CHAPTER 12: INFRASTRUCTURE

A. INTRODUCTION

This chapter evaluates the potential impacts of the proposed project on three components of the city's infrastructure: water supply, wastewater treatment, and stormwater management. Though this chapter focuses on these three systems, the *CEQR Technical Manual* defines the city's "infrastructure" as the physical systems that support the city's population, which also includes, but is not limited to, the transportation network, solid waste and sanitation services and public transportation systems. Because these other components are addressed separately under CEQR and discussed in separate chapters of this EIS, the focus of this chapter will remain on the water supply, wastewater treatment and stormwater management systems. The analyses utilized in this chapter follow the guidelines contained in Section 3L of the *CEQR Technical Manual*.

B. OVERVIEW

According to the *CEQR Technical Manual* actions that could affect water pressure and would therefore need detailed assessment include actions that would have an exceptionally large demand for water (power plants, large cooling systems, etc.); large developments (e.g., those that use more than one million gallons per day (mgd)); or actions taking place in locations that have weaknesses in the local water supply distribution systems (e.g., creating a large draw of water at locations at the end of the water system where water pressure is low or locations near pressure boundaries). The proposed project is expected to generate a net incremental increase of approximately 586,043 gallons per day (gpd) (0.586 mgd); thus, a detailed analysis of potential impacts on water supply and pressure is not needed. Given the size of the city's water supply system and the city's commitment to maintaining adequate water supply and pressure, the proposed project is not anticipated to result in a significant adverse impact on this system.

With respect to wastewater treatment, the *CEQR Technical Manual* states that a detailed analysis of wastewater treatment is needed for those proposed actions that have the potential to generate large increases in sewage flows. The proposed project is expected to generate a net incremental flow in wastewater of approximately 366,562 gpd and is not anticipated to result in a significant adverse impact on wastewater treatment.

The *CEQR Technical Manual* also states that a detailed analysis of stormwater management is warranted if a proposed action involves certain types of industrial activities (e.g., manufacturing, processing, or raw materials storage), or actions that would greatly increase the amount of paved area, or areas that would be served by a separate storm system and that would involve construction activities, or construction of a new stormwater outfall system. The proposed project could affect 40 projected development sites that total approximately 12.4 acres. However, the majority of these sites are currently occupied by buildings or other impervious surfaces (parking lots, etc.). Consequently, an analysis of potential stormwater runoff impacts is not necessary.

C. METHODOLOGY

The *CEQR Technical Manual* provides guidance on the methods to be used to assess impacts to the above-mentioned infrastructure systems. This chapter describes existing conditions, and examines future

conditions with and without the proposed project. To determine potential impacts, future conditions with the proposed project are compared to future conditions without the proposed project, as described below.

WATER SUPPLY

The existing water distribution system serving the proposed rezoning area was described based on information obtained from the New York City Department of Environmental Protection's (DEP) Bureau of Water and Sewer Operations. Using water demand rates contained in the *CEQR Technical Manual*, the current water usage in the area was examined, the likely demand was calculated for the future condition without the proposed project (No-Build) and the effects on the system were described. Future water demand for the projected developments induced by the proposed project was then calculated and the effects of the incremental demand on the system were assessed to determine if there is sufficient capacity to maintain adequate water supply and pressure in the area.

SANITARY SEWAGE

Existing sewers serving the proposed rezoning area were described using information obtained from DEP. Existing and future flows to the WPCP that serves the area (the Bowery Bay WPCP) were calculated and estimated according to the guidance contained in the *CEQR Technical Manual*. Sanitary sewage and stormwater generation for the projected developments induced by the proposed project were compiled based on water usage estimates, and the adequacy of the sewer system to meet the demand generated by the projected developments was qualitatively assessed. The effects of the incremental demand on the system was assessed to determine whether there would be any impact on the WPCP, or on its SPDES permit conditions.

D. EXISTING CONDITIONS

WATER SUPPLY

NEW YORK CITY

New York City's water supply system serves the city and portions of Westchester, Orange, Putnam and Ulster Counties and is operated by DEP. It utilizes three separate watershed systems which obtain water from 2,000 square miles of watershed in upstate New York. Water is delivered from reservoirs within each of these systems by gravity through a network of tunnels and aqueducts.

The three systems are the Croton, the Catskill and the Delaware. The Croton System consists of 12 reservoirs and three controlled lakes located in Westchester, Putnam and Duchess Counties. The smallest and oldest (1885) of the city's three watersheds, the Croton ordinarily provides approximately 10 percent of the city's water, though in times of drought or maintenance shutdowns it provides up to 30 percent. The system's storage capacity is approximately 94.5 billion gallons. The Croton System does not normally supply water to Queens.

The Catskill System was completed in 1927 and consists of two reservoirs, the Ashokan and the Schoharie. The Catskill System provides approximately 35 percent of the city's water and has a storage capacity of approximately 140.5 billion gallons. The Delaware System was completed in the late 1930s and consists of three reservoirs located in the Delaware River Basin: the Cannonsville, Pepacton and Neversink Reservoirs, as well as the Rondout Reservoir located on Rondout Creek in the Hudson River

Basin. The largest of the three systems, the Delaware has a storage capacity of approximately 345 billion gallons and provides approximately 55 percent of the city's water.

The Delaware and Catskill systems deliver water to the Hillview Reservoir in Yonkers. From there, it is distributed to the city through two tunnels: City Tunnel No. 2, which goes through the Bronx, Queens, and Brooklyn (and from there through the Richmond Tunnel to Staten Island) and a partially complete third tunnel, City Tunnel No. 3, which currently serves the Bronx, upper Manhattan, and Roosevelt Island. The construction of City Tunnel No. 3, which will serve Midtown and Lower Manhattan, as well as Brooklyn and Queens, is scheduled for completion in 2025.

Once in the city, a network of approximately 6,500 miles of distribution mains distributes water to consumers. Large mains – up to 96 inches in diameter – feed smaller 8-, 12- and 20-inch mains that provide water to individual locations and fire hydrants. Approximately 96 percent of the city's water is delivered to consumers by gravity. The remainder, usually located at pressure boundaries, high elevations or at pressure extremities such as Far Rockaway, is pumped to its final destination. There are pressure regulators located throughout the city that monitor and control water pressure. The city's current water demand is approximately 1.1 billion gpd.

Proposed Rezoning Area

With the exception of a 48-inch main located beneath 23rd Street, a 48-inch main located beneath 35th Avenue and a 20-inch main located beneath Northern Boulevard, the proposed rezoning area is served by a network of 8- and 12-inch water mains.

The proposed rezoning area is currently occupied by a mix of residential, commercial, and light industrial uses, along with vacant land and vacant buildings. The 40 projected development sites currently contain 24 dwelling units, 36,198 square feet of commercial space and 261,451 square feet of light industrial space. Table 12-1 presents the existing estimated water consumption and sewage generation at the projected development sites based on rates by land use type contained in the *CEQR Technical Manual*. Because the *CEQR Technical Manual* does not provide rates for industrial/manufacturing uses, rates were adopted from a DEP publication, *Draft Rules and Regulations Governing the Construction of Private Sewers & Drains*. To obtain a conservative analysis, all commercial use was assumed to be retail, since retail uses typically have higher water usage and sewage generation rates.

As shown in Table 12-1, the existing uses on the 40 projected development sites are estimated to consume approximately 70,998 gpd for domestic uses and an additional 52,232 gpd for air conditioning. Together, the estimated total water consumption emanating from these sites is approximately 123,230 gpd.

SANITARY SEWAGE AND STORMWATER MANAGEMENT

SANITARY SEWAGE COLLECTION AND TREATMENT

For impact assessment purposes the *CEQR Technical Manual* indicates that daily sanitary sewage generation is equivalent to the domestic water consumption rate with the exception of wastewater from air conditioning systems. Wastewater from air conditioning is not included in the overall volume used for analysis because minimal volumes of wastewater are generated from the recirculation and evaporation involved in the air conditioning process. As noted in Table 12-1, based on current domestic wastewater flows, the existing uses on the projected development sites generate approximately 70,998 gallons of sanitary sewage per day (0.071 mgd).

Table 12-1
Existing Water Consumption and Sewage Generation
at Projected Development Sites

Use	Consumption Rate [1]	Size	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	4,875 sf	829	829
Office[2]	Domestic: 25 gpd/person Air Conditioning: 0.10 gpd/sf	31,323 sf	3,132	3,132
Industrial/ Manufacturing [3]	Domestic: 10,000 gpd/acre Air Conditioning: 0.17 gpd/sf	261,451 sf	60,021	44,447
Residential [4]	Domestic: 112 gpd/person Air Conditioning: 0.17 gpd/sf	22,492 sf 24 units	7,016	3,824
		Subtotals	**70,998**	**52,232**
		Total Water Consumption	**123,230**	

Notes:

1 Usage and generation rates from the *CEQR Technical Manual* except where noted.
2 Assume one employee per 250 sf.
3 Because the *CEQR Technical Manual* does not provide industrial water consumption rates, DEP factors were used in determining industrial water demand. These factors are contained in DEP's *Draft Rules and Regulations Governing the Construction of Private Sewers and Drains*. The retail rate for air conditioning water demand was applied.
4 Residential calculations assume 2.61 persons per dwelling unit. Because the *CEQR Technical Manual* does not provide residential air conditioning water consumption rates, the retail rate for air conditioning water demand was applied.

Sources: CEQR Technical Manual.
Draft Rules and Regulations Governing the Construction of Private Sewers and Drains.
NYCDCP.

Most sanitary sewage in the city is collected and conveyed through a combined sewer system operated and maintained by DEP. This system receives sanitary sewage from buildings, as well as stormwater runoff from roof and street drainage, and sends this combined flow to 1 of the 14 WPCPs for treatment. In dry weather, only sanitary sewage is conveyed to the WPCP. In wet weather (e.g., rain or snow melt), both sanitary sewage and stormwater runoff are conveyed to the WPCP. The WPCPs have a total daily treatment capacity of approximately 1.8 billion gallons.

The conveyance capacity of a system is referred to as its wet-weather capacity. Because approximately 70 percent of the city is served by a combined sewer collection system, the system's pipes have been designed to a size that can accommodate loads that are much greater than the average dry-weather flow, or even the peak dry-weather flow.

All WPCPs in the city are issued operating permits by the New York State Department of Environmental Conservation (NYSDEC) that regulate the flows and pollutant loads for the plant. A plant's permitted flow is calculated based on each plant's monthly average dry weather flow. Flow records for each WPCP are reported to NYSDEC. The average daily flow rate is determined by compiling the average dry weather flows over a 24-hour period. The dry weather flow, which is defined as sanitary wastewater only, is variable throughout each 24-hour period, with peaks during times of meal preparation, personal hygiene or industrial processes. The average daily flow rate takes these variations into account. The average monthly flow rate is determined by compiling the average daily dry weather flows over a 30-day period.

The proposed rezoning area is served by the Bowery Bay WPCP. The plant is a step-aeration activated sludge plant designed for an average dry weather flow of 150 mgd. Maximum primary treatment capacity is 300 mgd. Secondary treatment facilities can handle 225 mgd, which is one and one-half times the average dry weather design flow. The plant's average monthly flow over the most recent 12-month period was 109 mgd. Treated effluent is discharged into the Rikers Island Channel through a 10-foot diameter outfall.

STORMWATER MANAGEMENT

Introducing impervious surfaces (sidewalks, roofs, roads, driveways, etc.) to a landscape can substantially impact receiving water bodies by increasing both stormwater runoff and its associated pollutants. In addition, data indicates a direct relationship between the amount of imperviousness in a given watershed and the degree of water body degradation.

During wet weather, rainwater runoff or flows from melting snow may inundate the WPCPs, depending upon the size of the storm. To minimize this inundation, regulator chambers (relief valves) are built into the combined sewer system to shunt excess flow to the closest surface water body outfall. This is referred to as a combined sewer overflow (CSO) outlet. The city's WPCPs are designed to treat double the amount of average dry weather flow so as to accommodate surges from minor storms.

As indicated in Chapter 2, Land Use and Zoning, the majority of the proposed rezoning area is heavily urbanized and is currently comprised of impervious surfaces that generate stormwater runoff.

E. FUTURE CONDITION WITHOUT THE PROPOSED ACTIONS

Under this scenario, the 40 projected development sites are assumed to either remain unchanged from their existing condition, or would be developed with uses that are permitted under the existing zoning regulations. Given the current zoning and existing land use trends in the area, in the future without the proposed project it is anticipated that the rezoning area would experience a slight decrease in residential units (2 units), a 334,854 square foot increase in commercial floor area, an 81,470 square foot increase in community facility floor area and a 78,440 square foot decrease in industrial floor area. In total, in the future without the proposed actions scenario, there would be proximately 371,052 square feet of commercial floor area, 183,011 square feet of industrial floor area, 81,470 square feet of community facility floor area and 22 dwelling units. These changes would result in an associated water demand of approximately 152,295 gpd for domestic uses and an additional 88, 237 gpd for air conditioning. Together, the estimated total water consumption associated with these sites would be approximately 240,532 gpd, an increase of approximately 117,302 gpd over current levels, as summarized in Table 12-2. Under this scenario, the 40 projected development sites would also generate approximately 152,295 gpd of sewage.

Table 12-2
Future Water Consumption and Sewage Generation
at Projected Development Sites
Without the Proposed Actions

Use	Rate [1]	Future			Increment from Existing Condition		
		Size	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)	Size	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	41,884 sf	7,120	7,120	37,009 sf	6,291	6,291
Office [2]	Domestic: 25 gpd/person Air Conditioning: 0.10 gpd/sf	132,848 sf	13,285	13,285	101,525 sf	10,153	10,153
Industrial/ Manufacturing [3]	Domestic: 10,000 gpd/acre Air Conditioning: 0.17 gpd/sf	183,011 sf	42,014	31,112	-78,440 sf	-18,007	-13,335
Residential [4]	Domestic: 112 gpd/person Air Conditioning: 0.17 gpd/sf	19,046 sf 22 units	6,431	3,238	-3,446 sf - 2 units	-585	-586
Hotel[5]	Domestic: 150 gpd/room Function Space: 0.17 gpd/sf Air Conditioning: 0.10 gpd/sf	196,320 sf	69,595	19,632	196,320 sf	69,595	19,632
Community Facility	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	81,470 sf	13,850	13,850	81,470 sf	13,850	13,850
	Subtotals		**152,295**	**88,237**		**81,297**	**36,005**
	Total Water Consumption		**240,532**			**117,302**	

Notes:

1 Usage and generation rates from the *CEQR Technical Manual* except where noted.
2 Assume one employee per 250 sf.
3 Because the *CEQR Technical Manual* does not provide industrial water consumption rates, DEP factors were used in determining industrial water demand. These factors are contained in DEP's *Draft Rules and Regulations Governing the Construction of Private Sewers and Drains*. The retail rate for air conditioning water demand was applied.
4 Residential calculations assume 2.61 persons per dwelling unit. Because the *CEQR Technical Manual* does not provide residential air conditioning water consumption rates, the retail rate for air conditioning water demand was applied.
5 Assume 400 sf per room and function space of 10 percent of total floor area.

Sources: CEQR Technical Manual; Draft *Rules and Regulations Governing the Construction of Private Sewers and Drains; and NYCDCP.*

F. FUTURE CONDITION WITH THE PROPOSED ACTIONS

Under this scenario, the development expected to occur on the 40 projected development sites includes approximately 1,555 dwelling units; 173,582 square feet of commercial floor area; 2,475 square feet of industrial floor area and 39,773 square feet of community facility floor area. Compared to the future condition without the proposed project, these figures represent a net increase of 1,555 housing units, a net decrease of 197,470 square feet of commercial floor area; a net decrease of 180,536 square feet of industrial floor area; and a net decrease of 41,697 square feet of community facility floor area. These changes would result in an associated water demand of approximately 491,980 gpd for domestic uses and an additional 307,718 gpd for air conditioning. Together, the estimated total water consumption associated with these sites would be approximately 799,698 gpd, an increase of approximately 559,166 gpd over the future condition without the proposed project, as summarized in Table 12-3. Under this scenario, the 40 projected development sites would also generate approximately 491,980 gpd of sewage.

G. CONCLUSION

The proposed project would not adversely impact the city's infrastructure. Development on the 40 projected development sites would produce an additional 799,698 gpd demand on the city's water supply system, representing a 0.042 percent increase. Because this is less than one-tenth of one percent of the city's water supply, the proposed project would not result in a significant adverse impact to the city's water supply or water pressure. The Bowery Bay WPCP would receive approximately 491,980 gpd of additional wastewater as a result of the proposed project, which represents approximately 0.33 percent of the plant's treatment capacity. Consequently, the proposed project would not result in a significant adverse impact to the city's wastewater treatment system. Because the proposed project would not appreciably increase the amount of impervious surfaces in the rezoning area, the proposed project would not adversely impact the city's stormwater management system.

Table 12-3
Future Water Consumption and Sewage Generation
at Projected Development Sites
With the Proposed Actions

Use	Rate [1]	Future			Increment from No-Build Condition		
		Size	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)	Size	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	173,582 sf	29,509	29,509	37,009 sf	22,389	22,389
Office [2]	Domestic: 25 gpd/person Air Conditioning: 0.10 gpd/sf	0	0	0	-132,848 sf	-13,285	-13,285
Industrial/ Manufacturing [3]	Domestic: 10,000 gpd/acre Air Conditioning: 0.17 gpd/sf	2,475 sf	568	421	-180,536 sf	-41,446	-30,691
Residential [4]	Domestic: 112 gpd/person Air Conditioning: 0.17 gpd/sf	1,594,277 sf 1,557 units	455,142	271,027	1,575,231 sf 1,555 units	448,711	267,789
Hotel	Domestic: 150 gpd/room Function Space: 0.17 gpd/sf Air Conditioning: 0.10 gpd/sf	0	0	0	-196,320 sf	-69,595	-19,632
Community Facility	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	39,773 sf	6,761	6,761	-41,697 sf	-7,089	-7,089
	Subtotals		**491,980**	**307,718**		**339,685**	**219,481**
	Total Water Consumption		**799,698**			**559,166**	

Notes:

1 Usage and generation rates from the *CEQR Technical Manual* except where noted.
2 Assume one employee per 250 sf.
3 Because the *CEQR Technical Manual* does not provide industrial water consumption rates, DEP factors were used in determining industrial water demand. These factors are contained in DEP's *Draft Rules and Regulations Governing the Construction of Private Sewers and Drains*. The retail rate for air conditioning water demand was applied.
4 Residential calculations assume 2.61 persons per dwelling unit. Because the *CEQR Technical Manual* does not provide residential air conditioning water consumption rates, the retail rate for air conditioning water demand was applied.

Sources: CEQR Technical Manual; Draft *Rules and Regulations Governing the Construction of Private Sewers and Drains; and NYCDCP.*