10.0 Water and Sewer Infrastructure

Introduction

This chapter examines the potential effects of the Proposed Actions on the City's water supply, wastewater treatment, and stormwater management infrastructure in accordance with the 2021 *CEQR Technical Manual*.

As described in **Chapter 1, Project Description**, the Proposed Actions consist of a series of land use actions such as zoning map amendments, disposition of City-owned property and Urban Development Action Area Project (UDAAP) designations, and zoning text amendments (including establishing a new Special District and Mandatory Inclusionary Housing [MIH]). The Proposed Actions would facilitate the implementation of a multi-year planning process along Atlantic Avenue in Prospect Heights, northwestern Crown Heights, and southern Bedford Stuyvesant in partnership with elected officials, City agencies, community boards, and local stakeholders.

The Proposed Actions would affect an approximately 23-block area, primarily along Atlantic Avenue in Brooklyn Community Districts (CDs) 3, and 8, and generally bounded by Vanderbilt Avenue to the west, Nostrand Avenue to the east, Herkimer Street to the north, and Bergen Street to the south (the Project Area). In addition, the Proposed Actions would affect two, separate, non-contiguous areas on a portion of two blocks bounded by:

- Sixth Avenue to the west, Carlton Avenue to the east, Dean Street to the north, and St. Marks and Flatbush Avenues to the south.
- Halsey Street to the north, Macon Street to the south, Nostrand Avenue to the west and Marcy Avenue to the east.

In response to the comments received on the Draft Scope of Work, two additional development sites (Sites #53 and #55) have been included in environmental analysis to account for development that could be facilitated by future discretionary actions not subject to the current Uniform Land Use Review Procedure (ULURP) application associated with the Proposed Actions. These two separate, non-contiguous sites in CDs 2 and 8 are on a portion of two blocks bounded by:

- Fulton Street to the north, Atlantic Avenue to the south, Carlton Avenue to the west and Clermont Avenue to the east.

- Prospect Place to the north, Park Place to the south, New York Avenue to the west, and Brooklyn Avenue to the east.

Under the reasonable worst-case development scenario (RWCDS), the Proposed Actions are anticipated to facilitate the development of 6,665,448 sf of floor area, including 5,321,642 sf of residential floor area (approximately 5,279 dwelling units (DUs), 25 to 30 percent of units would be affordable pursuant to MIH with additional affordable housing to be provided pursuant to other City-based programs), 344,325 sf of local retail uses, 50,410 sf of destination retail uses, 472,574 sf of commercial office uses, 77,095 sf of industrial uses, and 389,402 sf of community facility uses.

Development facilitated by the Proposed Actions is anticipated to be complete and occupied by 2034.

Principal Conclusions

Water Supply

The Proposed Actions are not anticipated to result in significant adverse impacts to the City's water supply system. Development facilitated by the Proposed Actions is anticipated to generate a water supply demand of approximately 1,698,155 gallons per day (gpd) (or approximately 1.70 million gallons per day [mgd]), representing an approximately 1,435,207 gpd (or approximately 1.44 mgd) increase compared to the future without the Proposed Actions. Water supply demand would be dispersed throughout an approximately 23-block area, and would represent approximately 0.17 percent of the City's average daily water supply of approximately one billion gallons per day.

Wastewater Treatment

The development facilitated by the Proposed Actions is anticipated to generate approximately 1,471,408 gpd (or approximately 1.47 mgd) of sanitary sewage, representing an increase of approximately 1,330,661 gpd (or approximately 1.33 mgd) compared to the future without the Proposed Actions. The majority of sanitary wastewater generated by this development would be conveyed to the Red Hook Wastewater Resource Recovery Facility (WRRF). One projected development site would convey sanitary wastewater to the Newtown Creek WRRF; however, the wastewater generated by one development would be considered negligible compared to the 310-mgd design capacity of the Newtown Creek WRRF. With an existing average dry weather flow of approximately 27 mgd (below the maximum dry weather flow permitted capacity of 60 mgd [DCP 2021]), and the addition of approximately 1.33 mgd of sanitary sewage generated by the development facilitated by the Proposed Actions, the Red Hook WRRF would continue to have approximately 31.67 mgd of reserve capacity. Therefore, the Proposed Actions would not result in a significant adverse impact to the City's wastewater treatment facilities.

Stormwater and Drainage Management

The Project Area is located within a combined sewer area and primarily spans two subcatchment areas of the Red Hook WRRF. Depending on rainfall volume and duration, the total volumes to

the combined sewer systems would range from 0.02 to 2.30 mgd. Portions of the Project Area also fall within the Gowanus Canal special drainage area.

The Red Hook WRRF has an available capacity of approximately 33 mgd; therefore, the increase in stormwater runoff generated within the Project Area would not overburden the Red Hook WRRF, and no significant impacts to water quality are anticipated. In addition, best management practices (BMPs) would be implemented in conjunction with development facilitated by the Proposed Actions, consistent with the City's site connection requirements, and the Unified Stormwater Rule (NYC Environmental Protection 2022). Based on this information, the Proposed Actions would not result in a significant adverse impact related to wastewater or stormwater conveyance and treatment infrastructure.

Methodology

Pursuant to the 2021 *CEQR Technical Manual*, a preliminary water supply infrastructure analysis is warranted if a project is anticipated to result in a water demand of greater than 1 million gpd or is in an area that experiences low water pressure (e.g., areas at the end of the water supply distribution system). The Project Area is not within an area that experiences low water pressure; however, the Proposed Actions would result in a net water demand of approximately 1.47 mgd (compared to the future without the Proposed Actions). Therefore, an assessment of water supply is warranted.

Pursuant to the 2021 *CEQR Technical Manual*, an assessment of wastewater and stormwater conveyance and treatment infrastructure is warranted if a project is in a combined sewer area and would exceed the following incremental thresholds: 1,000 residential units or 250,000 sf of commercial or community facility space in Manhattan, or 400 residential units or 150,000 sf of commercial space in the Bronx, Brooklyn, Staten Island, or Queens. The Project Area is located in Brooklyn, and the Proposed Actions would result in a net increase of more than 400 residential units and more than 250,000 sf of commercial space; therefore, an assessment of wastewater and stormwater infrastructure is warranted.

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

- Describes the existing water and sewer infrastructure serving the Project Area.
- Forecasts water demand, sanitary sewage, and stormwater generation associated with the Proposed Actions, consistent with the RWCDS based on 2021 *CEQR Technical Manual* guidance.
- Assesses the effects of the water demand, sanitary sewage, and stormwater generation associated with the Proposed Actions on the City's water and sewer infrastructure based on 2021 *CEQR Technical Manual* guidance.

Regulatory Context

Sanitary wastewater and stormwater within New York City are governed by State Pollutant Discharge Elimination System (SPDES) permits issued by the New York State Department of

Environmental Conservation (NYSDEC) in compliance with the Clean Water Act; however, the SPDES program is broader in scope than that required by the Clean Water Act because it controls point source discharges to groundwater as well as surface waters. In addition, New York City is a regulated Municipal Separate Storm Sewer System (MS4) discharging stormwater runoff directly to local waterbodies and has prepared a Stormwater Management Program Plan (SWMPP) identifying approaches for minimizing non-point source (runoff-generated) pollution of waterways from operations of facilities and construction activities.

The New York City Department of Environmental Protection (NYCDEP) proposed amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York (RCNY) as part of a Unified Stormwater Rule. In August 2020, the New York City Council passed Introduced Resolution No. 1851, enabling NYCDEP to move forward with the Chapter 19.1 amendments necessary to package the Unified Stormwater Rule amendments. The proposed Unified Stormwater Rule amendments were publicly reviewed and published as final on February 15, 2022. The Unified Stormwater Rule introduces new on-site stormwater management volume requirements, which increase the total volume of water that must be managed on new and redeveloped properties, and updates the type and performance of on-site stormwater management practices that must be implemented.

Preliminary Analysis

Existing Conditions

Water Supply

The New York City water supply system consists of a network of reservoirs, lakes, and aqueducts extending into the Catskill region and a pipe network that distributes water within the City. New York City obtains nearly all of its water from the Delaware, Catskill, and Croton watersheds, which are within 125 miles of the City. Water from the watersheds is stored at 19 reservoirs and 3 controlled lakes with a combined capacity of approximately 550 billion gallons.[1] The water is then carried into the City by a number of aqueducts. The water enters the City via City Tunnel 1 (which runs through the Bronx, Manhattan, and Queens) and City Tunnel 2 (which runs through the Bronx, Queens, and Brooklyn). The partially completed City Tunnel 3 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.

The three city tunnels distribute water into a network of water mains. Water mains up to 96 inches (8 feet) in diameter feed smaller mains that deliver water to its final destination. Nearly all the water reaches consumers by gravity alone, although approximately 4 percent (generally at the outer limits of the system where in-line pressure is lowest, at high elevations, or at a pressure extremity, such as Far Rockaway) is pumped to its final destination. Pressure regulators throughout the City monitor and control the water pressure.

Table 10-1 shows the existing water use on the projected development sites and the associated water consumption and wastewater generation rates. Based on the water consumption rates, the

[1] *CEQR Technical Manual* (2021).

existing water demand on the projected development sites is approximately 254,008 gpd, including approximately 127,855 gpd for domestic uses and approximately 126,748 gpd for air conditioning.

Table 10-1: Existing Water Consumption and Wastewater Generation

Land Use	Water Consumption and Wastewater Generation Rates	Unit	Domestic Water/ Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential[1]	Domestic: 100 gpd/person	9 DU	2,205	-
Commercial/Office	Domestic: 0.10 gpd/sf	30,374 sf	3,037	5,164
	Air Conditioning: 0.17 gpd/sf			
Retail	Domestic: 0.24 gpd/ sf	41,381 sf	9,931	7,035
	Air Conditioning: 0.17 gpd/sf			
Community Facilities[2]	Domestic: 0.10 gpd/ sf	192,786 sf	19,279	32,774
	Air Conditioning: 0.17 gpd/sf			
Schools	Domestic: 10 gpd/ seat	97 seats	970	12,733
	Air Conditioning: 0.17 gpd/sf	74,900 sf		
Industrial/Warehouse/ Auto-related/ Garage[3]	Domestic: 10,000 gpd/acre	402,637 sf	92,433	68,448
	Air Conditioning: 0.17 gpd/sf			
Total Existing Water Demand (gpd)			**254,008**	
Total Existing Wastewater Generation (gpd)			**127,855**	

Source: 2021 CEQR Technical Manual, Chapter 13: Table 13-2 "Water Usage and Sewage Generation Rates for Use in Impact Assessment."
Notes:
1 Residential DUs assume 2.45 residents per DU, based on the average household size for Brooklyn Community Districts 2, 3, and 8 (2020 Decennial Census).
2 Assumes same rate as commercial/ office.
3 Based on DCP 2021.

Wastewater Treatment

According to the 2021 *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 because it recirculates or evaporates in the cooling and heating process.

Much of New York City's wastewater treatment system is composed of the sewer network underneath the streets and the 14 WRRFs throughout the City. Most of the City's sewers are combined sewers that collect both sanitary sewage and stormwater. In periods of dry weather, the combined sewers (sized to convey an amount of sanitary sewage that is based on density levels) convey only sanitary sewage. During and immediately after wet weather, combined sewers can experience increased flow due to stormwater runoff collection. To control flooding at the WRRFs, sewer regulators are built into the system to serve as relief valves, allowing only approximately two times the amount of designed dry weather flow into the interceptors (larger sewers that convey wastewater to the WRRFs). The interceptors then take the allowable flow to

the WRRFs, while the excess flow is discharged untreated to the nearest waterbody as combined sewer overflow (CSO).

During the 1990s, the City instituted a range of water conservation measures in response to flows to the City's WRRFs that exceeded the dry weather flow allowed in accordance with 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 an Automated Meter Reading 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 at the City's WRRFs. At many WRRFs, this reduction has been in the order of magnitude of several million gpd. Overall, water demand is down more than 30 percent since the 1990s, despite population growth. NYCDEP anticipates that savings from the continued implementation of these and other conservation measures would exceed increases in water demand from consumers.

The Project Area is primarily served by combined sewers that convey flows to the Red Hook WRRF (see **Figure 10-1**); however, one projected development site would convey sanitary wastewater (and stormwater) to the Newtown Creek WRRF. At WRRFs, wastewater is fully treated by physical and biological processes before it is discharged as effluent. The quality of the effluent is regulated by an NYSDEC-issued SPDES permit, which establishes limits for effluent parameters (i.e., suspended solids, fecal coliform bacteria, and other pollutants). Because the volume of flow to a WRRF affects the level of treatment a plant can provide, the SPDES permit also establishes a maximum permitted capacity. For the Red Hook WRRF, the maximum permitted dry weather flow capacity is 60 mgd; the average monthly flow to the Red Hook WRRF is 27 mgd (DCP 2021),[2] which is approximately 45 percent of the permitted capacity. Each WRRF is designed to treat up to twice the maximum dry weather flow capacity during wet weather.

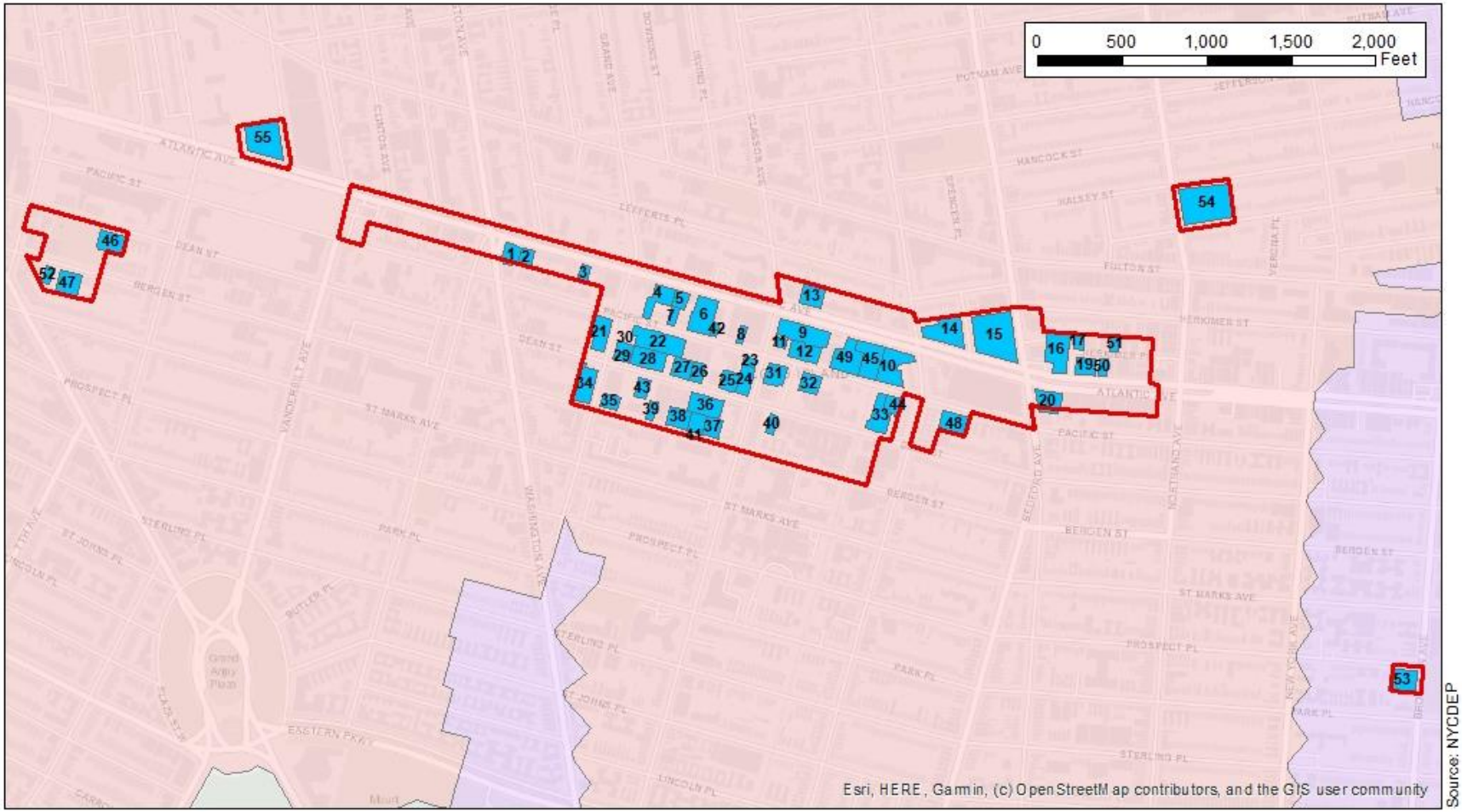
As shown in **Figure 10-1**, the majority of the projected development sites would be served by two Red Hook WRRF subcatchment areas. One projected development site would be served by the Newtown Creek WRRF subcatchment area. **Table 10-2** shows the estimated existing wastewater generated on the projected development sites within each of the affected subcatchment areas.

Table 10-2: Existing Wastewater Generation by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)
RH-034	9,891
RH-005	116,983
NCB-014	981

Source**:** 2021 *CEQR Technical Manual.*

[2] Average monthly flow for the 12-month period through March 2017.



Atlantic Avenue Mixed-Use Plan

Figure 10-1
WRRF Subcatchment Area

Stormwater and Drainage Management

The volume of stormwater runoff generated at a property varies depending on the type of land cover. NYCDEP defines runoff coefficients associated with the pervious or impervious qualities of the land cover. Pursuant to guidance in the 2021 *CEQR Technical Manual*, grass and softscape have a runoff coefficient of 0.20 because of their relative ability to absorb rainfall, whereas roof and pavement areas have higher runoff coefficients of 1.00 and 0.85, respectively, due to the relative inability of these surface types to absorb rainfall.

As described above, sewer regulators allow twice the dry weather design flow into sewer interceptors. During periodic storm events, stormwater flow that exceeds regulator-allowed capacity is discharged as CSO. The analysis of stormwater management typically focuses on the body of water into which stormwater is discharged during a CSO event—in this case, CSO from the Project Area would be primarily discharged through outfalls to the Gowanus Canal.

The 54 projected development sites within the Project Area are a mix of buildings, paved areas (such as surface parking lots), and pervious unpaved or vacant vegetated land. The combined total area of the projected development sites is approximately 20.38 acres. **Table 10-3** summarizes the surfaces and surface areas within each subcatchment area, as well as the associated weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type).

The total lot area of the projected development sites is approximately 887,700 sf, of which approximately 6.53 percent is located within subcatchment area RH-034, 91.23 percent is located within subcatchment area RH-005, and 2.24 percent is located within subcatchment area NCB-014.

As shown in **Table 10-3**, subcatchment areas RH-034, RH-055, and NCB-014, have weighted runoff coefficients of approximately 0.93, 0.90, and 0.84, respectively.

Table 10-3: Existing Surface Coverage by Subcatchment Area

Subcatchment Area	Surface Type	Roof	Pavement	Grass & Softscape	Total
RH-034	Area (%)	53.90	46.10	0	100
	Surface Area (sf)	31,246	26,721	0	57,967
	Runoff Coefficient	1.00	0.85	0.20	0.93
RH-055	Area (%)	49.82	46.74	3.45	100
	Surface Area (sf)	403,410	378,469	27,937	809,816
	Runoff Coefficient	1.00	0.85	0.20	0.90
NCB-014	Area (%)	51.17	35.00	13.82	100
	Surface Area (sf)	10,192	6,972	2,753	19,917
	Runoff Coefficient	1.00	0.85	0.20	0.84

Source: DCP Building Footprint and Map PLUTO data (2023); aerial photographs.

Using the sanitary and stormwater flow calculations provided in the 2021 *CEQR Technical Manual*, the Flow Volume Calculation Matrix was completed for the existing conditions for each subcatchment area. The calculations from the Flow Volume Calculation Matrix assist in determining the wastewater flow volumes to the combined sewer system, and include four rainfall volume scenarios with varying durations. The summary tables of the Flow Volume Calculation matrices for existing conditions are included in **Table 10-4**.

Table 10-4: Existing Condition Flow Volume Matrix

Subcatchment Area	Total Area (Acres)	Rainfall (in.)	Rainfall Duration (hr.)	Weighted Runoff Coefficient	Runoff Volume to Direct Drainage (mg)	Runoff Volume to CSS (mg)	Sanitary Volume to CSS (mg)	Total Volume to CSS (mg)
RH-034	1.33	0.00	3.80	0.93	0.0	0.00	0.00	0.00
		0.40	3.80		0.0	0.01	0.00	0.02
		1.20	11.30		0.0	0.04	0.00	0.05
		2.50	19.50		0.0	0.08	0.01	0.09
RH-055	18.59	0.00	3.80	0.90	0.0	0.00	0.02	0.02
		0.40	3.80		0.0	0.18	0.02	0.20
		1.20	11.30		0.0	0.55	0.06	0.60
		2.50	19.50		0.0	1.14	0.10	1.23
NCB-014	0.46	0.00	3.80	0.84	0.0	0.00	0.00	0.00
		0.40	3.80		0.0	0.00	0.00	0.00
		1.20	11.30		0.0	0.01	0.00	0.01
		2.50	19.50		0.0	0.03	0.00	0.03

Source: 2021 *CEQR Technical Manual*.
Notes: Totals may not sum due to rounding.

Individual properties are required to manage on-site stormwater runoff in accordance with NYCDEP requirements. Because many of the buildings in the Project Area likely pre-date NYCDEP stormwater runoff management requirements, little or no existing on-site detention of stormwater on the projected development sites is expected.

No-Action Condition

In the 2034 future without the Proposed Actions (No-Action condition), the projected development sites are anticipated to either remain unchanged from existing conditions or become occupied by uses that are as-of-right under the existing zoning and generally reflect current trends. As described in **Chapter 1, Project Description**, the No-Action condition would consist of approximately 781,480 sf of built floor area on the 54 projected development sites. Under the RWCDS, the total No-Action development would comprise approximately 114,957 sf of residential floor area (approximately 136 DUs), 57,818 sf of local retail uses, 3,500 sf of other commercial uses, 19,148 sf of office uses, 81,000 sf of automotive-related uses, 237,371 sf of warehouse and industrial uses, 267,686 sf of community facility uses, and 52,309 sf of parking (209 accessory parking spaces).

Water Supply

As indicated in **Table 10-5**, total water consumption on the projected development sites under the No-Action condition would be approximately 262,948 gpd. The No-Action condition water demand represents an increase of approximately 8,939 gpd over existing conditions (see **Table 10-1**).

Table 10-5: No-Action Condition Water Consumption and Wastewater Generation

Land Use	Water Consumption and Wastewater Generation Rates	Unit	Domestic Water/ Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential[1]	Domestic: 100 gpd/person	136 DU	33,320	-
Commercial/ Office	Domestic: 0.10 gpd/sf	22,648 sf	2,265	3,850
	Air Conditioning: 0.17 gpd/sf			
Retail	Domestic: 0.24 gpd/sf	57,818 sf	13,876	9,829
	Air Conditioning: 0.17 gpd/sf			
Community Facilities[2]	Domestic: 0.10 gpd/sf	25,386 sf	2,539	4,316
	Air Conditioning: 0.17 gpd/sf			
Schools	Domestic: 10 gpd seat	365 seats	3,650	41,191
	Air Conditioning: 0.17 gpd/sf	242,300 sf		
Industrial/ Warehouse/ Auto-related/ Garage[3]	Domestic: 10,000 gpd acre	370,680 sf	85,096	63,016
	Air Conditioning: 0.17 gpd/sf			
Total No-Action Water Demand (gpd)			**262,948**	
Total No-Action Wastewater Generation (gpd)			**140,746**	

Source: 2021 *CEQR Technical Manual*, Chapter 13: Table 13-2 "Water Usage and Sewage Generation Rates for Use in Impact Assessment."
Notes:
1 Residential DUs assume 2.45 residents per DU, based on the average household size for Brooklyn Community Districts 2, 3, and 8 (2020 Decennial Census).
2 Assumes same rate as commercial/office.
3 Based on DCP 2021.

Wastewater Treatment

Wastewater generated by the No-Action condition would total approximately 140,746 gpd, representing an increase of approximately 12,891 gpd compared to existing conditions. As described above, the Red Hook WRRF has an excess capacity of approximately 33 mgd; therefore, under the No-Action condition the Red Hook WRRF would continue to operate within its design capacity. **Table 10-6** shows the anticipated increase in sanitary sewage generated by the No-Action condition within each of the applicable subcatchment areas.

Table 10-6: No-Action Condition Wastewater Generation by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)
RH-034	9,891
RH-055	129,874
NCB-014	981

Source: 2021 *CEQR Technical Manual*.

Stormwater and Drainage Management

Under the No-Action condition, stormwater generated within the Project Area would continue to be conveyed primarily to the Red Hook WRRF through the combined sewer system, and development is anticipated to occur at 4 of 54 projected development sites, all of which fall within subcatchment area RH-055. Accordingly, the amount of roof area within subcatchment area RH-055 is anticipated to increase marginally compared to existing conditions. As a result of the increase in impervious surfaces, stormwater runoff generated in the No-Action condition would be anticipated to increase marginally compared to the existing conditions; however, as described above, new developments would be anticipated to adhere to the City's mandatory Unified Stormwater Rule. For the projected development sites where no additional development is anticipated to occur in the No-Action condition, stormwater generated on these 50 sites would remain unchanged from the existing conditions. The runoff calculations presented in **Table 10-7** and **Table 10-8** do not reflect the anticipated reduction in stormwater generation from new development due to on-site stormwater management requirements.

Table 10-7 summarizes the surfaces and surface areas within each subcatchment area in the No-Action condition, as well as the associated weighted runoff coefficient. As shown below, the amount of roof area would marginally increase in the RH-005 subcatchment area; however, it would not result in a material change to the runoff coefficient. The surface coverages and runoff coefficients within the RH-034 and NCB-014 subcatchment areas would remain unchanged from existing conditions.

Table 10-7: No-Action Condition Surface Coverage by Subcatchment Area

Subcatchment Area	Surface Type	Roof	Pavement	Grass & Softscape	Total
RH-034	Area (%)	53.90	46.10	0	100
	Surface Area (sf)	31,246	26,721	0	57,967
	Runoff Coefficient	1.00	0.85	0.20	0.93
RH-055	Area (%)	50.84	45.71	3.45	100
	Surface Area (sf)	411,731	370,148	27,937	809,816
	Runoff Coefficient	1.00	0.85	0.20	0.90
NCB-014	Area (%)	51.17	35.00	13.82	100
	Surface Area (sf)	10,192	6,972	2,753	19,917
	Runoff Coefficient	1.00	0.85	0.20	0.84

Source**:** DCP Building Footprint and Map PLUTO data (2023); aerial photographs.

Using the sanitary and stormwater flow calculations provided in the 2021 *CEQR Technical Manual*, the Flow Volume Calculation Matrix was completed for the No-Action condition for each subcatchment area. The summary tables of the Flow Volume Calculation matrices for the No-Action condition are provided in *Table 10-8*.

Table 10-8: No-Action Condition Flow Volume Matrix

Subcatchment Area	Total Area (Acres)	Rainfall (in.)	Rainfall Duration (hr.)	Weighted Runoff Coefficient	Runoff Volume to Direct Drainage (mg)	Runoff Volume to CSS (mg)	Sanitary Volume to CSS (mg)	Total Volume to CSS (mg)
RH-034	1.33	0.00	3.80	0.93	0.0	0.00	0.00	0.00
		0.40	3.80		0.0	0.01	0.00	0.02
		1.20	11.30		0.0	0.04	0.00	0.05
		2.50	19.50		0.0	0.08	0.01	0.09
RH-055	18.59	0.00	3.80	0.90	0.0	0.00	0.02	0.02
		0.40	3.80		0.0	0.18	0.02	0.20
		1.20	11.30		0.0	0.55	0.06	0.61
		2.50	19.50		0.0	1.14	0.11	1.25
NCB-014	0.46	0.00	3.80	0.84	0.0	0.00	0.00	0.00
		0.40	3.80		0.0	0.00	0.00	0.00
		1.20	11.30		0.0	0.01	0.00	0.01
		2.50	19.50		0.0	0.03	0.00	0.03

Source: 2021 *CEQR Technical Manual*.
Notes: Totals may not sum due to rounding.

With-Action Condition

In the With-Action condition, the Proposed Actions are anticipated to facilitate the development of approximately 6,665,448 sf of floor area, including 5,321,642 sf of residential floor area (approximately 5,279 DUs, 25-30% of units would be affordable pursuant to MIH with additional affordable housing to be provided pursuant to other City-based programs), 344,325 sf of local retail uses, 50,410 sf of destination retail uses, 472,574 sf of commercial office uses, 77,095 sf of industrial uses, and 389,402 sf of community facility uses.

Compared to the No-Action condition, the With-Action condition would result in an incremental increase of approximately 5,206,685 sf of residential floor area (5,143 DUs), 286,507 sf of local retail space, 50,410 sf of destination retail space, 449,926 sf of office space, 121,716 sf of community facility space. The With-Action condition would represent a net reduction of approximately 209 accessory parking spaces, and a net decrease of approximately 160,276 sf of industrial, and 81,000 sf of automotive-related uses within the Project Area.

Water Supply

The Proposed Actions are not anticipated to result in significant adverse impacts to the City's water supply system. As described in **Table 10-9**, the Proposed Actions are expected to result in a water supply demand of approximately 1,698,155 gpd (or approximately 1.70 mgd), representing an increase of approximately 1,453,207 gpd (or approximately 1.44 mgd) compared to the future without the Proposed Actions. Water supply demand would be dispersed throughout

an approximately 23-block area and would represent approximately 0.17 percent of the City's average daily water supply of approximately one billion gallons per day.

Table 10-9: With-Action Condition Water Consumption and Wastewater Generation

Land Use	Water Consumption and Wastewater Generation Rates	Unit/SF	Domestic Water/ Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential[1]	Domestic: 100 gpd/ person	5,279 DU	1,293,355	-
Commercial/ Office	Domestic: 0.10 gpd/ sf	472,574 sf	47,257	80,338
	Air Conditioning: 0.17 gpd/ sf			
Retail	Domestic: 0.24 gpd/ sf	394,735 sf	94,736	67,105
	Air Conditioning: 0.17 gpd/ sf			
Community Facilities[2]	Domestic: 0.10 gpd/ sf	147,102 sf	14,710	25,007
	Air Conditioning: 0.17 gpd/ sf			
Schools	Domestic: 10 gpd/ seat	365 seats	3,650	41,191
	Air Conditioning: 0.17 gpd/ sf	242,300 sf		
Industrial/ Warehouse/ Auto-related/ Garage[3]	Domestic: 10,000 gpd/ acre	77,095 sf	17,699	13,106
	Air Conditioning: 0.17 gpd/ sf			
Total With-Action Water Demand (gpd)			**1,698,155**	
Total With-Action Wastewater Generation (gpd)			**1,471,408**	
Incremental Water Demand (gpd)			**1,435,207**	
Incremental Wastewater Generation (gpd)			**1,330,661**	

Source: *CEQR Technical Manual* (2021), Chapter 13: Table 13-2 "Water Usage and Sewage Generation Rates for Use in Impact Assessment."
Notes:
1 Residential dwelling units assume 2.45 residents per dwelling unit, based on the average household size for Brooklyn Community Districts 2, 3, and 8 (2020 Decennial Census).
2 Assumes same rate as commercial/ office.
3 Based on DCP 2021.

Wastewater Treatment

Under the With-Action condition, wastewater generated on the projected development sites would continue to be conveyed primarily to the Red Hook WRRF. The Proposed Actions are not expected to affect the capacity of the Red Hook WRRF, and the WRRF would continue to operate with a design capacity of approximately 60 mgd. As shown in **Table 10-9**, the Proposed Actions are expected to generate approximately 1,471,408 gpd (or approximately 1.47 mgd) of sanitary sewage, representing an approximately 1,330,661 gpd (or approximately 1.33 mgd) increase compared to the No-Action condition. With an existing flow of approximately 27 mgd (below the maximum permitted dry weather flow capacity of approximately 60 mgd) and the addition of approximately 1.33 mgd associated with the incremental development in the With-Action condition, the Red Hook WRRF would continue to operate within its design capacity and maintain reserve capacity. **Table 10-10** shows the anticipated increase in sanitary sewage generated by the development in the With-Action condition within each of the applicable subcatchment areas.

Table 10-10: With-Action Condition Wastewater Generation by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)
RH-034	103,239
RH-005	1,365,228
NCB-014	2,940

Source: 2021 *CEQR Technical Manual*.

Pursuant to the 2021 *CEQR Technical Manual* guidance, because the Red Hook WRRF would continue to operate with an available capacity of approximately 31.67 mgd, the Proposed Actions are not anticipated to result in a significant adverse impact to the City's wastewater treatment services, and no further analysis is warranted.

Stormwater and Drainage Management

The With-Action condition is anticipated to result in an increase in the amount of impervious surface area across the projected development sites compared to the No-Action condition. As shown in **Table 10-11**, roof area is estimated to comprise between 85 and 90 percent of the surface areas in the three applicable subcatchment areas. While several of the projected development sites are expected to include landscaped areas with potentially pervious surfaces, the amount and location of landscaped areas is not known at this time; therefore, for the purposes of a conservative analysis, the lot areas on the projected development sites that are not rooftop area (such as side and rear yards) are split between the categorization of pavement area and landscaped area.

As indicated in **Table 10-11**, the weighted runoff coefficients for the projected development sites are anticipated to increase compared to the No-Action condition; however, the increases would be relatively minor. Under the With-Action condition, subcatchment areas RH-034, RH-005, and NCB-014 would have weighted runoff coefficients of approximately 0.95, 0.93, and 0.95, respectively.

Table 10-11: With-Action Condition Surface Coverage by Subcatchment Area

Subcatchment Area	Surface Type	Roof	Pavement	Grass & Softscape	Total
RH-034	Area (%)	90.00	5.00	5.00	100
	Surface Area (sf)	52,170	2,898	2,898	57,967
	Runoff Coefficient	1.00	0.85	0.20	0.95
RH-055	Area (%)	85.00	7.50	7.50	100
	Surface Area (sf)	688,344	60,736	60,736	809,816
	Runoff Coefficient	1.00	0.85	0.20	0.93
NCB-014	Area (%)	90.00	5.00	5.00	100
	Surface Area (sf)	17,925	996	996	19,917
	Runoff Coefficient	1.00	0.85	0.20	0.95

Source: DCP Building Footprint and Map PLUTO data (2023); aerial photographs.

Using the projected sanitary and stormwater flows provided in the 2021 *CEQR Technical Manual*, the Flow Volume Calculation Matrix was completed for the With-Action condition for each subcatchment area. The summary tables of the Flow Volume Calculation matrices are included in **Table 10-12**.

Table 10-12: With-Action Condition Flow Volume Matrix

Subcatchment Area	Total Area (Acres)	Rainfall (in.)	Rainfall Duration (hr.)	Weighted Runoff Coefficient	Runoff Volume to Direct Drainage (mg)	Runoff Volume to CSS (mg)	Sanitary Volume to CSS (mg)	Total Volume to CSS (mg)
RH-034	1.33	0.00	3.80	0.95	0.0	0.00	0.02	0.02
		0.40	3.80		0.0	0.01	0.02	0.03
		1.20	11.30		0.0	0.04	0.05	0.09
		2.50	19.50		0.0	0.09	0.08	0.17
RH-005	18.59	0.00	3.80	0.93	0.0	0.00	0.22	0.22
		0.40	3.80		0.0	0.19	0.22	0.40
		1.20	11.30		0.0	0.56	0.64	1.21
		2.50	19.50		0.0	1.17	1.11	2.28
NCB-014	0.46	0.00	3.80	0.95	0.0	0.00	0.00	0.00
		0.40	3.80		0.0	0.00	0.00	0.01
		1.20	11.30		0.0	0.01	0.00	0.02
		2.50	19.50		0.0	0.03	0.00	0.03

Source: 2021 *CEQR Technical Manual.*
Notes: Totals may not sum due to rounding.

As shown in **Table 10-12**, additional stormwater flow volumes would be introduced to the combined sewer system as a result of the Proposed Actions. However, the stormwater flows presented above do no account for the reduction in stormwater flow that would be required through adherence to the City's Unified Stormwater Rule.

In New York City, new development must comply with the Unified Stormwater Rule (consistent Chapters 19.1 and 31 of Title 15 of the RCNY). These regulations require that stormwater be released from redeveloped sites at a rate lower than that calculated consistent with guidance in the 2021 *CEQR Technical Manual*. As described in Chapter 31 of Title 15 of RCNY, the permissible stormwater release rate is the greater of 0.046 cubic feet per second (cfs), or 0.10 cfs per acre. These mandated release rates were selected to reduce the potential effects of development on the City's sewer system and to reduce the likelihood and severity of CSO events. With the Unified Stormwater Rule establishing maximum stormwater release rates, the Proposed Actions are anticipated to result in a nominal effect on the City sewer system.

The Proposed Actions would result in increased development and population density that could require a hydraulic analysis of the existing sewer system when site-specific applicants seek sewer connections, and an amended drainage plan for the area(s) when improvements to the system are planned. If applicable, the hydraulic analyses would be required prior to the submittal of a Site Connection Proposal (SCP) application to determine whether the existing sewer system is capable of supporting new development and the related increase in wastewater flow.

As part of the SCP permit approval processes, developments must comply with the required on-site stormwater volume requirements and stormwater release rate as detailed in the Unified Stormwater Rule. Sewer improvements may also be required of the applicant at the time of the SCP. Each projected development site, regardless of lot size, would be required to implement slow-release stormwater management practices to satisfy the updated release rate and volume requirements on-site. The Unified Stormwater Rule ensures that redeveloped properties manage more total stormwater and manage it more efficiently than prior to redevelopment.

Accordingly, the Proposed Actions would increase sanitary flows to the City's combined sewer system but would decrease the amount that may be discharged as CSOs during rain events due to adherence with the Unified Stormwater Rule. In addition, because of the available capacity at the Red Hook WRRF, the projected increased flows to the combined sewer system are not anticipated to result in a significant adverse impact on the WRRF.

Based on this information, the Proposed Actions are not anticipated to result in a significant adverse impact to the City's water supply or wastewater and stormwater conveyance and treatment infrastructure, and no further analysis is warranted.