	0.01	0.23
	5.90[c]	1.00[c]			0.52	0.00	0.52
	5.90[c]	4.00[c]			0.52	0.00	0.53
26W-005	0.00	3.80	34.1	0.73	0.00	0.02	0.02
	0.40	3.80			0.27	0.02	0.29
	0.20	11.30			0.81	0.05	0.86
	2.50	19.50			1.69	0.09	1.78
	5.90[c]	1.00[c]			3.99[c]	0.00[c]	4.00[c]
	5.90[c]	4.00[c]			3.99[c]	0.02[c]	4.01[c]

Notes:
[a] Refer to Table 10-4.
[b] Derived from Table 10-3.
[c] For informational purposes only.
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 five-year storm. Since many of the buildings in the rezoning area most 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.

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

In the 2030 future without the Proposed Actions, development is anticipated on 27 of the 80 projected development sites. As described in Chapter 2, "Land Use, Zoning, and Public Policy," in total, No-Action development on these 27 projected development sites would result in a net 452 DU, 308,723 sf of commercial office/retail/hotel uses, 88,977 sf of community facility uses, and 98,869 sf of industrial/warehouse/auto-related/garage uses over existing conditions. Infrastructure improvements anticipated in and around the rezoning area by the 2030 No-Action condition are also described below.

Water Supply

As indicated in Table 10-6, in the future without the Proposed Actions, the total water consumption on the projected development sites would be approximately 547,188. This represents an increase of approximately 345,516 gpd over existing conditions (refer to Table 10-1).

TABLE 10-6
No-Action Water Consumption

Land Use	Water Consumption & Wastewater Generation Rates[1]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpd/person[2]	550 DU	164,600	0
Commercial/Office	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	75,992 sf	7,599	12,919
Retail[3]	0.24 gpd/sf AC: 0.17 gpd/sf	281,877 sf	67,650	47,919
Community Facility[4]	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	156,972 sf	15,697	26,685
Industrial/Warehouse/Auto-Related/Garage	Domestic: 10,000 gpd/acre[5] A/C: 0.17 gpd/sf	330,476	75,867	56,181
Hotel	120 gpd/room/occupant[6] A/C: 0.17 gpd/sf	97,551 (486 rooms[7])	58,320	16,584
		Total Water Demand	***547,188***	
		Total Wastewater Generation	***388,075***	

Notes:
[1] Consumption rates obtained from the 2014 *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[2] Assumes 2.99 residents per DU for all residential development within CD 5 and 2.75 residents per DU for all residential development within CD 16.
[3] Use group comprises retail, supermarket, and restaurant.
[4] Assumes same rate as commercial/office. Includes house of worship, day care, medical office, and community center uses.
[5] Based on 2005 *Greenpoint-Williamsburg Rezoning FEIS.* Calculated based on total building floor area, assuming no additional water demand from open storage.
[6] Assumes two occupants per hotel room.
[7] Assumes 400 sf per hotel room.

Infrastructure Improvements

In conjunction with Infrastructure Project BED776, the City is replacing trunk water mains in the vicinity of East New York, Jamaica, and Atlantic Avenues. The project is expected to be completed by 2016, and is therefore included in the 2030 No-Action condition. These No-Action water main improvements are expected to improve the delivery of water to the rezoning area.

Wastewater Treatment

In the future without the Proposed Actions, wastewater generated on the 80 projected development sites would total 388,075 gpd (refer to Table 10-6), an increment of 262,346 gpd over existing conditions. This additional sanitary discharge to the 26th Ward WPCP would be well within the 38 mgd of capacity available at the plant on average, and, therefore, the WPCP would continue to operate within its design capacities.

Stormwater and Drainage Management

In the 2030 No-Action condition, stormwater runoff from the projected development sites would continue to be collected and directed through the combined sewer system and then conveyed to the 26th Ward WPCP for treatment. As development is anticipated on 27 of the 80 projected development sites under the No-Action condition, the amount of lot area comprising roofs would increase in all three affected subcatchment areas, with corresponding decreases in the area comprised of pavement/walks and grass/softscape. As a result, the amount of stormwater runoff generated on the projected development sites would increase, as compared to existing conditions.

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. As a result of these requirements, given that the existing development sites most likely do not provide detention, it is

expected that there would be a reduction in uncontrolled runoff on the 27 projected development sites where new construction is anticipated in the future without the Proposed Actions. However, no improvements to stormwater detention or retention, such as green roofs, blue roofs, or seepage basins, are expected on the remaining 54 projected development sites that are expected to remain unchanged in the No-Action condition.

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

In the 2030 future with the Proposed Actions, it is anticipated that development on the 80 projected development sites would comprise 6,862 DU, 1,210,389 sf of commercial uses, 98,851 sf of industrial uses, and 614,842 sf of community facility uses. In total, this would represent an increment of 6,312 DU, 557,290 sf of commercial uses, and 457,870 sf of community facility uses, as well as a net reduction of 27,035 sf of industrial uses as compared to the No-Action condition.

Water Supply

The Proposed Actions would not result in significant adverse impacts on the City's water supply system. As indicated in Table 10-7, the projected development sites are expected to generate a water demand of approximately 2,715,351 gpd in the 2030 With-Action condition, an increase of 2,168,163 gpd, or approximately 2.2 mgd, compared to demand in the future without the Proposed Actions. Future incremental demand from the projected development sites in the With-Action condition would be dispersed throughout the 190-block rezoning area and would represent approximately 0.2 percent of the City's average daily water supply of approximately one billion gpd.

TABLE 10-7
With-Action Water Consumption

Land Use	Water Consumption & Wastewater Generation Rates[1]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpf/person[2]	6,862 DU	2,044,700	0
Commercial/Office	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	191,887 sf	19,189	32,621
Retail[3]	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	1,018,502 sf	244,441	173,145
Schools (1,000-seat PS/IS & 205-seat Pre-K)	Domestic: 10 gpd/seat A/C: 0.17 gpd/sf	163,000 sf (approx. 1,205 seats)	12,050	27,710
Other Community Facility[4]	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	451,843 sf	45,184	76,813
Industrial/Warehouse/Auto-Related/Garage	Domestic: 10,000 gpd/acre[5] A/C: 0.17 gpd/sf	98,851 sf	22,693	16,805
		Total Water Demand	***2,715,351***	
		No-Action to With-Action Incremental Water Demand	***2,168,163***	
		Total Wastewater Generation	***2,388,257***	
		No-Action to With-Action Incremental Wastewater Generation	***2,000,182***	

Notes:
[1] Consumption rates obtained from the 2014 *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[2] Assumes 2.99 residents per DU for all residential development within CD 5 and 2.75 residents per DU for all residential development within CD 16.
[3] Use group comprises retail, supermarket, and restaurant.
[4] Assumes same rate as commercial/office. Includes house of worship, medical office, and community center uses.
[5] Based on 2005 *Greenpoint-Williamsburg Rezoning FEIS.* Calculated based on total building floor area, assuming no additional water demand from open storage.

Wastewater Treatment

In the future with the Proposed Actions, wastewater from the projected development sites would continue to be treated by the 26th Ward WPCP. The capacity of the plant would not change as a result of the Proposed Actions, and the facility would continue to operate within its SPDES-permitted capacity of 85 mgd.

As indicated in Table 10-8, under the RWCDS, development on the 80 projected development sites is expected generate a total of approximately 2,388,257 gpd of sanitary sewage; the majority (2,003,215 gpd, or 84 percent) is expected to be generated by the subcatchment area 26W-005 projected development sites, and approximately 169,164 gpd and 215,878 gpd are expected to be generated by the projected development sites within subcatchment areas 26W-003 and 26W-004, respectively. In total, the With-Action sanitary sewage generation on the 80 projected development sites would represent an increase of 2,000,182 gpd to the 26th Ward WPCP over No-Action conditions (refer to Table 10-7).

TABLE 10-8
With-Action Wastewater Generation on the 80 Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)
26W-003	169,164
26W-004	215,878
26W-005	2,003,215
Total	***2,388,257***

Notes:
[1] Derived using the same methodology used in Table 10-7.

With an existing average dry weather flow of 47 mgd to the 26th Ward WPCP (refer to Table 10-2) and the addition of approximately 2,000,182 gpd (2.0 mgd) on the 80 projected development sites in the 2030 With-Action condition (compared to the No-Action condition), the 26th Ward WPCP would continue to have ample reserve capacity. Pursuant to *CEQR Technical Manual* guidelines, as the demand associated with the Proposed Actions would be well within the capacity of the affected treatment plant, no significant adverse impacts to the City's wastewater treatment services would occur as a result of the Proposed Actions.

Stormwater and Drainage Management

In the future with the Proposed Actions, it is anticipated that the amount of surface area comprised of roofs would increase over existing conditions as underutilized and vacant lots are developed with new larger developments. As indicated in Table 10-9, it is anticipated that roof area would comprise 84, 90, and 80 percent of the projected development sites' surface area in subcatchment areas 26W-003, 26W-004, and 26W-005, respectively. For analysis purposes, it is assumed that the remaining lot area on each of the 80 projected development sites, including side and rear yards, would be evenly distributed between hardscape (pavement and walks) and softscape. As a result of these anticipated surface area changes, the weighted runoff coefficients for projected development sites within each of the subcatchment areas are expected to increase over existing conditions. As indicated in Table 10-9, subcatchment areas 26W-003, 26W-004, and 26W-005 are expected to have weighted runoff coefficients of 0.92, 0.95, and 0.91, respectively, in the With-Action condition.

Table 10-10 shows the estimated combined flow volumes (stormwater runoff and sanitary flows) to the combined sewer system. As shown in the table, for storm events with up to 2.5 inches of rainfall, the total volumes to the combined sewer systems within the 26W-003, 26W-004, and 26W-005 subcatchment areas would range from 0.03 to 0.35 million gallons, 0.03 to 0.44 million gallons, and 0.32 to 3.74 million gallons, respectively. As indicated in Table 10-10, compared to existing volumes to the combined sewer system from the 80 projected development sites, subcatchment area 26W-003 flows would increase by 0.03 to 0.18 million gallons, subcatchment area 26W-004 flows would increase by 0.03 to 0.22 million gallons, and subcatchment area 26W-005 flows would increase by 0.30 to

1.96 million gallons during storm events with up to 2.5 inches of rainfall. During five-year storm events, the increase in combined volumes would be up to 0.15 million gallons, 0.16 million gallons, and 1.30 million gallons in subcatchment areas 26W-003, 26W-004, and 26W-005, respectively. Increased volumes and flows would be conveyed to the 26th Ward WPCP or discharged directly to Hendrix Creek, the Fresh Creek Basin, and/or Spring Creek, dependent on the storm event.

TABLE 10-9
With-Action Projected Development Site Surface Areas and Runoff Coefficients

Subcatchment Area	Surface Type	Roof	Pavement & Walks	Grass & Softscape	Total
26W-003	Area (%)	84	8	8	100
	Surface Area (sf)	122,649	11,636	11,636	145,920
	Runoff Coefficient[1]	1.00	0.85	0.20	0.92
26W-004	Area (%)	90	5	5	100
	Surface Area (sf)	167,107	8,880	8,880	184,867
	Runoff Coefficient[1]	1.00	0.85	0.20	0.95
26W-005	Area (%)	80	10	10	100
	Surface Area (sf)	1,195,539	145,543	145,543	1,486,624
	Runoff Coefficient[1]	1.00	0.85	0.20	0.91

Source: DCP Building Footprint and PLUTO data; aerial photographs
Notes:
[1] Runoff coefficients for each surface type as per DEP.

TABLE 10-10
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[a]	Stormwater Runoff (MG)	Sanitary to CSS (MG)[b]	Total Volume to CSS (MG)	Increase over Existing Volume to CSS (MG)
26W-003	0.00	3.80	3.35	0.92	0.00	0.03	0.03	0.03
	0.40	3.80			0.03	0.03	0.06	0.03
	0.20	11.30			0.10	0.08	0.18	0.09
	2.50	19.50			0.21	0.14	0.35	0.18
	5.90[c]	1.00[c]			0.49[c]	0.01[c]	0.50[c]	0.13[c]
	5.90[c]	4.00[c]			0.49[c]	0.03[c]	0.52[c]	0.15[c]
26W-004	0.00	3.80	4.24	0.95	0.00	0.03	0.03	0.03
	0.40	3.80			0.04	0.03	0.07	0.03
	0.20	11.30			0.13	0.10	0.23	0.11
	2.50	19.50			0.27	0.18	0.45	0.22
	5.90[c]	1.00[c]			0.65[c]	0.01[c]	0.65[c]	0.13[c]
	5.90[c]	4.00[c]			0.65[c]	0.04[c]	0.68[c]	0.16[c]
26W-005	0.00	3.80	34.1	0.91	0.00	0.32	0.32	0.30
	0.40	3.80			0.34	0.32	0.66	0.37
	0.20	11.30			1.01	0.94	1.95	1.09
	2.50	19.50			2.11	1.63	3.74	1.96
	5.90	1.00			4.98	0.08	5.06	1.06
	5.90	4.00			4.98	0.33	5.31	1.30

Notes:
[a] Refer to Table 10-9.
[b] Derived from Table 10-8.
[c] For informational purposes only.MG = million gallons.

As shown in Table 10-10, new flow volumes would be introduced to the combined sewer system as a result of the Proposed Actions. 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 greater detail below, DEP requires substantial stormwater detention in compliance with the drainage plan for developments or building alteration on lots fronting on streets with sewers if the developed site's storm flow exceed the allowable flow of the drainage plan. As a result of these requirements, given that the existing development sites are unlikely to provide significant detention, it is expected that there would be an increase in on-site detention and retention as a result of the Proposed Actions.

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 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. Therefore, any new developments or alterations in the With-Action condition 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 (http://www.nyc.gov/html/dep/html/stormwater/stormwater_management_construction. shtml) 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.

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 East New York.

To be issued a permit to connect to the City sewer within the rezoning area, an applicant proposing a new development or expansion of an existing development may be required to submit a site-specific hydraulic analysis. Sewer improvements and/or incorporation of BMPs may also be required of the applicant at the time of the house or site connection proposal.

Stormwater Best Management Practices

A broad range of BMPs could be implemented on the development lots within the rezoning area to facilitate stormwater source controls and limit the stormwater release rate to the required 0.25 cfs or ten 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 RWCDS for the Proposed Actions. 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 control 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.

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

For each 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 ten 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 roofs and blue roofs, susbsurface 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 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 an exacerbation of existing CSO discharge.

The Proposed Actions would increase flows to the City's combined sewer system that may be discharged as CSOs into the Hendrix Creek, the Fresh Creek Basin, and/or Spring Creek during rain events. Because of the available assimilative capacity of the 26th Ward WPCP, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality. Based on the analysis and the required BMP measures that would be implemented on each projected development site by their respective developer in accordance with City site connection requirement, it is concluded that the Proposed Actions would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure.