Chapter 10: Water and Sewer Infrastructure

A. INTRODUCTION

New York City's water and sewer network is fundamental to the operation, health, safety, and quality of life of the City and its surrounding environment, and it must be sized to fit the City's users and surface conditions in order to function adequately. Ensuring these systems have adequate capacity to accommodate land use or density changes and new development is critical to avoiding environmental and health problems such as sewer back-ups, street flooding, or pressure reductions. This chapter evaluates the potential for the Proposed Actions to result in significant adverse impacts on the City's water supply and wastewater and stormwater conveyance, management, and treatment infrastructure in accordance with the guidance of the ~~2020~~2021 *City Environmental Quality Review (CEQR) Technical Manual*.

As described in Chapter 1, "Project Description," the Applicant (a joint venture between Kaufman Astoria Studios, BedRock Real Estate Partners, and Silverstein Properties) is seeking a series of land use actions, including zoning map amendments, zoning text amendments, and special permits (the Proposed Actions) to facilitate the Applicant's intended development and programming. The area subject to the Proposed Actions is the five city blocks bounded by 35th Avenue to the north, 43rd Street/Northern Boulevard to the east, 36th Avenue to the south and 37th Street to the west (the "Project Area") in the Astoria neighborhood of Queens in Community District 1. The Project Area (Blocks 641, 668, 669, 670, and 671) contains 43 lots, of which 21 are controlled by the Applicant while the remaining lots are controlled by others. With the Proposed Actions, the Applicant-controlled lots would be controlled by a Large-Scale General Development (LSGD) Special Permit and would contain the Proposed Development (referred to as the "Development Site"). The 22 lots outside of the Development Site that are not controlled by the Applicant would be rezoned with approval of the Proposed Actions (referred to as the "Additional Affected Area").

The Proposed Development (branded as the Innovation QNS project), would redevelop the Development Site with a series of mixed-use buildings and publicly accessible open spaces. The Innovation QNS project is intended create a series of arts and cultural venues including a multi-purpose arts and culture center, a re-envisioned multiplex movie theater that would provide a state-of-the-art cinematic experience, galleries, artists' workshops and tech and general office space. In addition to art and cultural venues, the project would include eating and drinking establishments, a grocery store and world market and other local retail, service and community facility uses.

In addition to the Proposed Development with approximately 2.9 million gsf of space, the Proposed Actions would facilitate the redevelopment of several projected development sites in the Additional Affected Area that are not controlled by the Applicant. These additional developments would include approximately 800,000 gsf of residential and commercial space, similar to the Proposed Development. Therefore, the Proposed Actions would facilitate the development of a total of approximately 3.7 million gsf in the Project Area.

PRINCIPAL CONCLUSIONS

The Proposed Actions would not result in significant adverse impact on the City's water and sewer infrastructure. Based on the methodology set forth in the *CEQR Technical Manual,* while the Proposed Actions would result in increased demand for water and treatment of sewage, the incremental increases would not constitute a significant adverse impact on the City's water supply, wastewater treatment, or stormwater management and treatment infrastructure.

WATER SUPPLY

In the 2032 analysis year, in the future with the Proposed Actions (the With Action condition) the Projected Development Sites would generate an incremental water demand of approximately 1.4 million gallons per day (mgd) as compared to the future without the Proposed Actions (the No Action condition). This represents an approximately 0.13 percent increase in demand on the New York City water supply system compared to the City's average daily water use of approximately 1.1 billion gallons per day (gpd). It is expected the existing water mains in the Project Area would be capable of handling the increase in water demand, and there would be no significant adverse impacts on the City's water supply in the With Action condition.

SEWER SYSTEM AND WASTEWATER TREATMENT

In the 2032 analysis year, the With Action condition would generate an incremental 820,250 gpd of sewage over the No Action condition. This incremental volume in sanitary flow to the combined sewer systems would represent approximately 0.55 percent of the average daily flow to the Bowery Bay Wastewater ~~Treatment Plant~~Resource Recovery Facility (WRRF~~WWTP~~). This volume would not result in an exceedance of the Bowery Bay ~~WWTP~~WRRF's capacity and is not anticipated to create a significant adverse impact on the City's sanitary sewage treatment system. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), all developments on the Projected Development Sites would be required to utilize low-flow plumbing fixtures, which would help to further reduce sanitary flows to the ~~WWTP~~WRRF. All developments on the Projected Development Sites would be required to file a Site Connection Proposal Application (SCP) for approval from the New York City Department of Environmental Protection (DEP) to tie into the sewer system. In this process, before a building permit can be issued, site connection proposals must be certified for sewer availability by DEP. This analysis and any improvements would be undertaken, as necessary, in coordination with DEP.

STORMWATER FLOWS

The Project Area is located within two sub catchment areas of the Bowery Bay ~~WWTP~~WRRF. As compared to existing conditions, in the With Action condition there would be an increase in flows from the Project Area to the ~~WWTP~~WRRF. The increase in volume under the With Action condition as compared with the existing conditions is attributable to the increase in sanitary flow resulting from denser development (particularly residential development); stormwater runoff would be similar to or lower than runoff under existing conditions, as the With Action condition would result in an increase in semi-impervious paved space and soft scape space on the Development Site. However, 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), specifically on-site detention, that would be required as part of the DEP site connection approval process. DEP's detention performance standard is intended to reduce peak discharges to the City's sewer system during rain events by requiring greater onsite storage of stormwater runoff

and slower release to the sewer system. The implementation of DEP's stormwater performance standard over time is expected to provide additional capacity to the existing sewer system, thereby improving its performance. In addition, as a New York State Department of Environmental Conservation (DEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) is required for any development that would involve soil disturbance of one or more acres, a Stormwater Pollution Prevention Plan (SWPPP), consisting of both temporary erosion and sediment controls and post-construction stormwater best management practices (BMPs), may be required of the Applicant.

The Proposed Actions would result in marginally increased flows to the City's combined sewer system that may be discharged as combined sewer overflows (CSOs) during rain events. Because of the available capacity of the Bowery Bay ~~WWTP~~WRRF, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality. In addition, with the incorporation of BMP measures to meet the City site connection requirement, development under the Proposed Actions would not result in a significant increase in stormwater runoff or CSO volumes/frequencies. Therefore, it is concluded that the Proposed Actions would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure.

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 of water (over 1 million gpd), or if it is located in an area that experiences low water pressure (i.e., an area at the end of the water supply distribution system, such as the Rockaway Peninsula or Coney Island). The Project Area is not in an area that experiences low water pressure; for the Proposed Actions, the Reasonable Worst Case Development Scenario (RWCDS) is expected to result in a water demand of more than one million gpd compared with the No Action scenario. Therefore, an assessment of water supply is warranted.

The *CEQR Technical Manual* indicates that for wastewater and stormwater conveyance and treatment analyses, a preliminary assessment is warranted if a project is located in a combined sewer area and would have an incremental increase above the No Action condition of 400 residential units or 150,000 sf of commercial, public facility, and institution and/or community facility space in the Bronx, Brooklyn, Staten Island, or Queens. Since the Project Area is located in a combined sewer area in Queens and the Proposed Actions would result in a net increase of more than 400 residential units and over 150,000 sf of commercial and community facility space, an assessment of wastewater and stormwater infrastructure is provided.

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

- Describes the existing water and sewer infrastructure serving the Project Area;
- Provides a preliminary analysis which estimates water demand and sewage generation on the projected development sites under Existing and No Action conditions based on use generation rates provided in the *CEQR Technical Manual* and the 2016 *East New York Rezoning Proposal Final Environmental Impact Statement (FEIS)*. The preliminary analysis also calculates stormwater runoff and sanitary flows using the DEP Volume Calculation Matrix. The preliminary analysis then forecasts water demand and sewage and stormwater generation by

the projected developments induced by the Proposed Actions under the RWCDS based on *CEQR Technical Manual* guidelines;

- Assesses the effects of the With Action water demand and sewage and stormwater generation on the City's water and sewer infrastructure based on the preliminary analyses, pursuant to *CEQR Technical Manual* guidelines.

C. EXISTING CONDITIONS

WATER SUPPLY SYSTEM

The New York City water supply system comprises a network of reservoirs, lakes, and aqueducts extending into the Catskill region and a pipe network that distributes water within the City. 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 control lakes with a combined capacity of approximately 550 billion gallons. The water is then carried into the City by a number of aqueducts. The water enters the City via City Tunnel 1 (which runs through the Bronx, Manhattan, and Queens) and City Tunnel 2 (which runs through the Bronx, Queens, and Brooklyn). The partially completed City Tunnel 3 currently serves the Bronx, Manhattan, and Queens, and, when fully complete, will terminate in Brooklyn. Staten Island obtains its water via the Richmond Tunnel, which is an extension of City Tunnel 2. City Tunnel 2 transverses the Project Area generally in a north-south orientation (generally along Steinway Street), and City Tunnel 3 is adjacent to the Project Area, generally running in an east-west orientation north of 35th Avenue.

Once in the City, the three aqueducts distribute water into a network of water mains. Water mains up to 96 inches in diameter feed smaller mains that deliver water to their final destination. Nearly all the water reaches its consumers by gravity alone, although some 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.

Based on a review of available DEP water system mapping, the Project Area is served by water mains, 8 inches or 12 inches in diameter, located on 37th, 38th, Steinway, 41st, 42nd, and 43rd Streets, as well as on 35th and 36th Avenues, which were generally installed in the early 20th century. In addition, there is a 48-inch diameter water main on 35th Avenue which was installed in 1935 and 1940; based on available DEP mapping, a portion of this main along the southern side of 35th Avenue extends to the property line of Playground Thirty Five XXXV at Block 669, Lot 20, adjacent to Projected Development Site C.[1] Finally, there is a 20-inch diameter water main on Northern Boulevard, which was installed in 1977.

On the southern side of 35th Avenue between Steinway Street and 41st Street, fronting Playground Thirty Five XXXV, there are a number of DEP accessory water structures. These structures are associated with the 48-inch water main discussed above, and a vertical shaft connection with City Tunnel 2.

[1] Playground Thirty Five XXXV is a public park operated by the New York City Department of Parks and Recreation (NYC Parks), which is not subject to the Proposed Actions and is neither part of the Development Site nor the Additional Affected Area.

SEWER SYSTEM AND WASTEWATER TREATMENT

The Project Area is located within a part of Queens that is served by a combined sewer system that collects both sanitary sewage and stormwater, as well as direct drainage. In periods of dry weather, the combined sewers located in the adjacent streets convey only sanitary sewage. The Project Area is served by combined sewers within the service area of the Bowery Bay Wastewater ~~Treatment Plant~~Resource Recovery Facility (~~WWTP~~WRRF); based on the DEP Amended Drainage Plan dated November 21, 1907, and available DEP sewer system mapping, the Project Area blocks fall within two Queens watersheds of the Bowery Bay ~~WWTP~~WRRF service area.

Along 35th Avenue, west of Steinway Street, there is an 18-inch-diameter combined sewer which flows in a westerly direction. There is also a 42-inch by 38-inch-diameter sewer which flows in a northerly direction. These sewers serve the lots located along the northern side of Blocks 641 and 668 (Projected Development Sites A and B). The sanitary flow from this portion of the Project Area is conveyed north to a trunk sewer on 34th Avenue and then west, where it connects to Regulator BB-L22, located at Vernon Boulevard and Broadway. From Regulator BB-L22, flow is conveyed to the interceptor running along Vernon Boulevard north and then east to the Bowery Bay ~~WWTP~~WRRF, which is located at the northern end of Astoria.

The remainder of the Project Area (the southern portions of Blocks 641 and 668, and all of Blocks 669, 670, and 671) is served by 12- to 18-inch-diameter combined sewers along 37th, 38th, Steinway, 41st, 42nd, and 43rd Streets, as well as 35th and 36th Avenues. There is also a 48-inch diameter sewer along Northern Boulevard that enlarges to a 54-inch-diameter pipe and a 78-inch-by-71-inch-diameter pipe. These sewers generally flow south and connect to a trunk sewer in Northern Boulevard. The sanitary flow from this portion of the Project Area is conveyed south and west, where it connects to Regulator BB-L21, located at Vernon Boulevard and 37th Avenue. From Regulator BB-L21, flow is conveyed to the same Vernon Boulevard interceptor described above and then to the Bowery Bay ~~WWTP~~WRRF.

At the Bowery Bay ~~WWTP~~WRRF, wastewater is treated by physical and biological processes before it is discharged into the Upper East River. A Stormwater Pollution Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (DEC), 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~~WRRF affects the level of treatment a plant can provide, the maximum permitted capacity for the Bowery Bay ~~WWTP~~WRRF is 150 million gallons per day (mgd). The average monthly flow over the latest 12-month period for which data are available is 101 mgd,[2] which is well below the maximum permitted capacity.

Most of New York 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 according to zoning regulations) convey only sanitary sewage. During and immediately after wet weather, combined sewers can experience a much larger flow due to stormwater runoff collection. To control flooding at the ~~WWTP~~WRRFs, regulators built into the system serve as relief valves, allowing only approximately two times the amount of design dry weather flow into the interceptors (larger sewers that convey wastewater to the ~~WWTP~~WRRFs). The interceptors then take the allowable flow to the ~~WWTP~~WRRFs, while the excess flow is

[2] Twelve-month period through March 2017.

discharged untreated to the nearest waterbody as CSO. As described above, the Project Area is located within two CSO drainage areas—BB-029 and BB-028—located along the East River.

WATER CONSUMPTION

The Projected Development Sites currently contain primarily commercial, manufacturing, and auto-related buildings, along with open parking and vehicle storage areas. In particular, the Regal Cinemas (Block 641, Lots 4, 9, and 51) and the P.C. Richard & Son Appliance Store (Block 668, Lot 5) are located on Projected Development Sites A and B, respectively. In addition, there are three low rise residential buildings on the southern portion of Projected Development Site A with a total of 6 DUs (Block 641, Lots 1 and 52), and a multi-family town house with 3 DUs on Projected Development Site F (Block 668, Lot 1). In total, the Projected Development Sites currently contain approximately 203,571 gsf of commercial space, approximately 197,000 gsf of manufacturing/warehouse/auto-related space, and approximately 7,500 gsf of residential space (9 DUs).

Table 10-1 shows the existing uses on the Projected Development Sites and their associated water consumption and wastewater generation rates. Based on the presented water consumption rates, it is estimated that the existing uses on the Projected Development Sites currently consume approximately 165,485 gpd, including approximately 96,135 gpd for domestic uses and approximately 69,350 gpd for air conditioning.

SANITARY FLOWS

For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated on the Projected Development Sites in the Project Area except water used by air conditioning, which is typically not discharged to the sewer system. As shown on **Table 10-1** and noted above, the total estimated sanitary sewage generated on the Projected Development Sites under existing conditions is 96,135 gpd.

As described above, the Projected Development Sites are served by two Bowery Bay ~~WWTP~~WRRF subcatchment areas. **Table 10-2** shows the estimated existing wastewater generated on the Projected Development Sites within each of the affected subcatchment areas.[3]

[3] An approximately 40,700 sf portion of the Regal Cinemas on Projected Development Site A (approximately 40 percent of the total lot area) is located in the Regulator BB-L22 subcatchment area; therefore, for purposes of analysis, 40 percent of the sanitary sewage generated by the Regal Cinemas is assumed to be conveyed to the BB-L22 subcatchment area. In addition, the majority of the P.C. Richard & Son building and parking lot on Projected Development Site B is located in the BB-L22 subcatchment area, therefore all sanitary sewage generated by this facility is assumed to be conveyed to the BB-L22 subcatchment area. All other uses in the Project Area convey sanitary sewage to the BB-L21 subcatchment area.

Table 10-1
Existing Water Consumption

Land Use[1]	Water Consumption and Wastewater Generation Rates[2]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpd/person[3] A/C: 0.17 gpd/sf	7,512 sf (9 DUs)	2,000	1,277
Retail[4]	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	203,571 sf	48,857	34,607
Manufacturing/ Warehouse/Auto-Related	Domestic: 0.23 gpd/sf[5] A/C: 0.17 gpd/sf	196,859 sf	45,278	33,466
Project Area—Total Water Demand				**165,485**
Project Area—Total Wastewater Generation				**96,135**

Notes:
Totals may not sum due to rounding.
gpd = gallons per day; DU = dwelling unit
[1] Projected Development Sites C and F currently contain parking/vehicle storage areas in the Existing condition, which are assumed to not consume water or generate wastewater for purposes of analysis.
[2] Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[3] Assumes 2.23 residents per DU—average household size of Queens Community District 1, 2015–2019 ACS.
[4] All existing commercial space, including Regal Cinemas, is assumed to consume water and generate domestic wastewater at the *CEQR Technical Manual* rates for retail space.
[5] Based on East New York Rezoning Proposal FEIS (equal to 10,000 gpd/acre); calculated based on total building floor area.

Table 10-2
Existing Wastewater Generation on the Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)[1]
BB-029	17,342
BB-028	78,792
Total	**96,235**

Note: [1] See **Table 10-1** for domestic water/wastewater generation methodology.

STORMWATER FLOWS

The Projected Development Sites have a combined lot area of approximately 478,608 sf (10.99 acres); a portion of Projected Development Site A and the majority of Projected Development Site B is located in the BB-029 subcatchment area (2.66 acres), while the remainder of the Projected Development Sites are located in the BB-028 subcatchment area (8.32 acres). The sites are currently paved and/or comprised of existing structures; **Table 10-3** 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 10-3
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
BB-029	Area (percent)	62%	38%	0%	0%	**100%**
	Surface Area (sf)	72,018	44,000	–	–	**116,018**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.94**
BB-028	Area (percent)	87%	13%	0%	0%	**100%**
	Surface Area (sf)	315,511	47,079	–	–	**362,590**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.98**

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 July 2021.
Totals may not sum due to rounding.

UNIFIED STORMWATER RULE

DEP recently enacted amended on-site stormwater management requirements for new and redevelopment projects in combined sewer areas, updating the previous regulations (2012 Stormwater Rule), which reduce peak discharges to the City's sewer system during rain events by requiring greater on-site storage of stormwater runoff and slower release to the sewer system. Specifically, DEP adopted 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. Development of the amended stormwater management regulations began in August 2020, when the New York City Council passed Intro No. 1851, enabling DEP to move forward with the Chapter 19.1 amendments necessary to package the Unified Stormwater Rule amendments. Draft rules were published in Spring 2021; DEP adopted the Unified Stormwater Rule in February 2022.

Under the Chapter 31 amendments, the Unified Stormwater Rule increases the amount of stormwater required to be managed on-site and further restricts the release rates for all new and redevelopment projects that require a DEP House or Site Connection Proposal. Additionally, under the Chapter 19.1 amendments, sites that disturb 20,000 square feet or more of soil or increase impervious surfaces by 5,000 square feet or more will also be required to manage the Water Quality Volume (WQv), currently defined as 1.5" over the lot area, using stormwater management practices (SMPs) dictated by DEP SMP hierarchies. DEP has developed hierarchies for both combined and separate sewer areas. The SMP hierarchies prioritize vegetated retention SMPs for both drainage areas with stormwater volume control and stormwater treatment communicated as the underlying goals for combined and separate sewer areas, respectively. For sites that trigger the Chapter 19.1 component of the Unified Stormwater Rule, the hierarchy is mandatory, meaning that developers must start with the most preferred SMP and provide documentation of site constraints that prevent implementation in order to move to the next SMP.

The Unified Stormwater Rule is expected to result in substantial improvements to the way that individual new and redeveloped properties manage stormwater compared to the 2012 Stormwater Rule it replaced. In some cases, stormwater will be entirely prevented from entering the sewer system through retention and, in most cases, stormwater that does enter the system will be reduced and/or treated and released at a much lower rate, allowing the system to operate more efficiently during peak wet weather events. In combined sewersheds, such as the portion of Queens that contains the Project Area, the Unified Stormwater Rule is expected to lead to a reduction in CSO volume as more lots redevelop over time. The analyses of stormwater flows presented in this

chapter conservatively do not account for the recommendations of the Unified Stormwater Rule, and design guidance included within.

D. THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO ACTION CONDITION)

In the No Action condition, the majority of the Projected Development Sites are expected to remain in their current condition, as described above under "Existing Conditions." The Applicant would not seek to redevelop the more active existing uses on Projected Development Sites A, B, and E (including the Regal Cinemas, the P.C. Richard & Son retail store) absent the Proposed Actions. Likewise, the remaining Projected Development Sites not controlled by the Applicant (Sites F, G, H, I, J and K) are expected to remain in their current condition. However, as-of-right development would occur on Projected Development Sites C and D, which are controlled by the Applicant and are largely underutilized. On Projected Development Site C (Block C), the Applicant would develop a 1-story, approximately 30,000 gsf grocery store along the site's Steinway Street frontage, with an approximately 29,000 sf parking lot along the 41st Street frontage to provide the required accessory parking for the grocery store. On Projected Development Site D (Block D), the Applicant would develop local retail uses on the 35th Street frontage (approximately 20,000 gsf) with a 1-story, approximately 68,000 gsf warehouse on the remainder of the site.

It is expected that the water mains and sewers serving the Project Area, as outlined above under Existing Conditions, will continue to convey the sanitary and stormwater flow from the Project Area and the Projected Development Sites to the Bowery Bay ~~WWTP~~WRRF.

WATER SUPPLY

The overall water supply system in New York City is not expected to change materially in the No Action condition. **Table 10-4** summarizes the water demand and sewage generation on the Projected Development Sites in the No Action condition: it is estimated that the Projected Development Sites would consume approximately 172,152 gpd, including approximately 100,229 gpd for domestic uses and approximately 71,923 gpd for air conditioning. This would represent an incremental increase of approximately 6,668 gpd as compared to existing conditions.

Additionally, in 2011, DEP launched the Water for the Future Program (WFF), a comprehensive long-term planning effort to repair leaks in sections of the Delaware Aqueduct by 2024. To support this program, a newly created Demand Management Unit within DEP was tasked with the development of a citywide strategy that will outline DEP's plan for the implementation of water demand management projects. DEP's 2013 *Water Demand Management Plan* identified five key strategies for managing water demand in New York City and detailed 21 specific initiatives to be implemented by 2024 in order to achieve targeted water demand reductions. It is anticipated that these initiatives will offset much of the increased demands citywide that may result from population growth and new development.

Table 10-4
No Action Condition Water Consumption

Land Use[1]	Water Consumption and Wastewater Generation Rates[2]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpd/person[3] A/C: 0.17 gpd/sf	7,512 sf (9 DUs)	2,000	1,277
Retail[4]	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	264,852 sf	63,564	45,052
Manufacturing/Warehouse/ Auto-Related	Domestic: 0.23 gpd/sf[5] A/C: 0.17 gpd/sf	150,715 sf	34,664	25,622
Project Area—Total Water Demand				**172,152**
Project Area—Total Wastewater Generation				**100,229**

Notes:
Totals may not sum due to rounding.
gpd = gallons per day; DU = dwelling unit
[1] Projected Development Sites C and F contain parking/vehicle storage areas in No Action Existing condition, which are assumed to not consume water or generate wastewater for purposes of analysis.
[2] Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[3] Assumes 2.23 residents per DU—average household size of Queens Community District 1, 2015–2019 ACS.
[4] All commercial space, including Regal Cinemas and grocery store, is assumed to consume water and generate domestic wastewater at the *CEQR Technical Manual* rates for retail space.
[5] Based on East New York Rezoning Proposal FEIS (equal to 10,000 gpd/acre); calculated based on total building floor area.

SEWER SYSTEM AND WASTEWATER TREATMENT

As shown in **Table 10-4**, in the No Action condition, wastewater generated on the Projected Development Sites would total 100,229 gpd, an incremental increase of 4,094 gpd over Existing conditions. This additional sanitary discharge to the Bowery Bay ~~WWTP~~WRRF would be well within the capacity available at the plant on average; therefore, the ~~WWTP~~WRRF would continue to operate within its design capacity.

Table 10-5 shows the estimated wastewater generated on the Projected Development Sites within each of the affected subcatchment areas in the No Action condition.

Table 10-5
No Action Condition Wastewater Generation on the Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)[1]
BB-029	17,342
BB-028	82,887
Total	**100,229**

Note: [1] See **Table 10-4** for domestic water/wastewater generation methodology.

STORMWATER FLOWS

In the No Action condition, surface coverage would change on Projected Development Site C with the introduction of a large parking lot along 41st Street; in existing conditions, this portion of the site is largely improved with buildings, therefore the No Action development would result in a reduction in roof surface area. On Projected Development Site D, the No Action retail and warehouse buildings would occupy the full site; however, as the site is currently occupied by buildings,

the No Action development would not result in an increase in rooftop area on the site. Surface coverage on the other Projected Development Sites would remain as in existing conditions.

Although there would be a slight increase in paved space on Projected Development Site C in the No Action condition, this would result in a negligible change to the weighted runoff coefficients as compared to the existing conditions (see **Table 10-6**). As required by the DEP regulations and the recently adopted Unified Stormwater Rule (described above), sanitary and stormwater source control BMPs would be used to reduce sanitary volume and peak stormwater runoff volumes to the combined sewer system. The No Action condition buildings on Projected Development Sites C and D would incorporate low-flow plumbing fixtures to reduce sanitary flow. In addition, stormwater detention would be required as part of the DEP site connection approval process for new construction that connects to the City's sewer system. This performance standard, required by DEP, is discussed in more detail below.

Table 10-6
No Action Condition Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
BB-029	Area (percent)	62%	38%	0%	0%	**100%**
	Surface Area (sf)	72,018	44,000	–	–	**116,018**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.94**
BB-028	Area (percent)	84%	16%	0%	0%	**100%**
	Surface Area (sf)	302,870	59,720	–	–	**362,590**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.98**

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 July 2021.
Totals may not sum due to rounding.

In the No Action condition, Projected Development Sites C and D would be redeveloped with site flows restricted in accordance with DEP's regulations. The flow generated from the sites would be detained and restricted with an outlet control. Through the use of this system, the developed peak flow rate is restricted to the allowable peak flow rate with an additional 10 percent restriction in conformance with DEP standards to reduce the peak flow rate to the City's combined sewers.

E. THE FUTURE WITH THE PROPOSED ACTIONS (WITH ACTION CONDITION)

In the With Action condition, the Development Site (Projected Development Sites A, B, C, D, and E), would be developed by the Applicant with the Proposed Development, which would include 12 buildings with approximately 2.9 million gsf of space. In addition, the With Action condition includes new developments that would be facilitated on the Projected Development Sites not controlled by the Applicant (Sites F, G, H, I, J, and K). For the purposes of the RWCDS, each of the additional Projected Development Sites are assumed to contain mixed-use buildings with ground floor retail and residential space above the ground floor.

In total, in the With Action condition, the Projected Development Sites (inclusive of the Proposed Development in the Development Site and the sites in the Additional Affected Area) would contain approximately 3.7 million gsf of space, an increase of approximately 3.3 million gsf above the No Action scenario. The With Action condition would include a total of approximately 3.1 million gsf of residential space (3,652 DUs, of which 914 would be permanently affordable pursuant to MIH), approximately 540,000 gsf of commercial space (retail, eating and drinking

establishments, grocery store, PCEs, and the relocated cinema and potential automobile showroom), approximately 108,000 gsf of community facility space (e.g., day care, community center, and performing arts center), and approximately 1,600 parking spaces. The With Action condition would also include 2.17 acres of publicly accessible open space to be constructed in the Development Site.

WATER SUPPLY

As shown in **Table 10-7**, the With Action condition on the Projected Development Sites would result in a total water demand of 1,558,831 gpd (approximately 1.6 mgd); this would be an increase in incremental water demand of approximately 1.4 mgd as compared to the No Action condition. This represents an approximately 0.13 percent increase in demand on the water supply system compared to the City's average daily water use of approximately 1.1 billion gpd. It is expected the existing water mains in the Project Area would be capable of handling the increase in water demand. Therefore, there would be no significant adverse impact on the City's water supply.

Table 10-7
With Action Condition Water Consumption

Land Use	Water Consumption and Wastewater Generation Rates[1]	Area/Units	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpd/person[2] A/C: 0.17 gpd/sf	3,104,308 sf (3,652 DU)	814,400	527,732
Retail[3]	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	292,915 sf	70,300	49,796
Office	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	250,070 sf	25,007	45,512
Community Facility[4]	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	107,720	10,772	18,312
Project Area—Total Water Demand				**1,558,831**
Project Area—Total Wastewater Generation				**920,479**
No Action to With Action Incremental Water Supply Demand				**1,386,679**
No Action to With Action Incremental Sewage Generation				**820,250**

Notes:
Totals may not sum due to rounding.
gpd = gallons per day; DU = dwelling unit
[1] Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[2] Assumes 2.23 residents per DU—average household size of Queens Community District 1, 2015–2019 ACS.
[3] Retail space includes relocated cinema, grocery store, and Physical Culture Establishment (PCE), which are assumed to consume water and generate domestic wastewater at the *CEQR Technical Manual* rates for retail space.
[4] Community Facility space includes medical office, performing arts center, daycare, and community center space, which are assumed to consume water and generate domestic wastewater at the *CEQR Technical Manual* rates for commercial office space.

As noted above, City Tunnel 2 transverses the Project Area generally in a north-south orientation (generally along Steinway Street), and City Tunnel 3 is adjacent to the Project Area, generally running in an east-west orientation north of 35th Avenue. Due to the proximity of the water tunnels to the Project Area, DEP approvals will be required for any subsurface investigations and excavation/foundation construction on the Projected Development Sites, and any disturbance or construction activities would be performed in accordance with DEP requirements. In addition, due to the proximity of the tunnel shaft and the 48-inch diameter water main on 35th Avenue at the north end of Projected Development Site C, if required by DEP, the below-grade space on this site would be set back from the north property line. In addition, DEP has directed that, for future capital projects, any existing cast-iron distribution water mains less than 24-inches in diameter

constructed on or before 1945 must be replaced with new ductile iron pipe.[4] If sewer improvements are required of the Applicant at the time of the site connection proposal for the Proposed Development (discussed below), water main replacement may also be required due to the age of the existing water mains, and subject to additional coordination with DEP.

SEWER SYSTEM AND WASTEWATER TREATMENT

As shown in **Table 10-7**, the With Action condition on Projected Development Sites are expected to generate 920,479 gpd of daily sanitary sewage. The sanitary sewage generated by the With Action condition would be an incremental increase of 820,250 gpd compared to the No Action condition. **Table 10-8** shows the estimated wastewater generated on the Projected Development Sites and the incremental wastewater generation within each of the affected subcatchment areas in the With Action condition; as shown in the table, the majority of the wastewater generation would occur in the BB-028 subcatchment area.[5]

Table 10-8
With Action Condition Wastewater Generation on the Projected Development Sites by Subcatchment Area

Subcatchment Area	Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)[1]	Incremental Water/Wastewater Generated on the Projected Development Sites (gpd)
BB-029	186,536	169,194
BB-028	733,942	651,056
Total	**920,479**	**820,250**

Note: [1] See **Table 10-8** for domestic water/wastewater generation methodology.

The incremental increase in sewage generation would be approximately 0.55 percent of the average daily flow at the Bowery Bay ~~WWTP~~WRRF and would not result in an exceedance of the ~~WWTP~~WRRF's permitted capacity of 150 mgd. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), all developments on the Projected Development Sites would be required to utilize low-flow plumbing fixtures, which would help to further reduce sanitary flows to the ~~WWTP~~WRRF.

Connecting to the City's sewer system requires certification from DEP as part of the building permit process, which is not a discretionary approval. An applicant would be required to file a Site Connection Proposal Application (SCP) for approval from DEP to tie into the sewer system. In this process, before a building permit can be issued, site connection proposals must be certified for sewer availability by DEP. An applicant would be required to demonstrate that the existing sanitary system could handle the site-specific sanitary flows from the proposed development. Because the City's sewers are sized and designed based on the designated zoning of an area and related population density and surface coverage characteristics, the Proposed Actions may result

[4] DEP instruction in a letter dated March 30, 2018 to New York City Department of Design and Construction (DDC)

[5] As discussed above, the northern portion of Projected Development Site A and the majority of Projected Development Site B is located in the Regulator BB-L22 subcatchment area. For purposes of analysis, the northernmost With Action condition building on Projected Development Site A (which would contain office and retail space) as well as all With Action development on Projected Development Site B are assumed to convey sanitary sewage to the BB-L22 subcatchment area. With Action developments on all other Projected Development Sites are assumed to covey sanitary sewage to the BB-L21 subcatchment area.

in development that is inconsistent with the design of the existing built sewer system. A site-specific hydraulic analysis of the existing sewer system will likely be required to determine whether the existing sewer system is capable of supporting higher density development and related increases in wastewater flows. Sewer upgrades may be required, including upgrades to the existing regulators, at the time of the SCP to accommodate the projected flows from the new development. In addition, there will be a need to amend the existing drainage plan based on the hydraulic analysis calculations.

As the Proposed Actions are not expected to result in a significant increase in dry weather flows to the combined sewer system, no significant adverse impacts would result.

STORMWATER FLOWS

The With Action condition development would result in changes to surface coverage in the Project Area: in particular, as the majority of the Project Area is fully impervious rooftop space in both existing and No Action conditions, the Proposed Actions would result in an increase in semi-impervious paved space and soft scape space on publicly accessible and private open space that would be provided with the Proposed Development. Specifically, based on a conceptual design, the Proposed Development is expected to include: a community gathering space and a children's playscape on Projected Development Site A; a through-block pedestrian plaza and a community gathering space on Projected Development Site B; a large public plaza on Projected Development Site C; and a community plaza on Projected Development Site E.[6] (The Proposed Development is also expected to include a publicly accessible through-block pedestrian promenade and plaza on Projected Development Site D, however, this space would be covered by building rooftop and would be fully impervious.) At the southern end of Projected Development Site A along 36th Avenue, the Proposed Development would include an additional 10,000 sf publicly accessible open space that is planned for active use There would also be a two private open spaces for residents, one at the southern end of Projected Development Site A and one in the mid-block area on Projected Development Site B.

The remainder of the Projected Development Sites would generally be occupied by rooftop space, with a paved area for loading on Projected Development Site B, and paved pedestrian circulation spaces near the building entrances (see Figure 1-6 in Chapter 1, "Project Description").

Table 10-9 shows the surface coverage and weighted runoff coefficients in the two subcatchment areas in the Project Area.[7] The weighted runoff coefficient would decrease in the BB-029 service area from 0.94 in existing conditions to 0.81 in the With Action condition, and the runoff coefficient in the BB-028 service area would decrease from 0.98 in existing conditions to 0.92 in the With Action condition.

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[6] The final design of the proposed open space and amenities to be provided will be determined. For purposes of analysis, excepting the covered open space area on Projected Development Site D, the publicly accessible and private open space areas are assumed to be 50 percent paved space and 50 percent softscape.

[7] As discussed above, the northern portion of Projected Development Site A and the majority of Projected Development Site B is located in the Regulator BB-L22 subcatchment area. For purposes of analysis, the northernmost With Action condition building and the playground space on the northern end of Projected Development Site A as well as all With Action development on Projected Development Site B are assumed to convey stormwater to the combined sewers in the BB-L22 subcatchment area. With Action developments on all other Projected Development Sites are assumed to covey stormwater to the combined sewers in the BB-L21 subcatchment area.

Table 10-9
With Action Condition Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
BB-029	Area (percent)	52%	30%	0%	18%	**100%**
	Surface Area (sf)	55,088	31,722	–	19,033	**105,842**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.81**
BB-028	Area (percent)	82%	10%	0%	8%	**100%**
	Surface Area (sf)	306,160	36,234	–	30,372	**372,766**
	Runoff Coefficient	1.00	0.85	–	0.20	**0.92**

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 July 2021.
Totals may not sum due to rounding.

Using these sanitary and stormwater flow calculations, the DEP Volume Calculation Matrix was utilized to determine flows for the With Action condition. The calculations from the Volume Calculation Matrix help to determine the change in wastewater volumes to the combined sewer system from existing conditions to With Action condition, and include four rainfall runoff volume scenarios with varying durations.[8] The drainage analysis assumes that all stormwater runoff from the Projected Development Sites would flow via the existing combined sewer infrastructure serving the Project Area. The summary tables of the Volume Calculation Matrix are included in **Table 10-10**.

Table 10-10
DEP Volume Calculation Matrix:
Existing and With Action Condition Volume Comparison

Rainfall Volume (in)	Rainfall Duration (hr)	Runoff Volume to SS (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Runoff Volume to SS (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Increased Total Volume to CSS (MG)*
BB-029		**Existing**				**With Action**				**BB-029 Increment**
		2.66 acres				2.43 acres				
0.00	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03
0.40	3.80	0.00	0.03	0.00	0.03	0.00	0.02	0.03	0.05	0.02
1.20	11.30	0.00	0.08	0.01	0.09	0.00	0.06	0.09	0.15	0.06
2.50	19.50	0.00	0.17	0.01	0.18	0.00	0.13	0.15	0.29	0.10
BB-028		**Existing**				**With Action**				**BB-028 Increment**
		8.32 acres				8.56 acres				
0.00	3.80	0.00	0.00	0.01	0.01	0.00	0.00	0.12	0.12	0.10
0.40	3.80	0.00	0.09	0.01	0.10	0.00	0.09	0.12	0.20	0.10
1.20	11.30	0.00	0.27	0.04	0.30	0.00	0.26	0.35	0.60	0.30
2.50	19.50	0.00	0.55	0.06	0.62	0.00	0.53	0.60	1.13	0.51

Notes:
Totals may not sum due to rounding.
*Assumes no on-site detention or Best Management Practices (BMPs) for purposes of calculations.
SS = Storm Sewer; CSS = Combined Sewer System; MG = Million Gallons

As shown in **Table 10-10**, in all rainfall scenarios the total rainfall and sanitary sewage volume would increase for CSO outfalls BB-029 and BB-028: during storm events with up to 2.5 inches of rainfall, the increase would be up to 0.10 million gallons at outfall BB-029, and up to 0.51 million

[8] Consistent with the guidance of the *CEQR Technical Manual* and the DEP Volume Calculation Matrix, With Action condition flows are compared to existing conditions rather than No Action conditions.

gallons at outfall BB-028. The increase in volume under the With Action condition as compared with the existing conditions is attributable to the increase in sanitary flow resulting from denser development (particularly residential development); stormwater runoff would be similar to or lower than runoff under existing conditions in all scenarios, as the With Action condition would result in an increase in semi-impervious paved space and soft scape space.

The volume matrix calculations presented in **Table 10-10** above do not reflect the use of any sanitary and stormwater source control BMPs to reduce sanitary volume and stormwater runoff volumes to the combined sewer system. As noted above, all development on the Projected Development Sites would incorporate low-flow plumbing fixtures to reduce sanitary flow as required by the New York City Plumbing Code. In addition, stormwater detention would be required as part of the DEP Site Connection Proposal (SCP) application process for new buildings connecting to the City's sewer system. As part of the SCP permit approval processes, developments must be in compliance with the required on-site stormwater volume requirements and stormwater release rate as detailed in the Unified Stormwater Rule. The performance standard is intended to reduce peak discharges to the City's sewer system during rain events by requiring greater onsite storage of stormwater runoff and slower release to the sewer system. The implementation of DEP's stormwater performance standard over time is expected to provide additional capacity to the existing sewer system, thereby improving its performance. The performance standard is a key element of the New York City Green Infrastructure Plan to promote green infrastructure and improve water quality in the City's surrounding waterbodies. Specific BMP measures for the proposed developments would be determined in the future in consultation with DEP when specific designs are advanced, and may include stormwater detention tanks, and rainwater reclamation systems.

In addition, a New York State Department of Environmental Conservation (DEC) State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) is required for any development that would involve soil disturbance of one or more acres. Therefore, a Stormwater Pollution Prevention Plan (SWPPP) for the Proposed Development may be required of the Applicant. The SWPPP would include both temporary erosion and sediment controls and post-construction stormwater BMPs.

Because the City's sewers are sized and designed based on the designated zoning of an area, and related population density and surface coverage characteristics, the proposed rezoning may result in development that is inconsistent with the design of the existing built sewer system. If necessary, subject to additional consultation with DEP, an Amended Drainage Plan (ADP) would be prepared for the Projected Area. In addition, a hydraulic analysis of the existing sewer system may be required as part of the SCP permit approval process, due to the projected increase in sanitary flow. The hydraulic analysis calculations would inform the ADP process as necessary. Sewer improvements and/or incorporation of BMPs may also be required of the Applicant at the time of the site connection proposal.

The Proposed Actions would result in marginally increased flows to the City's combined sewer system that may be discharged as CSOs during rain events. Because of the available capacity of the Bowery Bay ~~WWTP~~WRRF, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality. In addition, with the incorporation of BMP measures to meet the City site connection requirement, development under the Proposed Actions would not result in a significant increase in stormwater runoff or CSO volumes/frequencies. Therefore, it is concluded that the Proposed Actions would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure. ✷