A. INTRODUCTION

This chapter assesses the potential effect of the Proposed Action on the City's water supply, wastewater treatment, and stormwater management infrastructure. 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. 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.

According to *City Environmental Quality Review* (CEQR) *Technical Manual* guidelines, a water and sewer infrastructure preliminary assessment is required for the Proposed Action as it would increase population density by, as described in detail in Chapter 1, "Project Description," facilitating a proposal by the Applicant, to develop a new mixed-use, predominantly residential, development on the project site. As proposed by the Applicant, the approximately 2,189,068 gross square feet (gsf) mixed-use development would consist of approximately 1,689 dwelling units, 109,470 gsf of local retail space, a site for a 456-seat elementary school, 900 accessory parking spaces, and 83,846 sf of publicly accessible open space on the approximately 377,726 sf (8.7-acre) project site.

In addition to the approvals being sought from the City, the proposed project will also require approvals from the U.S. Army Corps of Engineers (USACE) and the New York State Department of Environmental Conservation (NYSDEC) for two proposed new stormwater outfalls to be located at the northern terminus of 4th Street (proposed to be mapped) and 9th Street.

B. PRINCIPAL CONCLUSIONS

Based on the methodology set forth in the *CEQR Technical Manual*, the analysis finds that the Proposed Action would not result in a significant adverse impact on the City's water supply, wastewater and stormwater conveyance and treatment infrastructure.

Water Supply

The anticipated water usage as a result of the Proposed Action is expected to total 338,611 gallons per day (gpd) over water demand under existing conditions. This incremental demand would represent less than 0.1 percent of the City's overall water supply and would be distributed over the 8.7-acre site. 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 (Dry Weather) Flows

The Bowery Bay water pollution control plant (WPCP), which is designed to treat a dry weather flow of 150 million gallons per day (mgd), handled an average of 110 mgd of sewage flow between January and

December 2012. Based on rates in the *CEQR Technical Manual*, the Proposed Action has the potential to result in an increase of 0.34 mgd of sanitary sewage flow. This incremental increase in sanitary flow would represent approximately 0.2 percent of the Bowery Bay WPCP's designated State Pollution Discharge Elimination System (SPDES) capacity. Pursuant to CEQR methodology, as the projected increase in sanitary sewage would not cause the Bowery Bay WPCP to exceed its operational capacity or its SPDES-permitted capacity, the Proposed Action would not result in significant adverse impacts to sanitary sewage conveyance and treatment.

Stormwater (Wet Weather) Flows

The Proposed Action would include improvements to stormwater infrastructure to support the new development, including the construction of new stormwater outfalls to enable direct discharge of project site stormwater flows into the East River and therefore would decrease the amount of stormwater flows generated on the project site that could contribute to combined sewer overflow (CSO) events. Based on the analysis conducted in accordance with the *CEQR Technical Manual*, with the infrastructure improvements and Best Management Practices (BMP) implemented on the project site by the Applicant, it is concluded that the Proposed Action would not result in significant adverse impacts on stormwater conveyance and treatment infrastructure.

C. 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 one mgd), or is located in an area that experiences low water pressure (i.e., areas at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). As the project site is not located in an area that experiences low water pressure and the Proposed Action would not result in an incremental water demand exceeding one mgd, a detailed analysis is not warranted. However, the proposed project's total water demand is calculated for purposes of determining the sewage generated by the proposed project. Table 11-1 shows the applicable RWCDS water consumption and wastewater generation rates utilized for this assessment.

Table 11-1: Water Consumption and Wastewater Generation Rates

Land Use	Rate	
	Domestic	**Air Conditioning**
Industrial/Warehouse /Storage	10,000 gpd per acre multiplied by 1.00 zoning district factor for M1-1[1]	0.17 gpd/sf
Residential	234 gpd/DU[2]	N/A
Retail	0.24 gpd/sf	0.17 gpd/sf
Schools	10 gpd/seat	0.17 gpd/sf

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

Notes:

[1] Rate for industrial/manufacturing, vehicle/open storage, and automotive uses in M1-1 districts from the 2005 *Greenpoint-Williamsburg Rezoning FEIS*.

[2] Based on Queens Community District (CD) 1 housing occupancy rate of 2.34 persons per dwelling unit and domestic water consumption rate of 100 gpd/person.

The proposed project is located in an area that is primarily served by combined sewers. A preliminary sewer assessment is warranted if a project exceeds 100 residential units or 100,000 sf of commercial/public and/or institution/community facility uses in a separately sewered area zoned R6 and

M1-1 (i.e., zoning districts noted in Table 13-1 of the *CEQR Technical Manual* as "all remaining zoning designations, including commercial, manufacturing and mixed-use districts"); 400 residential units or 150,000 sf of commercial/public and/or institution/community facility use in a combined sewer area; or if a project would involve the construction of a new stormwater outfall that requires Federal and/or State permits. As the proposed project meets the *CEQR Technical Manual* thresholds, a preliminary sewer assessment is warranted and is provided in this chapter.

The preliminary sewer assessment is undertaken by calculating existing and future water demands and sanitary sewage generation based on use generation rates as set forth in Table 13-2 of the *CEQR Technical Manual*. The estimated amount of sewage generated from the proposed project conservatively includes all of the project site's water consumption excluding air conditioning, which is typically not discharged into the sewer system. The New York City Department of Environmental Protection (DEP) Flow Calculation Matrix is then used to calculate the sanitary sewage and stormwater runoff volume discharged to the sewer system for four rainfall volume scenarios with varying durations. Stormwater runoff volumes are determined by estimating the project site's pervious and impervious surfaces. If a proposed project is located within multiple CSO subcatchment areas, the Flow Calculation Matrix is completed for each CSO subcatchment area.

As analyses of water demand and sewage generation are density-based technical analyses, only the anticipated development forms the basis for this assessment.

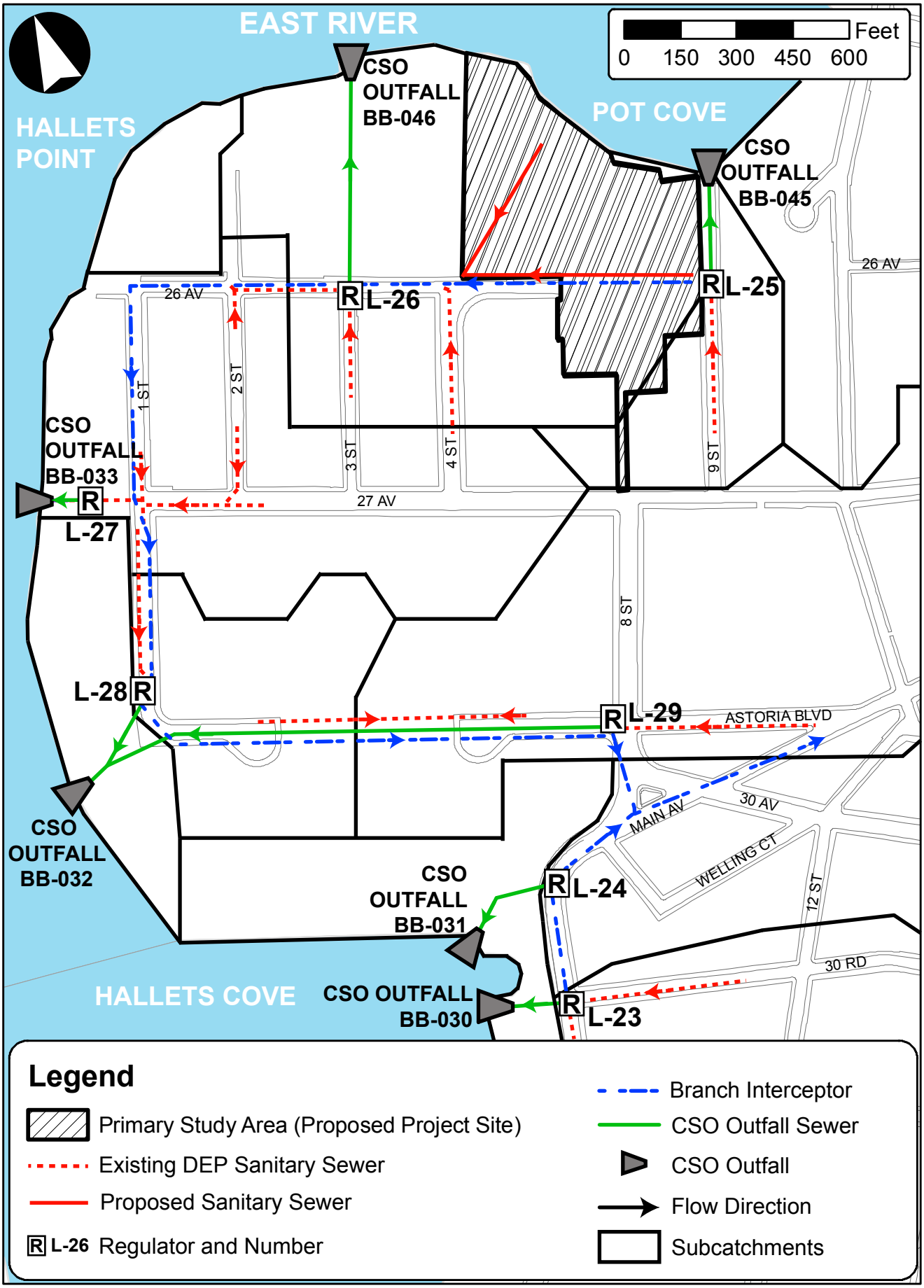
The ability of the City's sewer infrastructure to handle the proposed project's anticipated demand is assessed by estimating existing water demand and storm and sewage generation rates and then comparing the estimates for the future with and without the Proposed Action. Figure 11-1 shows the existing and proposed sanitary sewer system serving the project site and Figure 11-2 shows the existing and proposed storm sewer system in the vicinity of the project site. As shown in Figure 11-3, the project site is located within CSO Subcatchment Areas BB-045 and BB-046. Buildings 1 through 4 would be located entirely within Subcatchment Area BB-046, while only a portion of Building 5 site and 8th Street south of 26th Avenue are located within Subcatchment Area BB-046. The remaining portion is located within Subcatchment Area BB-045. In total, the portion of the project site within Subcatchment Area BB-046 consists of approximately 347,631 sf and the portion located within Subcatchment Area BB-045 consists of approximately 30,095 sf.

The analysis of existing and No-Action conditions is based on the existing sanitary and stormwater conveyance and treatment systems serving the project site. Specifically, sanitary and the majority of stormwater flow generated on the project site is conveyed to the Bowery Bay WPCP via an existing interceptor pipe located under 26th Avenue; portions of the project site discharge stormwater directly to the East River as overland flow. In instances of heavy combined flows that cause the regulator to divert flows (i.e., storm events), a portion of the combined flow is discharged to the East River via existing CSO outfalls.

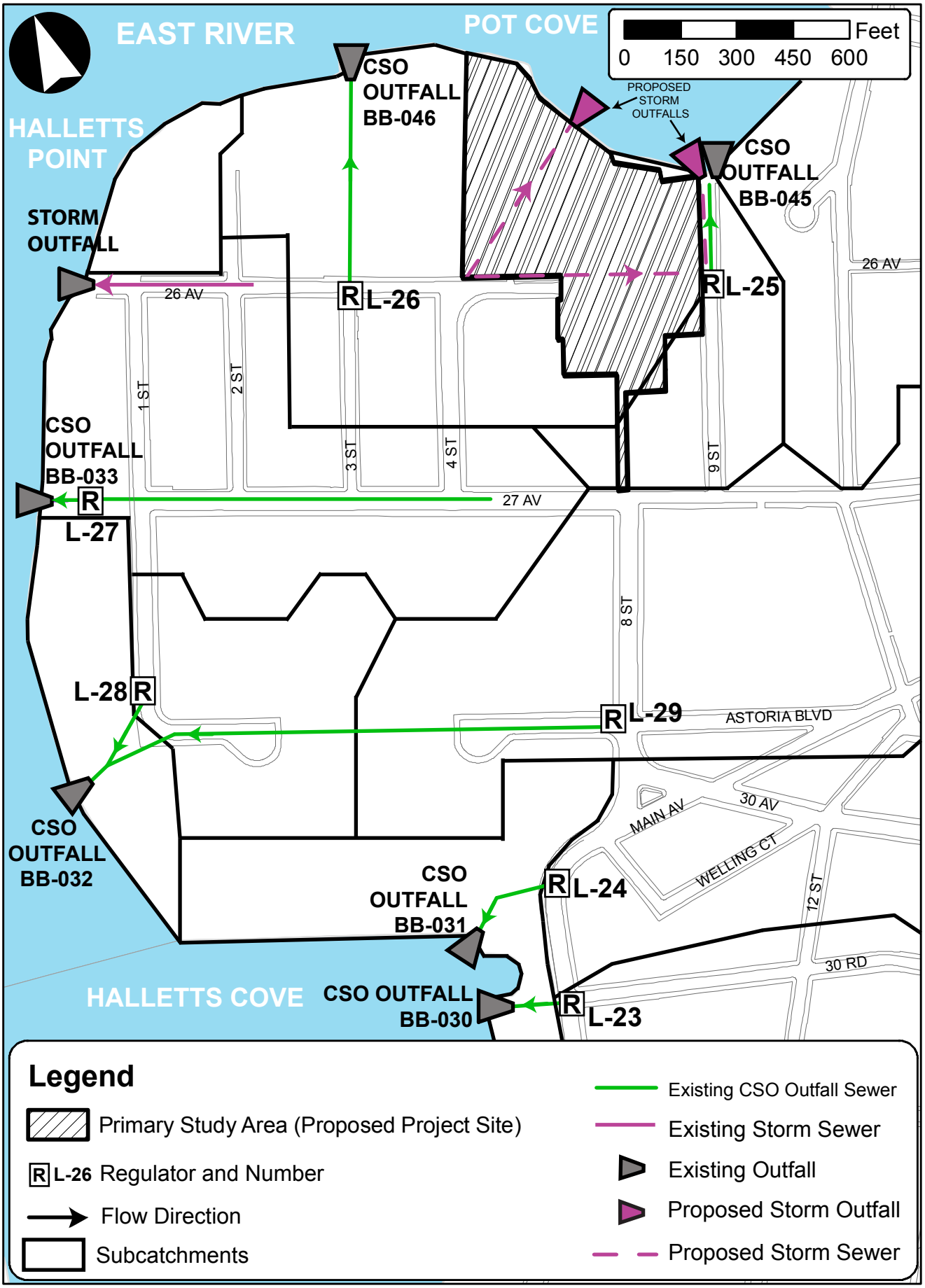
The analysis of With-Action sanitary and stormwater conveyance and treatment systems assumes several improvements to infrastructure on and adjacent to the project site, as recommended by DEP (see Figures 11-1 and 11-2). Specifically, sanitary flow generated on the project site would be conveyed to the Bowery Bay WPCP via new sanitary sewers to be installed along 4th Street and 26th Avenue and connect to the existing interceptor pipe located under 26th Avenue. Stormwater flow generated on the project site would be conveyed to the East River via new storm sewers along 26th Avenue, 4th Street, and a portion of 9th Street to new stormwater outfalls at the northern termini of 4th and 9th Streets.

Table 11-2 below compares the method of sanitary and storm discharge for each building site under existing/No-Action conditions and With-Action conditions.

Existing and Proposed Sanitary Sewer System



Existing and Proposed Storm Sewer System



Bowery Bay Subcatchment Areas

Table 11-2: Summary of Sanitary and Storm Discharges and CSO Subcatchment Areas

Area Designation	Existing/No-Action Condition		With-Action Condition	
	Sanitary Sewage	Stormwater Runoff	Sanitary Sewage	Stormwater Runoff
CSO Subcatchment Area BB-045				
Site 1	Interceptor sewer	Interceptor pipe and/or direct discharge to the East River via overland flow and CSO outfall pipe	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe
Site 2	Interceptor sewer	Interceptor pipe and/or direct discharge to the East River via overland flow and CSO outfall pipe	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe
Site 3	Interceptor sewer	Interceptor pipe and/or direct discharge to the East River via overland flow and CSO outfall pipe	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe
Site 4	No sanitary discharge	Interceptor pipe and/or discharge to the East River via CSO outfall pipe after regulator	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe
Site 5 (p/o)	No sanitary discharge	Interceptor pipe and/or discharge to the East River via CSO outfall pipe after regulator	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe
CSO Subcatchment Area BB-046				
Site 5 (p/o)	No sanitary discharge	Interceptor pipe and/or discharge to the East River via CSO outfall pipe after regulator	Sanitary sewer with connection directly into Interceptor sewer	Direct discharge to the East River via new storm outfall pipe

Note: See Figure 11-1 and Figure 11-2.

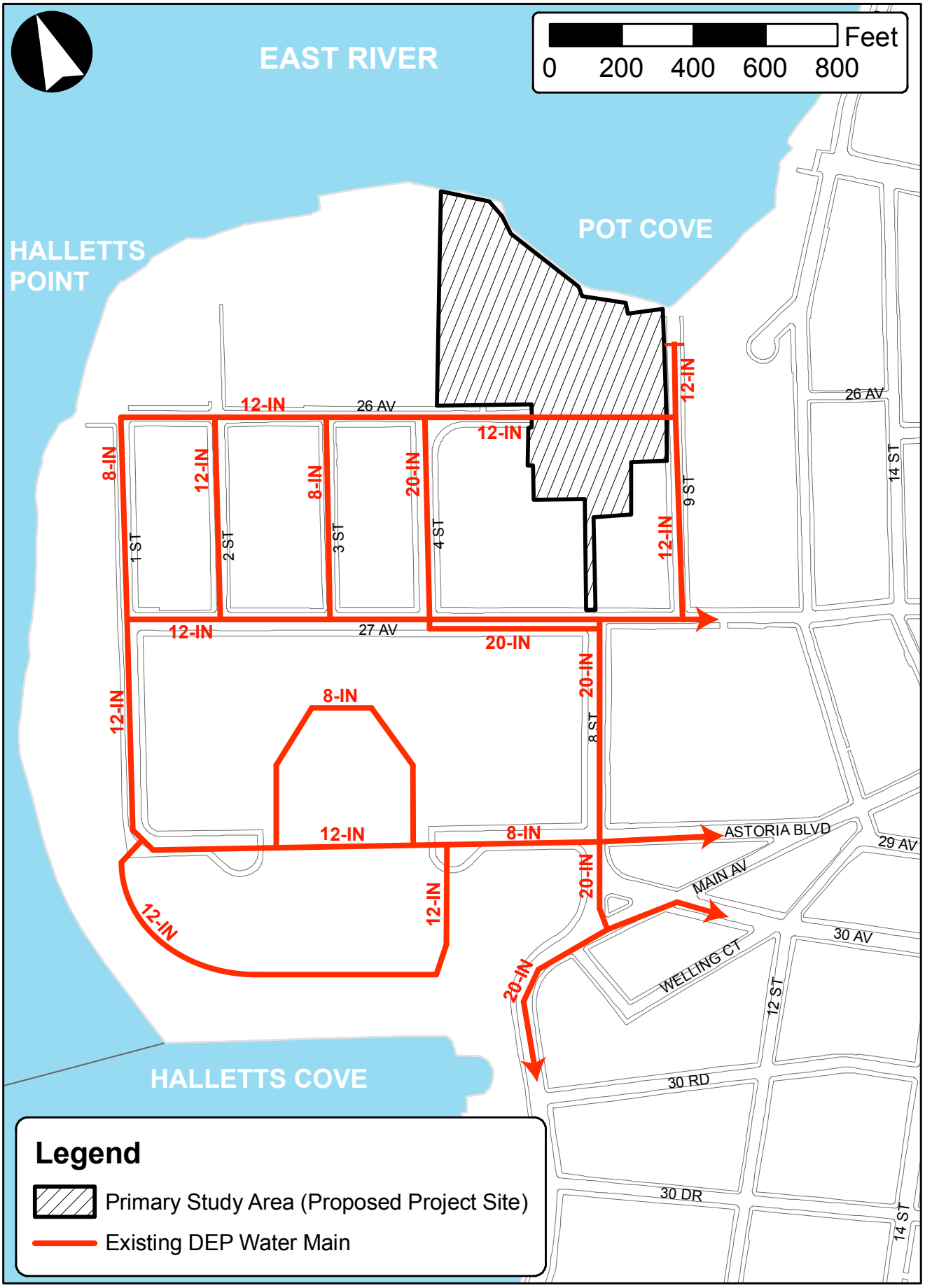
D. EXISTING CONDITIONS

Water Supply

The New York City water supply system comprises a network of reservoirs, lakes, and aqueducts extending north and west of the City 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 is stored at 19 reservoirs and three control lakes, having a combined capacity of approximately 580 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 complete City Tunnel 3 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 the smaller mains, which 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

DEP Water Mains



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.

City water mains exist in the streets fronting the project area, including a 12-inch water main in 9th Street, a 12-inch water main in 26th Avenue and a 20-inch water main in 27th Avenue (see Figure 11-4). These mains provide water service to the existing industrial buildings on the waterfront parcels. Table 11-3 summarizes the estimated water demand from the existing 194,700 sf of industrial/warehousing and storage uses on the project site based on the water consumption and wastewater generation rates presented in Table 11-1.

As shown in Table 11-3, existing uses on the project site consumes approximately 44,697 gpd of domestic water and approximately 33,099 gpd related to air conditioning for a total water consumption of approximately 77,796 gpd.

Table 11-3: Existing Water Consumption

Land Use	Floor Area (sf)	Domestic Water gpd)	Air Conditioning (gpd)
Industrial/Warehouse/Storage	194,700 (4.47 acres)[1]	44,697	33,099
Total Water Consumption		***77,796***	

Notes:
Refer to Table 11-1 for rate assumptions.
[1] Conservatively calculated based on waterfront parcel total building floor area assuming no water demand from existing open bus/vehicle storage.

Wastewater

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 very little, if any, is discharged to the sewage system and nearly all of it is recirculated or evaporated 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 combined sewers since they receive both 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, as well as stormwater and debris, can be discharged, untreated, into the nearest body of water. This untreated overflow is known as "combined sewer overflow" (CSO).

The project site is located in Queens CD 1 and is served by the Bowery Bay WPCP. The Bowery Bay WPCP is located adjacent to LaGuardia Airport in Astoria, Queens and treats wastewater through full

secondary physical and biological processes before the wastewater is discharged into the East River. Secondary treatment includes the removal of a minimum of 85 percent of biological oxygen demand and total suspended solids from the effluent. The quality of the effluent from this WPCP is regulated by a SPDES permit issued by the NYSDEC. The permit specifies the maximum limit for effluent parameters that include suspended solids, fecal coliform bacteria, and other pollutants. The treatment capacity of the Bowery Bay WPCP is limited to a maximum of 150 mgd. As shown in Table 11-4, from January through December 2012, the Bowery Bay WPCP treated between 99 mgd and 118 mgd, averaging approximately 110 mgd with approximately 40 mgd available capacity.

Table 11-4: Monthly Average Dry Weather Flows from the Bowery Bay WPCP

Year	Month	Bowery Bay WPCP (mgd)
2012	January	110
	February	102
	March	99
	April	106
	May	117
	June	118
	July	114
	August	116
	September	115
	October	112
	November	102
	December	113
Annual Average		***110***

Source: DEP

The project site and the immediate surrounding area are served primarily by combined sewers, with an existing interceptor pipe beneath 26th Avenue receiving the majority of existing project site stormwater and sanitary flows. Existing sewers in the immediate surrounding area flow to regulators L-25 (CSO BB-045) and L-26 (CSO BB-046) (see Figure 11-1). Sites 1 through 4 are located entirely within Subcatchment Area BB-046, while only a portion of Site 5 and 8th Street south of 26th Avenue are located partially within Subcatchment Area BB-046. As previously stated, the portion of the project site within Subcatchment Area BB-046 consists of approximately 347,631 sf and the portion located within Subcatchment Area BB-045 consists of approximately 30,095 sf.

Consistent with *CEQR Technical Manual* methodologies, the amount of sanitary sewage generated from the existing building uses is conservatively estimated as all water consumption except that used by air conditioning, which is typically not discharged to the City sewer system. Therefore, the overall estimated amount of daily sanitary sewage currently generated is 44,697 gpd as computed in Table 11-3. As the upland portions of the project site (Block 909, Lot 35 and Block 908, Lot 12) currently do not contain any buildings, no wastewater is generated on these portions of the project site under existing conditions. As a result, all wastewater generated within the project site under existing conditions flows to Subcatchment Area BB-046 via the existing interceptor pipe beneath 26th Avenue.

Stormwater and Drainage Management

Stormwater runoff from impermeable surfaces on the project site is collected and conveyed by the City's combined sewer system to the Bowery Bay WPCP, with the exception of a small amount of overland flow that runs directly into the East River. 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 a portion of the combined wastewater and stormwater approximating twice the dry weather design flow for the WPCP into interceptor sewers and the remaining overflow is discharged into the East River (see Figure 11-1).

For combined sewer areas, the analysis of stormwater management typically focuses on the body of water into which the combined overflow 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 combined sewers) are not usually considered to have a potential to increase CSO occurrences.

In the existing condition, the total lot area of the project site consists of approximately 377,726 sf, comprised predominantly of impervious surfaces such as paved areas or roofs. Approximately 347,631 sf (92 percent) of the project site is located within Subcatchment Area BB-046. Subcatchment Area BB-045 contains approximately 30,095 sf (eight percent), the balance of the project site. As shown in Table 11-5, Subcatchment Area BB-046 is comprised predominantly of roof and paved areas, with grass and softscape comprising approximately 25 percent of the total surface area. Within Subcatchment Area BB-045, just over two-thirds of the surface area is pavement and walks, while just under one-third of the surface area is grass and softscape.

Table 11-5: Existing Stormwater Runoff to the Bowery Bay WPCP

	Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Bowery Bay WPCP (Subcatchment Area BB-045)	Area (%)	0.0	68.3	0.0	31.7	100%
	Surface Area (sf)	0.0	20,563	0.0	9,532	30,095
	Runoff Coefficient[1]	1.0	0.85	0.85	0.20	0.64
Bowery Bay WPCP (Subcatchment Area BB-046)	Area (%)	38.9	36.4	0.0	24.7	100%
	Surface Area (sf)	135,315	126,531	0.0	85,785	347,631
	Runoff Coefficient[1]	1.0	0.85	0.85	0.20	0.75

Source: Estimates from site survey and aerial photographs
Notes: [1] Runoff coefficients for each surface type as per the DEP.

For this analysis, standard DEP runoff coefficients were used to calculate the amount of stormwater runoff using the three-month, six-month, and twelve-month storm events, with rainfall averaging from 0.00 to 2.50 inches over durations of 3.80 to 19.50 hours. The project site is predominantly comprised of impervious surfaces that have higher runoff coefficients. Table 11-6 shows the existing combined stormwater runoff and wastewater generation for existing conditions on the project site. As indicated in the table, the project site currently generate between 0.01 and 0.47 mgd of stormwater within the Bowery Bay WPCP subcatchment areas (combined) for different rainfall intensities.

Individual development projects are required to manage on-site stormwater runoff in accordance with DEP conditions to ensure that a development properly regulates its stormwater runoff corresponding to the City's five-year storm. Currently, the project site contains warehousing/manufacturing uses or is used for parking. Since the project site contains older warehousing and manufacturing uses (i.e., pre-dating DEP requirements), there are currently no on-site stormwater detention or other control systems.

Table 11-6: Existing Combined Stormwater Runoff and Wastewater Generation to the Bowery Bay WPCP

	Storm Event Type	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient	Stormwater Runoff to CSS (MG)	Sanitary to CSS (MG)[1]	Total Volume to CSS (MG)
Bowery Bay WPCP (BB-045)		0.00	3.80	0.69	0.64	0.00	0.00	0.00
	3-Month	0.40	3.80	0.69	0.64	0.00	0.00	0.00
	6-Month	1.20	11.30	0.69	0.64	0.01	0.00	0.01
	12-Month	2.50	19.50	0.69	0.64	0.03	0.00	0.03
Bowery Bay WPCP (BB-046)		0.00	3.80	7.98	0.75	0.00	0.01	0.01
	3-Month	0.40	3.80	7.98	0.75	0.07	0.01	0.08
	6-Month	1.20	11.30	7.98	0.75	0.20	0.02	0.22
	12-Month	2.50	19.50	7.98	0.75	0.41	0.03	0.44

Notes:
[1] Derived from Table 11-2.
CSS = combined sewer system; MG = million gallons

Water Conservation and WPCP Load Reduction

During the 1990s, the City instituted a range of water conservation measures in response to excess flow to the City's WPCPs that exceeded the dry weather flow 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. These programs have reduced water demand and load in the City's WPCPs. At many WPCPs, this reduction has been in an order of magnitude of several million gallons per day.

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

In the future without the Proposed Action, anticipated growth in the vicinity of Queens CD 1, and development that would occur on the project site without the Proposed Action would result in additional demand for water, wastewater production, and stormwater runoff. As identified in Chapter 1, "Project Description," the future development on the project site without the Proposed Action would consist of approximately 166 DUs on the upland parcels. Current operations and uses on each of the other building sites on the waterfront parcels would not change. Currently there are no known water or sewer infrastructure improvement projects planned by DEP within the fronting streets.

The nearby Halletts Point Rezoning project, approved by the City in 2013, is not located within Subcatchment Areas BB-045 or BB-046. Therefore, it is not expected to contribute sanitary or stormwater runoff volumes to the sewer infrastructure serving this project site.

Water Supply

As shown in Table 11-7, in the future without the Proposed Action, the new water consumption that would occur on the upland parcels due to the anticipated 166 units of new residential development would be approximately 38,844 gpd over the existing condition water consumption described above (77,796 gpd). As such, the total water consumption that would occur on the project site under No-Action conditions would be approximately 116,640 gpd (0.12 mgd), an increase of approximately fifty percent over existing conditions. Given this level of consumption, this incremental demand of less than 0.04 mgd 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 11-7: Water Consumption and Wastewater Generation in the Future Without the Proposed Action

	Existing Conditions			No-Action Conditions			Net Change		
Land Use	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)
Industrial/ Warehouse/Storage	194,700 sf[1]	44,697	33,099	194,700 sf[1]	44,697	33,099	0	0	0
Residential	0	0	0	166 DUs	38,844	0	166 DUs	38,844	0
Water Consumption Subtotal		44,697	33,099		83,541	33,099		38,844	0
Sewage Generation Subtotal		44,697			83,541			38,844	
Total Water Consumption		77,796 (0.07 mgd)			116,640 (0.12 mgd)			38,844 (0.04 mgd)	
Total Wastewater Generation		44,697 (0.04 mgd)			83,541 (0.08 mgd)			38,844 (0.04 mgd)	

Notes: Refer to Table 11-1 for rate assumptions. A/C = air conditioning

[1] 4.47 acres conservatively calculated based on waterfront parcel total building floor area assuming no water demand from existing open bus/vehicle storage.

Wastewater

In the future without the Proposed Action, additional sanitary discharges would be conveyed to the Bowery Bay WPCP.

As indicated above in Table 11-7, in the future without the Proposed Action, approximately 83,541 gpd (0.08 mgd) of wastewater would be generated and conveyed to the Bowery Bay WPCP. This level of incremental wastewater generation over existing conditions (38,844 gpd, or 0.04 mgd) would be well within the 40 mgd average available capacity of the WPCP. Therefore, the Bowery Bay WPCP is expected to continue to operate within its design capacity.

Stormwater and Drainage Management

In the future without the Proposed Action, stormwater runoff (except for a small amount of overland flow directly conveyed to the East River) would continue to be collected and directed through the existing combined sewer system and then conveyed to the Bowery Bay WPCP for treatment. As noted above, future development on the project site absent the Proposed Action would consist of a new residential development (166 DUs) on the upland parcels; current operations and uses on each of the other building sites would not change. The permeable surface would be reduced slightly as a result of the new development that could occur on the project site. As noted previously, DEP requires stormwater detention in compliance with the applicable drainage plan for new developments if the developed site's storm flow exceeds the allowable flow of the drainage plan. As a result of these requirements, given that the project site is predominantly covered with impervious surfaces currently and does not provide detention, it is

expected that there would be a reduction in uncontrolled runoff in the future without the Proposed Action. The new development on the upland parcels would be required to incorporate the latest stormwater detention and retention measures, such as green roofs, blue roofs, or seepage basins, to handle stormwater runoff from these two sites.

Assuming that the area of impermeable surfaces within the project site would only undergo changes on the upland parcels, and since there would be small increases in sanitary flow to the combined sewer resulting from the new development, it is anticipated that no significant change in the frequency or duration of CSO events would occur as a result of development within the project site in the future without the Proposed Action.

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

In the future with the Proposed Action, the water supply, wastewater treatment, and stormwater management systems are expected to support the Proposed Action without incurring significant adverse impacts to those infrastructure systems. The Proposed Action would result in substantial development that would not occur in the future without the Proposed Action. As indicated in Attachment A, "Project Description," a reasonable worst-case development scenario (RWCDS) has been developed in conjunction with the Proposed Action. With the Proposed Action, the project site would include approximately 1,689 dwelling units (approximately 1,689,416 gsf), 109,470 gsf of retail space, and a site for a 456-seat elementary school (approximately 62,248 gsf). Additionally, approximately 83,846 square feet of new open space and up to 900 accessory parking spaces would be provided.

Water Supply

The Proposed Action would not result in significant adverse impacts on the City's water supply system. As shown in Table 11-8, the proposed project would generate a water supply demand of approximately 455,251 gpd (0.46 mgd), an increase of 338,611 gpd (0.34 mgd) or approximately 290 percent, compared to demand in the future without the Proposed Action. Future demand from the Proposed Action would represent less than 0.1 percent of the City's water supply demand. Though not included in this analysis, in the 2023 future condition, it is anticipated that air conditioning technology would improve and would require less water, resulting in a further decrease in future water consumption by the proposed project.

As discussed above, the existing water distribution network through this area generally consists of eight- to 20-inch diameter water mains. No water main improvement projects are currently proposed in the area immediately adjacent to the project site. However, water mains that are located within those streets and constructed prior to 1945 could be subject to replacement due to construction of new sewer infrastructure related to the proposed development on the project site. Any future water main work would be coordinated with DEP.

Given the relatively minor incremental increase in water consumption as compared to the City's overall water supply, the proposed project's location in an area of Queens well-served by water infrastructure, and anticipated 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.

Table 11-8: Water Consumption and Wastewater Generation in the Future Without and With the Proposed Action

	Future Without the Proposed Action			Future With the Proposed Action			Incremental Changes with the Proposed Action		
Land Use	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)	Size	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)
Residential	166 DUs	38,844	0	1,689 DUs	395,226	0	+1,523 DUs	+356,382	0
Industrial/ Warehouse/ Storage	194,700 sf[1]	44,697	33,099	0	0	0	-194,700 sf	-44,697	-33,099
Commercial —Retail	0	0	0	109,470 sf	26,273	18,610	+109,470 sf	+26,273	+18,610
School	0	0	0	62,248 sf with 456 Seats	4,560	10,582	+62,248 sf with 456 Seats	+4,560	+10,582
Water Consumption Subtotals		83,541	33,099		426,059	29,192		+342,518	-3,907
Sewage Generation Subtotal		83,541			426,059			+342,518	
Total Water Consumption		116,640 (0.112 mgd)			455,251 (0.455 mgd)			+338,611 (0.339 mgd)	
Total Wastewater Generation		83,541 (0.08 mgd)			426,059 (0.426 mgd)			+342,518 (0.343 mgd)	

Notes: Refer to Table 11-1 for rate assumptions.
[1]4.47 acres conservatively calculated based on waterfront parcel total building floor area assuming no water demand from existing open bus/vehicle storage.

Wastewater

Based on DEP consultation, in the future with the Proposed Action, the Applicant would install new sanitary sewers in portion of 26th Avenue and the proposed 4th Street extension. Wastewater from the project site would flow via the new storm sewers to the Bowery Bay WPCP. 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 150 mgd. As shown in Table 11-8, the Proposed Action would generate approximately 426,059 gpd of sanitary sewage. The sewage generated by the proposed project would result in an incremental increase of 342,518 gpd over No-Action conditions.

With an existing average dry weather flow of 110 mgd to the Bowery Bay WPCP (see Table 11-5) and the addition of approximately 0.43 mgd of sanitary sewage in the With-Action condition, the Bowery Bay WPCP would continue to have ample reserve capacity with this anticipated new demand. Pursuant to CEQR guidelines, since the demand associated with the Proposed Action would be well within the capacity of the treatment plant, no significant adverse impacts to the City's wastewater treatment services would occur.

Stormwater and Drainage Management

Currently, stormwater runoff from the project site is collected and conveyed by the City's combined sewer system to the Bowery Bay WPCP. 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 a portion of the combined wastewater and stormwater into interceptor sewers and the remaining overflow is discharged into the East River through two outfalls located adjacent to the project site: BB-045, located at 9th Street and BB-046, located at 3rd Street. An existing eight-inch outfall currently exists at 9th Street. Based on consultation with DEP, in the future with

the Proposed Action the Applicant would construct separate stormwater sewers within the new 4th Street and 26th Avenue street segments as well as a portion of the existing 9th Street that would connect to two new stormwater outfalls to enable direct discharge of stormwater flows to the East River: one at the northern terminus of 4th Street (proposed to be mapped) and one at the northern terminus of the existing 9th Street (see Figure 11-2). These outfalls would be constructed by the Applicant and permitted by NYSDEC and the USACE. Stormwater generated on-site would be treated for water quality prior to discharge.

As indicated above, the project site totals approximately 377,726 sf (approximately 8.7 acres) of lot area. As a result of the Proposed Action, the weighted runoff coefficient in all parts of the project site would change due to the introduction of more landscaped areas and new building construction and paving in other areas. For conservative analysis purposes, it is estimated that approximately 54 percent of the surface area in Subcatchment Area BB-045 and 56 percent of the surface area in Subcatchment Area BB-046 would comprise roofs, which have the highest stormwater runoff coefficient. An additional 26 percent of the total site area in Subcatchment Area BB-045 and 32 percent of the site area in Subcatchment Area BB-046 was estimated to be pavement and walks. Finally, approximately 21 percent of Subcatchment Area BB-045 was estimated to be grass and softscape while approximately seven percent of Subcatchment Area BB-046 was estimated to be grass/softscape and five percent was estimated to be "other" (in this case "other" is characterized by riprap that would be added along the coastline in the vicinity of the project site). As such, the future With-Action condition would result in increases in roof and pavement/walkway areas and decreases in pervious surface areas when compared to existing conditions. Consequently, the stormwater runoff would be expected to increase as compared to existing conditions.

All stormwater would be managed through separate stormwater outfalls to the East River and would comply with DEP and/or NYSDEC regulations for water quality treatment and quantity management. As such, stormwater flows generated on the project site under the With-Action condition would not be conveyed to the Bowery Bay WPCP or discharged to the East River via CSO outfalls, dependent on the storm event, as under existing and No-Action conditions, and, therefore, would not contribute to combined flow volumes. Increased volumes and flows conveyed to the Bowery Bay WPCP, or discharged directly to the East River, dependent on the storm event, from the project site would be limited to sanitary volumes generated on the project site. As indicated previously, Regulators L-25 (CSO BB-045) and L-26 (CSO BB-046) correspond with the two affected subcatchment areas. Any developments resulting from the proposed project in those subcatchment areas would also affect these regulators.

Based on the existing and proposed site plans, the DEP Flow Calculation Matrix was completed for existing and With-Action conditions. The calculations from the Flow Calculation Matrix help to determine the change in wastewater volumes to the combined sewer system from existing conditions to the future conditions with the Proposed Action. Runoff volumes were calculated for four rainfall volume scenarios with varying durations. As previously stated, stormwater runoff from the project site would flow directly to the East River via the proposed separate storm sewers and two new stormwater outfalls and therefore would not contribute to combined sewer system volumes in the affected subcatchment areas.

Table 11-9 shows the estimated project site flow volumes 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 project site could be between 0.07 and 0.35 million gallons (MG) for both subcatchment areas, combined. Compared to existing volumes to the combined sewer system this would represent a decrease of 0.01 MG to 0.08 MG during storm events, with an increase of 0.05 MG during dry weather (see Table 11-10). However, it should be noted that the Flow Volume Matrix calculations do not reflect the use of

any best management practices to reduce sanitary flows such as low-flow fixtures as mandated by New York City Local Law 33.

Table 11-9: Combined Stormwater Runoff and Wastewater Generation Flow Volume to the Combined Sewer System—Future With-Action Condition

	Storm Event Type	Rainfall (inches)	Duration (hours)	Total Area (acres)	Weighted Runoff Coefficient	Runoff Volume Direct Drainage (MG)	Stormwater Runoff to CSS (MG)	Sanitary to CSS (MG)[1]	Total Volume to CSS (MG)
Bowery Bay WPCP (Subcatchment Area BB-045)		0.00	3.80	0.69	0.80	0.00	0.00	0.01	0.01
	3-Month	0.40	3.80			0.01	0.00	0.01	0.01
	6-Month	1.20	11.30			0.02	0.00	0.02	0.02
	12-Month	2.50	19.50			0.04	0.00	0.03	0.03
Bowery Bay WPCP (Subcatchment Area BB-046)		0.00	3.80	7.98	0.89	0.00	0.00	0.06	0.06
	3-Month	0.40	3.80			0.08	0.00	0.06	0.06
	6-Month	1.20	11.30			0.23	0.00	0.18	0.18
	12-Month	2.50	19.50			0.48	0.00	0.32	0.32

Notes:
[1] Derived from Table 11-8.
CSS = combined sewer system; MG = million gallons

Table 11-10: Combined Stormwater Runoff and Wastewater Generation Flow Volumes to the Combined Sewer System – Existing vs, With-Action Condition

	Rainfall (inches)	Duration (hours)	Total Volume to Combined Sewer System (MG)		
			Existing Conditions	With-Action Condition	Increment
Bowery Bay WPCP (Subcatchment Area BB-045)	0.00	3.80	0.00	0.01	0.01
	0.40	3.80	0.00	0.01	0.01
	1.20	11.30	0.01	0.02	0.01
	2.50	19.50	0.03	0.03	0.00
Bowery Bay WPCP (Subcatchment Area BB-046)	0.00	3.80	0.01	0.06	0.05
	0.40	3.80	0.08	0.06	-0.02
	1.20	11.30	0.22	0.18	-0.02
	2.50	19.50	0.44	0.32	-0.08

Notes: MG = million gallons

Stormwater Best Management Practices

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 Stormwater Pollution Prevention Plan (SWPPP) consisting of both temporary erosion and sediment controls and post-construction stormwater management practices would be prepared by the Applicant. Water quality treatment would need to be designed to meet the NYSDEC design criteria and treat stormwater runoff from the project site via the two new stormwater outfalls that would be constructed as part of the proposed project.

Post-construction stormwater management measures that would be integrated into the proposed project as part of the SWPPP could include measures such as underground detention, infiltration practices, and vegetated areas. In addition, stormwater management would be implemented through the use of BMPs

such as those shown in the BMP concept plan (Figure 11-5) and described below. The following typical BMP measures would help manage stormwater flows: the implementation of BMPs described in the NYC Green Infrastructure Plan; green technologies, including blue and green roofs, subsurface detention and infiltration, porous pavement, enhanced tree pits, and rain cisterns, depending on site conditions. As indicated in Figure 11-5, rooftop detention areas and detention facilities within the buildings could potentially be implemented on/in all five of the proposed project's buildings. Stormwater infiltration areas could be implemented within the proposed project's open space elements; rain gardens to capture stormwater have been incorporated into the seating elements along the proposed 8th Street Mews.

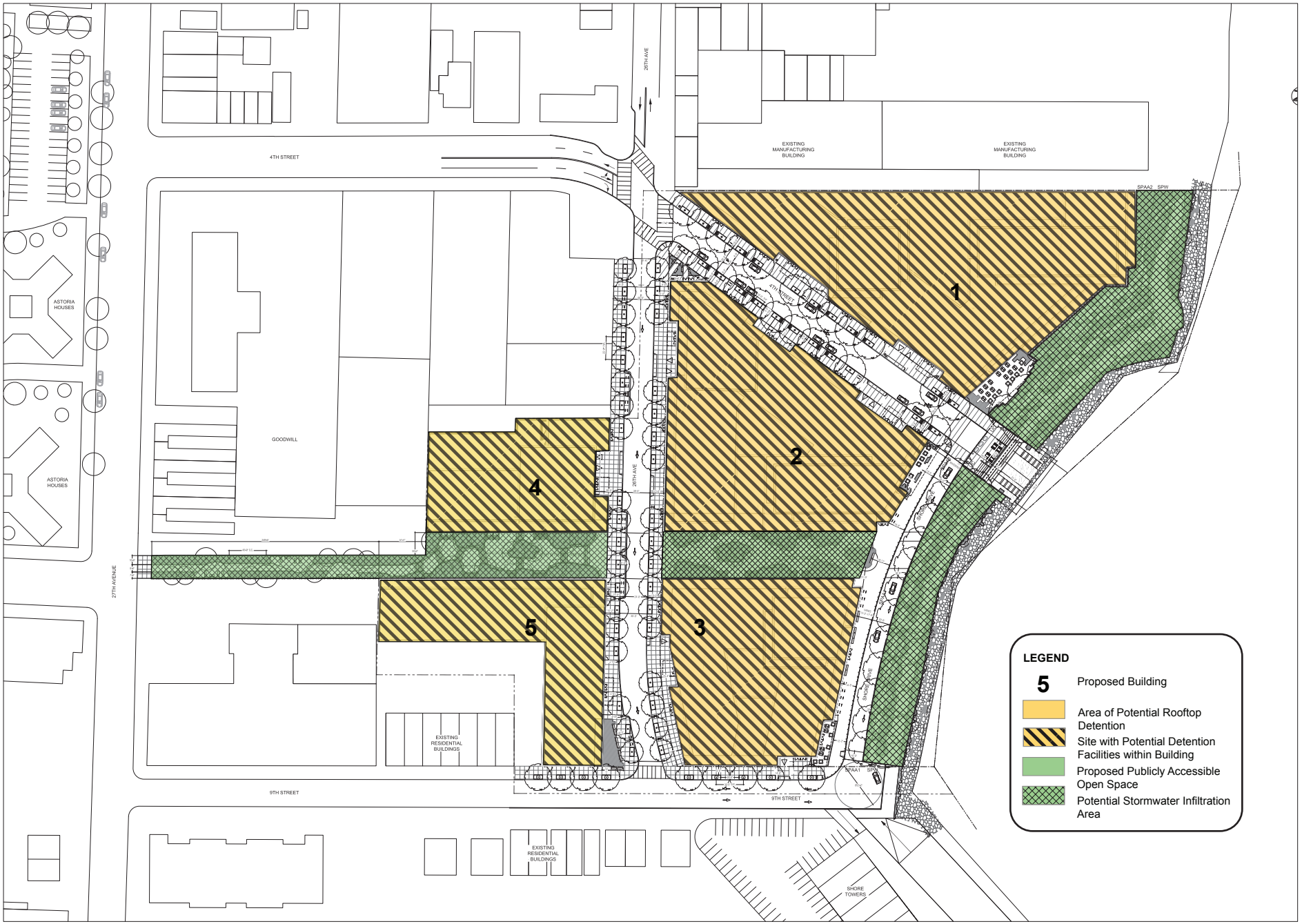
In addition, as previously stated and described in detail below, the Applicant would make improvements to stormwater infrastructure. Where applicable to ensure the implementation of specific measures, the Applicant would enter into a Restrictive Declaration upon approval of the land use-related actions required for the proposed project.

Street Mapping and Associated Infrastructure Improvements

The proposed mapping action would result in the mapping of a new section of 4th Street from 26th Avenue to the waterfront public access area. The new street segment would be paved and open to public traffic and would also accommodate new public infrastructure. 4th Street would have a mapped width of 60 feet, including a 30-foot travel way and two 15-foot wide sidewalks. These widths are consistent with the adjacent streets connecting to these newly mapped street segments.

As the Proposed Action includes the mapping of a City street, an amended drainage plan (ADP) is required by DEP to be prepared. An ADP would be prepared by the Applicant and submitted to DEP for review and approval. Per consultation with DEP, it is expected that as part of the Proposed Action new storm and sanitary sewers would be required within the proposed mapped portion of 4th Street. It is further anticipated that new storm and sanitary sewers would be required along 26th Avenue, and a new storm sewer would be required along a portion of 9th Street (north of 26th Avenue). Any infrastructure improvements required to be provided by the Applicant would be included in the mapping agreement. The ADP will determine the required stages of the sewers to serve the area. Should any of the existing adjacent built sewers need to be upgraded to meet the project demands, this would be undertaken at that time. The new sewers would be designed in accordance with the DEP ADP for the area and would be built to meet all DEP requirements.

Based on the analysis and with the required BMP measures that would be implemented at the project site and the improvements associated with the ADP, it is concluded that the Proposed Action would not result in significant adverse impacts to wastewater and/or stormwater conveyance and treatment infrastructure.



ASTORIA COVE - LANDSCAPE PLAN
SCALE: 1"=30'-0"
05.02.2013

Astoria Cove

Figure 11-5

Stormwater Best Management Practices Concept Plan