11

Water and Sewer Infrastructure

This chapter evaluates the potential for the Proposed Actions in connection with the Proposed Development to result in significant adverse impacts on the city's water supply, as well as its wastewater and stormwater conveyance and treatment infrastructure.

Introduction

GO Quay, LLC (the Project Developer), and the Metropolitan Transportation Authority (MTA) (an affiliate of the New York City Transit Authority [NYCTA]) (collectively, the Applicants) are seeking several discretionary actions (the Proposed Actions) to facilitate the development of three buildings totaling approximately 1,215,000 gross square feet (gsf) (the Proposed Development). The Proposed Development would include approximately 35,000 gsf of community facility space earmarked as a permanent home for the Greenpoint Monitor Museum on Lot 25 and two buildings on Lot 1 that would include approximately 1,106,500 gsf of residential space for up to approximately 1,150 total dwelling units (DUs). It is the Project Developer's intent to pursue Mandatory Inclusionary Housing (MIH) Option 1, under which 25 percent (up to approximately 300) of the proposed units would be affordable at an average of 60 percent Area Median Income (AMI), pursuant to MIH requirements. The development would also include approximately 36,500 gsf of local retail commercial space;[1] approximately 37,000 gsf of below-grade parking (140 spaces) on Lot 1; and approximately 50,000 square feet (sf) of open space, including a 34,000-sf Waterfront Public Access Area (WPAA) and 9,000 sf of Public Access Area (PAA). The WPAA would provide a pedestrian connection between the future Bushwick Inlet Park and the existing Shore Public Walkway to the north of the site and an upland connection between the future Bushwick Inlet Park and West Street.

The Proposed Development would also include resiliency and flood protection measures on the Development Site. As part of the Proposed Development, long-term funding would be provided to

[1] The Project Developer may include up to approximately 3,000 sf of community facility space (i.e., meeting space) for non-profit use in place of local retail space in the East Building. For the purpose of a conservative assessment, the EIS analyzes this space as local retail.

the City/New York City Department of Parks and Recreation (NYC Parks) for the operation of Bushwick Inlet Park.

The Proposed Actions would also include the relocation of two existing NYCTA facilities to the NYCTA Relocation Site in East Williamsburg Brooklyn located at 213 Meadow Street (Block ~~2591~~2951, Lot 1, 5 and 45). The NYCTA Relocation Site would be redeveloped with a new, approximately 143,000-gsf turnkey facility (the NYCTA Replacement Facility) to accommodate the NYCTA Mobile Wash Unit and Materials Storage that is currently located at 40 Quay Street and the NYCTA Emergency Response Unit (ERU) facility currently located on 65 Commercial Street (Block 2472, Lot 415). The NYCTA Relocation Site currently drains directly to Newtown Creek, which is considered a drainage area of concern according to the ~~*2021*~~*2025 CEQR Technical Manual*.

According to the *CEQR Technical Manual,* discretionary actions that would increase density or change the drainage conditions may warrant a water and sewer infrastructure analysis. Specifically, developments that would result in an exceptionally large demand for water (more than 1 million gallons per day [mgd]) or developments that are located in an area that experiences low water pressure require an analysis of potential impacts on the water supply system. Developments located in combined sewered areas exceeding incremental development thresholds (above the predicted No-Action condition) of 400 residential units or 150,000 sf or more of commercial, public facility, and institution, and/or community facility space in Brooklyn would warrant a sewer infrastructure analysis. Additionally, developments that are 1 acre or larger, increase the impervious cover, and are located in a drainage area of concern would warrant an analysis of the stormwater infrastructure.

Principal Conclusions

Development Site

The Proposed Actions would not result in a significant adverse impact to water and sewer infrastructure. The Development Site is not located in an area that experiences low water pressure, and the Proposed Actions would generate a water demand of 0.26 mgd. Therefore, a detailed analysis is not warranted. It is anticipated that there would be adequate water service to meet the incremental water demand of the Proposed Development and there would be no significant adverse impact on the city's water supply.

Because the Development Site is located in a combined sewer area and the Proposed Actions would result in an incremental increase of more than 400 DUs, as compared to the existing condition, an analysis of the Proposed Actions' potential impacts on the City's wastewater and stormwater conveyance and treatment system is warranted. Based on the four rainfall events provided in the New York City Department of Environmental Protection (NYC DEP) Flow Volume Calculation Matrix, the increment of sanitary and stormwater flows to the combined sewer system (CSS) would be between 0.036 and 0.187 mgd, which would exceed the 5 percent threshold established in the *CEQR Technical Manual*. However, these increments represent only a 0.011 to 0.064 percent increase of the Newtown Creek Water Resource Recovery Facility (WRRF) State Pollutant Discharge Elimination System (SPDES)-permitted capacity. As there would be an increase of 5 percent or more at the site over existing conditions, further review by and coordination with NYC DEP would be required to determine the site-specific stormwater management measures that would be implemented as part of the Proposed Development to ensure that sanitary and stormwater flows to the combined sewer system would not exceed operational capacity. Additionally, the implementation of best

management practices (BMPs) are required under NYC's USWR, which updated and aligned water quantity requirements in the city's combined sewer drainage areas with water quality requirements in separately sewered drainage areas, providing a comprehensive, citywide stormwater management policy for public and private development. Therefore, stormwater retention would be required onsite for small and frequent rainfall events to prevent an increase in combined sewer overflow (CSO) events. The projected increase in sanitary and stormwater flows would not cause the Newtown Creek WRRF to exceed its operational capacity or cause an increase in CSO events; as such, no significant adverse impact would occur.

NYCTA Relocation Site

The operations at the NYCTA Relocation Site would not result in a significant adverse impact to the water and sewer infrastructure. The NYCTA Relocation Site is not in a location that experiences low water pressure, and the Proposed Actions would generate a water demand of 0.056 mgd. Therefore, a detailed analysis is not warranted. It is anticipated that there would be adequate water service to meet the incremental water demand of the NYCTA Replacement Facility and there would be no significant adverse impact on the city's water supply.

Because the NYCTA Relocation Site is located in a separately sewered area and the Proposed Actions would result in an incremental increase of more than 100,000 sf of industrial use as compared to the No-Action condition, an analysis of the NYCTA Relocation Site's potential impacts on the City's wastewater and treatment system is warranted. The NYCTA Relocation Site would result in a total sewage generation of 0.033 mgd, an increase of 0.032 mgd over the existing condition. Although the increase in volume exceeds the 5 percent threshold established in the *CEQR Technical Manual*, this increment represents only a 0.01 percent increase of the Newtown Creek WRRF SPDES-permitted capacity. While future coordination with NYC DEP would be required to assess the existing sanitary infrastructure's capacity for sewage generation from the NYCTA Relocation Site, the projected increase in sanitary flows would not cause the Newtown Creek WRRF to exceed its operational capacity, or SPDES-permitted capacity.

The NYCTA Relocation Site is in a drainage area of concern and the Proposed Actions would increase the amount of impervious roof surface over the existing condition which is predominantly paved; therefore, an analysis of the NYCTA Relocation Site's potential impacts on the city's stormwater conveyance is warranted. Based on the four rainfall events provided in the NYC DEP Flow Volume Calculation Matrix, the increment of stormwater flows to Newtown Creek would be between 0 and 0.020 mgd (between 0 and 16.6 percent) over the existing condition. Although the increase in volume exceeds the 2 percent threshold for a drainage area of concern, the implementation of BMPs, which are required by the Unified Stormwater Rule (USWR), would reduce stormwater runoff and regulate stormwater release rates into the existing stormwater infrastructure. Therefore, the Proposed Actions would not result in a significant adverse impact to stormwater infrastructure tributary to Newtown Creek.

Although the Proposed Actions would create new demand for water and treatment of sewage in comparison to the existing condition, based on the methodology set forth in the *CEQR Technical Manual*, the incremental increase would be well within the capacity of the City's systems, and the effects would not be considered significant or adverse.

Methodology

This analysis follows the *CEQR Technical Manual* guidelines that recommends a preliminary water analysis be completed if a proposed action would result in an exceptionally large demand of water (over 1 million gpd) or if a project area is located in an area that experiences low water pressure (i.e., in an area at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island).

Furthermore, according to the *CEQR Technical Manual*, a preliminary sewer infrastructure analysis is required in a combined sewer area if the With-Action condition would introduce 400 or more residential units over the No-Action condition, or if the With-Action condition would exceed an increment of 100,000 sf of commercial, industrial, institution or community facility use. As the Proposed Actions would facilitate the development of more than 400 incremental residential units on the Development Site, a preliminary infrastructure assessment is warranted. Additionally, as an increment of over 100,000 sf of industrial land use would be constructed at the NYCTA Relocation Site, resulting in an increase of impervious cover in a drainage area of concern, a preliminary analysis of the wastewater and stormwater conveyance is warranted.

Existing and future water demand and sanitary sewage generation are calculated based on use rates set by the *CEQR Technical Manual*. The NYC DEP Flow Volume Calculation Matrix is then used to calculate the overall stormwater runoff volume for four rainfall volume scenarios with varying durations. The ability of the City's sewer infrastructure to handle the anticipated demand from the Proposed Development is assessed by estimating existing sewage generation rates and then comparing these existing rates with the No-Action and With-Action conditions, per *CEQR Technical Manual* methodology. Water consumption and wastewater generation rates applicable to the existing, No-Action, and With-Action conditions were derived from the *CEQR Technical Manual* and are provided in **Table 11-1**.

Table 11-1 Water Consumption and Wastewater Generation Rates

	Rate			
Land Use	**Domestic[1]**	**Units**	**Air Conditioning[1]**	**Units**
Residential	100	gpd/person	0.00	gpd/sf
Retail	0.24	gpd/sf	0.17	gpd/sf
Office	0.10	gpd/sf	0.17	gpd/sf
Community Facility[2]	0.10	gpd/sf	0.17	gpd/sf
Manufacturing/ Industrial[3]	0.23	gpd/sf	0.17	gpd/sf

Notes:
[1] Consumption rates obtained from the ~~2021~~2025 *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment"
[2] Consistent with the *Stevenson Commons EIS*, the water consumption and wastewater generation rates for Community Facility utilizes the same CEQR rates as office space
[3] Based on the *Willets Point Phase 2 Development EIS*

Preliminary Assessment

Existing Conditions

Development Site

The Development Site consists of Lot 1 and Lot 25. Lot 1 is owned by the NYCTA and is currently occupied by a 71,838-gsf industrial transit building (the NYCTA Facility), which houses the MTA Mobile Wash Unit and Materials Storage Facility. Lot 25, located to the west of Lot 1, owned by the Greenpoint Monitor Museum, consists of a roadway and undeveloped land.

Water Supply

The New York City water supply system consists of a network of reservoirs, lakes, and aqueducts extending north into the Catskill region of New York State, and a grid of underground distribution mains that distributes water within the city. Approximately 1.3 billion gpd of water are consumed within New York City through this water supply system.

Most of New York City obtains water from three surface water supply systems operated by NYC 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.

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 destination, including fire hydrants, along many of the city's streets. Nearly all the water reaches consumers by gravity alone, with approximately 4 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 mentioned above, New York City consumes approximately 1.3 billion gallons of water per day from the reservoir system, which has a total storage capacity of approximately 550 billion gallons.[2, 3]

[2] Source: New York City's Wastewater Treatment System, NYC DEP; https://www1.nyc.gov/site/dep/water/

[3] Source: *CEQR Technical Manual*.

Water Demand

Water consumption and wastewater generation rates were derived from the *CEQR Technical Manual* and are provided in **Table 11-1**. Under existing conditions, the Development Site generates a total water demand of approximately 0.029 mgd. Existing water consumption and sewage generation for the site is shown in **Table 11-2**.

Table 11-2 Existing Water Consumption and Sewage Generation

Land Use	Area (sf)	Dwelling Units/Seats	Domestic Water/Wastewater Generation (gpd)	Air Conditioning Water Generation (gpd)
Manufacturing / Industrial	71,838	-	16,523	12,212
Water Consumption Subtotals			16,523	12,212
Sewage Generation Subtotal			16,523	
Total Water Consumption			28,735	

Sanitary Sewage

Sanitary sewage generated by the Development Site would discharge to the Newtown Creek WRRF, which has a SPDES-permitted dry weather flow capacity of 310 mgd. The average monthly flow to Newtown Creek WRRF over a 12-month period is 213 mgd (see **Table 11-3**).

Table 11-3 Newtown Creek Average Monthly Flows

	Month	Flow (MGD)
2023	June	188
	July	207
	August	223
	September	248
	October	207
	November	195
	December	222
2024	January	221
	February	203
	March	230
	April	212
	May	195
Average		213

Note:
[1]Average Monthly flows were provided by NYC DEP

For purposes of analysis, the amount of sanitary sewage is calculated as all water demand generated by the existing uses on the Development Site except water used by air-conditioning, which is typically not discharged to the sewer system. As shown in **Table 11-2**, the amount of sanitary sewage generated under existing conditions is 0.~~17~~017 mgd.

Stormwater Flows

The Development Site currently consists of a 71,838-gsf NYCTA Facility and undeveloped land to the west of the building. Stormwater runoff from the NYCTA Facility flows north into a combined sewer system within Quay Street. Lot 25 currently discharges directly into the East River. **Table 11-4** and **Table 11-5** summarizes the existing surface areas as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type) for outfall areas NCB-004 and direct drainage to the East River.

Table 11-4 Existing Surface Coverage to Combined Sewer System

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
NCB-004	Area (%)	90%	10%	0%	0%	100%
	Surface Area (sf)	72,600	8,017	-	-	80,617
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**0.99**

Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)

Table 11-5 Existing Surface Coverage to Direct Drainage to the East River

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
Direct Drainage	Area (%)	0%	39%	0%	61%	100%
	Surface Area (sf)	-	14,954	-	23,550	38,504
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**0.45**

Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)
[3] The total area tributary to the East River is 51,004 sf. 12,500 sf between the lot line and the mean highwater line was removed from the analysis.

The NYC DEP Flow Volume Calculation Matrix was completed for the existing conditions that are serviced by the combined sewer system and the existing area that discharges directly into the East River. The calculations from the NYC DEP Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from existing, No-Action, and With-Action conditions and include four rainfall volume scenarios with varying durations. A summary of the existing Flow Volume Calculation Matrix for the combined sewer system and the East River is included in **Table 11-6** and **Table 11-7**.

Table 11-6 NYC DEP Flow Volume Matrix – Existing Conditions to Combined Sewer System

Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Stormwater Runoff (MG)[4]	Sanitary to CSS (MG)[5]	Total Volume to CSS (MG)
0.00	3.80	1.85	0.99	0.000	0.003	0.003
0.40	3.80	1.85	0.99	0.020	0.003	0.023
1.20	11.30	1.85	0.99	0.059	0.008	0.067
2.50	19.50	1.85	0.99	0.124	0.013	0.137

Notes:
[1] Storm event rainfalls per NYC DEP Flow Volume Calculation Matrix.
[2] Total surface area on-site for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Flow Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the *CEQR Technical Manual*
MG = million gallons

Table 11-7 NYC DEP Flow Volume Matrix – Existing Conditions to the East River

Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Stormwater Runoff (MG)[4]	Sanitary to CSS (MG)[5]	Total Volume to CSS (MG)
0.00	3.80	0.88	0.45	0.000	-	0.000
0.40	3.80	0.88	0.45	0.004	-	0.004
1.20	11.30	0.88	0.45	0.013	-	0.013
2.50	19.50	0.88	0.45	0.027	-	0.027

Notes:
[1] Storm event rainfalls per NYC DEP Flow Volume Calculation Matrix.
[2] Total surface area on-site for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the *CEQR Technical Manual*
MG = million gallons

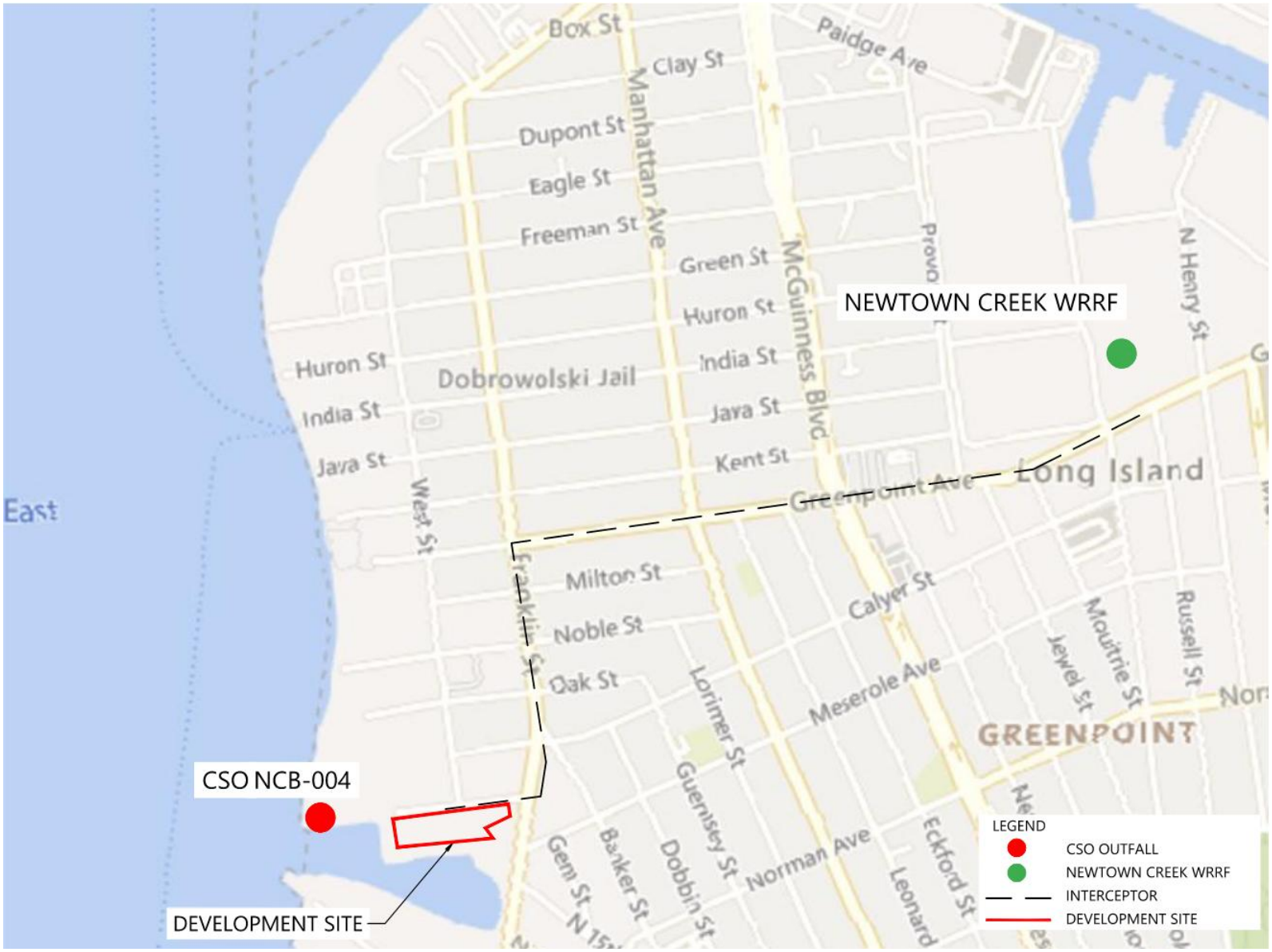
Conveyance System

The Development Site is currently divided into two drainage areas. The existing NYCTA Facility is served by a combined sewer system and combined sewer overflow (NCB-004) located in Quay Street. The existing roadway and undeveloped portion of the site (Lot 25) currently discharges directly into the East River.

Outfall NCB-004

Sanitary and stormwater systems serving the site collect and discharge to a 36-inch combined sewer in Quay Street. The combined sewer then flows into a 66-inch pipe that flows north from underneath the existing MTA Facility and into an NYC DEP regulator. The combined sewer connects to an 18-inch branch interceptor located in Quay Street. The branch interceptor flows east and connects to a 96-inch by 90-inch interceptor in Franklin Street that flows to the Newtown Creek WRRF (see **Figure 11-1**). During large storm events, excess flow from the combined sewer system would bypass the regulator and flow west into a 66-inch pipe that discharges from NCB-004 into the East River.

Figure 11-1 Development Site Drainage Network



NYCTA Relocation Site

The NYCTA Relocation Site consists of Lots 1, 5 and 45 on Block 2591 in East Williamsburg, Brooklyn. The existing site contains a 2,000-gsf building that is utilized for truck repairs. The remainder of the site is paved and used for truck parking and storage.

Water Demand

Water consumption and wastewater generation rates were derived from the *CEQR Technical Manual* and are provided in **Table 11-1**. Under existing conditions, the NYCTA Relocation Site generates a total water demand of approximately 800 gallons per day [gpd]). Existing water consumption and sewage generation for the site is shown in **Table 11-8**.

Table 11-8 NYCTA Relocation Site Existing Water Consumption and Sewage Generation

Land Use	Area (sf)	Dwelling Units/Seats	Domestic Water/Wastewater Generation (gpd)	Air Conditioning Water Generation (gpd)
Manufacturing /Industrial	2,000	-	460	340
Water Consumption Subtotals			460	340
Sewage Generation Subtotal			460	
Total Water Consumption			800	

Sanitary Sewage

Sanitary Sewage from the NYCTA Relocation Site discharges to the Newtown Creek WRRF, which has an SPDES-permitted dry weather flow capacity of 310 mgd. For purposes of analysis, the amount of sanitary sewage is calculated as all water demand generated by the existing uses on the Development Site except water used by air-conditioning, which is typically not discharged to the sewer system.

As shown in **Table 11-8**, the amount of sanitary sewage generated under existing conditions for the NYCTA Relocation Site is 460 gallons per day.

Stormwater Flows

The NYCTA Relocation Site currently consists of a 2,000-gsf building utilized for truck repairs and approximately 54,200 sf of pavement surrounding the site for truck parking and storage. Stormwater runoff from the site directly discharges into Newtown Creek. **Table 11-9** summarizes the existing surface areas as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type) for direct drainage to Newtown Creek.

Table 11-9 Redevelopment Site Existing Surface Coverage to Newtown Creek

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
Direct Drainage	Area (%)	4%	96%	0%	0%	100%
	Surface Area (sf)	2,000	54,200	-	-	56,200
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**0.86**

Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)

The NYC DEP Flow Volume Calculation Matrix was completed for the Redevelopment Site that directly discharges to Newtown Creek. The calculations from the Flow Volume Calculation Matrix help to determine the change in flow volumes to Newtown Creek from existing, No-Action, and With-Action conditions and include four rainfall volume scenarios with varying durations. A summary of the existing Flow Volume Calculation Matrix is included in **Table 11-10**.

Table 11-10 NYC DEP Flow Volume Matrix – Existing Conditions to Newtown Creek

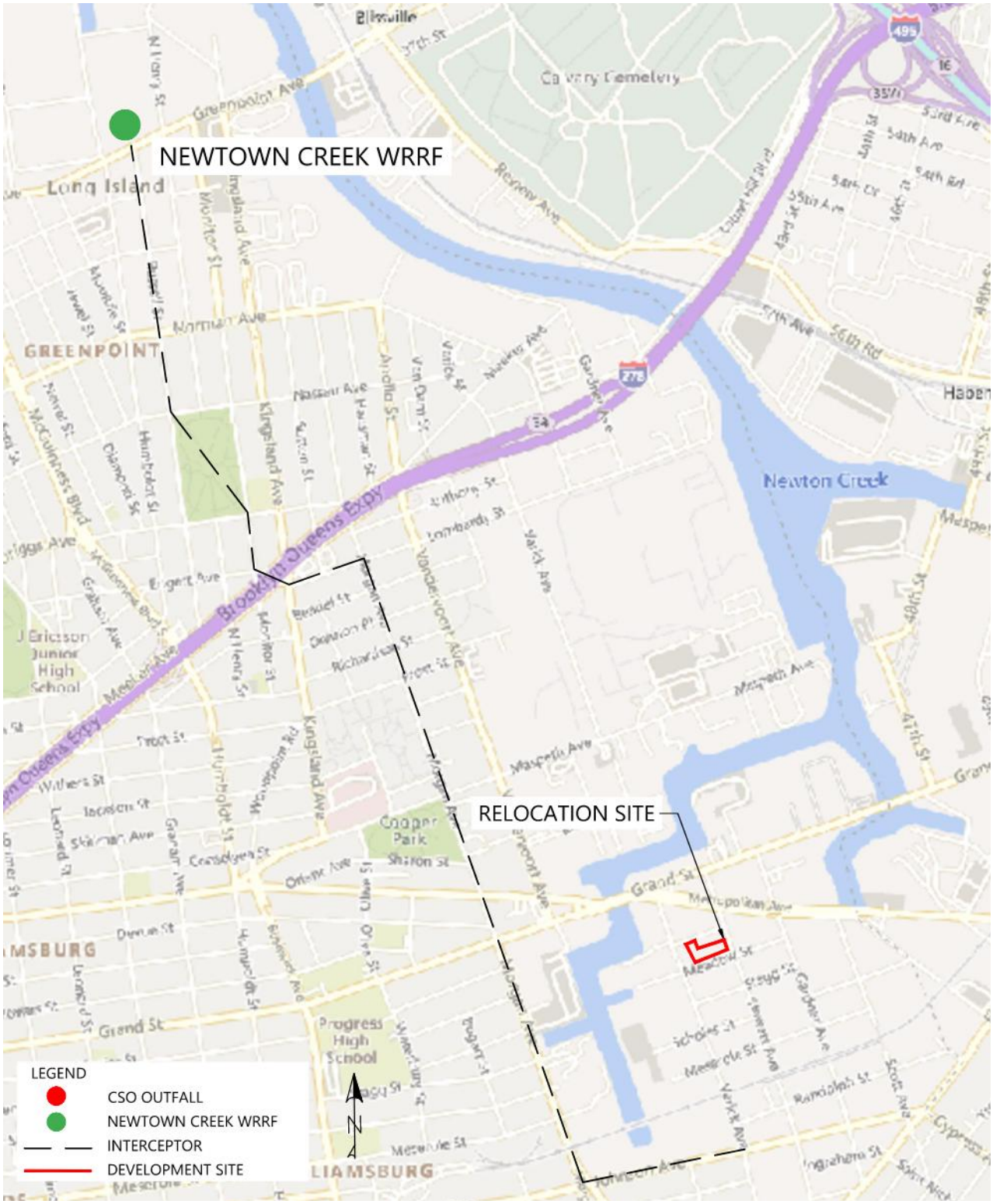
Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Total Volume to Newtown Creek (MG)
0.00	3.80	1.29	0.86	0.000
0.40	3.80	1.29	0.86	0.012
1.20	11.30	1.29	0.86	0.036
2.50	19.50	1.29	0.86	0.075

Notes:
[1] Storm event rainfalls per NYC DEP Volume Calculation Matrix.
[2] Total surface area onsite for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the *CEQR Technical Manual*
MG = million gallons

Conveyance System

The NYCTA Relocation Site is located in a separately sewered area. The sanitary sewage discharges into a sanitary pipe in Meadow Street and flows west to Varick Avenue. The sanitary sewage then flows to the south and connects to the Kent Avenue interceptor. The Kent Avenue interceptor flows west and north by gravity to the Newtown Creek WRRF. The stormwater drains into catch basins located on the surrounding streets and discharges directly to Newtown Creek.

Figure 11-2 NYCTA Relocation Site Sanitary Network



No-Action Condition

As described in **Chapter 1, Project Description**, absent the Proposed Actions, the Development Site is assumed to remain in its existing condition. The NYCTA Facility on Lot 1 would not be relocated, and Lot 25 would remain undeveloped. No new development would occur on the NYCTA Relocation Site at 213 Meadow Street, and the NYCTA ERU Site would remain on Commercial Street.

With-Action Condition

Development Site

The With-Action condition would result in the development of approximately 1,150 dwelling units (1,106,500 gsf of residential), 35,000 gsf of community facility, 36,500 gsf local retail, and 50,000 sf of open space, including a 34,000-sf WPAA and 9,000 sf of PAA. The results of the analysis of the With-Action condition on water and sewer infrastructure are described below.

Water Demand

The total water usage anticipated in the With-Action condition is calculated as approximately 0.26 mgd, an incremental increase of 0.23 mgd compared to the existing condition's projected demand of 0.028 mgd. This represents a 0.02 percent increase in demand on the water supply system compared to the city's average daily water use of approximately 1.3 billion gpd. As the total water usage anticipated of the Proposed Development would result in less than 1 mgd, the Proposed Actions would not have a significant adverse impact on the city's water supply or system water pressure.

Sanitary Flows

Water consumption and wastewater generation rates applicable to the Proposed Development were derived from the *CEQR Technical Manual* and are provided in **Table 11-11**. The Proposed Development is expected to have approximately 0.249 mgd of daily sanitary sewage generated under the With-Action condition.

Table 11-11 With-Action Water Consumption and Sewage Generation

Land Use	Area (sf)	Dwelling Units/Seats	Domestic Water/Wastewater Generation (gpd)	Air-Conditioning Water Generation (gpd)
Residential	-	1,150	236,900	-
Retail	36,500	-	8,760	6,205
Community Facility	35,000	-	3,500	5,950
Water Consumption Subtotals			**259,460**	**12,155**
Sewage Generation Subtotal			**249,160**	
Total Water Consumption			**261,315**	

Notes:
[1] Consumption rates obtained from the *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment."

The incremental sanitary sewage generated by the With-Action condition, as compared with the existing condition, would be 0.232 mgd. This increase in wastewater generation would be approximately 0.075 percent of the Newton Creek WRRF capacity of 310 mgd.

In accordance with the New York City Plumbing Code (Local Law 33 of 2007), the Proposed Development would be required to utilize low flow plumbing fixtures, which would reduce sanitary flows to the plant. Before the Development Site can connect to the City's sewer infrastructure, NYC DEP must accept that the combined sewer system can accept the stormwater and sanitary discharge from the site through a connection permit. Since the Project Developer would be required to demonstrate that the City's sewer infrastructure can accept the proposed stormwater and sanitary discharge, the With-Action condition would not result in a significant adverse impact on the City's sanitary sewage conveyance and treatment system.

Stormwater Flows

Under the With-Action condition, Lot 1 and the proposed museum on Lot 25 would connect to the existing NYC DEP combined sewer system located within Quay Street and the unbuilt balance of Lot 25 would connect to an on-site outfall that would discharge into the East River. **Table 11-12** summarizes the surface areas and weighted runoff coefficient for the With-Action condition tributary to the combined sewer system. **Table 11-13** summarizes the surface areas and weighted coefficient for the With-Action Condition that discharges directly into the East River.

Table 11-12 With-Action Surface Coverage to Combined Sewer System

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
NCB-004	Area (%)	71%	15%	0%	14%	100%
	Surface Area (sf)	64,359	13,362	-	12,896	90,617
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**0.86**

Source: DCP Building Footprint; aerial photographs
Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)

Table 11-13 With-Action Surface Coverage to the East River

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
Direct Drainage	Area (%)	0%	69%	0%	31%	100%
	Surface Area (sf)	-	19,647	-	8,857	28,504
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**0.65**

Source: DCP Building Footprint; aerial photographs
Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)
[3] 12,500 SF between the lot line and the mean highwater line was removed from the analysis.

The NYC DEP Flow Volume Calculation Matrix was completed for the With-Action condition for the portion of the site that is serviced by the combined sewer system. As shown in **Table 11-14**, for the With-Action condition, the combined sewer system flow would be between 0.039 MG and 0.324 MG.

Table 11-14 NYC DEP Flow Volume Matrix – With-Action Condition to Combined Sewer System

Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Stormwater Runoff (MG)[4]	Sanitary to CSS (MG)[5]	Total Volume to CSS (MG)
0.00	3.80	2.08	0.86	0.000	0.039	0.039
0.40	3.80	2.08	0.86	0.0195	0.039	0.059
1.20	11.30	2.08	0.86	0.058	0.117	0.175
2.50	19.50	2.08	0.86	0.122	0.202	0.324

Notes:
[1] Storm event rainfalls per NYC DEP Volume Calculation Matrix.
[2] Total surface area onsite for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the *CEQR Technical Manual*
MG = million gallons

The NYC DEP Flow Volume Calculation Matrix was completed for the With-Action condition for the portion of the site that would connect to an outfall that discharges to the East River. As shown in **Table 11-15**, the stormwater runoff would be between zero and 0.033 mg.

Table 11-15 NYC DEP Flow Volume Matrix – With-Action Condition to the East River

Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Stormwater Runoff (MG)[4]	Sanitary to CSS (MG)[5]	Total Volume to CSS (MG)
0.00	3.80	0.65	0.65	0.000	-	0.000
0.40	3.80	0.65	0.65	0.005	-	0.005
1.20	11.30	0.65	0.65	0.014	-	0.014
2.50	19.50	0.65	0.65	0.028	-	0.028

Notes:
[1] Storm event rainfalls per NYC DEP Volume Calculation Matrix.
[2] Total surface area onsite for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the *CEQR Technical Manual*
MG = million gallons

Table 11-16 compares the stormwater flow volumes that are tributary to the combined sewer system under the existing and With-Action conditions. As shown in the table, depending on the volume of rainfall and duration, the With-Action condition stormwater flows would decrease from zero to 0.002 MG. Additionally, the Proposed Actions would require the implementation of BMPs in accordance with the NYC DEP Unified Stormwater Rule. The USWR requires the use of stormwater BMPs to reduce stormwater runoff from small and frequent rain events that cause the majority of CSO events.

Table 11-16 Existing and With-Action Comparison of Stormwater Flows to the Combined Sewer System

		Total Volume to Combined Sewer System (MG)			
Rainfall (inches)[1]	Duration (hours)	Existing	With-Action Condition	Increment	Percent Increase (%)
0.00	3.80	0.000	0.000	0.000	0
0.40	3.80	0.020	0.020	0.000	-2.5
1.20	11.30	0.059	0.058	-0.001	-1.7
2.50	19.50	0.124	0.122	-0.002	-1.6

Table 11-17 compares the estimated total volume tributary to the combined sewer system under existing and With-Action conditions using the NYC DEP Flow Volume Calculation Matrix. As shown in the table, depending on the rainfall volume and duration, the With-Action increment would be between 0.036 and 0.187 MG. This incremental increase in combined sewer flow would be between a 1,200 percent (as there are very low contributions under existing conditions) and 136.5 percent increase (under a condition with 2.5 inches of rainfall over a period of 19.5 hours) over the existing condition. As there would be an increase of five percent or more at the site over existing conditions, NYC DEP review and coordination would be required under the NYC DEP site connection approval process to determine the site-specific stormwater management measures that would be implemented in connection with the development of the Proposed Development. the Proposed Actions would include implementation of BMP's, which are required by the NYC DEP USWR to reduce stormwater runoff and regulate stormwater release rates into the existing stormwater system. Although the 5 percent threshold is exceeded, these increments represent only a 0.011 to 0.060 percent increase of the Newtown Creek WRRF capacity. As the Proposed Actions would not cause the Newtown Creek WRRF to exceed its operational capacity, and the implementation of stormwater BMPs would prevent an increase in CSO events, the Proposed Actions would not result in a significant adverse impact on the City's sanitary sewage conveyance and treatment system, and further analysis is not warranted.

Table 11-17 Existing and With-Action Comparison Total Volume to the Combined Sewer System

		Total Volume to Combined Sewer System (MG)			
Rainfall (inches)[1]	Duration (hours)	Existing	With-Action Condition	Increment	Percent Increase (%)
0.00	3.80	0.003	0.039	0.036	1,200
0.40	3.80	0.023	0.059	0.036	154.3
1.20	11.30	0.067	0.175	0.108	161.2
2.50	19.50	0.137	0.324	0.187	136.5

Table 11-18 compares the estimated total volume that discharges to the East River under the existing and With-Action conditions using the NYC DEP Flow Volume Calculation Matrix. As shown in the table, depending on the rainfall volume and duration, the With-Action increment would be between zero and 0.001 MG. This incremental increase in stormwater runoff would be approximately 7 percent over the existing condition. Although the five percent threshold is exceeded, this portion of

the site would not connect to the combined sewer system and would not lead to an increase in CSO events or impact the operational capacity of the Newtown Creek WRRF. Stormwater runoff that is tributary to the East River would need to be treated in accordance with the USWR before it is discharged. Therefore, further analysis of the Proposed Action is not warranted.

Table 11-18 Existing and With-Action Comparison Total Volume to the East River

		Total Volume to Combined Sewer System (MG)			
Rainfall (inches)[1]	**Duration (hours)**	**Existing**	**With-Action Condition**	**Increment**	**Percent Increase (%)**
0.00	3.80	0.000	0.000	0.000	0
0.40	3.80	0.004	0.005	0.001	7
1.20	11.30	0.013	0.014	0.001	6.2
2.50	19.50	0.027	0.028	0.001	3.7

The Flow Volume Matrix calculations do not reflect the use of any sanitary and stormwater source control BMPs to reduce sanitary flow and stormwater runoff volumes to the combined sewer system. As noted above, the Proposed Development would incorporate low flow plumbing fixtures to reduce sanitary flow in accordance with the New York City Plumbing Code. In addition, stormwater BMPs would be required in accordance with the NYC DEP USWR guidelines, which includes requirements for bringing the Development Site into compliance with the allowable stormwater release rate.

The USWR increases on-site stormwater detention requirements and updates release rates for developments discharging to combined sewer systems and requires a retention-first approach to stormwater management practice (SMP) design. The water quality requirement (WQv) aims to manage and reduce runoff from small, frequent storms that often trigger the majority of CSO events. The USWR manual defines this event as the 90th percentile rain event. Runoff reduction (RR) criteria aim to maintain a minimum level of RR during small storms, which is generally met when treating the entire WQv. If site constraints make it impossible to treat the WQv, then a minimum Runoff Reduction Volume (RRv) for all newly constructed impervious areas must be met. The sewer operations volume (Vv) and maximum release rate (Qdrr) requirements are associated with the 10-year event, and work in tandem to maintain optimal flow rates in the City's combined sewer system to further limit the amount of CSO events. The existing buildings on the Development Site were developed prior to the USWR; however, the proposed redevelopment of the site is required to meet the new stormwater requirements, for which the calculations are based on the entire tributary area to the existing site connection. Therefore, the entire area tributary to the existing site connection would be brought into compliance as part of the Proposed Development.

Based on the USWR guidelines, the required WQv and Vv is equal to 839 cubic feet and 13,118 cubic feet, respectively. If using infiltration SMPs to manage the WQv, then half of the water quality volume provided can be counted towards the Vv, so the total required storage volume is approximately 13,538 cubic feet. The maximum release rate (Qdrr) is equal to 0.1 cfs/acre, which is approximately 0.27 cfs for the site.

To achieve this release rate, stormwater could be managed by utilizing one or a combination of detention or infiltration techniques identified in the manual. Green technologies, such as green and blue roofs, subsurface detention tanks and infiltration, and permeable pavement, could be implemented to retain or release stormwater with slowed discharge rates to control peak runoff

rates. While it is anticipated that detention tanks would be used as a primary stormwater management measure, specific BMP methods will be determined with further refinement of the building design and in consultation with NYC DEP. The stormwater management practices designed for the site are required to meet the water quality volume and release rate requirements outlined in the USWR.

The incorporation of the appropriate sanitary flow and stormwater source control SMPs would reduce the overall volume of sanitary sewer discharge and stormwater runoff as well as the peak stormwater runoff rate from the Proposed Development as compared to conditions that would exist without the BMPs. Sewer treatment capacity at the Newtown Creek WRRF could adequately handle wastewater flow resulting from the Proposed Development.

NYCTA Relocation Site

In addition to the redevelopment of the Development Site, the Proposed Actions would also facilitate the relocation of the two existing NYCTA facilities into a new approximately 143,000-gsf facility (the NYCTA Replacement Facility) located at 213 Meadow Street in East Williamsburg, Brooklyn. The NYCTA Relocation Site would accommodate the NYCTA Mobile Wash Unit currently located on Lot 1 of the Development Site at 40 Quay Street, and the NYCTA ERU Facility located at 65 Commercial Street in northern Greenpoint. The results of the analysis of the With-Action condition for the NYCTA Relocation Site on water and sewer infrastructure are described below.

Water Demand

The total water usage anticipated in the With-Action condition is calculated as approximately 57,200 gpd, an incremental increase of 56,400 gpd compared to the existing condition's projected demand of 800 gpd. This represents a 0.004 percent increase in demand on the water supply system compared to the city's average daily water use of approximately 1.3 billion gpd. As the total water usage anticipated of the NYCTA Relocation Site would result in less than 1 mgd, the Proposed Actions would not have a significant adverse impact on the city's water supply or system water pressure.

Sanitary Flows

Water consumption and wastewater generation rates applicable to the NYCTA Relocation Site were derived from the *CEQR Technical Manual* and are provided in **Table 11-19**. The NYCTA Relocation Site is expected to have approximately 0.033 mgd of daily sanitary sewage generated under the With-Action condition.

Table 11-19 NYCTA Relocation Site With-Action Water Consumption and Sewage Generation

Land Use	Area (sf)	Dwelling Units/Seats	Domestic Water/Wastewater Generation (gpd)	Air-Conditioning Water Generation (gpd)
Manufacturing / Industrial	143,000	-	32,890	24,310
Water Consumption Subtotals			32,890	24,310
Sewage Generation Subtotal			32,890	
Total Water Consumption			57,200	

The incremental sanitary sewage generated by the NYCTA Relocation Site under the With-Action condition, as compared to the existing condition, would be 0.032 mgd. This increase in wastewater generation would be approximately 0.018 percent of the Newtown Creek WRRF capacity of 310 mgd.

In accordance with the New York City Plumbing Code (Local Law 33 of 2007), the NYCTA Replacement Facility would be required to utilize low flow plumbing fixtures, which would reduce sanitary flows to the plant. Therefore, the With-Action condition would not result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system.

Stormwater Flows

Under the With-Action condition, stormwater flows from the NYCTA Relocation Site would continue to discharge to Newtown Creek. **Table 11-20** summarizes the surface areas and weighted runoff coefficient for the With-Action condition.

Table 11-20 With-Action Surface Coverage to Newtown Creek

Affected Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scope	Total
Direct Drainage	Area (%)	98%	2%	0%	0%	100%
	Surface Area (sf)	55,120	1,080	-	-	56,200
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	**1.00**

Source: DCP Building Footprint; aerial photographs
Notes:
[1] Runoff coefficients for each surface type as per NYC DEP
[2] Source: CSO Locations in New York City's Waterways, CSO Locations in New York City's Waterways (arcgis.com)

The NYC DEP Flow Volume Calculation Matrix was completed for the With-Action condition. As shown in **Table 11-21**, for the With-Action condition of the NYCTA Relocation Site, the direct discharge flow would be between 0 and 0.090 mg.

Table 11-21 NYC DEP Flow Volume Matrix – With-Action Condition to Newtown Creek

Rainfall (inches)[1]	Duration (hours)	Total Area (acres)[2]	Weighted Runoff Coefficient[3]	Total Volume to Newtown Creek (MG)
0.00	3.80	1.29	1.00	0.000
0.40	3.80	1.29	1.00	0.014
1.20	11.30	1.29	1.00	0.041
2.50	19.50	1.29	1.00	0.087

Notes**:**
[1] Storm event rainfalls per NYC DEP Volume Calculation Matrix.
[2] Total surface area onsite for Proposed Development within the subcatchment area.
[3] Runoff coefficients for surface type area as per NYC DEP.
[4] Stormwater runoff derived from NYC DEP Volume Calculation Matrix.
[5] Sanitary volumes derived using methodology and consumption rates per the ~~2021~~2025 *CEQR Technical Manual*
MG = million gallons

Table 11-22 compares the estimated total volume under existing and With-Action conditions using the NYC DEP Flow Volume Calculation Matrix. As shown in the table, depending on the rainfall volume and duration, the With-Action increment would be between 0 and 0.012 mg. This incremental increase in combined sewer flow would be between a zero and 16.6 percent increase over the existing condition. As there would be an increase of more than 2 percent over the existing conditions in a drainage area of concern, further NYC DEP review and coordination will be required to determine the site-specific stormwater management measures that would be implemented as part of the development of the Relocation Site. Further, the Proposed Actions would include implementation of BMP's, as required by the NYC DEP USWR, to reduce stormwater runoff and regulate stormwater release rates into the existing stormwater system.

Table 11-22 Existing and With-Action Comparison Total Volume to Newton Creek

		Total Volume to Combined Sewer System (MG)			
Rainfall (inches)[1]	**Duration (hours)**	**Existing**	**With-Action Condition**	**Increment**	**Percent Increase (%)**
0.00	3.80	0	0	0	0
0.40	3.80	0.012	0.014	0.002	16.7
1.20	11.30	0.036	0.041	0.005	13.9
2.50	19.50	0.075	0.087	0.012	16.6

The Flow Volume Matrix calculations do not reflect the use of any sanitary and stormwater source control BMPs to reduce sanitary flow and stormwater runoff volumes to the combined sewer system. As noted above, the NYCTA Replacement Facility at the NYCTA Relocation Site would incorporate low flow plumbing fixtures to reduce sanitary flow in accordance with the New York City Plumbing Code. In addition, stormwater BMPs would be required in accordance with the NYC DEP USWR guidelines, which includes requirements for bringing the NYCTA Relocation Site into compliance with the allowable stormwater release rate. While it is anticipated that detention tanks would be used as a primary measure, specific BMP methods will be determined with further refinement of the building design and in consultation with NYC DEP.

The USWR increases on-site stormwater detention requirements and updates release rates for developments discharging to combined sewer systems and requires a retention first approach to stormwater management practice (SMP) design. The water quality requirement (WQv) aims to manage and reduce runoff from small, frequent storms that often trigger the majority of CSO events. The USWR manual defines this event as the 90th percentile rain event. Runoff reduction (RR) criteria aims to maintain a minimum level of RR during small storms, and which is generally met when treating the entire WQv. If site constraints make it impossible to treat the WQv, then a minimum Runoff Reduction Volume (RRv) for all newly constructed impervious areas must be met. The sewer operations volume (Vv) and maximum release rate (Qdrr) requirements are associated with the 10-year event, and work in tandem to maintain optimal flow rates in the City's combined sewer system to further limit the amount of CSO events. The existing buildings on the NYCTA Relocation Site were developed prior to the USWR; however, the proposed redevelopment of the site is required to meet the new stormwater requirements, for which the calculations are based on the entire tributary area to the existing site connection. Therefore, the entire area tributary to the existing site connection would be brought into compliance as part of the redevelopment of the NYCTA Relocation Site.

Based on the USWR guidelines, the required WQv and Vv is equal to 415 cubic feet and 7,025 cubic feet, respectively. If using infiltration SMPs to manage the WQv, then half of the water quality volume provided can be counted towards the Vv, so the total required storage volume is approximately 7,233 cubic feet. The maximum release rate (Qdrr) is equal to 1.0 cfs/acre, which is approximately 1.29 cfs for the site.

To achieve this release rate, stormwater could be managed by utilizing one or a combination of detention or infiltration techniques identified in the USWR manual. Green technologies, subsurface detention, and infiltration could be implemented to retain or release stormwater with slowed discharge rates to control peak runoff rates. Specific BMP methods will be determined with further refinement of the building design under the site connection approval process in consultation with NYC DEP.

The incorporation of the appropriate sanitary flow and stormwater source control SMPs would reduce the overall volume of sanitary sewer discharge and stormwater runoff as well as the peak stormwater runoff rate from the NYCTA Relocation Site. Sewer treatment capacity at the Newtown Creek WRRF could adequately handle wastewater flow resulting from the NYCTA Replacement Facility.