A. INTRODUCTION

This chapter evaluates the potential for the Proposed Project to result in significant adverse impacts on the City's water supply and wastewater and stormwater conveyance, management, and treatment infrastructure in accordance with the guidance of the 2021 *City Environmental Quality Review Technical Manual (CTM)*.

New York City's water and sewer network is fundamental to the operation, health, safety, and quality of life of the City and its surrounding environment, and it must be sized to fit the City's users and surface conditions in order to function adequately. Ensuring these systems have adequate capacity to accommodate land use or density changes and new development is critical to avoiding environmental and health problems such as sewer back-ups, street flooding, or pressure reductions.

As discussed in **Chapter 02.0, "Project Alternatives,"** there are four feasible alternatives under consideration for implementation of the Proposed Project. These include: Alternative 2 – the Rezoning Alternative, which has been identified as the Preferred Alternative and is referred to by the latter term for the remainder of this chapter; Alternative 3 – the Non-Rezoning Alternative; Alternative 4 – the Midblock Bulk Alternative; and Alternative 7 – the City of Yes (COY) Alternative. A discussion of Alternative 5 – the Rehabilitation and Infill Alternative, which has been determined to be infeasible, is presented in **Chapter 05.22, "Rehabilitation and Infill Alternative Analysis."** Refer to **Chapter 04.0, "Analysis Framework," Table 04.0-4,** for information on the analysis approach for the four feasible alternatives for each technical area.

B. PRINCIPAL CONCLUSIONS

No significant adverse impact on the City's water supply, wastewater and stormwater conveyance and treatment infrastructure are anticipated as a result of the Preferred Alternative, Non-Rezoning Alternative, Midblock Bulk Alternative, and COY Alternative pursuant to applicable guidance and methodologies. Refer to **Section E, "Environmental Effects,"** for further information.

C. METHODOLOGY

According to the *CTM*, a preliminary water supply infrastructure analysis is needed if a project would result in an exceptionally large demand for water (e.g., more than one mgd) or is located in an area that experiences low water pressure (e.g., areas at the end of the water supply distribution system). As the Proposed Project would not generate more than one million gpd of incremental water demand under any of the development alternatives, and the Project Sites are not located in an area that experiences low water pressure, an analysis is not warranted. However, water demand estimates are provided in this chapter to inform the wastewater and stormwater conveyance and treatment analysis.

For wastewater and stormwater conveyance and treatment, the *CTM* indicates that a preliminary assessment would be needed if a project is located in a combined sewer area and would exceed the following incremental development of residential units or commercial space above the predicted No-Action Alternative: (a) 1,000 residential units or 250,000 square feet (sf) of commercial space or more in Manhattan; or (b) 400 residential units or 150,000 sf of commercial space or more in the Bronx, Brooklyn, Staten Island, or Queens. As the Proposed Project is located in a combined sewer area and would result in a net increase of more than 1,000 residential units under all four development alternatives, a preliminary assessment of wastewater and stormwater infrastructure is provided.

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

- Describes the existing water and sewer infrastructure serving the Project Sites and estimates water demand and sewage and stormwater generation under existing conditions and in the No-Action Alternative (for the 2041 Analysis Year). Existing and future water demands for the existing and future Project Sites uses are based on information provided in the *CTM*. Stormwater runoff and sanitary flows are calculated using the New York City Department of Environmental Protection (DEP) Flow Calculation Matrix.
- Describes relevant planned infrastructure improvements including the affected area, project components, and current schedules.
- Forecasts water demand and sewage and stormwater generated by the Proposed Project and RWCDS based on *CTM* guidelines.
- Assesses the effects of the Proposed Project's water demand and sewage and stormwater generation on the City's water and sewer infrastructure, pursuant to *CTM* guidelines.

D. AFFECTED ENVIRONMENT

Regulatory Context

Unified Stormwater Rule

In 2012, DEP promulgated a stormwater rule for new and redevelopment projects in combined sewer areas (2012 Stormwater Rule).[1] The 2012 Stormwater Rule reduced peak discharges to the city's sewer system during rain events by requiring greater on-site storage of stormwater runoff and slower release to the sewer system.

After ten years of implementing the NYC Green Infrastructure Program, DEP updated on-site stormwater management requirements to apply lessons learned in designing, siting and constructing over 10,000 green infrastructure practices. DEP proposed amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York (RCNY) as part of a Unified Stormwater Rule. The Unified Stormwater Rule, issued February 15, 2022 and administered

[1] New York City Department of Environmental Protection, *Rule Governing House/Site Connections to the Sewer System* (New York, 2012). https://www.nyc.gov/assets/dep/downloads/pdf/about/water-and-sewer-forms/rules-of-the-city-of-new-york/title-15-rules-city-new-york-chapter-31-rule-governing-house-site-connections-sewer-system.pdf

citywide, updates and aligns Chapter 31 stormwater quantity and flow rate requirements with Chapter 19.1 Construction/Post-Construction permitting program water quality requirements. Under Chapter 31 amendments, the Unified Stormwater Rule increases the amount of stormwater required to be managed on-site and further restricts the release rates for all new and redevelopment projects that require a DEP House or Site Connection Proposal. The maximum allowable stormwater release rate from the site to the DEP combined sewer system is now 0.1 cubic feet per second (cfs) per acre or 0.046 cfs, whichever is greater. Additionally, under Chapter 19.1 amendments, sites that disturb 20,000 square feet (sf) or more of soil or increase impervious surfaces by 5,000 sf or more are required to manage the Water Quality Volume (WQv), currently defined as 1.5", using stormwater management practices (SMPs) dictated by DEP SMP hierarchies. DEP has developed hierarchies for both combined and separate sewer areas. The SMP hierarchies prioritize vegetated retention SMPs for both drainage areas with stormwater volume control and stormwater treatment communicated as the underlying goals for combined and separate sewer areas, respectively. The priority level of each SMP group is indicated by tiers with different colors, where the darker shades of green indicate higher tier SMPs. A new New York City Stormwater Manual has been issued to accompany the Unified Stormwater Rule to provide clear guidance on requirements and design options. While enforcing more rigorous stormwater quantity and flow rate requirements, the Manual (15 RCNY § 19.1, Appendix) allows for increased flexibility in stormwater management design options to apply a wide range of potential configurations that may be necessary to accommodate various site constraints.[2] These new requirements are in effect in the existing condition and are expected to remain in effect in the 2041 analysis year.

The Unified Stormwater Rule is expected to lead to a substantial improvement in the way that individual new and redeveloped properties manage stormwater compared to the 2012 Stormwater Rule. In some cases, stormwater will be entirely prevented from entering the city sewer system through retention and, in most cases, stormwater that does enter the system will be reduced and/or treated and released at a much slower rate, allowing the system to operate more efficiently during peak wet weather events. In combined sewersheds, the Unified Stormwater Rule is expected to lead to a reduction in combined sewer overflow (CSO) volume as more lots redevelop over time. The Unified Stormwater Rule is presented as part of this analysis due to the cumulative benefits in CSO volume reduction resulting from lots that are expected to be redeveloped, and therefore would be subject to the updated on-site stormwater management requirements, as part of the Proposed Project. The Unified Stormwater Rule would not apply in the No-Action Alternative, since no new development would occur within the Project Sites. Given that the Unified Stormwater Rule is independent from the Proposed Project, the Rule is additionally described in **Section E** below. More details on the Unified Stormwater Rule and forthcoming outreach can be found on DEP's website: https://www1.nyc.gov/site/dep/water/unified-stormwater-rule.page.

[2] New York City Department of Environmental Protection, *New York City Stormwater Manual (*Appendix to Chapter 19.1 of Title 15 of the Rules of the City of New York)*, (New York, 2024). https://www.nyc.gov/assets/dep/downloads/pdf/water/stormwater/unified-stormwater-rule/uswr_nyc_stormwater_manual.pdf

Stormwater Pollution Prevention Plans (SWPPPs)

To fulfill the requirements of the Unified Stormwater Rule, any development in New York City, public or private, that either disturbs 20,000 sf or more of soil or creates 5,000 sf or more new impervious area is required to prepare a Stormwater Pollution Prevention Plan (SWPPP). A SWPPP is a plan for controlling stormwater runoff and pollutants during the construction and post-construction phases. It identifies potential sources of pollution which may reasonably be expected to affect the quality of stormwater discharges. In addition, the SWPPP describes and ensures the implementation of practices which would be used to reduce the pollutants in stormwater discharges and to assure compliance with the terms and conditions of a State Pollutant Discharge Elimination System (SPDES) permit. For the construction phase of the project, SWPPPs must include erosion and sediment controls, with fully designed and engineered stormwater management practices with all necessary maps, plans and construction drawings. SWPPPs are prepared in accordance with applicable permit requirements for stormwater management as outlined in the New York City Stormwater Manual (SWM) published by the NYCDEP; the SWPPP must be reviewed and approved by the NYCDEP in order for a Stormwater Construction Permit to be issued. This process provides standards to ensure that stormwater discharges from certain construction activities do not degrade water quality of the City's water supply.

To ensure long-term water quality, runoff reduction, and no net increase (NNI) resulting from development, the SWPPP must also identify all post construction SMPs to be constructed as part of the proposed project. Potential SMPs to achieve compliance with SWPPP requirements include gravel bed, perforated pipe, stormwater chamber, storage vault, filtration, infiltration, evapotranspiration, reuse, and detention systems. The SWPPP must also identify appropriate maintenance measures to ensure proper upkeep of any identified SMPs.

New York City Plumbing Code (Local Law 33 of 2007, as Amended)

The New York City Plumbing Code, established in Local Law 33 of 2007 and as amended subsequently, applies to the erection, installation, alteration, repair, relocation, replacement, addition to, use or maintenance of plumbing systems. As indicated in the Code, its purpose is to provide minimum standards to safeguard life or limb, health, property, public welfare and the environment by regulating and controlling the design, construction, installation, quality of materials, location, operation and maintenance or use of plumbing systems.

Water Supply

The Proposed Project is expected to generate an incremental water demand of less than 1 mgd, which is below the level of significance per *CTM* guidance.[3] As such, a detailed water supply analysis is not warranted for the Proposed Project. However, a description of water infrastructure serving the Project Sites and calculations of site-generated water demand under existing, No-

[3] The Proposed Project's incremental water demand is 629,998 gpd. This was calculated using standard rates for water demand based on the number of residents, daycare seats, and square footages of the various uses included as part of the Proposed Project under the Preferred Alternative or Midblock Bulk Alternative; it would be lower under the Non-Rezoning Alternative.

Action, and conditions as a result of the Proposed Project are provided for informational purposes and to provide context for the other analyses in this chapter.

As shown in **Figure 05.10-1**, the New York City water supply enters the City via City Tunnel No. 1, which runs through the Bronx, Manhattan, and Queens, and City Tunnel No. 2, which runs through the Bronx, Queens, and Brooklyn. Work on the mostly complete City Tunnel No. 3, serving the Bronx, Manhattan, Brooklyn and Queens is expected to be finished in 2032. Staten Island obtains its water via the Richmond Tunnel, which is an extension of City Tunnel No. 2 and is backed up by the Staten Island Siphon activated in 2016.

Once in the City, the three aqueducts distribute water into a network of water mains. Water mains up to 96 inches in diameter feed the smaller mains, which deliver water to their final destination. Water conservation measures taken by DEP in the 1990s have resulted in a steady reduction in the City's overall water demand over the last 20 years. As of 2021, the in-City water consumption totaled approximately 1,000 mgd.[4]

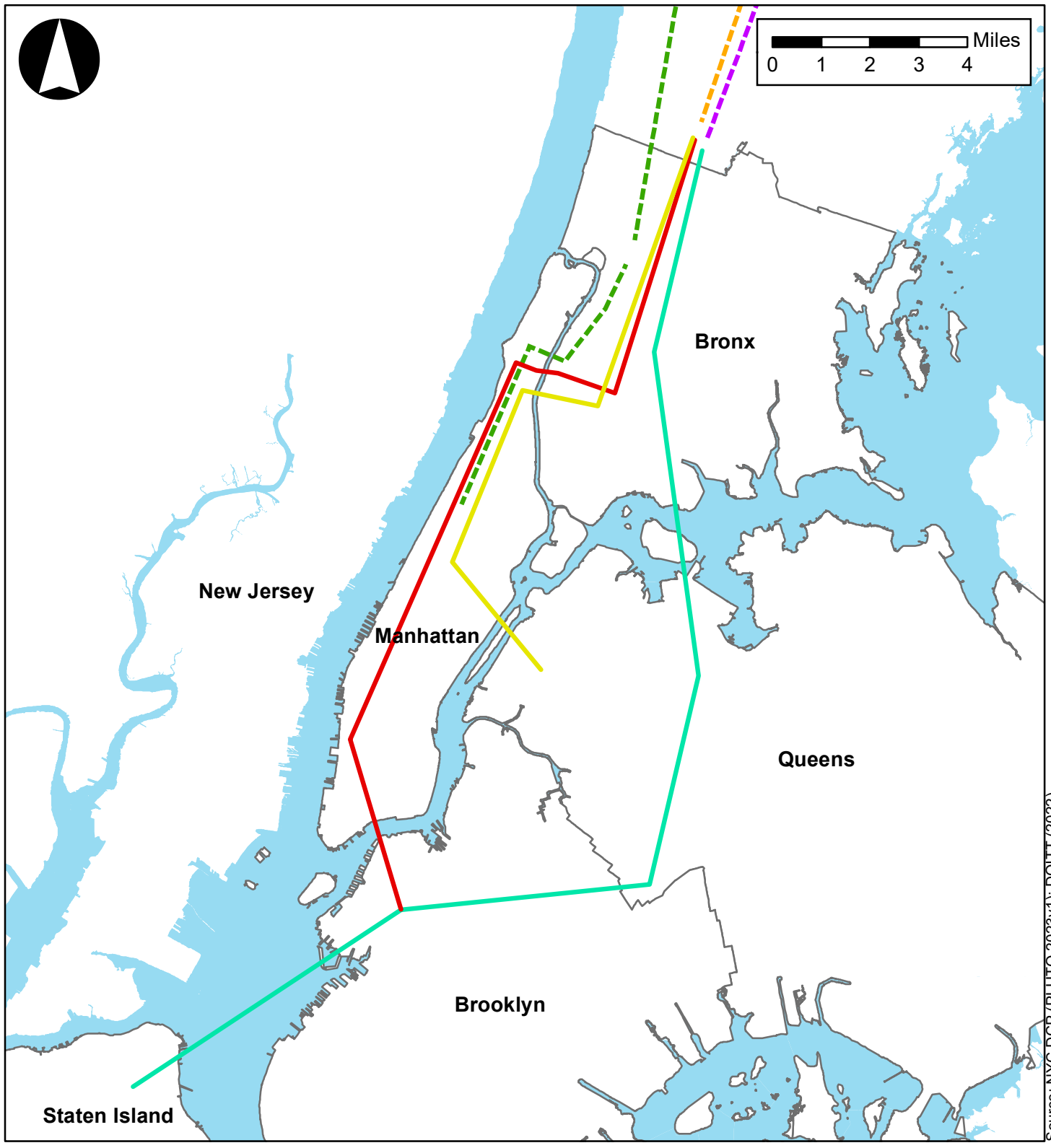
Schematic plans of the water supply system serving the Project Sites were obtained from the DEP Bureau of Water and Sewer Operations (BWSO) in August 2023. Based on the information in these plans, a summary of the water supply infrastructure serving the Project Sites is presented below.

The Fulton Houses Project Site is served by three water mains beneath 9th Avenue. There is one 24-inch water main with Cast Iron Pipe (CIP) construction which was built in 1870 and includes eccentric regulators and valves; it connects to standard hydrants along the western sidewalk of 9th Avenue. There is also a 36-inch CIP water main which was built in 1907, and a 12-inch CIP water main also built in 1907 that features valves and one regulator at W. 19th Street; this 12-inch main connects to standard hydrants along the eastern sidewalk of 9th Avenue. The Fulton Houses Project Site is also served by two mains under 10th Avenue. There is a 20-inch Lined Cast Iron Pipe (LCP) main constructed in 1951 with valves, one regulator at W. 19th Street, and standard and breakaway hydrants along the eastern sidewalk of 10th Avenue. There is also a 12-inch CIP main constructed in 1878 that features valves and a single regulator at W. 18th Street, connecting to standard and breakaway hydrants along the western side of 10th Avenue. Also serving the Fulton Houses Project Site are water mains running along W. 16th, 17th, 18th, 19th, and 20th Streets between 9th and 10th Avenues. Under W. 16th Street, there is a 20-inch LCP main constructed in 1930 with valves and connections to standard hydrants on both sides of the street. Under W. 17th Street, there is a 12-inch LCP main constructed in 1962 with valves and connections to standard hydrants on both sides of the street. Under W. 18th Street, there is a 12-inch LCP main constructed in 1940 with valves and connections to standard hydrants on both sides of the street. Under W. 19th Street, there is a 12-inch LCP main constructed in 1958 with valves and connections to standard hydrants on both sides of the street. Under W. 20th Street, there is a 20-inch LCP main constructed in 1939 with valves and connections to standard hydrants on both sides of the street.

The Elliott-Chelsea Houses Project Site is also served by the same three water mains under 9th Avenue that serve the Fulton Houses Project Site as described above: 24-inch, 36-inch, and 12-

[4] Water Consumption in the City of New York (website), NYC Open Data. https://data.cityofnewyork.us/Environment/Water-Consumption-in-the-City-of-New-York/ia2d-e54m/about_data

New York City Water Supply Aqueducts and Tunnels



Legend

Aqueducts and Tunnels

- Catskill Aqueduct and Tunnels
- Delaware Aqueduct and Tunnels
- Croton Aqueduct
- City Tunnel 1
- City Tunnel 2
- City Tunnel 3

inch CIP mains. Beneath 10th Avenue, the Elliott-Chelsea Houses Project Site is served by a 20-inch CIP main built in 1897 with valves and connections to standard hydrants along the eastern sidewalk of 10th Avenue, and a 12-inch CIP main built in 1878 with valves and connections to standard hydrants along the western sidewalk.

W. 25th and W. 26th Streets both have 12-inch CIP mains constructed in 1946 with valves and standard fire hydrants. W. 26th Street has three DEP water testing stations along the northern sidewalk. There is also a 12-inch CIP water main constructed in 1946 beneath the former roadbed of the unmapped W. 27th Street (now referred to as W. 27th Drive).

As presented in **Table 05.10-1**, the existing Project Sites are currently estimated to have a total daily water demand of 431,911 gpd, consisting of 194,073 gpd of demand from the Fulton Project Site and 237,839 gpd from the Elliott-Chelsea Project Site. Total demand across the Project Sites consists of 420,494 gpd of domestic demand and 11,417 gpd of air conditioning (A/C) demand from existing residential, child care, and neighborhood center uses.

Table 05.10-1: Existing/No-Action Alternative Project Sites Water Consumption and Wastewater Generation

Land Use	Unit	Rate[1]	Domestic Water/ Wastewater Generation (gpd)	A/C (gpd)
Fulton Houses				
Residential	1,901 residents	100 gpd/resident	190,122 gpd	
Neighborhood Center	14,634 gsf	Domestic: 0.1 gpd/sf A/C: 0.17 gpd/sf	1,463 gpd	2,488 gpd
Fulton Houses Water Consumption			**194,073 gpd**	
Fulton Houses Wastewater Generation			**191,585 gpd**	
Elliott-Chelsea Houses				
Residential	2,240 residents	100 gpd/resident	223,957 gpd	
Child care	73 seats 10,300 gsf	Domestic: 0.1 gpd/sf A/C: 0.17 gpd/sf	730 gpd	1,751 gpd
Neighborhood Center	42,255 gsf	Domestic: 0.1 gpd/sf A/C: 0.17 gpd/sf	4,223 gpd	7,178 gpd
Elliott-Chelsea Houses Water Consumption			**237,839 gpd**	
Elliott-Chelsea Houses Wastewater Generation			**228,909 gpd**	
Total Water Consumption			**431,911 gpd**	
Total Wastewater Generation			**420,494 gpd**	

Notes:
Some numbers in this and the subsequent chapter tables may appear to not sum correctly; this is due to rounding.
[1] Residential and daycare rates based on average daily water use rates provided in Table 13-2 of the *CTM* (*CEQR* school rate used to approximate daycare rate. Neighborhood Center water demand rate based on a generic community facility rate, which was used to estimate demand for the YMCA use analyzed in the *River Ring EIS (CEQR no. 21DCP157K).*

Sewer System

According to the *CTM*, wastewater is considered to include sanitary sewage, wastewater generated by industries, and stormwater. Water used for air conditioning generates a negligible amount of wastewater as it recirculates or evaporates in the cooling and heating process.

New York City's sewer system consists of a grid of sewers beneath the streets that send wastewater flows to fourteen different Wastewater Resource Recovery Facilities (WRRFs). The City's WRRFs are regulated by the NYSDEC, which issues permits regulating the discharge of treated effluent. Combined, all fourteen WRRFs in New York City have a SPDES permitted total capacity of 1.8 billion gpd. The area served by each plant is called a "drainage area" or "catchment area." The majority of New York City's sewers are combined sewers, since they receive both sanitary wastewater and stormwater runoff. During wet weather, large volumes of rainfall runoff enter the combined system through storm drains and catch basins in streets and mix with sanitary sewage, then flow through regulators (relief valves), before being sent to the WRRFs through interceptor sewers. During such wet-weather events, excessive volumes of stormwater runoff (ten to 50 times the dry-weather flow) can enter the combined sewer system and, if transported to the WRRF, could exceed the treatment design capacity. Flow into the interceptor sewers are controlled by regulators along the length of the interceptor sewers. The purpose of the regulators is to divert sanitary flow from the existing combined sewers to the interceptor sewers during normal flow periods (dry weather) and limit the flow to the interceptor sewers to twice the dry weather flow during storm periods (wet weather). The existing tide gates placed on the CSOs downstream of the regulators are designed to keep tidal water from entering the existing combined sewers and the interceptor sewers. Tide gates can be part of the regulator structure or stand-alone chambers. The New York City wastewater treatment system currently treats approximately 1.3 billion gpd of municipal wastewater and a portion of combined sewer flow during wet weather events.

Sanitary sewers can be one to two feet in diameter on side streets and three or four feet in diameter under larger roadways. They connect to trunk sewers, which are generally five to seven feet in diameter. The description of the sewer infrastructure in the vicinity of the Project Sites, below, is based on schematic plans received from the DEP BWSO in August 2023.

The wastewater collection system in the immediate vicinity of the Fulton Houses Project Site consists of a 54-inch circular combined sewer of unknown material running under W. 19th Street, a 96-inch by 72-inch flat-top combined sewer made of reinforced concrete under W. 18th Street, a 29-inch by 43-inch egg-shaped combined sewer made of brick under W. 17th Street, a 32-inch by 48-inch egg-shaped combined sewer of unknown material under W. 16th Street, and a 32-inch by 48-inch combined sewer under 9th Avenue south of W. 17th Street. There are several small (12-inch to 15-inch) sewer lines along 9th and 10th Avenues that drain into the trunk sewers that flow along W. 16th, 17th, 18th, and 19th Streets (described above). These trunk sewers run from east to west, where they drain into an interceptor sewer that runs from south to north and terminates at the North River WRRF. The sewer under W. 17th Street was constructed in 1871, the sewer under W. 18th Street was constructed in 1940, and the sewers along 9th and 10th Avenues were constructed between 1873 and 1899. Construction dates for the other sewers in the vicinity of the Fulton Houses Project Site are unknown.

The wastewater collection system serving the Elliott-Chelsea Houses Project Site consists of a circular, reinforced concrete pipe 15-inch combined sewer (constructed in 2002) under the unmapped former roadbed of W. 27th Street (now known as W. 27th Drive), a 60-inch circular combined sewer of unknown material (constructed in 1899) under W. 26th Street, a 48-inch by 32-inch horizontal elliptical combined sewer of unknown material constructed at an unknown date under W. 25th Street, and one 12-inch (constructed in 1867) and one 15-inch (constructed in 1903) circular sewer, both of unknown material, under 10th Avenue. The sewer under W. 25th Street was

reconstructed in 2017 with shotcrete. There is also a chamber under 10th Avenue at the intersection with W. 27th Street. The trunk sewers under W. 25th, W. 26th, and W. 27th Streets run from east to west, where they drain into an interceptor sewer that runs from south to north and terminates at the North River WRRF.

As shown in **Figure 05.10-2**, according to data from NYC DEP the Project Sites is located within the service area, aka sewershed, of the North River WRRF, which treats wastewater from an approximately 5,500-acre area located along the west side of Manhattan. The North River WRRF has been operating since 1986 and has a SPDES permitted dry weather capacity of 170 mgd. As presented in **Table 05.10-2**, through a 12-month running period ending in July 2023, the North River WRRF handled an average of 113 mgd of flows, which is less than the facility's permitted capacity of 170 mgd.

Table 05.10-2: Existing North River WRRF Average Daily Sewer Flows

Year	Month	Average Daily Flows (mgd)
2023	June	103
2023	July	112
2023	August	112
2023	September	131
2023	October	111
2023	November	106
2023	December	117
2024	January	116
2024	February	105
2024	March	119
2024	April	110
2024	May	110
	12-Month Average	113

Source: DEP "Monthly Operating Efficiency (2023) and (May 2024)" tables.

Sanitary Flows (Dry Weather)

For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated by the Project Sites except water used by air conditioning, which is typically not discharged to the sewer system. As shown on **Table 05.10-1** and noted above, the total estimated sanitary sewage generated within the Project Sites under existing conditions is 431,911 gpd.

Stormwater Flows (Wet Weather)

Table 05.10-3 describes the surfaces, surface areas, and the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff) for each surface type present in the Project Sites. Based on existing site plans provided by the project surveyor, and as indicated in **Table 05.10-3**, the Project Sites are comprised of a mix of roof area, pavement, and landscaped area. Based on the existing Project Sites surface types, the weighted runoff coefficient for the Fulton

Project Sites Sewershed

Source: NYC DCP (PLUTO 2023v1); DOITT (2022)

Legend

- Elliott-Chelsea Houses
- Fulton Houses
- Sewershed

Houses Project Site is 0.78, and the weighted runoff coefficient for the Elliott-Chelsea Houses Project Site is 0.70.[5]

Table 05.10-3: Project Sites Surface Types and Runoff Coefficients – Existing and No-Action Alternative

Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Fulton Houses					
Area	34%	47%	0%	19%	100%
Surface Area (sf)	90,265	123,016	0	48,662	261,943
Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.20
Elliott-Chelsea Houses					
Area	29%	41%	0%	30%	100%
Surface Area (sf)	81,403	113,461	0	83,761	278,631
Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.20

Notes:
[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CTM.*

For this analysis, the runoff coefficients were used to calculate the amount of stormwater runoff during a range of storm events, with rainfall averaging from 0.00 to 2.50 inches over durations of 3.80 to 19.50 hours.[6] **Table 05.10-4** shows the existing stormwater runoff for the Project Sites. As indicated in the table, the Fulton Houses Project Site currently generate between 0.03 and 0.45 mg of wet weather flows for different rainfall intensities, and the Elliott-Chelsea Houses Project Site currently generate between 0.03 and 0.46 mg of wet weather flows for different rainfall intensities.

[5] Weighted stormwater runoff coefficients are calculated using a matrix provided by DEP. The relative percentage of roof area, pavement/walkways, grass/softscape, and other surfaces are estimated based on site plans, and are then multiplied by standard runoff coefficients. The weighted average of these coefficients is then calculated to determine the total runoff coefficient.
[6] The range of rainfall amounts and durations is provided by DEP and is utilized to estimate the stormwater runoff throughout the full range of possible precipitation events.

Table 05.10-4: Project Sites Stormwater and Sanitary Sewage Flow Volumes – Existing and No-Action Alternative

Rainfall Volume (in)	Rainfall Duration (hr)	Total Area	Weighted Runoff Coefficient[1]	Runoff Volume to CSS (MG)	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)
Fulton Houses						
0.00	3.80	261,943 sf (6.01 acres)	0.78	0.00	0.03	0.03
0.40	3.80			0.05	0.03	0.08
1.20	11.30			0.15	0.08	0.23
2.50	19.50			0.32	0.13	0.45
Elliott-Chelsea Houses						
0.00	3.80	278,631 sf (6.40 acres)	0.70	0.00	0.03	0.03
0.40	3.80			0.05	0.03	0.08
1.20	11.30			0.15	0.09	0.24
2.50	19.50			0.30	0.16	0.46
Project Sites Total						
0.00	3.80	540,574 sf (12.41 acres)	0.74	0.00	0.06	0.06
0.40	3.80			0.10	0.06	0.16
1.20	11.30			0.30	0.17	0.47
2.50	19.50			0.62	0.29	0.91

Notes:
CSS = combined sewer system; MG = million gallons
[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CTM.*

E. ENVIRONMENTAL EFFECTS

Alternative 1 – No-Action Alternative

Water Supply

The overall water supply system in New York City is not expected to change materially in the No-Action Alternative. In the No-Action Alternative, the Project Sites would continue to be served by the existing water mains as discussed in subsection "Water Supply" under **Section D, "Affected Environment"** above. The No-Action Alternative would be equivalent to the existing condition as presented in **Section D.** As presented above in **Table 05.10-1**, the developments within the Project Sites in the No-Action Alternative are estimated to have a total daily water demand of 431,911 gpd, consisting of 194,073 gpd of demand from the Fulton Houses Project Site and 237,839 gpd from the Elliott-Chelsea Houses Project Site.

Sewer System

Sanitary Flows (Dry Weather)

It is anticipated that the Project Sites would remain within the mapped service area of the North River WRRF in the No-Action Alternative. As presented in **Table 05.10-1** and described above, no changes to the existing developments in the Project Sites are expected to occur in the No-Action Alternative. As such, the No-Action Alternative's sanitary sewage generation is expected to be equivalent to existing sewage generation of approximately 420,494 gpd of sanitary sewage.

Stormwater Flows (Wet Weather)

In the No-Action Alternative, no changes in the type or amount of surface coverage (i.e., roof area, paved area, and landscaped area) in the Project Sites are expected as compared to the existing conditions. As such, the weighted runoff coefficient for the Fulton Houses Project Site would remain at 0.78, and the weighted runoff coefficient for the Elliott-Chelsea Houses Project Site would remain at 0.70. Refer to **Table 05.10-3** above, for the Project Sites Surface Types and Runoff Coefficients under the No-Action Alternative.

As shown in **Table 05.10-4**, above, the Fulton Houses Project Site would continue to generate between 0.03 and 0.45 mg of wet weather flows for different rainfall intensities, and the Elliott-Chelsea Houses Project Site would continue to generate between 0.03 and 0.46 mg of wet weather flows depending on rainfall duration and volume.

Alternative 2 – Preferred Alternative and Alternative 4 – Midblock Bulk Alternative

Water Supply

The Preferred Alternative and the Midblock Bulk Alternative would generate identical amounts of incremental demand on the DEP water supply system over the No-Action Alternative (see **Table 05.10-5**). As indicated in the table, the Preferred Alternative and the Midblock Bulk Alternative would each generate a total incremental water demand of approximately 629,998 gpd, consisting of an increment of 323,307 gpd of demand over the No-Action Alternative at the Fulton Houses Project Site, and an increment of 306,692 gpd of demand at the Elliott-Chelsea Houses Project Site. The total incremental demand represents approximately 0.06 percent of the approximately one billion gallons of water supplied daily to New York City by DEP. These estimated demands include water for both domestic uses and air conditioning systems.

As discussed above, the Project Sites would continue to be served by served by the existing water mains as discussed in subsection "Water Supply" under **Section D.** Existing infrastructure would be capable to handle the estimated increase in water demand generated by the Preferred Alternative or Midblock Bulk Alternative, given that each of these alternatives would generate an incremental demand of less than 1 million gpd (the *CTM* threshold for conducting a preliminary analysis). As such, given the relatively minor incremental increase in water consumption (as compared to city-wide demand) and the Project Sites' location in areas well-served by water infrastructure, neither

the Preferred Alternative nor the Midblock Bulk Alternative are expected to adversely affect the City's water supply or system water pressure.

Sewer System

Sanitary Flows (Dry Weather)

As indicated in **Table 05.10-5**, below, the estimated total amount of sanitary sewage generated by the Preferred Alternative and the Midblock Bulk Alternative would each be 1,022,925 gpd, an increment of 602,431 gpd (0.61 mgd) over the No-Action Alternative. Sewage generation would consist of 517,380 gpd at the Fulton Houses Project Site, and 544,530 gpd at the Elliott-Chelsea Houses Project Site. The incremental increase over the No-Action Alternative would represent approximately 0.5 percent of the average daily flow of 113 mgd at the North River WRRF (refer to **Table 05.10-2,** above) and would not result in an exceedance of the plant's permitted capacity of 170 mgd. In addition, per the New York City Plumbing Code (Local Law 33 of 2007, as amended), low-flow fixtures would be required to be implemented, which would help to reduce sanitary flows from the Project Sites for any of the development alternatives.

Table 05.10-5: Expected Project Sites Water Demand – No-Action Alternative vs. Preferred Alternative/ Midblock Bulk Alternative

	Land Use	Area/Population	Domestic Use (gpd)[1]	A/C (gpd)[1]
Existing/ No-Action Alternative	**Fulton Houses**			
	Residential	1,901 residents	190,122 gpd	-
	Neighborhood Center	14,634 gsf	1,463 gpd	2,488 gpd
	Fulton No-Action Alternative Water Consumption		**194,073 gpd**	
	Fulton No-Action Alternative Wastewater Generation		**191,585 gpd**	
	Elliott-Chelsea Houses			
	Residential	2,240 residents	223,957 gpd	-
	Daycare	10,300 gsf 73 seats	730 gpd	1,751 gpd
	Neighborhood Center	42,255 gsf	4,223 gpd	7,178 gpd
	Elliott-Chelsea No-Action Alternative Water Consumption		**237,839 gpd**	
	Elliott-Chelsea No-Action Alternative Wastewater Generation		**228,909 gpd**	
	Total No-Action Alternative Water Consumption		**431,911 gpd**	
	Total No-Action Alternative Wastewater Generation		**420,494 gpd**	
	Land Use	**Area/Population**	**Domestic Use (gpd)[1]**	**A/C (gpd)[1]**
Preferred Alternative/ Midblock Bulk Alternative	**Fulton Houses**			
	Residential	4,905 residents	490,506 gpd	-
	Daycare	9,770 gsf 42 seats	420 gpd	1,661 gpd
	Neighborhood Center	53,939 gsf	5,394 gpd	9,170 gpd
	Healthcare	2,500 gsf	250 gpd	425 gpd
	Retail	23,304 gsf	5,593 gpd	3,920 gpd
	Fulton Preferred/Midblock Bulk Alternative Water Consumption		**502,162 gpd**	
	Fulton Preferred/Midblock Bulk Alternative Wastewater Generation		**517,380 gpd**	
	Elliott-Chelsea Houses			
	Residential	5,038 residents	503,845 gpd	-
	Daycare	8,215 gsf 53 seats	530 gpd	1,397 gpd
	Neighborhood Center	97,249 gsf	9,725 gpd	16,532 gpd
	Healthcare	11,285 gsf	1,129 gpd	1,918 gpd
	Elliott-Chelsea Preferred/Midblock Bulk Alternative Water Consumption		**520,763 gpd**	
	Elliott-Chelsea Preferred/Midblock Bulk Alternative Wastewater Generation		**544,530 gpd**	
	Total Preferred/Midblock Bulk Alternative Water Consumption		**1,061,910 gpd**	
	Total Preferred/Midblock Bulk Alternative Wastewater Generation		**1,022,925 gpd**	
Increment	***Fulton Increment Water Consumption***		**323,307 gpd**	
	Fulton Increment Wastewater Generation		**310,577 gpd**	
	Elliott-Chelsea Increment Water Consumption		**306,692 gpd**	
	Elliott-Chelsea Increment Wastewater Generation		**291,853 gpd**	
	Total Increment Water Consumption		**629,998 gpd**	
	Total Increment Wastewater Generation		**602,431 gpd**	

Notes:

[1] Residential and retail rates based on average daily water use rates provided in Table 13-2 of the *CTM*. Neighborhood Center water demand rate based on a generic community facility rate, which was used to estimate demand for the YMCA use analyzed in the *River Ring EIS (CEQR no. 21DCP157K.* Healthcare water demand rate based on a generic community facility water demand rate which was used to estimate demand for community facility uses including a medical office analyzed in the *Innovation QNS EIS (CEQR no. 21DCP180Q).*

Site Connection Proposal and Regulatory Requirements

Connecting to the City's sewer system requires certification from DEP as part of the building permit process, which is not a discretionary approval. For any of the development alternatives, the project would be required to file a Site Connection Proposal for approval from DEP to tie into the sewer system. In this process, before building permits can be issued, Site Connection Proposals must be certified for sewer availability by DEP. The project would be required to demonstrate that the existing sanitary system could handle the sanitary flows from the Proposed Project, under any of the development alternatives. Both the Preferred Alternative or the Midblock Bulk Alternative would likely result in an increase of Project Sites sanitary flow to the adjacent sewers based on the proposed buildout and estimated in accordance with the City's drainage design criteria. A hydraulic analysis of the existing sewer system would be required prior to the submittal of the Site Connection Proposal (SCP) application to determine whether the existing sewer system is capable of supporting higher density development and related increase in wastewater flow, or whether there will be a need to upgrade the existing sewer system. In addition, there would be a need to submit an amended drainage plan based on the hydraulic calculations. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007 as amended), while not accounted for in the quantitative analysis, low-flow fixtures would be required to be implemented and would help to reduce sanitary flows as a result of either the Preferred Alternative or the Midblock Bulk Alternative.

As the expected increase in dry weather flows resulting from Preferred Alternative and the Midblock Bulk Alternative represents only about 0.5 percent of the North River WRRF's average daily flow, and given that a sewer system capacity analysis and hydraulics analysis will be performed prior to the proposed DEP site connection application is approved to ensure that existing infrastructure can accommodate the increase in sanitary flows, no significant adverse impacts to sanitary flows would result.

Stormwater Flows (Wet Weather)

As presented in **Table 05.10-6**, below, based on the site plans for both the Preferred Alternative and the Midblock Bulk Alternative, compared to No-Action Alternative, both the Preferred Alternative and the Midblock Bulk Alternative would result in an increase in the amount of roof area present on both the Fulton Houses Project Site (increasing from approximately 34 percent of the total Project Site surface area to approximately 60 percent) and the Elliott-Chelsea Houses Project Site (increasing from approximately 29 percent of the total Project Site surface area to approximately 52 percent) under both alternatives. The surface area comprised of pavement and walks would decrease from approximately 47 percent to approximately 20 percent at the Fulton Houses Project Site and would decrease from approximately 41 percent to approximately 26 percent at the Elliott-Chelsea Houses Project Site. Landscaped areas would increase slightly from approximately 19 percent to approximately 20 percent of the total surface area at the Fulton Houses Project Site and would decrease from 30 percent to 22 percent at the Elliott-Chelsea Houses Project Site.

Using the surface area percentages outlined above, the DEP Flow Volume Calculation Matrix was completed for the future condition for the Preferred Alternative and the Midblock Bulk Alternative and compared to the existing/No-Action Alternative presented in **Table 05.10-4**, above. The

calculations from the Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from existing conditions to the Preferred/Midblock Bulk Alternatives, based on four rainfall volume scenarios with varying durations. The drainage analysis assumes that all stormwater runoff from the Project Sites would flow via the existing combined sewer infrastructure adjacent to the Project Sites. The summary tables, taken from the DEP Flow Volume Calculation Matrix, are presented in **Table 05.10-7**.

Table 05.10-6: Project Sites Surface Types and Runoff Coefficients – Preferred Alternative/Midblock Bulk Alternative

Surface Type	Roof	Pavement and Walks	Other	Grass and Softscape	Total
Fulton Houses					
Area	60%	20%	0%	20%	100%
Surface Area (sf)	156,474	51,975	0	53,494	261,943
Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.20
Elliott-Chelsea Houses					
Area	47%	27%	0%	27%	100%
Surface Area (sf)	144,830	71,656	0	62,145	278,631
Runoff Coefficient[1]	1.00	0.85	0.85	0.20	0.20

Note:
[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CTM.*

As shown in **Table 05.10-7**, with either the Preferred Alternative or the Midblock Bulk Alternative, approximately 0.00 to 0.67 mg of stormwater and approximately 0.16 to 0.78 mg of sanitary sewage would be conveyed to the existing combined sewers from the Project Sites, for a total of 0.16 to 1.45 mg of combined volumes to the combined sewer system (consisting of 0.08 to 0.72 mg from the Fulton Houses Project Site, and 0.08 to 0.73 mg to the Elliott-Chelsea Houses Project Site). Compared to the No-Action Alternative, the total wet weather flows from the Project Sites would increase by 0.10 to 0.54 mg, depending on rainfall duration and volume. The Flow Volume Matrix calculations presented in **Table 05.10-7** do not reflect the use of sanitary and stormwater source control Best Management Practices (BMP)s to reduce sanitary flow and stormwater runoff volumes to the combined sewer system.

Unified Stormwater Rule

As noted above in **Section D**, the newly adopted Unified Stormwater Rule is now in effect and is expected to remain in effect in the 2041 condition under the Preferred Alternative and Midblock Bulk Alternative. As described in more detail above, the Unified Stormwater Rule requires projects that disturb 20,000 sf or more of soil or add 5,000 sf or more impervious surface limit the amount of runoff into DEP combined sewer systems to 0.1 cubic feet per second (cfs) per acre or 0.046 cfs, whichever is greater. To achieve this requirement, projects must incorporate SMPs into their design, such as vegetative areas, permeable surfaces, and rainwater retention areas. As a result of these requirements, it is expected that there would be a reduction in stormwater runoff volume and flow rates from the Project Sites under the Preferred Alternative or the Midblock Bulk Alternative as compared to the No-Action Alternative. The runoff calculations presented in **Table 05.10-7** conservatively do not reflect the required reduction in stormwater from new development in the

study area due to these new on-site stormwater management regulations.[7] As noted in Chapter 31 of Title 15 of RCNY, the permissible stormwater release rate is the greater of 0.046 cubic feet per second (cfs), or 0.1 cfs per acre. These maximum release rates were selected to reduce the effects of new development on the City's sewer system and to reduce the likelihood and severity of CSO events. With the Unified Stormwater Rule setting the maximum release rates, both the Preferred Alternative and the Midblock Bulk Alternative would have a negligible effect on the City sewer system and may reduce the frequency and severity of future CSO events over the No-Action Alternative.

Table 05.10-7: Project Sites Stormwater and Sanitary Sewage Flow Volumes – Preferred Alternative/ Midblock Bulk Alternative

Rainfall Volume (in)	Rainfall Duration (hr)	Total Area	Weighted Runoff Coefficient[1]	Runoff Volume to CSS (MG)	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Incremental Volume to CSS Over No-Action Alternative (MG)[2]
Fulton Houses							
0.00	3.80	261,943 sf (6.01 acres)	0.81	0.00	0.08	0.08	+0.05
0.40	3.80			0.05	0.08	0.13	+0.05
1.20	11.30			0.16	0.22	0.38	+0.15
2.50	19.50			0.33	0.39	0.72	+0.27
Elliott-Chelsea Houses							
0.00	3.80	278,631 sf (6.40 acres)	0.78	0.00	0.08	0.08	+0.05
0.40	3.80			0.05	0.08	0.13	+0.05
1.20	11.30			0.16	0.23	0.39	+0.15
2.50	19.50			0.34	0.39	0.73	+0.27
Project Sites Total							
0.00	3.80	540,574 sf (12.41 acres)	0.79	0.00	0.16	0.16	+0.10
0.40	3.80			0.10	0.16	0.26	+0.10
1.20	11.30			0.32	0.45	0.77	+0.30
2.50	19.50			0.67	0.78	1.45	+0.54

Notes:
CSS = combined sewer system; MG = million gallons
[1] Weighted runoff coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CTM.*
[2] Refer to **Table 5.10-1**

Stormwater Best Management Practices

A broad range of BMPs could be implemented on the Project Sites to facilitate stormwater source controls and limit the stormwater release rate to the required 0.1 cfs/acre. The implementation of low-flow fixtures, as per the New York City Plumbing Code and the US Environmental Protection Agency's WaterSense Program, would help control sanitary flows.

[7] The *CTM* notes that the Unified Stormwater Rule (which was a pending proposal at the time the *CTM* was issued) would result in a reduction in combined sewer overflows and flooding. The *CTM* further noted that after the final Unified Stormwater rule is adopted, the *CTM* guidance will be updated as appropriate. Such an update was not yet published at the time this EIS was prepared.

In addition, as a NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activity (GP-0-10-001) is required for any development that would involve soil disturbance of one or more acres, the project will be required to prepare a SWPPP, which would identify stormwater BMPs to control stormwater runoff during construction. Post-construction stormwater management measures that would be integrated into either the Preferred Alternative or the Midblock Bulk Alternative as part of the SWPPP, as identified in the *New York City Green Infrastructure Plan*, could include measures such as underground detention, subsurface detention and infiltration practices, vegetated areas, solar and green roofs, porous pavement, enhanced tree pits, and rain cisterns, depending on site conditions. The design of detention tanks, green roofs, and/or other chosen stormwater control BMPs, would achieve the required overall maximum release rate of 0.1 cfs/acre.

Therefore, with the incorporation of appropriate BMPs that would be required as part of the Site Connection Proposal approval process to be reviewed and approved by DEP, and the overall volume of sanitary sewer discharge and stormwater runoff, as well as the peak stormwater runoff rate, would be substantially reduced under the Preferred Alternative and Midblock Bulk Alternative as compared to the No-Action Alternative. As the wastewater treatment capacity at the receiving WRRF and the sewer conveyance infrastructure near the Project Sites would be sufficient to handle wastewater flows that would result from either the Preferred Alternative or the Midblock Bulk Alternative, there would not be any significant adverse impacts on wastewater treatment or stormwater conveyance infrastructure under these alternatives.

Alternative 3 – Non-Rezoning Alternative and Alternative 7 – COY Alternative

As discussed in **Chapter 04.0**, given that water and sewer infrastructure is a density-based technical area in which the Preferred and Midblock Bulk Alternatives would not result in significant adverse impacts on the City's water supply, wastewater and stormwater conveyance and treatment infrastructure, a detailed analysis for the Non-Rezoning Alternative and COY Alternatives are not warranted as their development programs are smaller than the Preferred and Midblock Bulk Alternatives. The latter two alternatives represent a higher potential for environmental impacts than the Non-Rezoning Alternative or the COY Alternative. Therefore, as the Preferred Alternative and Midblock Bulk Alternative would not result in significant adverse impacts to the City's water supply, wastewater and stormwater conveyance and treatment infrastructure, there is no potential for the Non-Rezoning Alternative or the COY Alternative to result in a significant adverse impact to water and sewer infrastructure and further analysis is not warranted.