A. INTRODUCTION

This chapter evaluates the potential for the proposed project to result in significant adverse impacts on the City's water supply as well as wastewater and stormwater conveyance and treatment infrastructure. As discussed in Chapter 1, "Project Description," the proposed project would replace the existing Brooklyn Detention Complex at 275 Atlantic Avenue (Block 175, Lot 1) with a new detention facility, supporting uses, and accessory parking.

According to the 2014 *City Environmental Quality Review (CEQR) Technical Manual*, projects that increase density or change drainage conditions on a large site require a water and sewer infrastructure analysis. The project site is located in a combined sewer area. The proposed project would see the redevelopment of the project site with approximately 1,190,000 gross square feet (gsf) of space; therefore, following the guidelines of the *CEQR Technical Manual*, an analysis of the project site's potential impacts on the wastewater and stormwater conveyance and treatment system was performed.

PRINCIPAL CONCLUSIONS

This analysis finds that the proposed actions are not anticipated to result in significant adverse impacts related to the City's water supply or to wastewater and stormwater conveyance and treatment infrastructure.

WATER SUPPLY

By 2027, the future with the proposed project (With Action condition) would generate an incremental water demand of 306,050 gallons per day (gpd) as compared with the future without the proposed project (the No Action condition). This represents a 0.03 percent increase in demand on the New York City water supply system. It is expected that there would be adequate water service to meet the incremental water demand, and there would be no significant adverse impacts on the City's water supply.

SANITARY SEWAGE

By 2027, the With Action condition would generate an incremental 131,800 gpd of sewage over the future without the proposed project. This incremental volume in sanitary flow to the combined sewer systems would represent approximately 0.49 percent of the average daily flow to the Red Hook Wastewater Treatment Plant (WWTP). This volume would not result in an exceedance of the Red Hook WWTP's capacity, and is not anticipated to create a significant adverse impact on the City's sanitary sewage treatment system.

STORMWATER

The project site is located in one sub catchment area of the Red Hook WWTP. As compared with No Action condition, the With Action condition would result in an increase in flows to the WWTP during wet weather due to the increase in sanitary flow and impervious surfaces. A reduction in stormwater peak flows to the combined sewer system would be achieved with the incorporation of stormwater source control best management practices (BMPs) in accordance with the City's site connection requirements. Therefore, the proposed actions are not anticipated to have a significant adverse impact on the City's combined sewer system or the City's sewage treatment system.

B. METHODOLOGY

This analysis follows the *CEQR Technical Manual* guidelines that recommend a preliminary water analysis if a project would result in an exceptionally large demand for water (over 1 million gpd), or if it is located in an area that experiences low water pressure (e.g., an area at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). The proposed project would not generate an incremental water demand of 1 million gpd and is not located in an area that experiences low water pressure. Therefore, it is anticipated that there would be adequate water service to meet the incremental demand, and there would be no significant adverse impacts on the City's water supply. In addition, the New York City Department of Environmental Protection (DEP) has confirmed that the existing water supply infrastructure serving the project site should be sufficient to handle the incremental increase in water demand.

The *CEQR Technical Manual* indicates certain scenarios in which a sewer analysis is warranted.[1] The proposed project, located within the Gowanus Canal drainage area, would develop more than 1 acre of land and create more impervious surface than existed. In addition, the proposed project would introduce more than 150,000 square feet of non-residential space within Brooklyn. Therefore, following the guidelines of the *CEQR Technical Manual*, an analysis of the proposed project's potential impacts on the wastewater and stormwater conveyance and treatments system was performed.

Existing and future water demand and sanitary sewage generation are calculated based on use rates set by the *CEQR Technical Manual*.[2] The New York City Department of Environmental Protection (DEP) Volume Calculation Matrix is then used to calculate the overall combined sanitary sewage and stormwater runoff volume discharged to the combined sewer system for four rainfall volume scenarios with varying durations. The ability of the City's sewer infrastructure to handle the anticipated demand from the proposed project is assessed by estimating existing sewage generation rates, and then comparing these existing rates with the No Action condition and the With Action condition, per *CEQR Technical Manual* methodology.

[1] *CEQR Technical Manual*, Table 13-1, Page 13-9.

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

C. EXISITING CONDITIONS

WATER SUPPLY SYSTEM

The New York City water supply system—comprised of three watersheds: the Croton, Delaware, and Catskill—extends as far north as the Catskill Mountains and delivers on average approximately 1.1 billion gallons of water per day to customers in the five boroughs and Westchester County. From these watersheds, potable water is conveyed to the City via a system of reservoirs, aqueducts, and tunnels. Within the City, a grid of water pipes distributes water to customers. Based on a review of available DEP water system mapping, the project site is served by water mains along State Street, Boerum Place, and Atlantic Avenue.

CONVEYANCE SYSTEM

The Brooklyn Site is located at 275 Atlantic Avenue (Block 175, Lot 1) within a part of Brooklyn served by a combined sewer system that collects both sanitary sewage and stormwater. In periods of dry weather, the combined sewers located in the adjacent streets convey only sanitary sewage. The project site currently contains the Brooklyn House of Detention as well as the portion of State Street between Boerum Place and Smith Street. The project site is approximately 1.84 acres. Combined sewers running east along State Street and Atlantic Avenue, and south along Smith Street serve the project site.

Along State and Smith Streets, and Atlantic Avenue adjacent to the project site is a combined sewer system that runs east along State Street and Atlantic Avenue, and then south along Smith Street to Regulator R2. From Regulator R2, flow is conveyed to the Gowanus Pump Station that runs west and connects with the intercepting sewer running north along the Brooklyn-Queens Expressway towards the Red Hook WWTP, located within the Brooklyn Navy Yard.

At the Red Hook WWTP, wastewater is treated by physical and biological process before it is discharged into the East River. A State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (NYSDEC), which establishes limits for effluent parameters (i.e., suspended solids, fecal coliform bacteria, and other pollutants), regulates the quality of the treated wastewater (effluent). Since the volume of flow to a WWTP affects the level of treatment a plant can provide, the maximum permitted capacity for the Red Hook WWTP is 60 million gallons per day (mgd). The average monthly flow over the past 12 months is 27 mgd,[3] which is well below the maximum permitted capacity.

During and immediately after wet weather, combined sewers can experience a much larger flow due to stormwater runoff collection. To control flooding at the Red Hook WWTP, the regulators built into the system allow only approximately two times the amount of design dry weather flow into the interceptors. The interceptor then takes the allowable flow to the WWTP, while the excess flow is discharged to the nearest waterbody as combined sewer overflow (CSO). The project site is located within one CSO drainage area. In wet weather, excess sanitary flow and stormwater runoff from this drainage area is conveyed by Regulator R2 to CSO outfall RH-034, located at the northern end of the Gowanus Canal, which then flows into the Upper New York Bay.

[3] For the 12-month period through March 2017, the most recent available data.

SANITARY FLOWS

For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated on the project site except water used by air conditioning, which is typically not discharged to the sewer system. **Table 3.8-1** summarizes the water demand and sewage generation from the project site under the existing conditions. The project site includes 815 beds within approximately 165,000 square feet of space. For the purposes of this analysis, the water demand and sewer generation estimate for detention facility space uses the residential rates found in the *CEQR Technical Manual*. The total sanitary sewage generated by the existing conditions on the project site is estimated to be approximately 81,500 gpd, while the total water demand generated is approximately 109,550 gpd.

Table 3.8-1
Project Site Water Consumption and Sewage Generation
Existing Conditions

Use	Size/Population	Rate*	Consumption (gpd)
Detention Housing[1]			
Domestic	815 persons	100 gpd/person	81,500
Air Conditioning	165,000 sf	0.17 gpd/sf	28,050
Support Services[2]			
Domestic	0 sf	0.24 gpd/sf	0
Air Conditioning	0 sf	0.17 gpd/sf	0
Community Facility and/or Retail[2]			
Domestic	0 sf	0.24 gpd/sf	0
Air Conditioning	0 sf	0.17 gpd/sf	0
		Total Water Supply Demand	109,550
		Total Sewage Generation	81,500

Notes:
* Rates are from the *CEQR Technical Manual* Table 13-2.
[1] Total number of persons in Detention Housing is determined by the number of beds provided in the facility. Utilizes Residential rates for calculation.
[2] Utilizes Retail rates for calculation.

STORMWATER FLOWS

The project site has a lot area of approximately 79,966 square feet (1.84 acres). The majority of the project site includes the Brooklyn House of Detention with some pavement and greenery. **Table 3.8-2** summarizes the surfaces and surface areas, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type).

Table 3.8-2
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
RH-034	Area (percent)	56%	44%	0%	1%	**100%**
	Surface Area (sf)	44,672	34,882	–	411	**79,966**
	Runoff Coefficient*	1.00	0.85	–	0.20	**0.93**

Notes:
* The Runoff Coefficient is a weighted average. The calculations are based on the DEP Volume Calculation Matrix provided in the *CEQR Technical Manual*, retrieved December 2017.
Totals may not sum due to rounding.

D. THE FUTURE WITHOUT THE PROPOSED PROJECT

Absent the proposed project, the project site will remain as is. Therefore, there will be no changes to the sanitary or stormwater flows on the site.

As noted above, the project site is located within the drainage area of CSO outfall RH-034, located at the northern end of the Gowanus Canal. Independent of the proposed project, there are expected to be significant modifications to the sewer infrastructure in the drainage area related to the remediation of the Canal as mandated by the United States Environmental Protection Agency (USEPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, or Superfund).[4] Specifically, as part of the Superfund remediation, the USEPA directed the City to construct CSO controls that would reduce CSOs from being discharged to the Canal. Pursuant to a 2013 Record of Decision (ROD) issued by USEPA, the City is constructing two CSO facilities along the Canal: one facility (known as the "Head End Facility") would capture CSO from the outfall RH-034 drainage area (of the 12 combined sewer system outfalls that discharge to the Canal, RH-034 discharges the greatest amount of CSO). The Head End Facility is expected to include an 8-million-gallon (MG) underground tank. During wet weather events, flows would be directed to the Facility and stored in the tank. Then, when there is sufficient downstream capacity in the sewer system following the wet weather event, flows would be pumped from the Facility to the Gowanus Wastewater Pumping Station for delivery to the Red Hook WWTP. When completed, the Head End Facility is expected to reduce the CSO volume discharged from outfall RH-034 during a typical year by approximately 76 percent. Construction of the Head End Facility is expected to include other changes to the sewer infrastructure in the area near outfall RH-034, including modifications to the existing RH-034 regulator structure and construction of new sewers in adjacent streets. The CSO Facilities project is expected to be complete by 2028.[5]

In addition, independent from the CSO Facilities project, DEP has commenced construction and installation of High Level Storm Sewers (HLSS) in the Gowanus drainage area, generally located between Carroll Street and State Street near the northern end of the Canal, extending north to Atlantic Avenue (east of the project site). The HLSS is a form of partial separation that separates stormwater from streets or other public rights-of-way from combined sewers. As part of the project, 87 new catch basins will be installed to allow stormwater to drain from the streets into 14,000 linear feet of new HLSS, which would reduce the frequency and volume of CSO discharged into the Canal. The HLSS project is expected to be complete by 2020.

While these two projects would modify sewer infrastructure within the drainage area of the Gowanus Canal and outfall RH-034, they are generally downstream of the project site. No changes to the combined sewers that directly serve the project site (along State Street, Atlantic Avenue, and Smith Street) are expected in the No Action condition.

---

[4] On March 2, 2010, the Canal was designated a federal Superfund site under CERCLA and placed on the National Priorities List (NPL).

[5] See also the *Gowanus Canal CSO Facilities Final Environmental Impact Statement (FEIS)*, February 2018.

E. THE FUTURE WITH THE PROPOSED PROJECT

The proposed project would replace the existing Brooklyn Detention Complex with a new detention facility containing approximately 1,190,000 gsf of above-grade floor area, including approximately 1,437 beds for people in detention; support space; and community facility and/or retail space. In addition, the site would involve the demapping of above- and below-grade volumes of State Street between Boerum Place and Smith Street to facilitate the potential construction of pedestrian bridges and/or tunnels connecting the proposed detention facility to existing court facilities to the north and allow the placement of accessory space below the street. State Street would remain a mapped public street open to vehicular and pedestrian traffic with utilities in the street bed.

WATER SUPPLY SYSTEM

As shown in **Table 3.8-3**, the proposed project is expected generate an incremental water demand of 306,050 gpd as compared with the No Action condition. This represents a 0.03 percent increase in demand on the New York City water supply system. According to DEP, it is expected that there would be adequate water service and that the existing infrastructure would be capable to meet the incremental water demand with the proposed actions, and there would be no significant adverse impacts on the City's water supply.

Table 3.8-3
Total Water Consumption and Sewage Generation

Use	Size/Population	Rate*	Consumption (gpd)
Detention Housing[1]			
Domestic	1,437 persons	100 gpd/person	143,700
Air Conditioning	900,000 sf	0.17 gpd/sf	153,000
Support Services[2]			
Domestic	260,000 sf	0.24 gpd/sf	62,400
Air Conditioning	260,000 sf	0.17 gpd/sf	44,200
Commercial Facility and/or Retail[2]			
Domestic	30,000 sf	0.24 gpd/sf	7,200
Air Conditioning	30,000 sf	0.17 gpd/sf	5,100
		Total Water Supply Demand	**415,600**
		Total Sewage Generation	**213,300**

Notes:
* Rates are from the *CEQR Technical Manual* Table 13-2.
[1] Total number of persons in Detention Housing is determined by the number of beds provided in the facility. Utilizes Residential rates for calculation.
[2] Utilizes Retail rates for calculation.

In addition, according to DEP, it is suggested that the existing water main along State Street be disconnected from the distribution system and abandoned.

CONVEYANCE SYSTEM

In the With Action condition, it is anticipated that the sewers in State and Smith Streets and Atlantic Avenue would be available for connection, and would convey the sanitary and stormwater flow from the project site to the Red Hook WWTP. As noted above, the sewer infrastructure in the drainage area would be undergoing significant modifications that would reduce CSOs from being discharged to the Canal. The CSO Facilities project has an expected completion date of 2028, and the HLSS project is expected to be complete by 2020. While these two projects would modify sewer infrastructure within the drainage area of the Gowanus Canal

and outfall RH-034, there would be no changes to the combined sewers that directly serve the project site.

SANITARY FLOWS

As shown in **Table 3.8-3**, the proposed project is expected to generate 213,300 gpd of daily sanitary sewage. In addition, the incremental sanitary sewage generated by the proposed project over the No Action condition would be 131,800 gpd. The incremental increase in sewage generation is approximately 0.49 percent of the average daily flow at the Red Hook WWTP and would not result in an exceedance of the WWTP's permitted capacity of 60 mgd. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), the proposed project would plan to utilize low-flow plumbing fixtures. Therefore, the proposed project would not result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system.

However, according to DEP, due to the increase in sanitary flow, a hydraulic analysis of the existing sewer system may be needed at the time of the site connection proposal application to determine whether the existing sewer system is capable of supporting higher density development and related increase in wastewater flow. If it is determined at that time that the existing sewer system is incapable of supporting the increase in wastewater flow, the existing sewer system will need to be upsized. In addition, the existing drainage plan may need to be amended.

STORMWATER FLOWS

The amount of impervious surfaces in the No Action condition would increase in the With Action condition with the elimination of grass and softscape on the project site. The proportion of impervious surfaces—roof, pavement/walkways, and pervious pavement—would change from the No Action condition to the With Action condition; therefore, the anticipated stormwater flow would also change (see **Table 3.8-4**).

Table 3.8-4
Project Site Surface Coverage
With Action Condition

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other[1]	Grass and Softscape	Total
RH-034	Area (percent)	75%	22%	2%	1%	**100%**
	Surface Area (sf)	59,868	17,989	1,303	805	**79,966**
	Runoff Coefficient*	1.00	0.85	0.70	0.20	**0.95**

Notes:
* The Runoff Coefficient is a weighted average. The calculations are based on the DEP Volume Calculation Matrix provided in the *CEQR Technical Manual*, retrieved December 2017.
[1] Pervious pavement.
Totals may not sum due to rounding.

Using these sanitary and stormwater flow calculations, the DEP Flow Volume Calculation Matrix was completed for the existing conditions and the proposed project. The calculations from the Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from existing conditions to the With Action condition, and include four rainfall volume scenarios with varying durations. The summary tables of the Flow Volume Calculation Matrix are included in **Table 3.8-5**.

Table 3.8-5
DEP Flow Volume Matrix: Existing and Build Volume Comparison

Rainfall Volume (in)	Rainfall Duration (hr)	Runoff Volume to Direct Drainage (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Runoff Volume to River (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Increased Total Volume to CSS (MG)*
RH-034		Existing				With Action				**Increment**
		1.84 acres				1.84 acres				
0.00	3.80	0.00	0.00	0.01	**0.01**	0.00	0.00	0.03	**0.03**	0.02
0.40	3.80	0.00	0.02	0.01	**0.03**	0.00	0.02	0.03	**0.05**	0.02
1.20	11.30	0.00	0.06	0.04	**0.09**	0.00	0.06	0.10	**0.16**	0.06
2.50	19.50	0.00	0.12	0.07	**0.18**	0.00	0.12	0.17	**0.29**	0.11

Notes:
*Assumes no on-site detention or Best Management Practices (BMPs) for purposes of calculations
CSS = Combined Sewer System; MG = Million Gallons

As shown in **Table 3.8-5**, in all rainfall volume scenarios, flow to the CSO outfall RH-034 drainage area would increase. The increase in flow is attributable to the addition of sanitary flows, the increase of impervious surface, and the elimination of grass and softscape as compared with the No Action condition.

The Flow Volume Matrix calculations do not, however, 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 project 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 as part of the DEP site connection approval process in order to bring the building into compliance with the required stormwater release rate. Specific BMP methods would be determined with further refinement of the building and site design and in consultation with DEP, but may include planted rooftop spaces ("green roofs"), detention tank, and/or additional plantings around the project site.

The incorporation of the appropriate sanitary flow and stormwater source control BMPs that would be required, as part of the site connection approval process would help reduce the overall additional volume of sanitary sewer discharge as well as the peak stormwater runoff rate from the project site. Sewer conveyance infrastructure adjacent to the project site will likely undergo a hydraulic analysis as a way of assessing whether the existing sewer system has capacity for the increased wastewater flow resulting from the project. Through this analysis, it will be determined whether the existing sewer has sufficient capacity or whether upgrades will be made to the infrastructure to provide adequate capacity for the increased flow. The treatment capacity at the Red Hook WWTP is sufficient to handle wastewater flow resulting from the proposed project. Therefore, it is anticipated that there would be no significant adverse impacts on the City's wastewater or stormwater conveyance and treatment infrastructure. ✷