CHAPTER 10: WATER AND SEWER INFRASTRUCTURE

A. INTRODUCTION

This chapter provides an evaluation of the potential effect of the Proposed Action on the city's water supply, wastewater treatment, and stormwater management infrastructure. Based on the methodology set forth in the *CEQR Technical Manual*, the Proposed Action would not result in significant adverse impacts to these infrastructure systems. Other city infrastructure identified in the *CEQR Technical Manual*, including the transportation network, and public transportation systems, are discussed in separate chapters of this EIS. Included is a description of the existing water supply and wastewater infrastructure in the study area which identifies changes to water supply, stormwater, and wastewater conditions that would occur in the future with and without the Proposed Action.

B. PRINCIPAL CONCLUSIONS

Water Supply

The incremental additional water usage as a result of the Proposed Action is expected to total 245,931 gpd. This incremental demand would represent less than one-tenth of one percent of the overall water supply and less than half of one percent of Manhattan's water supply. Changes of this magnitude would not be large enough to have a significant adverse impact on the city's water system.

Sanitary Sewage

The North River WWTP handles an average of 123.75 mgd of sewage flow over the 12 month period that was analyzed and it is designed to treat a dry weather flow of 170 mgd. The Ward's Island WWTP handles an average of 200.67 mgd of sewage flow over the 12 month period that was analyzed and it is designed to treat a dry weather flow of 275 mgd. Based on rates in the *CEQR Technical Manual*, the proposed rezoning has the potential to result in an incremental sanitary sewage discharge of just under approximately 196,300 gpd over the existing condition. This incremental increase in sanitary flow would not result in significant adverse impacts to the sewage system within the catchment area or to the North River and Ward's Island WWTPs as it is approximately 0.1 percent of the dry weather capacity. As described above, the projected increase in sanitary sewage would not result in new impacts within the catchment area or cause the North River or the Ward's Island WWTPs to exceed their operational capacity or their SPDES-permitted capacities.

Stormwater Drainage and Management

As also described above, there would be increases of combined sewer volumes in the subcatchment areas affected by the Proposed Action as compared to existing conditions. Due to NYCDEP's new stormwater management requirements, stormwater runoff from new developments is expected to decrease as compared to existing conditions.

Based on the analysis pursuant to the *CEQR Technical Manual*, with the Best Management Practices (BMPs) described in Section E below implemented by the developer of each projected development site,

it is concluded that the Proposed Action would not result in significant adverse impacts on the water supply, wastewater or stormwater conveyance and treatment infrastructure.

C. 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 approximately 580 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 distribute water into a network of water mains. Water mains up to 96-inches in diameter feed smaller mains, such as 8-, 12-, and 20-inch mains, which 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 the outer limits of the system where in-line pressure is the 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.

The New York City Department of Environmental Protection (NYCDEP) estimates that New York City currently consumes approximately 1.3 billion gallons of water per day (gpd). Given this supply capacity, 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.

As indicated in Chapter 1, "Project Description," four RWCDS scenarios have been developed in conjunction with the Proposed Action. For the purposes of this infrastructure analysis, RWCDS 4 will be assessed because this scenario maximizes commercial and community facility uses, thereby maximizing the anticipated water demand. Table 10-1 shows the applicable water consumption and wastewater generation rates utilized in the analysis. Table 10-2 shows existing uses on the projected development sites, including 215 residential units (consists of approximately 195,907 sf), 58,128 sf of retail space, 344,091 sf of other commercial (office) space, and 95,605 sf of community facility area. The estimated water usage for these existing uses has been calculated using the consumption rates in the following table.

Based on the consumption rates listed in Table 10-1, it is estimated that the existing uses on the projected development sites within the rezoning area consume approximately 113,176 gpd of water for domestic uses and 84,630 gpd of water for air conditioning for a total of 197,806 gpd (0.20 million gallons per day [mgd]) of water.

TABLE 10-1
Water Consumption and Wastewater Generation Rates

Land Use	Rate[1]
Residential[2]	Domestic: 100 gpd/person (257 gpd/DU) Air Conditioning: 0 gpd/sf
Retail[3]	Domestic: 0.24 gpd/sf Air Conditioning: 0.17 gpd/sf
Other Commercial (Office)[4]	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.17 gpd/sf
Community Facility[5]	Domestic: 0.10 gpd/sf Air Conditioning: 0.17 gpd/sf

Notes:
1- Consumption rates obtained from *CEQR Technical Manual* Table 13-2 "Water Usage and Sewage Generation Rates for Use in Impact Assessment" unless otherwise indicated.
2- Assumes 100 gpd/person. The average household size for the proposed rezoning area is 2.57 persons per dwelling unit (DU) (2010 Census). This equates to 257 gpd/DU.
3- Use group is comprised of retail, and restaurant space.
4- Assumes 25 gpd/person and 250 sf of office space per person, which equates to 0.10 gpd/sf.
5- Assumes "other commercial" use consumption rates for domestic uses.

TABLE 10-2
Existing Water Consumption and Wastewater Generation Due to Land Uses on the Projected Development Sites

Land Use	Rate	Area (sf)	DUs	Domestic Water/Wastewater Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 100 gpd/person (257 gpd/DU) Air Conditioning: 0 gpd/sf	195,907	215	55,255	0
Retail	Domestic: 0.24 gpd/sf Air Conditioning: 0.17 gpd/sf	58,129		13,951	9,882
Other Commercial (Office)	Domestic: 25 gpd/person (0.10 gpd/sf) Air Conditioning: 0.17 gpd/sf	344,091		34,409	58,495
Community Facility	Domestic: 0.10 gpd/sf Air Conditioning: 0.17 gpd/sf	95,605		9,561	16,253
Water Consumption Subtotals				**113,176**	**84,630**
Sewage Generation Subtotal				**113,176**	
Total Water Consumption				**197,806 (0.20 mgd)**	
Total Wastewater Generation				**113,176 (0.11 mgd)**	

Notes:
Refer to Table 10-1 for rate assumptions.

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 New York City's sewers are called combined sewers as they receive sanitary wastewater and

stormwater runoff. 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's sewers are combined sewers, they are also the recipients of stormwater and 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 both are treated at a WPCP. During wet weather, rainfall runoff can reach 10 to 50 times the dry weather flow, 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, 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.

The proposed rezoning area is located in Manhattan Community District 9 and is generally bounded by West 126th Street to the south, West 155th Street to the north, Edgecombe, Bradhurst and Convent Avenues to the east and Riverside Drive to the west. As shown in Figure 10-1, the rezoning area (shown shaded in grey) is served by the North River WPCP and the Ward's Island WPCP. While the portion of the rezoning area to the east of Amsterdam Avenue is located within the area served by the Ward's Island WPCP (Subcatchment area WIM-046), this section of the rezoning area only contains four of the 24 projected development sites; the balance of the projected development sites are located within the area served by the North River WPCP (Subcatchment areas NR-002, NR-043, NR-044, and NR-056). As such, most of the wastewater generated by the projected development sites within the study area is treated at the nearby North River WPCP; only a small portion of the wastewater from the projected development sites is treated at the Wards Island WPCP. DEP's operational bureaus report that regulator N-23 corresponds with subcatchment area NR-043 and regulator WIM-46 corresponds with subcatchment area WIM-046.

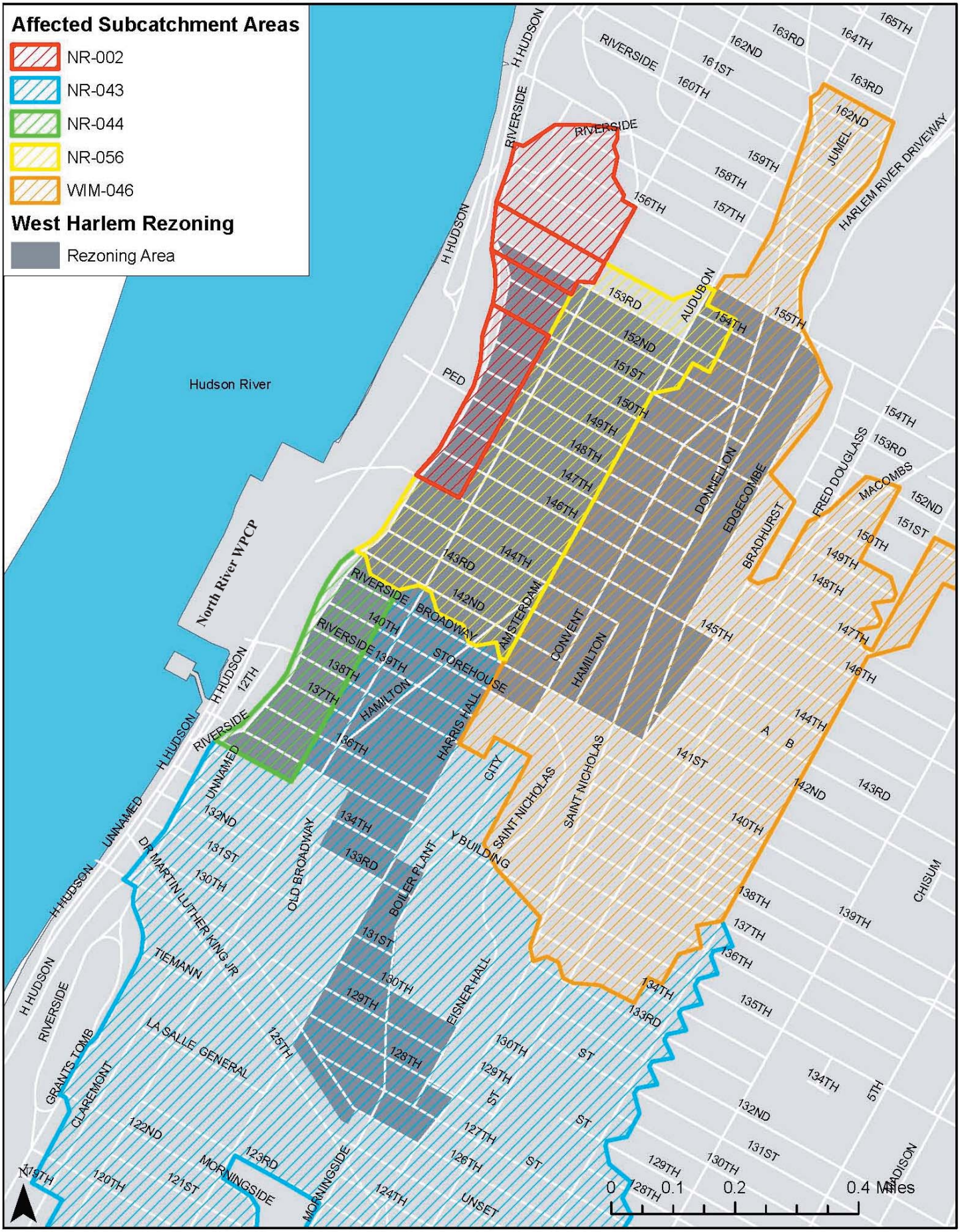
Subcatchment area NR-002 (shown as red in Figure 10) and Subcatchment area NR-044 (shown as green in Figure 10) do not contain any projected development sites. Subcatchment area NR-056 (shown as yellow in Figure 10) contains the following seven projected development sites: Site 4, Site 5, Site 6, Site 7, Site 8, Site 9, and Site 51 – a total land area of approximately 88,146 sf. Subcatchment area NR-043 (shown as blue in Figure 10) contains the following 13 projected development sites: Site 10, Site 11, Site 12, Site 13, Site 14, Site 15, Site 17, Site 18, Site 19, Site 40, Site 50, Site 54, and Site 55 – a total land area of approximately 223,059 sf. Subcatchment area WIM-046 (shown as orange in Figure 10) contains projected development sites 1, 2, 52, and 53 – a total land area of approximately 29,129 sf.

All 14 WPCPs in New York City have a State Pollution Discharge Elimination System (SPDES) permitted total capacity of 1.8 billion gallons per day. The North River WPCP is regulated by SPDES permit to treat and discharge up to 170 mgd of wastewater. As shown in Table 10-3, from June 2010 through May 2011, the North River WPCP treated between 119 mgd to 128 mgd, an average of approximately 124 mgd with approximately 46 mgd available capacity.

The Wards Island WPCP is regulated by SPDES permit to treat and discharge up to 275 mgd of wastewater. As also shown in Table 10-3, in the 12 month period from June 2010 through May 2011, the

Figure 10-1

Affected Subcatchment Areas



Source: NYCDEP

Wards Island WPCP treated between 186 mgd to 218 mgd, an average of nearly 201 mgd with approximately 74 mgd available capacity.

TABLE 10-3
Monthly Average Dry Weather Flows for the North River WPCP and the Wards Island WPCP

	Month	North River WPCP (mgd)	Wards Island WPCP (mgd)
2010	June	121	209
	July	126	218
	August	126	208
	September	126	201
	October	125	193
	November	119	186
	December	122	188
2011	January	121	187
	February	125	199
	March	128	213
	April	124	203
	May	122	203
Annual Average		**123.75**	**200.67**

Source: NYCDEP

Stormwater and Drainage 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 North River and the Wards Island WPCPs. During dry weather, regulators built into the combined sewer system direct flows to interceptor sewers leading to the WPCPs. However, during storm events, the regulators allow only twice the dry-weather design flow into interceptor sewers and the remaining flow is diverted as a CSO to the Hudson River or Bronx River.

The analysis of stormwater management typically focuses on the body of water into which the stormwater is discharged during a CSO event, in this case, the Hudson and Bronx Rivers. However, actions that do not involve the addition of impermeable surfaces or those which do not direct additional volume to storm sewers are not usually considered to have a potential to increase CSO occurrences.

In the existing condition, the total lot area of the projected development sites consists of 340,334 sf, much of which has the permeability of rooftops and/or pavement. Approximately 88,146 sf of the total projected development site lot area is located within Subcatchment area NR-056 of the North River WPCP. Subcatchment area NR-043 of the North River WPCP contains approximately 223,059 sf. The balance of the lot area (approximately 29,129 sf) is located in Subcatchment area WIM-046 of the Ward's Island WPCP. As shown in Table 10-4, the estimated 88,146 sf portion of the projected development sites' lot area within Subcatchment area NR-056 of the North River WPCP is comprised of approximately 73 percent roof (approximately 64,256 sf) and 20 percent pavement and walkways (approximately 17,556 sf) for a total of 93 percent impermeable surfaces. Approximately seven percent (6,324 sf) of the lot area is permeable (grass and softscape). The estimated 223,059 sf portion of the projected development sites' lot area within Subcatchment area NR-043 of the North River WPCP is comprised of approximately 57 percent roof (approximately 127,182 sf) and 34 percent pavement and walkways (approximately 76,672 sf) for a total of 91 percent impermeable surfaces. Approximately nine percent (19,205 sf) of the lot area is permeable (grass and softscape). The portion of the projected development sites' lot area within the

WIM-046 subcatchment area of the Ward's Island WPCP is comprised of approximately 44 percent roof (approximately 12,782 sf) and 52 percent pavement and walkways (approximately 15,187 sf) for a total of 96 percent impermeable surfaces. Approximately four percent (1,160 sf) of the lot area is permeable (grass and softscape).

TABLE 10-4
Existing Stormwater Runoff

	Existing					
	Weighted Runoff Coefficient, C					
	Surface Type	**Roof[2]**	**Pavement and Walks**	**Other[3]**	**Grass and Softscape**	**TOTAL**
North River WPCP (NR-056)	**Area (%)**	73%	20%	0%	7%	100%
	Surface Area (SF)	64,256	17,566	0	6,324	88,146
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.91
North River WPCP (NR-043)	**Area (%)**	57%	34%	0%	9%	100%
	Surface Area (SF)	127,182	76,672	0	19,205	223,059
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.88
Wards Island WPCP (WIM-046)	**Area (%)**	44%	52%	0%	4%	1.0
	Surface Area (SF)	12,782	15,187	0	1,160	29,129
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.89

Notes:
1. Runoff coefficients for each surface type are as per NYCDEP.
2. Total roof areas on site.
3. Identify other surfaces on site and obtain runoff coefficients from NYCDEP.

For this analysis, standard NYCDEP runoff coefficients were used to calculate the amount of stormwater runoff using the standard 3-month, 6-month, and 12-month storm events, with rainfall ranging from 0.00 to 2.50 inches over durations of 3.80 to 19.50 hours. Table 10-5 shows the existing combined stormwater runoff and wastewater generation for the existing uses on the projected development sites. As indicated in this table, the projected development sites together currently generate between 0.00 and 0.43 mgd of stormwater within the two affected North River WPCP subcatchment areas (combined) and between 0.00 and 0.04 mgd of stormwater within the Ward's Island WPCP for the different rainfall intensities.

Individual development projects are required to manage on-site stormwater runoff in accordance with NYCDEP requirements to ensure that a development properly regulates its stormwater runoff corresponding to the city's 5-year storm. Currently, as stated above, many of the development sites within the proposed rezoning area are entirely covered by impervious surfaces, including buildings and paved parking that have high runoff coefficients. Since most of the buildings in the area most likely pre-date NYCDEP requirements, there is little or no on-site detention of stormwater on any of the projected development sites.

TABLE 10-5
Existing Combined Stormwater Runoff and Wastewater Generation

	Storm Event Type	Rainfall (Inches)	Duration (Hours)	Total Area (Acres)	Runoff Coefficient	Stormwater Runoff (MG)	Sanitary to CSS (MG)
North River WPCP (NR-056)		0.00	3.80	2.02	0.91	0.00	0.006
	3-Month	0.40	3.80	2.02	0.91	0.02	0.006
	6-Month	1.20	11.30	2.02	0.91	0.06	0.018
	12-Month	2.50	19.50	2.02	0.91	0.12	0.032
North River WPCP (NR-043)		0.00	3.80	5.12	0.88	0.00	0.010
	3-Month	0.40	3.80	5.12	0.88	0.05	0.010
	6-Month	1.20	11.30	5.12	0.88	0.15	0.031
	12-Month	2.50	19.50	5.12	0.88	0.31	0.053
Wards Island WPCP (WIM-046)		0.00	3.80	0.67	0.89	0.00	0.002
	3-Month	0.40	3.80	0.67	0.89	0.01	0.002
	6-Month	1.20	11.30	0.67	0.89	0.02	0.006
	12-Month	2.50	19.50	0.67	0.89	0.04	0.010

Notes:
MG = million gallons

Water Conservation and WPCP Load Reduction

During the 1990s, the city instituted a range of 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. Measures included equipping fire hydrants with locks to prevent illegal use, and requiring that all new plumbing fixtures in the city, including replacements in existing structures and new fixtures in new structures, be of a low-flow design (Local Law No. 29, 1989). The city also implemented 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.

These programs 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.

D. THE FUTURE WITHOUT THE PROPOSED ACTION (NO-ACTION)

In the future without the Proposed Action, anticipated growth in the vicinity of Manhattan Community District 9, and development that would occur on the 24 projected sites without the Proposed Action would result in additional demand for water, wastewater production, and stormwater runoff. As identified in Chapter 1, "Project Description," the future development on the projected development sites without the Proposed Action would consist of 567 dwelling units (approximately 506,402 sf), 41,716 sf of retail space, 363,323 sf of other commercial space, and 290,731 sf of community facility space.

Water Supply

In the future without the Proposed Action, as shown in Table 10-6, the water consumption that would occur at the projected development sites would total approximately 358,787 gpd (0.36 mgd). This represents an increase from the existing conditions of approximately 160,981 gpd (0.16 mgd) or an approximately 81.4 percent increase over the existing water demand for these 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 0.16 mgd would not be large enough to significantly affect the ability of the city's water system to deliver water in the future without the Proposed Action.

Wastewater Treatment

In the future without the Proposed Action, additional sanitary discharges would primarily go to the North River WPCP but would be well within the 46 mgd average available capacity of the plant in the future without the project. Therefore, it is anticipated that the WPCP would continue to operate within its design capacities.

TABLE 10-6
No-Action Water Consumption and Wastewater Generation Due to Land Uses on the Projected Development Sites

Land Use	Rate	Existing Conditions			Conditions in the Future Without the Proposed Action			Change in Conditions in the Future Without the Proposed Action Compared to Existing Conditions		
		Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)
Residential	Domestic: 100 gpd/person (257 gpd/DU) A/C: 0 gpd/sf	195,907 (215 DUs)	55,255	0	521,594 (567 DUs)	145,719	0	325,687 (352 DUs)	90,464	0
Retail	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	58,129	13,951	9,882	45,888	11,013	7,801	-12,241	-2,938	-2,081
Other Commercial (Office)	Domestic: 25 gpd/person (0.10 gpd/sf) A/C: 0.17 gpd/sf	344,091	34,409	58,495	399,655	39,966	67,941	55,564	5,557	9,446
Community Facility	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	95,605	9,561	16,253	319,804	31,980	54,367	224,199	22,419	38,114
Water Consumption Subtotals			**113,176**	**84,630**		**228,678**	**130,109**		**115,502**	**45,479**
Sewage Generation Subtotal			**113,176**			**228,678**			**115,502**	
Total Water Consumption			**197,806 (0.20 mgd)**			**358,787 (0.36 mgd)**			**160,981 (0.16 mgd)**	
Total Wastewater Generation			**113,176 (0.11 mgd)**			**228,678 (0.23 mgd)**			**115,502 (0.12 mgd)**	

Notes:
Refer to Table 10-1 for rate assumptions.
A/C = Air conditioning.
gpd = Gallons per day.

As indicated in Table 10-6, in the future without the Proposed Action, 228,678 gpd (0.23 mgd) of wastewater would be generated, most of which (approximately 93 percent or 212,671 gpd) would go to the North River WPCP, while the balance of the wastewater (approximately 16,007 gpd) would flow to the Ward's Island WPCP. The incremental wastewater generation over existing conditions is 115,502 gpd (0.12 mgd). There is available capacity at North River WPCP and Ward's Island WPCP for the

anticipated new wastewater flows. Therefore, both WPCPs are expected to continue to operate within their design capacities.

Stormwater and Drainage 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 North River and Ward's Island WPCPs for treatment. The permeable surface is anticipated to be reduced slightly in the study area as a result of development that is expected to occur on the projected development sites. Without the Proposed Action, the majority of the projected development sites would experience either new construction or conversion of existing uses. This development (described in depth in Chapter 1, "Project Description") would likely include a variety of new residential, commercial, and community facility 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 predominantly covered with impervious surfaces and do not provide detention, it is expected that there would be substantial reduction in uncontrolled runoff in the future without the Proposed Action, as these new developments would be required to incorporate the latest stormwater detention and retention measures, such as green roofs, blue roofs or seepage basins, to handle stormwater runoff from the developed sites.

Assuming that the area of impermeable surface within the study area would not undergo substantial changes, and since there would be small increases in sanitary flow to the combined sewer resulting from increased detention measures, 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 without the Proposed Action.

E. THE FUTURE WITH THE PROPOSED ACTION (WITH-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. As indicated in Chapter 1, "Project Description," four different RWCDS scenarios have been established. For the purposes of the infrastructure analysis, RWCDS Scenario 4 represents the worst case for water and sewer infrastructure analysis purposes. As such, this scenario has been selected as the most conservative option for analysis. With the Proposed Action, the rezoning area would include a total of 1,136 dwelling units, 194,722 sf of retail space, 415,540 sf of other commercial space, and 447,162 sf of community facility space under RWCDS Scenario 4.

Compared to the condition in the future without the Proposed Action, conditions in the future with the Proposed Action would add a net total 569 dwelling units, 148,834 sf of retail space, 15,885 sf of office, and 127,358 sf of community facility space.

Water Supply

The Proposed Action would not result in significant adverse impacts on the city's water supply system. As shown in Table 10-7, the projected developments would generate a water supply demand of approximately 604,718 gpd (0.60 mgd), an increase of 245,931 gpd (0.25 mgd) or approximately 68.5 percent, compared to demand in the future without the Proposed Action. Demand with the Proposed Action would represent less than 0.1 percent of the city's water supply demand. The incremental demand

with the Proposed Action would, therefore, not adversely impact the city's water supply or system water pressure.

Wastewater Treatment

In the future with the Proposed Action, wastewater from the study area would continue to be treated by the North River WPCP and Ward's Island WPCP. The capacity of these plants would not change as a result of the Proposed Action and the facilities would retain their SPDES permitted capacities of 170 mgd and 275 mgd, respectively. As shown in Table 10-7, the Proposed Action would generate approximately 424,955 gpd of sanitary sewage. This sanitary sewage generation is a 196,277 gpd (0.20 mgd or 85.8 percent) increase from the amount of sanitary sewage that would be generated in the future without the Proposed Action. The North River WPCP and the Ward's Island WPCP will continue to have ample reserve capacity with this anticipated new demand. Since the demand associated with the Proposed Action is well within the capacity of the treatment plants, no significant adverse impacts to the city's wastewater treatment services would occur as a result of the proposed rezoning.

TABLE 10-7
Water Consumption and Wastewater Generation in the Future Without and With the Proposed Action

Land Use	Rate	Conditions in the Future Without the Proposed Action			Conditions in the Future With the Proposed Action			Changes in Water Consumption and Wastewater Generated with the Proposed Action		
		Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)	Area (sf)	Domestic Water / Wastewater Generation (gpd)	A/C (gpd)
Residential	Domestic: 100 gpd/person (257 gpd/DU) A/C: 0 gpd/sf	521,594 (567 DUs)	145,719	0	1,048,298 (1,136 DUs)	291,952	0	526,704 (569 DUs)	146,233	0
Retail	Domestic: 0.24 gpd/sf A/C: 0.17 gpd/sf	45,888	11,013	7,801	194,722	46,733	33,103	148,834	35,720	25,302
Other Commercial (Office)	Domestic: 25 gpd/person (0.10 gpd/sf) A/C: 0.17 gpd/sf	399,655	39,966	67,941	415,540	41,554	70,642	15,885	1,588	2,701
Community Facility	Domestic: 0.10 gpd/sf A/C: 0.17 gpd/sf	319,804	31,980	54,367	447,162	44,716	76,018	127,358	12,736	21,651
Water Consumption Subtotals			**228,678**	**130,109**		**424,955**	**179,763**		**196,277**	**49,654**
Sewage Generation Subtotal			**228,678**			**424,955**			**196,277**	
Total Water Consumption			**358,787 (0.36 mgd)**			**604,718 (0.60 mgd)**			**245,931 (0.25 mgd)**	
Total Wastewater Generation			**228,678 (0.23 mgd)**			**424,955 (0.42 mgd)**			**196,277 (0.20 mgd)**	

Notes: Refer to Table 10-1 for rate assumptions.

Stormwater Drainage and Management

In the future with the Proposed Action, the development sites would total 340,334 sf of land, most of which would continue to be covered by impervious surface. Table 10-8 shows the surface types that are anticipated on the 24 projected development sites under future With-Action conditions. As indicated below, the future With-Action conditions are expected to result in minor increases in impervious areas and minor decreases in the pervious areas. Consequently, the stormwater runoff would be similar to that under existing and No-Action conditions.

TABLE 10-8
Surface Types on the Projected Development Sites – Future With-Action Condition

	With-Action Scenario (Project + No-Action Scenario)					
	Weighted Runoff Coefficient, C					
	Surface Type	**Roof[2]**	**Pavement and Walks**	**Other[3]**	**Grass and Softscape**	**TOTAL**
North River WPCP (NR-056)	**Area (%)**	71%	26%	0%	3%	100%
	Surface Area (SF)	62,889	22,731	0	2,526	88,146
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.94
North River WPCP (NR-043)	**Area (%)**	66%	32%	0%	3%	100%
	Surface Area (SF)	146,301	70,622	0	6,136	223,059
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.93
Wards Island WPCP (WIM-046)	**Area (%)**	61%	37%	0%	2%	100%
	Surface Area (SF)	17,655	10,801	0	673	29,129
	Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.93

Notes:
1. Runoff coefficients for each surface type are as per NYCDEP.
2. Total roof areas on site.
3. Identify other surfaces on site and obtain runoff coefficients from NYCDEP.

Table 10-9 shows the estimated combined flow volumes (stormwater runoff and sanitary flows) to the combined sewer system. As shown above, depending on the rainfall volume and duration, the total volume to the combined sewer system could be between 0.00 to 0.48 MG within the North River WPCP and 0.00 to 0.06 MG within the Ward's Island WPCP (a total of 0.00 to 0.54 MG).

TABLE 10-9
Combined Stormwater Runoff and Wastewater Generation Flow Volumes to Combined Sewer System in the Proposed Rezoning Area – Future With-Action Condition

	Storm Event Type	**Rainfall (Inches)**	**Duration (Hours)**	**Total Area (Acres)**	**Weighted Runoff Coefficient**	**Stormwater to CSS (MG)**	**Sanitary to CSS (MG)**	**Total Volume to CSS (MG)**
North River WPCP (NR-056)		0.00	3.80	2.02	0.94	0.00	0.02	0.02
	3-Month	0.40	3.80	2.02	0.94	0.02	0.03	0.05
	6-Month	1.20	11.30	2.02	0.94	0.06	0.07	0.13
	12-Month	2.50	19.50	2.02	0.94	0.13	0.12	0.25
North River WPCP (NR-043)		0.00	3.80	5.12	0.93	0.00	0.04	0.04
	3-Month	0.40	3.80	5.12	0.93	0.05	0.04	0.09
	6-Month	1.20	11.30	5.12	0.93	0.16	0.10	0.26
	12-Month	2.50	19.50	5.12	0.93	0.32	0.19	0.51
Wards Island WPCP (WIM-046)		0.00	3.80	0.67	0.93	0.00	0.01	0.01
	3-Month	0.40	3.80	0.67	0.93	0.01	0.01	0.01
	6-Month	1.20	11.30	0.67	0.93	0.02	0.02	0.04
	12-Month	2.50	19.50	0.67	0.93	0.04	0.04	0.08

Table 10-10 shows the incremental difference between existing conditions and with-action conditions. As shown above, the Proposed Action would result in an incremental increase of approximately 0.01 to 0.14 MG depending on the rainfall volume and duration. The corresponding percent change in flow volumes to the combined sewer system over existing conditions is also shown below.

TABLE 10-10
Incremental Increase in Combined Stormwater Runoff and Wastewater Generation Flow Volumes to Combined Sewer System in the Proposed Rezoning Area

Subcatchment Area	Rainfall Volume (Inches)*	Rainfall Duration (Hours)*	Total Volume to Combined Sewer System (MG)			Percent Change (%)
			Existing Conditions	With-Action Conditions	Increment	
NR-056	0.00	3.80	0.01	0.03	0.02	199.9
	0.40	3.80	0.03	0.05	0.02	66.6
	1.20	11.30	0.08	0.13	0.05	62.5
	2.50	19.50	0.15	0.26	0.11	73.3
NR-043	0.00	3.80	0.01	0.04	0.03	300.0
	0.40	3.80	0.06	0.09	0.03	50.0
	1.20	11.30	0.18	0.27	0.09	50.0
	2.50	19.50	0.36	0.50	0.14	38.8
WIM-046	0.00	3.80	0.00	0.01	0.01	100.0
	0.40	3.80	0.01	0.02	0.01	100.0
	1.20	11.30	0.03	0.04	0.01	33.3
	2.50	19.50	0.05	0.08	0.03	60.0

Notes:
MG = million gallons
* Based on information provided by NYCDEP.

New flows would be introduced to the combined sewer system as a result of the Proposed Action. These increased volumes and flows would be conveyed partially to the North River WPCP and partially to the Ward's Island WPCP, or discharged directly to the Hudson or Bronx Rivers, dependent on the storm event. As indicated above, regulator N-23 corresponds with subcatchment area NR-043 and regulator WIM-46 corresponds with subcatchment area WIM-046. Any developments resulting from the proposed rezoning in those subcatchment areas would also affect these regulators.

As noted previously, NYCDEP requires substantial 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 stormwater discharge from private development sites in the future with the Proposed Actions, as these new developments would be required to incorporate stormwater detention or retention measures such as green roofs, blue roofs or seepage basins to handle stormwater runoff from the developed site.

NYCDEP amended Chapter 31 of Title 15 of the Rules of the City of New York (RCNY), the existing rules governing house and site connections to the city's sewer system. The rule amendment modifies the flow rate of stormwater to the city's combined sewer system for new and existing development, as part of sewer availability and connection approvals, and applies to development lots where new buildings or alterations of existing buildings that would result in an expansion of building footprint or impervious surfaces are proposed. The rule was promulgated on January 4, 2012 and goes into effect on July 4, 2012. For a new development, the Stormwater Release Rate will be the greater of 0.25 cubic feet per second

(cfs) or 10% of the Allowable Flow, unless the Allowable Flow is less than 0.25 cfs, in which case the Stormwater Release Rate shall be the Allowable Flow. For Alterations, the Stormwater Release Rate for the altered area will be directly proportional to the ratio of the altered area to the total site area and no new points of discharge are permitted.

Therefore, any developments or alternations under the proposed rezoning requiring a connection to the sewer system beginning July 4, 2012 would be required to achieve the new flow rate. Flexibility in achieving this rate is provided to the development community through a variety of approvable systems including subsurface and rooftop systems. Joint DEP and New York City Department of Buildings (DOB) guidelines (http://www.nyc.gov/html/dep/html/stormwater/ stormwater_management_construction .shtml) are available to ensure the proper design and construction of approvable systems and encourage design professionals to include onsite source controls in the early stages of site planning and building design. This performance standard allows for a wide range of management techniques, costs and space considerations.

Self-certification of house or site connection proposals will not be permitted by the Department of Buildings or NYCDEP in connection with any proposed new developments or expansions of existing development as per the Rules of the City of New York, Title 15, Chapter 31, "Rule Governing House / Site Connections to the Sewer System." 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. At this time, there are no plans to amend the drainage plan for the proposed affected area or upgrade the affected sewer system. To be issued a permit to connect to a city sewer within the proposed rezoning area, an applicant proposing a new development or expansion of an existing development would be required to submit a site-specific hydraulic analysis to NYCDEP for review and approval. The site-specific hydraulic analysis would establish the adequacy of the existing combined sewer system that would serve the development lot. Based on this site-specific hydraulic analysis, sewer improvements, incorporation of a variety of the BMPs, may be required of the applicant at the time of the house or site connection proposal.

A Best Management Practices (BMPs) concept plan has been developed and is included as Appendix D. A variety of BMPs that could potentially be implemented are discussed in the Appendix for each of the proposed zoning districts. Additionally, the following section includes a general discussion of some BMPs that could be implemented on development lots within the rezoning area to incorporate on-site stormwater source controls during site planning and building design phases of project development.

Stormwater Best Management Practices

As indicated in the BMP concept plan, the following BMPs could be implemented on the development lots within the proposed rezoning area to facilitate stormwater source controls during site planning and building design phases of the projected developments to limit the stormwater release rate to 0.25 cfs or 10 percent of the allowable flow per the drainage plan, whichever is greater.

The increased flows to the combined sewer within the affected CSO subcatchment areas is a direct result of the increased densities and sanitary flows associated with the Proposed Action. The implementation of low-flow fixtures, as per the New York City Plumbing Code, Local Law 33 of 2007 and the US Environmental Protection Agency's WaterSense Program, will help to control sanitary flows. To further offset these increases, onsite stormwater source controls or BMPs would be implemented to retain or slowly release stormwater runoff with controlled discharge rates to the city's combined sewer system.

Enhanced stormwater management throughout the city is consistent with recent policies including the *NYC Green Infrastructure Plan* and Mayor Bloomberg's *PlaNYC 2030* and *Sustainable Stormwater Management Plan*. The *NYC Green Infrastructure Plan*, released September 2010, includes a goal of capturing the first inch of rainfall on 10 percent of the impervious areas in combined sewer watersheds through detention or infiltration techniques over 20 years.

The typical BMP measures described below would help to avoid an exacerbation of existing CSOs discharged to the Hudson River and the Bronx River. These measures include the implementation of BMPs described in the NYC Green Infrastructure Plan, including blue and green roofs, and could potentially also include subsurface detention, porous pavement, enhanced tree pits, rain gardens or infiltration swales and rain cisterns if site conditions allow for such measures.

For each projected development site, the developer would be required to incorporate BMPs to limit stormwater to 0.25 cfs (or 10 percent of the allowable flow, whichever is greater) from the site to the sewer system. To achieve this release rate, stormwater would be managed by utilizing one or more detention or infiltration techniques identified in the *NYC Green Infrastructure Plan*, which may include green roofs, blue roofs, subsurface detention and infiltration, or permeable pavement, or a combination of these green technologies. These green technologies would retain or release stormwater with slowed discharge rates to control peak runoff rates. Trees planted per NYC's street tree requirements could also be utilized to capture and store water below an enhanced tree pit.

The Proposed Action would increase flows into the city's combined sewer system that may discharge as CSOs into the Hudson River or Bronx River during rain events. Because of the available assimilative capacity of the Hudson River and Bronx River, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality.

Based on the analysis described above, conducted pursuant to *CEQR Technical Manual* methodologies, and in concert with the measures described above, it is concluded that the Proposed Action would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure with the above measures implemented by the developer of each site in conjunction with each projected development.