3.12 INFRASTRUCTURE

INTRODUCTION

This chapter describes three parts of the city's infrastructure: the water supply, wastewater treatment, and stormwater management systems. Based on the methodology set forth in the *CEQR Technical Manual*, the proposed action would not result in significant adverse impacts to the water supply, wastewater treatment or stormwater management systems. Though this chapter focuses on these three systems, the *CEQR Technical Manual* defines the city "infrastructure" as the physical systems that support the population of the city, also including, but not limited to, the transportation network, waste and sanitation services and public transportation systems. Because many of these topics are discussed in separate chapters of this EIS, the focus of this chapter will remain on the water supply, wastewater treatment and stormwater management systems.

PRINCIPAL CONCLUSIONS

Water Supply

The New York City Department of Environmental Protection (NYCDEP) estimates that New York City consumes approximately 1.3 billion gallons of water per day. Given this enormous consumption rate, the *CEQR Technical Manual* notes the unlikelihood that any particular action would result in a significant adverse impact on the City's water supply or water pressure. In the future with the proposed action, projected development would generate demand for water supply of approximately 0.97 million gallons per day (mgd) in comparison to conditions in the future without the proposed action. This demand represents less than 0.1 percent of the city's overall water supply demand. Since the proposed action would not result in developments that consume an exceptional amount of water, the proposed action is not anticipated to adversely impact the City's water supply or water pressure.

Wastewater Treatment

The proposed rezoning area is located in the South Bronx, and approximately bound by the Harlem River to the West, the Major Deegan Expressway to the South, Morris Avenue to the East, and 149th street to the North (see 2.0, "Project Description"). Wastewater generated in this area is treated at the Wards Island Water Pollution Control Plant (WPCP), which is designed to treat up to 275 million gallons per day (mgd) of wastewater. In 2007, the average dry weather flow was 222 mgd with a 53 mgd available capacity. The proposed action would generate approximately 0.94 mgd of sanitary sewage over the future without the proposed action, equivalent to 1.8 percent of the reserve capacity of the Wards Island WPCP. Therefore, the proposed action is not anticipated to adversely affect the WPCP.

Stormwater Management

The analysis of stormwater management typically focuses on the body of water into which stormwater is discharged during a rainfall event, in this case the Harlem River. However, actions that do not involve the addition of permeable surfaces or those which do not direct additional volume to storm sewers are not usually considered to have a potential to result in impacts to the water body.

Given that the existing development sites are mostly covered with impervious surfaces and do not provide detention, it is expected that there would be some reduction in uncontrolled runoff from private development sites in the future with the proposed action. The proposed action is anticipated to generate approximately 9.6 cfs of runoff over No Action conditions. Although there may not be specified requirements for increased detention associated with the proposed action itself, stormwater Best Management Practices and sustainable design features could be incorporated into future development. These would serve to decrease the potential for an increase to CSO frequency or duration to the Harlem River.

3.12.1 EXISTING CONDITIONS

Water Supply

The New York City water supply system is comprised of a network of reservoirs, lakes and aqueducts extending into the Catskill region and a pipe network that distributes water within the city. Because the Hudson River, Harlem River and the East River are not potable water sources, New York City obtains nearly all of its water from the Delaware, Catskill and Croton watersheds located within 125 miles north of the city. Water from the watersheds is stored at 19 reservoirs and three control lakes, having a combined capacity of 550 billion gallons. The water is then carried into the city by a number of aqueducts. It 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. City Tunnel 3, partially complete, serves the Bronx, Manhattan and Queens, and when fully complete, will terminate in Brooklyn. Staten Island obtains its water from the Richmond Tunnel, an extension of City Tunnel 2.

Once in the city, the three aqueducts disperse water into a network of water mains. Water mains up to 96-inches in diameter feed smaller mains, such as 20, 12 and 8-inch mains, that deliver water to their final destination. These are the same mains that provide water to fire hydrants. Nearly all of the water reaches its consumers by gravity alone although some four percent, generally located at pressure boundaries, high elevations or at a pressure extremity such as Far Rockaway, is pumped to its final destination. There are pressure regulators throughout the city that monitor and control the water pressure.

In the existing condition, uses on the sites where projected development is predicted to occur include two residential units, 105,163 sf of retail, 36,599 sf of community facility, 532,626 sf of Industrial/Manufacturing, and 349,831 sf of unoccupied floor area. The

projected water usage for these areas is calculated using the consumption rates in the following table.

Table 3.12-1
Existing Water Consumption and Wastewater Generation

Land Use	*Rate*[1]	*Land Use*	*Rate*[1]
Residential[2]	Domestic: 112 gpd/person (271 gpd/DU) Air Conditioning: 0 gpd/sf	**Hotel**[4]	Domestic: 150 gpd/rm/occup (0.75 gpd/sf) Function Space: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	**Community Facility**[5]	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf
Office[3]	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.10 gpd/sf	**Industrial/ Manufacturing**[6]	Domestic: 2000 gpd/acre (0.46 gpd/sf) Air Conditioning: 0.17 gpd/sf

Notes:
1- Consumption rates obtained from *CEQR Technical Manual* unless otherwise indicated
2- Assumes 112 gpd/person. The average household size for the proposed rezoning area is 2.42 persons per dwelling unit (2000 Census). This equates to 271 gpd/DU.
3- Assumes 25 gpd/person and 250 sf of office space per person, which equates to 0.10 gpd/sf
4- Assumes 150 gpd/room/occupant, 400 sf per room and 2 occupants per room, which equates to 0.75 gpd/sf
5- Assumes retail/public use consumption rates
6- 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 domestic rate of 2,000 gpd/acre accounts for a rate of 10,000 gpd/acre multiplied by zoning district factors of 2.00 for M1-2, M2-1, and M1-4 zoning districts. The retail rate for air conditioning water demand was applied.

According to the consumption rates listed in Table 3.12-1, it is estimated that the existing facilities consume approximately 269,650 gallons per day (gpd) of water for domestic uses and 114,650 gpd of water for air conditioning for a total of 384,300 gpd (0.38 million gallons per day (mgd)) of water. These results are displayed in Table 3.12-2.

Wastewater Treatment

According to the *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 for it is recirculated or evaporates in the cooling and heating process.

The majority of New York City's wastewater treatment system is comprised of the sewer network beneath the streets and the 14 water pollution control plants (WPCPs) located throughout the city. The majority of the New York City sewers are called combined sewers as they receive sanitary wastewater and stormwater runoff.

Table 3.12-2: Existing Water Consumption and Wastewater Generation

Land Use	*Rate*[1]	*Existing Conditions*		
		Area (sf)	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*
Residential[2]	Domestic: 112 gpd/person (271 gpd/DU) Air Conditioning: 0 gpd/sf	2 DUs	542	0
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	105,163	17,878	17,878
Office[3]	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.10 gpd/sf	0	0	0
Hotel[4]	Domestic: 150 gpd/rm/occup (0.75 gpd/sf) Function Space: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	0	0	0
Community Facility[5]	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	36,599	6,222	6,222
Industrial/Manufacturing[6]	Domestic: 2,000 gpd/ac (0.46 gpd/sf) Air Conditioning: 0.17 gpd/sf	532,626	245,008	90,546
Vacant Floor Area	Domestic: 0 gpd/person Air Conditioning: 0 gpd/sf	349,831	0	0
Subtotals – Water Consumption			**269,650**	**114,646**
Subtotal – Sewage Generation			**269,650**	
Total Water Consumption			**384,296 (0.38 mgd)**	
Total Wastewater Generation			**269,650 (0.27 mgd)**	

Notes:
1- Consumption rates obtained from *CEQR Technical Manual* unless otherwise indicated
2- Assumes 112 gpd/person. The average household size for the proposed rezoning area is 2.42 persons per dwelling unit (2000 Census). This equates to 271 gpd/DU
3- Assumes 25 gpd/person and 250 sf of office space per person, which equates to 0.10 gpd/sf
4- Assumes 150 gpd/room/occupant, 400 sf per room, and 2 occupants per room, which equates to 0.75 gpd/sf
5- Assumes retail/public use consumption rates
6- 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 domestic rate of 2,000 gpd/acre accounts for a rate of 10,000 gpd/acre multiplied by zoning district factors of 2.00 for M1-2, M2-1, and M1-4 zoning districts. The retail rate for air conditioning water demand was applied.
gpd =gallons per day, mgd=million gallons per day, sf=square feet, occup=occupant

Wastewater generated in a "drainage basin," the area served by a WPCP, is conveyed through a network of combined sewers to the WPCP.

During dry weather, the WPCP primarily treats sanitary sewage. The average daily flow during dry weather is known as the average "dry-weather flow". WPCPs have treatment capacities set at twice their dry-weather design flow for a limited amount of time. However, because the majority of New York City sewers are combined sewers, they are also the recipients of stormwater, rainwater runoff from impermeable surfaces that generally contain pollutants such as oil and floatable debris. During wet weather, stormwater enters the combined sewer system along with sanitary sewage, and are both treated at a WPCP. However, during such wet weather, rainfall runoff can reach 10 to 50 times the dry weather flow, sometimes well above the WPCP design capacity. To avoid flooding the WPCPs, built-in regulators act as relief valves to direct the excess water to an outfall. During storm events, sanitary sewage entering or already in the combined sewer system, stormwater and debris can be discharged (or overflowed) untreated into the nearest body of water. This untreated overflow is known as "combined sewer overflow" (CSO). As mentioned above, the majority of New York City wastewater is collected by a combined sewer system and treated by WPCPs, however small areas in Brooklyn, Queens and Staten Island either have separate sewer systems or use septic systems to dispose of sanitary waste.

Wastewater in the Bronx is collected and conveyed through a network of combined sewers that direct the wastewater to water pollution control plants. Wastewater from the project area is treated at the Wards Island WPCP located along the bank of the Harlem River. The Wards Island WPCP has State Pollution Discharge Elimination System (SPDES) permits to treat and discharge up to 275 mgd of the 1.77 billion gallon per day SPDES permitted capacity of all 14 WPCP.

Wards Island WPCP, in 2007, treated from 200 mgd to 244 mgd, an average of 222 mgd. The average dry-weather for the Wards Island WPCP is displayed in Table 3.12-3.

Table 3.12-3
Monthly Average Dry Weather Flows for Wards Island WPCP (2007)

Month	*Wards Island WPCP*
January	212
February	200
March	219
April	244
May	212
June	238
July	238
August	243
September	206
October	214
November	211
December	227
Annual Average	***222***

Source: New York City Department of Environmental Protection (NYCDEP)
All flows in million gallons per day (mgd)

Based on the wastewater generation rates provided in Table 3.12-1 and the *CEQR Technical Manual,* existing uses on the projected development sites generate approximately 269,650 gpd (0.27 mgd) of wastewater (Table 3.12-2).

Stormwater Management

Stormwater runoff from impermeable surfaces is collected by catch basins along the street and conveyed by the city's combined sewer system to the Wards Island WPCP. During dry weather, regulators built into the combined sewer system direct flows to interceptor sewers leading to the Wards Island WPCP. However, during storm events, the regulators allow only twice the dry-weather design flow into interceptor sewers and the remaining flow is diverted to a CSO in the Harlem River.

In the existing condition, the total site area of the projected development sites consists of 1,010,332 sf, of which 80% has a permeability of rooftops and pavement and 20% is pervious. Since the projected development sites fall into two relative categories, the evaluation of storm water runoff will use two runoff coefficients. For this analysis, standard NYCDEP runoff coefficients are used to calculate the amount of stormwater runoff using a standard 5.95 inches per hour rainfall intensity, as well as increments of 0.1, 0.2, 0.5, 1.0 and 2.0 inches per hour (in/hr). Stormwater runoff in cubic feet per second (cfs) and million gallons per day (mgd) is displayed in Table 3.12-4. As indicated in this table, the projected development sites currently generate between approximately 1.8 and 111 cfs (or 1.2 and 72 mgd) of stormwater with rainfall intensities ranging from 0.1 to 5.95 in/hr.

Table 3.12-4:
Existing Stormwater Runoff

	Rooftop/ Paved Areas	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*
Rainfall Intensity (in/hr)	**0.1**		**0.2**		**0.5**		**1.0**		**2.0**		**5.95**	
Area (sf)	808,266	202,066	808,266	202,066	808,266	202,066	808,266	202,066	808,266	202,066	808,266	202,066
Area (acres)	18.56	4.64	18.56	4.64	18.56	4.64	18.56	4.64	18.56	4.64	18.56	4.64
Runoff Coefficient	0.95	0.25	0.95	0.25	0.95	0.25	0.95	0.25	0.95	0.25	0.95	0.25
Stormwater Discharge (cfs)	1.76	0.12	3.53	0.23	8.81	0.58	17.63	1.16	35.25	2.32	104.88	6.90
Total Stormwater Discharge (cfs)	**1.88**		**3.76**		**9.39**		**18.79**		**37.57**		**111.78**	
Total Stormwater Discharge (mgd)	**1.21**		**2.43**		**6.07**		**12.14**		**24.28**		**72.25**	

Notes:
- Assumed 0.95 runoff coefficient for combined rooftop and pavement areas
- Assumed 0.25 runoff coefficient for pervious areas with porosity between undeveloped and grass
- Assumed 80% of site conditions have permeability of pavement/rooftops and 20% of site conditions are pervious surface
- 0.1, 0.2, 0.5, 1.0, and 2.0 inches per hour rainfall intensities used to represent small storm events

The total combined stormwater and wastewater flow generated by the existing uses on the projected development sites are presented in Table 3.12-5. As shown in the table, the flows range from approximately 1.48 to 72.52 mgd for rainfall intensity increments between 0.1 and 5.95 inches per hour.

Table 3.12-5
Existing Combined Stormwater Runoff and Wastewater Generation

Rainfall Intensity (inches/hour)	0.1	0.2	0.5	1.0	2.0	5.95
Total Stormwater Discharge (mgd)	1.21	2.43	6.07	12.14	24.28	72.25
Total Wastewater Generation (mgd)	0.27	0.27	0.27	0.27	0.27	0.27
Total Combined Stormwater & Wastewater (mgd)	**1.48**	**2.70**	**6.34**	**12.41**	**24.55**	**72.52**

Individual development projects are required to have on-site stormwater runoff management in accordance with NYCDEP requirements. This is intended to ensure that a development properly regulates its stormwater runoff corresponding to the City's 5-year storm. To be issued a permit to connect to a City sewer (for all boroughs except Manhattan), NYCDEP requires that storm runoff from new developments in excess of the amount allowed under the applicable drainage plan be detained on-site. The method to be used to calculate this amount is described in the NYCDEP document "Criteria for Determination of Detention Facility Volume" (June 2002).

Currently, as stated above, the projected development sites within the proposed rezoning area are developed in some way with residential, commercial, or industrial uses, and are covered by impervious surfaces, such as buildings and paved parking that have high runoff coefficients. It is assumed that most of the buildings in the area pre-date NYCDEP requirements and therefore do not provide any on-site detention.

Water Conservation and WPCP Load Reduction

During the 1990s, the City instituted various water conservation measures in response to excess flow to the City's WPCPs that exceeded the dry weather flow allowed in their respective SPDES permits. For example, fire hydrants were equipped with locks to prevent illegal use. In addition, all new plumbing fixtures in the City, including replacements in existing structures and new fixtures in new structures, were required to be of a low-flow design (Local Law No. 29, 1989). The City also implemented a metering 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 for consumers to conserve. The City also implemented leak detection programs to identify and repair leaks in the water distribution system.

The programs described above have, on the whole, been successful, in that they have reduced water demand and the load on the City's WPCPs. At many WPCPs, this reduction has been in an order of magnitude of several million gallons per day. NYCDEP projects that savings from the continued implementation of these conservation measures over the next decade would exceed any increase in water demand from consumers.

3.12.2 FUTURE WITHOUT THE PROPOSED ACTION

In the future without the proposed action, anticipated growth in the vicinity of the Bronx's Lower Concourse along with development anticipated on 14 of the 31 sites projected to have development as a result of the Proposed Action would result in additional demand for water, wastewater production and stormwater runoff. As identified in Chapter 2.0, "Project Description," the future development without the proposed action would consist of 2 dwelling units, 106,358 sf of retail space, 598,351 sf of office space, 90,589 sf of community facility, and 404,372 sf of industrial use. Of the 14 projected developments under conditions without the proposed action, eight have been identified as new construction and six have been identified as conversions of existing structures currently located on their sites.

Water Supply

In the future without the proposed action, as shown in Table 3.12-6, the water consumption associated with the projected development sites would total approximately 441,900 gpd (0.44 mgd). This represents an increase from the existing conditions of approximately 57,600 gpd (0.06 mgd) or approximately 15 percent over the existing water demand for these projected development sites. As noted previously, New York City consumes approximately 1.3 billion gallons of water per day. Given this level of consumption, this incremental demand of 0.06 mgd would not be large enough to significantly impact the ability of the City's water system to deliver water in the future without the proposed action.

Table 3.12-6:
No-Action Water Consumption and Wastewater Generation

Land Use	*Rate*[1]	*Existing Conditions*			*No-Action Condition*			*No-Action Increment*		
		Area (sf)	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*	*Area (sf)*	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*	*Area (sf)*	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*
Residential[2]	Domestic: 112 gpd/pers (371 gpd/sf) Air Conditioning: 0 gpd/sf	2 DUs	542	0	3,522	542	0	0	0	0
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	105,163	17,878	17,878	106,358	18,081	18,081	1,195	203	203
Office[3]	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.10 gpd/sf	0	0	0	598,351	59,835	59,835	598,351	59,835	59,835
Hotel[4]	Domestic: 150 gpd/rm/occup (.75 gpd/sf) Function Space: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	0	0	0	0	0	0	0	0	0
Community Facility[5]	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	36,599	6,222	6,222	90,589	15,400	15,400	53,990	9,178	9,178
Industrial/ Manufacturing[6]	Domestic: 2000 gpd/ac (0.46 gpd/sf) Air Conditioning: 0.17 gpd/sf	532,626	245,008	90,546	404,372	186,011	68,743	-128,254	-58,997	-21,803
Vacant Floor Area	Domestic: 0 gpd/sf Air Conditioning: 0 gpd/sf	349,831	0	0	0	0	0	0	0	0
Water Consumption Subtotal			**269,650**	**114,646**		**279,869**	**162,059**		**10,220**	**47,413**
Wastewater Generation Subtotal			**269,650**		**1.**	**279,869**			**10,220**	
Total Water Consumption			**384,295 gpd (0.38 mgd)**			**441,929 gpd (0.44 mgd)**			**57,633 gpd (0.06 mgd)**	
Total Wastewater Generation			**269,650 gpd (0.27 mgd)**			**279,869 gpd (0.28 mgd)**			**10,220 gpd (0.01 mgd)**	

Notes:
1- Consumption rates obtained from *CEQR Technical Manual* unless otherwise indicated
2- Assumes 112 gpd/person. The average household size for the proposed rezoning area is 2.42 persons per dwelling unit (2000 Census). This equates to 271 gpd/DU
3- Assumes 25 gpd/person and 250 sf of office space per person, which equates to 0.10 gpd/sf
4- Assumes 150 gpd/sf, 400 sf per room, and 2 occupants per room, which equates to 0.75 gpd/sf
5- Assumes retail/public use consumption rates
6- 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 domestic rate of 2,000 gpd/acre accounts for a rate of 10,000 gpd/acre multiplied by zoning district factors of 2.00 for M1-2, M2-1, and M1-4 zoning districts. The retail rate for air conditioning water demand was applied.
gpd=gallons per day, mgd=million gallons per day, sf=square feet

Wastewater Treatment

Additional sanitary discharges to the Wards Island WPCP would be within the 53 mgd available capacity of the plant in the future without the project. Therefore, it is anticipated that the Wards Island WPCP would continue to operate within its 275 mgd design capacity. As indicated on Table 3.12-6, in the future without the proposed action, 279,900 gpd (0.28 mgd) of wastewater would be generated. This wastewater generation is 10,200 gpd, or a four percent increment from existing generation and represents 0.02 percent of the 53 mgd available capacity of the plant. The Wards Island WPCP is therefore expected to operate within its design capacity.

Stormwater Management

In the future without the proposed action, stormwater runoff would continue to be collected and directed through the existing combined sewer system and then conveyed to the Wards Island WPCP for treatment. No reduction in the amount of impervious surfaces is anticipated, as additional development is expected to occur at the project development sites. Without the proposed action, 14 projected development sites would experience either new construction or conversion of existing structures. This development would include new commercial, office, and community facility uses (and, conversely, loss of industrial uses). As noted previously, NYCDEP requires stormwater detention in compliance with the applicable drainage plan for new developments if the developed site's storm flow exceeds the allowable flow of the drainage plan. As a result of these requirements, given that the existing development sites are mostly covered with impervious surfaces and do not provide detention, it is expected that there would be some reduction in uncontrolled runoff in the future without the proposed action, as these new developments would be required to incorporate stormwater detention measures such as dry wells or seepage basins to handle stormwater runoff from the developed site.

Assuming conservatively that the area of impermeable surface within the study area would not change, and since there is only minimal increase in sanitary flow to the combined sewer, it is anticipated that no significant change in the frequency or duration of CSO events would occur as a result of development within the study area in the future without the proposed action. A summary of the total combined stormwater and wastewater flow predicted for the No Action condition is provided in Table 3.12-7. This tables shows that the combined flow ranges from approximately 1.49 to 72.53 mgd for rainfall intensity increments between 0.1 and 5.95 inches per hour. A comparison to the values provided in Table 3.12-5 shows a less than one percent increase in combined flows between existing conditions and No Action conditions.

Table 3.12-7:
No Action Combined Stormwater Runoff and Wastewater Generation

Rainfall Intensity (inches/hour)	0.1	0.2	0.5	1.0	2.0	5.95
Total Stormwater Discharge (mgd)	1.21	2.43	6.07	12.14	24.28	72.25
Total Wastewater Generation (mgd)	0.28	0.28	0.28	0.28	0.28	0.28
Total Combined Stormwater & Wastewater (mgd)	**1.49**	**2.71**	**6.35**	**12.42**	**24.57**	**72.53**

3.12.3 FUTURE WITH THE PROPOSED ACTION

In the future with the proposed action, the existing water supply, wastewater treatment and stormwater management systems are expected to support the proposed action without incurring significant adverse impacts. The proposed action would facilitate more mixed-use commercial and residential development than would occur in the future without the proposed action. With the proposed action the rezoning area would include a total of 3,416 dwelling units, 677,520 sf of retail space, 164,285 sf of hotel space, 154,289 sf of community facility space, 98,446 sf of parkland and 1,518 parking spaces. Compared to the No Action condition, the proposed action would add a net total 3,414 dwelling units, 571,162 sf of retail space, 164,285 sf of hotel space, 63,700 sf of community facility space, 98,446 sf of parkland, and a decrease of 598,351 sf of office space, 308,872 sf of industrial and manufacturing use, as well as 1,291 parking spaces.

Water Supply

The proposed action would not result in significant adverse impacts on the City's water supply system. As shown in Table 3.12-8, in the future with the proposed action, projected development represents a water supply demand of approximately 1,410,300 gpd (1.41 mgd), an increase of 968,400 gpd (0.97 mgd), or approximately 219 percent, compared to the No Action demand. The demand is not evenly distributed within the study area. As depicted on Figure 3-12-1, the demand in the western portion of the study area, where the greater bulk development would occur, would be greater. As noted previously, New York City consumes approximately 1.3 billion gallons of water per day. Given this level of consumption, this demand represents less than 0.1 percent of the city water supply demand. The project increment would therefore be unlikely to adversely impact the City's water supply or water pressure.

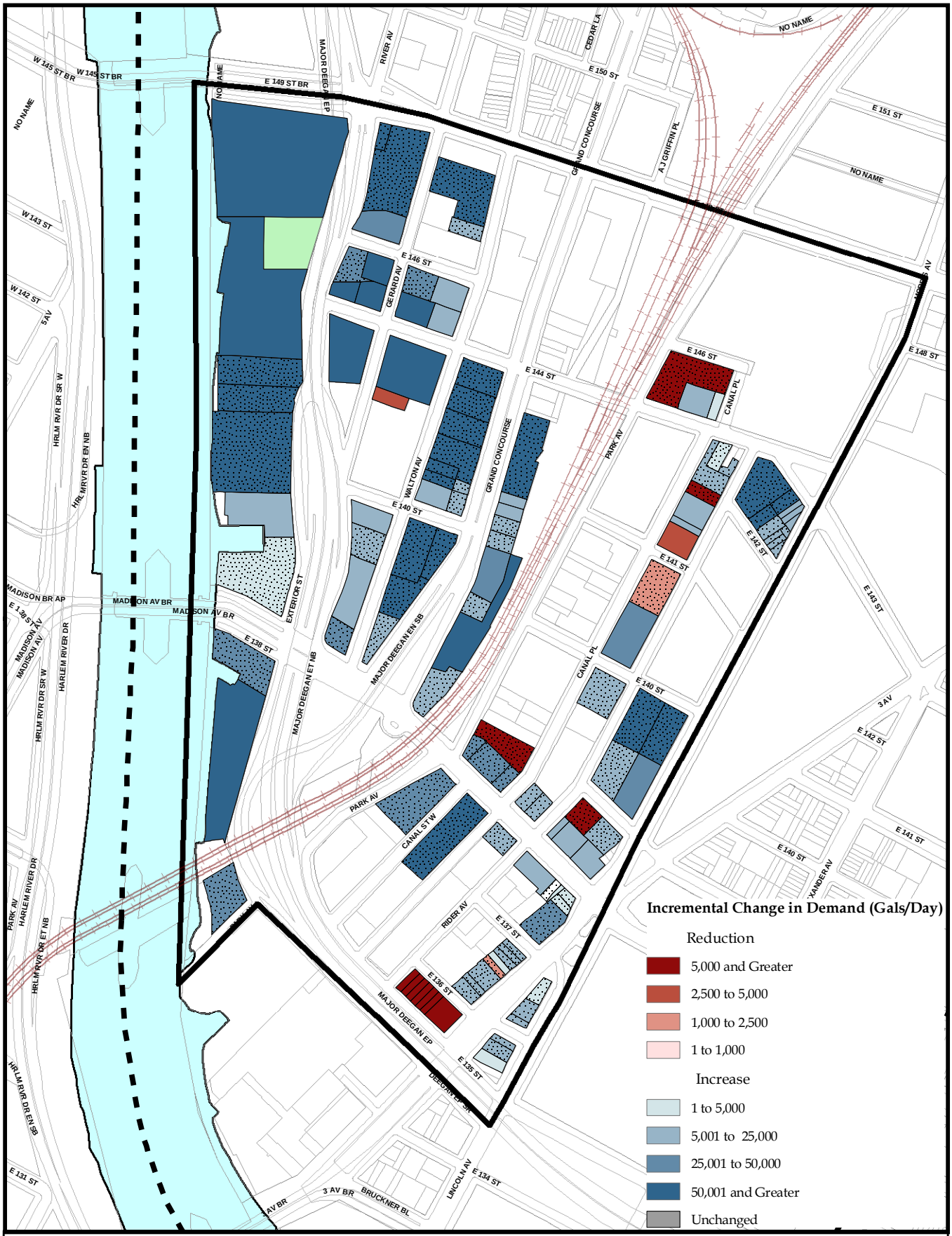

Figure 3.12-1: Incremental Change in Water Demand

Lower Concourse Rezoning and Related Actions EIS

NYC Department of City Planning

Table 3.12-8:
With-Action Water Consumption and Wastewater Generation

Land Use	*Rate*[1]	*No Action Condition*			*With-Action Condition*			*With-Action Increment*		
		Area (sf)	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*	*Area (sf)*	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*	*Area (sf)*	*Water/ Wastewater Generation (gpd)*	*Air Conditioning (gpd)*
Residential[2]	Domestic: 112 gpd/DU (271 gpd/sf) Air Conditioning: 0 gpd/sf	2 DUs	542	0	3,416 DUs	925,736	0	3,414 DUs	925,194	0
Retail	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	106,358	18,081	18,081	677,520	115,178	115,178	571,162	97,098	97,098
Office[3]	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.10 gpd/sf	598,351	59,835	59,835	0	0	0	-598,351	-59,835	-59,835
Hotel[4]	Domestic: 150 gpd/rm/occ (0.75 gpd/sf) Function Space: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	0	0	0	164,285	113,685	27,928	164,285	113,685	27,928
Community Facility[5]	Domestic: 0.17 gpd/sf Air Conditioning: 0.17 gpd/sf	90,589	15,400	15,400	154,289	26,229	26,229	63,700	10,829	10,829
Industrial/ Manufacturing[6]	Domestic: 2,000 gpd/ac (0.46 gpd/sf) Air Conditioning: 0.17 gpd/sf	404,372	186,011	68,743	95,500	43,930	16,235	-308,872	-142,081	-52,508
Water Consumption Subtotal			**279,869**	**162,059**		**1,224,759**	**185,571**		**944,890**	**23,512**
Wastewater Generation Subtotal			**279,869**			**1,224,759**			**944,890**	
Total Water Consumption			**441,929 gpd (0.44 mgd)**			**1,410,330 gpd (1.41 mgd)**			**968,401 gpd (0.97 mgd)**	
Total Wastewater Generation			**279,869 gpd (0.28 mgd)**			**1,224,759 gpd (1.22 mgd)**			**944,890 gpd (0.94 mgd)**	

Notes:
1- Consumption rates obtained from *CEQR Technical Manual* unless otherwise indicated
2- Assumes 112 gpd/person. The average household size for the proposed rezoning is 2.42 persons per dwelling unit (2000 Census). This, equates to 271 gpd/DU
3- Assumes 25 gpd/person and 250 sf of office space per person, which equates to 0.10 gpd/sf
4- Assumes 150 gpd/room/occupant, 400 sf per room, and 2 occupants per room, which equates to 0.75 gpd/sf; Assumes 10% of hotel square footage is function space
5- Assumes retail/public use consumption rates
6- 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 domestic rate of 2,000 gpd/acre accounts for a rate of 10,000 gpd/acre multiplied by zoning district factors of 2.00 for M1-2, M2-1, and M1-4 zoning districts. The retail rate for air conditioning water demand was applied.
gpd=gallons per day, mgd=million gallons per day, sf=square feet

Wastewater Treatment

In the future with the proposed action, wastewater from the study area would continue to be treated by the Wards Island WPCP. The capacity of the plant would not change as a result of the Proposed Action and the facility would retain its SPDES permitted capacity of 275 mgd. As shown in Table 3.12-8, the proposed action would generate approximately 1,224,800 gpd of sanitary sewage. This sanitary sewage generation is a 944,900 gpd (0.94 mgd or 338 percent) increase from the No Action condition and equivalent to 2.3 percent of the reserve capacity of the Wards Island WPCP. Table 3.12-8 shows the additional wastewater generated in the drainage basin of the Wards Island WPCP. Since the demand associated with the proposed action is well within the capacity of the treatment plant, no significant impacts to the City's wastewater treatment services would occur as a result of the rezoning.

In addition, water conservation measures would be employed to minimize sanitary sewage flow to the existing sewer system. Water conservation measures, which could be included as design guidelines for the rezoning of the District, include, but are not limited to:

- Low water usage water closets;
- Low water usage urinals;
- Low water usage showers;
- Low water usage lavatories;
- Pressure-assist/'Vacuum-assist' toilets;
- Composting toilets;
- Waterless urinals (in high use areas);
- Automatic shut-off controls on sinks, toilets, and urinals;
- Rainwater use for irrigation, toilet/urinal flushing, etc.; and,
- Graywater use for water closets and urinal flushing.

Stormwater Management

In the future with the proposed action, the projected development sites would total 1,010,332 sf of land, 98,446 sf of which is parkland and 40,000 sf of which would be waterfront esplanade area. Twenty percent of the 98,446 sf of parkland will be developed with impervious surface, as described in the Open Space chapter of this FEIS. The remaining 80 percent of the proposed parkland will permeable. Forty percent of the waterfront esplanade area on projected development sites, or approximately 16,000 sf, will be vegetated. These two areas, totaling 94,773 sf, are the only permeable surfaces considered in the analysis of stormwater under future With Action conditions. Commercial, industrial and residential uses represent the remaining 911,866 sf. For this analysis, standard NYCDEP runoff coefficients are used to calculate the amount of stormwater runoff for developed areas and vacant land using a standard 5.95 inches per hour of rainfall intensity, as well as increments of 0.1, 0.2, 0.5, 1.0 and 2.0 inches per hour. As shown in the Table 3.12-10 below, the rezoning area would, in the future with the proposed action, generate between approximately 2 and 121 cfs of stormwater for the storm increment analyzed. This corresponds to approximately 0.12 to 7.27 cfs

greater than in the existing and No Action conditions. Overall, both the smaller and larger intensity storm events are predicted to have an approximate 9 percent increase in combined flow.

Table 3.12-9 provides a summary of the total combined stormwater and wastewater flow predicted for the proposed rezoning. The combined flows range from approximately 2.5 to 80 mgd for rainfall intensity increments between 0.1 and 5.95 inches per hour.

Table 3.12-9:
With Action Combined Stormwater Runoff and Wastewater Generation

Rainfall Intensity (inches/hour)	**0.1**	**0.2**	**0.5**	**1.0**	**2.0**	**5.95**
Total Stormwater Discharge (mgd)	1.32	2.64	6.59	13.19	26.37	78.46
Total Wastewater Generation (mgd)	1.22	1.22	1.22	1.22	1.22	1.22
Total Combined Stormwater & Wastewater (mgd)	**2.54**	**3.86**	**7.82**	**14.41**	**27.60**	**79.68**

A comparison of the combined flow in the existing and the No Action condition to the combined flow predicted for the proposed action is provided in Table 3.12-11. As shown in this table, the total combined stormwater and wastewater flow predicted for the proposed action shows an increase in the combined flow from the No Action condition ranging between 1.05 and 7.16 mgd for storm events with rainfall intensities between 0.1 and 5.95 inches per hour. Based on the values in the table, there is a greater percentage increase in combined flow for the smaller storm events than for the larger storm events. The smaller storm events with rainfall intensities of 0.1 to 0.5 inches per hour are predicted to have a 71 percent to 23 percent increase in combined flow. The larger storm events, of one to 5.95 inches per hour of rainfall intensity, are predicted to have a 9 percent to 16 percent increase in combined flow.

Table 3.12-10:
2018 With Action Stormwater Runoff

	Rooftop/ Paved Areas	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*	*Rooftop/ Paved Areas*	*Pervious Areas*
Rainfall Intensity (in/hr)	**0.1**		**0.2**		**0.5**		**1.0**		**2.0**		**5.95**	
Area (sf)	915,559	94,773	915,559	94,773	915,559	94,773	915,559	94,773	915,559	94,773	915,559	94,773
Area (acres)	21.02	2.18	21.02	2.18	21.02	2.18	21.02	2.18	21.02	2.18	21.02	2.18
Runoff Coefficient	0.95	0.2	0.95	0.2	0.95	0.2	0.95	0.2	0.95	0.2	0.95	0.2
Stormwater Discharge (cfs)	2.00	0.04	3.99	0.09	9.98	0.22	19.97	0.44	39.93	0.87	118.81	2.59
Total Stormwater Discharge (cfs)	**2.04**		**4.08**		**10.20**		**20.40**		**40.81**		**121.40**	
Total Stormwater Discharge (mgd)	**1.32**		**2.64**		**6.59**		**13.19**		**26.37**		**78.46**	

Notes:
- Assumed 0.95 runoff coefficient for combined rooftop and pavement areas
- Assumed 0.20 runoff coefficient for pervious areas with grass and vegetation
- Assumed 80% of 98,466 sf parkland is developed of pavement/rooftops and 20% of parkland is grass
- Assumed 40% of waterfront esplanade area is vegetated
- 0.1, 0.2, 0.5, 1.0, and 2.0 inches per hour rainfall intensities used to represent small storm events

Table 3.12-11:
Combined Stormwater Runoff and Wastewater Generation Increment in MGD
Existing and No Action Comparison to With Action

Rainfall Intensity (inches/hour)	**0.10**	**0.20**	**0.50**	**1.00**	**2.00**	**5.95**
Existing	1.48	2.70	6.34	12.41	24.55	72.52
No Action	1.49	2.71	6.35	12.42	24.56	72.53
With Action	2.54	3.86	7.82	14.41	27.60	79.68
Flow Increment From Existing to With Action	**1.06** *(71.4%)*	**1.16** *(43.1%)*	**1.48** *(23.3%)*	**2.00** *(16.1%)*	**3.04** *(12.4%)*	**7.17** *(9.9%)*
Flow Increment From No Action to With Action	**1.05** *(70.2%)*	**1.15** *(42.6%)*	**1.47** *(23.1%)*	**1.99** *(16.0%)*	**3.03** *(12.3%)*	**7.16** *(9.9%)*

As noted previously, NYCDEP requires stormwater detention in compliance with the drainage plan for existing or new developments fronting on streets with sewers, if the developed site's storm flow exceeds the allowable flow of the drainage plan. As a result of these requirements, given that the existing development sites are mostly covered with impervious surfaces and do not provide detention, it is expected that there would be some reduction in uncontrolled runoff from private development sites in the future with the proposed actions, as these new developments would be required to incorporate stormwater detention measures such as dry wells or seepage basins to handle stormwater runoff from the developed site.

Since the increment of combined flow does appear to be affected by the size of the storm events, the stormwater component of wet weather flow to the plant may potentially affect combined sewer frequency or duration. Although there may not be a specified requirement for increased detention associated with the proposed action itself, the following Best Management Practices and sustainable design features could be incorporated into future development. These would serve to decrease the potential for an increase to CSO frequency or duration.

- Increased quantity, density, and diversity of trees.
- Sustainable irrigation and landscaping practices.
- Graywater recycling for individual building sites.
- Integration of vegetated swales.
- Green roofs.
- Blue roofs.
- Rooftop storage and filters.
- Underground storage.
- Inline pipe storage.
- Decorative wet ponds.

- Detention dry ponds.
- Proprietary pre-treatment structures (e.g., Stormceptor, Vortechnics);
- Bioengineered and structural practices to reduce and control runoff.
- Stormwater recycling facilities (reuse for toilet flushing, custodial work, landscape irrigation, and other uses to reduce demand for potable water).
- Optimized right-of-way drainage.
- Vegetated filters and buffer strips.
- Water quality inlets including oil and grit separators, media filters, and high-volume treatment proprietary devices.
- Surface, perimeter, and/or underground sand filters.
- Infiltration trenches, with under-drain and overflow to a control structure connection to a storm sewer.
- Bioretention-shallow swales, with under-drain and overflow to a control structure connection to a storm sewer.
- Other low-impact, effective measures.

CONCLUSION

To summarize the above infrastructure analysis, the following is expected with respect to potential impacts of the proposed action.

Water Supply

In the future with the proposed action, projected development would generate water supply demand of approximately 0.97 million gallons per day (mgd) over future conditions without the proposed action. This demand represents less than 0.1 percent of the city's overall water supply demand of 1.3 billion gallons per day. Since the proposed action would not result in developments that consume an exceptional amount of water, the proposed action is not anticipated to adversely impact the City's water supply or water pressure.

Wastewater Treatment

The proposed action would generate approximately 0.94 mgd of sanitary sewage over the future without the proposed action, which is equivalent to 1.8 percent of the 53 mgd reserve capacity of the Wards Island WPCP. Since the proposed action would not result in developments that would generate an exceptional amount of sewage, the proposed action is not anticipated to adversely affect the WPCP.

Stormwater Management

The proposed action is anticipated to generate approximately 9.6 cfs of runoff in comparison to No Action conditions. Although there may not be a specified requirement for increased detention associated with the proposed action itself, stormwater Best Management Practices and sustainable design features could be incorporated into future development. These would serve to decrease the potential for an increase to CSO frequency or duration to the Harlem River. Therefore, it is expected

that there would be some reduction in uncontrolled runoff from private development sites in the future with the proposed actions.

Based on the analysis described above and conducted pursuant to *CEQR Technical Manual* methodologies, it is concluded that the proposed actions would not result in significant adverse impacts to the local water supply, sanitary wastewater treatment, or stormwater management infrastructure systems.