

A. INTRODUCTION

This chapter considers the potential for the proposed projects to result in a significant adverse impact to the City’s water supply and sanitary sewage and stormwater conveyance and treatment system. As described in Chapter 1, “Project Description,” the three applicants each seek separate minor modifications to the existing Two Bridges Large Scale Residential Development (LSRD) to allow for the development of three new mixed-use buildings within the Two Bridges LSRD. The three project sites—Sites 4 (4A/4B), 5, and 6A—are located in the Lower East Side neighborhood of Manhattan in Community District (CD) 3, within the boundaries of the former Two Bridges Urban Renewal Area (TBURA). According to the 2014 *City Environmental Quality Review (CEQR) Technical Manual*, projects that increase density or change drainage conditions on a large site require a water and sewer infrastructure analysis. Developments that would result in an exceptionally large demand for water (more than one million gallons per day [gpd]) or that are in an area that experiences low water pressure require an analysis of potential impacts on the water supply system. Developments in a combined sewer area in Manhattan exceeding incremental development thresholds of 1,000 residential units or 250,000 square feet (sf) of commercial, public facility, institutional and/or community facility space require an analysis of potential impacts on the wastewater and stormwater conveyance and treatment system. The project sites are in an area of Manhattan that is served by a combined sewer system, and the proposed projects would result in approximately 2,775 new residential units across the three project sites. Following the guidelines of the *CEQR Technical Manual*, an analysis of the proposed actions’ potential impacts on the City’s water supply, wastewater and stormwater conveyance and treatment system was performed.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed actions are not anticipated to result in any significant adverse impacts on the City’s water supply or wastewater and stormwater conveyance and treatment infrastructure. The proposed projects would result in an increase in water consumption and sewage generation on the project sites as compared with the No Action condition. While the proposed projects would result in an incremental water demand of 1,022,347 gpd, based on results of two hydrant flow tests conducted in the vicinity of the project sites and confirmation by the New York City Department of Environmental Protection (DEP), the proposed projects are expected to be adequately served by the existing infrastructure. Therefore, the proposed projects would not be anticipated to result in any significant adverse impacts to the City’s water supply.

While the proposed projects would generate 588,010 gpd of sanitary sewage more than in the No Action condition, this incremental increase in sewage generation would be approximately 0.12 percent of the average daily flow at the Newtown Creek Waste Water Treatment Plant (WWTP) and would not result in an exceedance of the plant’s permitted capacity. This incremental increase in volume would not be anticipated to result in a significant adverse impact on the

City's sanitary sewage treatment system, and would not exceed the capacity of the Newtown Creek WWTP.

The overall volume of stormwater runoff and the peak stormwater runoff rate from the project sites is anticipated to remain approximately the same as in existing conditions. With the incorporation of selected best management practices (BMPs), the peak stormwater runoff rates would be reduced from the future without the proposed actions and therefore would not be anticipated to have a significant impact on the downstream City combined sewer system or the City sewage treatment system.

B. METHODOLOGY

WATER SUPPLY

The *CEQR Technical Manual* recommends a preliminary water supply analysis if a project would result in an exceptionally large demand of water (over one million gpd), or is located in an area that experiences low water pressure (i.e., in an area at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). The project sites are not in an area that experiences low water pressure, however, the proposed projects would result in an incremental water demand of 1,022,347 gpd.¹ Two hydrant flow tests were recently completed by DEP within the vicinity of the project sites. The test results determined that the average water pressure was 56 pounds per square inch (psi), which is consistent with pressures typically observed in this area of Manhattan. Additionally, this average water pressure is above the minimum desired operating water pressure in Manhattan. Therefore, with the proposed projects, there would be adequate water service to meet the incremental demand, and there would be no significant adverse impacts on the City's water supply.

WASTEWATER AND STORMWATER CONVEYANCE AND TREATMENT

As described above, the project sites are in a combined sewer area in Manhattan, and the proposed projects would exceed the *CEQR Technical Manual* threshold of 1,000 residential units. Therefore, this chapter includes an analysis of the proposed projects potential impacts on the City's wastewater and stormwater conveyance and treatment system. Existing and future water demand and sanitary sewage generation are calculated based on use rates set by the *CEQR Technical Manual*.² The DEP Flow Volume Calculation Matrix is used to calculate the overall combined sanitary sewage and stormwater runoff volume discharged to the combined sewer system for four rainfall volume scenarios with varying durations. The ability of the City's sewer infrastructure to handle the anticipated demand from the proposed projects is assessed by estimating existing sewage generation rates and comparing these existing rates with the With Action condition, per *CEQR Technical Manual* methodology.

¹ See **Table 11-3**.

² *CEQR Technical Manual*, March 2014, Table 13-2.

C. EXISTING CONDITIONS

WATER SUPPLY

New York City's water supply system comprises three watersheds—Croton, Delaware, and Catskill—and extends as far north as the Catskill Mountains. From these watersheds, water is carried to the City via a conveyance system made up of reservoirs, aqueducts, and tunnels. Within the City, a network of underground water pipes distributes water to customers. On average, the New York City water system delivers approximately 1.1 billion gallons per day (bgd) to the five boroughs and Westchester County.

The Croton system supplies an average of 22 million gallons per day (mgd), primarily to users in the lower-elevation portions of Manhattan and the Bronx. The Delaware and Catskill systems supply all five boroughs and deliver approximately 98 percent of the City's drinking water. The Delaware and Catskill water systems collect water from watershed areas in the Catskill Mountains and deliver it to the Kensico Reservoir in Westchester County. From the Kensico Reservoir, water is sent to the Hillview Reservoir in Yonkers, which balances the daily fluctuations in water demand and pressure to the system. From there, water is delivered to the City through three tunnels, Tunnel Nos. 1, 2, and 3. Tunnel No. 1 carries water through the Bronx and Manhattan to Brooklyn; Tunnel No. 2 travels through the Bronx, Queens, Brooklyn, and then through the Richmond Tunnel to Staten Island; and Tunnel No. 3 goes through the Bronx and Manhattan, terminating in Queens. Tunnel No. 1 serves the southern portion of Manhattan where the project sites are located.³

Per water supply mapping obtained from DEP in March 2017, 12" diameter city water mains are located in all streets abutting the project sites. Additionally, a 30" diameter trunk main is located in South Street, which has interconnections to the adjacent existing 12" main. The DEP water mapping noted that recently a new 12" diameter water main was installed in South Street from Clinton Street to Rutgers Slip to replace the existing main that was constructed in 1870. As noted above, two hydrant flow tests were completed by DEP within the vicinity of the project sites that determined that the average water pressure for this area was 56 pounds per square inch (psi).

CONVEYANCE SYSTEM

The project sites are served by a combined sewer system that collects both sanitary sewage and stormwater. In periods of dry weather, the combined sewers (sized to convey an amount of sanitary sewage that is based on density levels according to zoning regulations) in the adjacent streets convey only sanitary sewage. The project sites are served by sewers running along Pike Slip, a 32" high and varying width (28"–35") sewer running north-south immediately east of Rutgers Slip on Site 5 within an existing easement, a sewer running along the north-south walkway between Site 5 (Block 247) and Site 6A (Block 246), and sewers running along Clinton, Cherry, and South Streets. There is also a sewer that runs east-west underneath Site 4 (4A/4B), bisecting Block 248, and a sewer that runs east-west underneath Site 5, bisecting Block 247. The sewers converge at the sewer located immediately east of Rutgers Slip between Cherry and South Streets where they meet the sewers under the Franklin D. Roosevelt (FDR) Drive.

³ Source: <http://www.nyc.gov/html/dep/pdf/wsstate17.pdf>

Two Bridges LSRD

The sewer lines that serve the project sites connect to Regulator NC-M21, located underneath the FDR Drive (between Rutgers Slip and Clinton Street). Regulators are structures that control the flow of sewage to interceptors, i.e., larger sewers that connect the combined sewer system to the City's sewage treatment system. From Regulator NC-M21, flow is conveyed to an interceptor that connects to the Newtown Creek WWTP, the largest of the City's 14 WWTPs.

At the Newtown Creek WWTP, wastewater is fully treated by physical and biological processes before it is discharged into the ~~Hudson~~ East River. The quality of the treated wastewater (effluent) is regulated by a State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (DEC), which establishes limits for effluent parameters (i.e., suspended solids, fecal coliform bacteria, and other pollutants). Since the volume of flow to a WWTP affects the level of treatment a plant can provide, the maximum permitted capacity for the Newtown WWTP is 310 million gallons per day (mgd). The average monthly flow to the WWTP over the past 12 months is 211 mgd,⁴ which is well below the maximum permitted capacity.

During and immediately after wet weather, combined sewers can experience a much larger flow due to stormwater runoff collection. To control flooding at the Newtown Creek WWTP, the regulators built into the system allow only approximately two times the amount of design dry weather flow into the interceptors. The interceptor then takes the allowable flow to the WWTP, while the excess flow is discharged to the nearest waterbody as combined sewer overflow (CSO). The project sites are located within one CSO drainage area: in wet weather, sanitary flow and stormwater runoff is conveyed to CSO outfall NCM-063, located under the end of Pier 35, where it is discharged into the East River.

SANITARY FLOWS

As described in Chapter 1, "Project Description," the three project sites currently contain residential, retail, and community facility uses. For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated by the occupied portions of the project sites, except for water used for air conditioning, which is typically not discharged to the sewer system. It is estimated that the current residential tenants, on all three project sites, occupy a total of approximately 1,211,370 gross square feet (gsf), including approximately 2,264 residents; the retail use occupies approximately 13,599 gsf; and the community facility use occupies approximately 27,552 gsf. For purposes of analysis, the community facility space is estimated to have water demand and sewage generation at the rates of commercial office space as outlined in the *CEQR Technical Manual*. As shown on **Table 11-1**, the project sites currently generate an estimate approximately 232,419 gpd of sanitary sewage with a total water demand of 445,348 gpd.

⁴ 12-month period through December 2016.

**Table 11-1
Existing Water Consumption and Sewage Generation**

Use	Floor Area	Rate ¹	Consumption (gpd)
Residential Space			
Domestic	2,264 residents ²	100 gpd/person	226,400 gpd
Air Conditioning	1,211,370 gsf	0.17 gpd/sf	205,933 gpd
Retail Space			
Domestic	13,599 gsf	0.24 gpd/sf	3,264 gpd
Air Conditioning	13,599 gsf	0.17 gpd/sf	2,312 gpd
Community Facility			
Domestic	27,552 gsf	0.10 gpd/sf	2,755 gpd
Air Conditioning	27,552 gsf	0.17 gpd/sf	4,684 gpd
Total Water Supply Demand			445,348 gpd
Total Sewage Generation			232,419 gpd
Notes:			
¹ Rates are from the <i>CEQR Technical Manual</i> , Table 13-2.			
² The number of residents was calculated by multiplying the number of dwelling units (1,053 DUs) by the average household size of 2.15 from Manhattan Community District 3 Profile (Sources: U.S. Census Bureau, 2000 and 2010 Censuses SF1 Population Division—NYC Department of City Planning [December 2011]).			

STORMWATER FLOWS

The project sites have a total area of approximately 285,598 sf (6.56 acres). As noted above, there are existing buildings on the project sites, therefore, a portion of the project sites contain rooftop areas. **Table 11-2** summarizes the existing surface coverage of the project sites, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff).

**Table 11-2
Existing Surface Coverage**

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Grass and Soft Scape	Total
NCM-063	Area (percent)	26%	65%	9%	100%
	Surface Area (acres)	1.77	4.20	0.59	6.56
	Runoff Coefficient ¹	1.00	0.85	0.20	0.83
Note:					
¹ Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the 2014 <i>CEQR Technical Manual</i> , retrieved September 2015.					

D. FUTURE WITHOUT THE PROPOSED PROJECTS

As described in Chapter 1, “Project Description,” in the future without the proposed actions (the No Action condition), it is assumed that the project sites would continue in their existing conditions and that the existing retail on Site 4 (4A/4B) would be re-tenanted. In total, the No Action condition is expected to include the same programing as in the existing condition (as shown in **Table 11-2**).

CONVEYANCE SYSTEM

In the No Action condition, there would be no changes to the wastewater conveyance system serving the project sites. Wastewater would continue to be conveyed to Regulator NC-M21 and the Newtown Creek WWTP, and the CSO would continue to be discharged to the East River through outfall NCM-063.

SANITARY FLOWS

The water demand and sewage generation of the No Action condition is the same as the existing condition (see **Table 11-2**). As noted above, community facility space is estimated to have water demand and sewage generation at the rates of commercial office space as established in the *CEQR Technical Manual*. The No Action condition is expected to generate the same sanitary sewage and total water demand in existing conditions.

STORMWATER FLOWS

The project sites have a total area of approximately 285,598 sf (6.56 acres). As noted above, the No Action condition assumes the project sites would continue as they are in existing conditions. **Table 11-2** summarizes the No Action surface coverage of the project sites, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff).

E. FUTURE WITH THE PROPOSED PROJECTS

With the proposed actions, the project sites would be redeveloped with a mix of uses and would include an incremental increase of approximately 2,775 residential units, approximately 10,858 gsf of retail uses, 17,028 gsf of community facility use, and a 103-space below-grade accessory parking garage (spaces relocated from the existing surface parking area on Site 5).

On Site 5, there are approximately 14,300 sf of basketball court and playground space and approximately 21,114 sf of landscaped area. In the With Action condition, the existing basketball court and playground on Site 5 would be replaced with semi-pervious landscaped features and paved plaza area for a total of approximately 33,878 sf of landscaped area.

WATER SUPPLY

Table 11-3 summarizes the projected water consumption for each project site and the cumulative water consumption in the future with the proposed actions.

The incremental water demand compared to the No Action condition generated by uses that would be introduced by the proposed actions would be 1,022,347 gpd.

The 1,022,347 gpd incremental demand represents a small increase in demand on the New York City water supply system—approximately 0.09 percent of the 1.1 bgd typically distributed within New York City and Westchester County. Additionally, two hydrant flow tests were completed by DEP within the vicinity of the proposed projects and found that the average water pressure was 56 pounds per square inch (psi), which is consistent with pressures typically observed in this area of Manhattan. This average water pressure is above the minimum desired operating pressures; therefore, there would be adequate water service to meet the incremental demand. In a letter dated July 7, 2017, DEP confirmed that the existing water mains are sufficient to supply the increased water demand, provided that the water service connections for each site are made to a different water main. Therefore, it is anticipated there would be no significant adverse impacts on the City's water supply.

**Table 11-3
Proposed Projects Incremental Water Consumption and Sewage Generation**

Use	Floor Area/Units/Persons ²	Rate ¹	Consumption (gpd)
Site 4 (4A/4B)			
Residential			
Domestic	1,419	100	141,900
Air Conditioning	629,252	0.17	106,973
Retail			
Domestic	3,124	0.24	750
Air Conditioning	3,124	0.17	531
Site 4 (4A/4B) Water Supply Demand			250,154
Site 4 (4A/4B) Sewage Generation			142,650
Site 5			
Residential			
Domestic	2,838	100	283,800
Air Conditioning	1,227,932	0.17	208,748
Retail			
Domestic	5,319	0.24	1,277
Air Conditioning	5,319	0.17	904
Community Facility ³			
Domestic	17,028	0.10	1,703
Air Conditioning	17,028	0.17	2,895
Site 5 Water Supply Demand			499,327
Site 5 Sewage Generation			286,780
Site 6A			
Residential			
Domestic	1,580	100	158,000
Air Conditioning	669,851	0.17	113,875
Retail			
Domestic	2,415	0.24	580
Air Conditioning	2,415	0.17	411
Site 6 Water Supply Demand			272,866
Site 6 Sewage Generation			158,580
Total Water Supply Demand			1,022,347
Total Sewage Generation			588,010
Notes:			
¹ Rates are from the <i>CEQR Technical Manual</i> , Table 13-2.			
² Refer to Table 1-2D in <u>the Chapter 1, Project Description</u> chapter.			
³ Assumes commercial office rates.			

CONVEYANCE SYSTEM

As discussed in “Existing Conditions,” combined City sewers are located on Site 4 (4A/4B) and Site 5. The east–west sewers that bisect both sites, as noted on the mapping provided by DEP in March 2017, collect flow from Blocks 247 and 248 only. The sewer running north-south within an easement on Site 5 east of Rutgers Slip shall remain in place. The proposed building footprints are not within the limits of the existing sewers; however, DEP shall be consulted regarding at-grade improvements located within the Site 5 sewer easement such as a playground structure, benches, and other similar improvements. Wastewater would continue to be conveyed to Regulator NC-M21 and the Newtown Creek WWTP, and the CSO would continue to be discharged to the East River through outfall NCM-063.

SANITARY FLOWS

Table 11-3 summarizes the sewage generation of the proposed projects, which includes residential, retail, and community facility space. The proposed projects are expected to generate

an estimated 588,010 gpd of total daily sanitary sewage. This incremental increase in sewage generation is approximately 0.12 percent of the average daily flow at the Newtown Creek WWTP and would not result in an exceedance of the plant’s permitted capacity of 310 mgd. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), the proposed projects would be required to utilize low-flow plumbing fixtures, which would reduce sanitary flows to the plant. Therefore, the proposed projects would not result in a significant adverse impact to the City’s sanitary sewage conveyance and treatment system.

STORMWATER FLOWS

As described above, the proposed projects would develop three new mixed-use buildings on the project sites. The proposed projects would include an additional approximately 22,779 square feet (sf) of new open space—including both private and publicly accessible open space—and alterations to approximately 80,020 sf of existing private open space on the project sites. On Site 5, the existing private Rutgers Slip Open Space would be enlarged and dedicated as publicly accessible open space, totaling approximately 33,550 sf (approximately 0.77 acres), including alterations to approximately 22,440 sf of existing open space and approximately 11,110 sf of new open space. The reconstructed Rutgers Slip Open Space would include new and altered landscaping and open areas that would contain new trees and other plantings and increased permeable surfaces. The private courtyard between the 265 and 275 Cherry Steet buildings would be relandscaped and new amenities would be added. With these changes in surface areas, the weighted runoff coefficient would be reduced slightly to 0.81 (0.83 in the existing and No Action conditions). **Table 11-4** summarizes the proposed projects surface coverage and the weighted runoff coefficient.

**Table 11-4
Proposed Surface Coverage**

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total²
NCM-063	Area (percent)	43%	41%	0%	15%	100%
	Surface Area (acres)	2.83	2.72	0	1.01	6.56
	Runoff Coefficient ¹	1.00	0.85	0	0.20	0.81
Notes:						
¹ Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the <i>CEQR Technical Manual</i> , retrieved September 2015.						
² Totals may not sum due to rounding.						

Using these sanitary and stormwater flow calculations, the DEP Flow Volume Calculation Matrix was completed for the existing conditions and the proposed projects (the With Action condition). The calculations from the Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from existing With Action conditions, and include four rainfall volume scenarios with varying durations. The summary tables of the Flow Volume Calculation Matrix are included in **Table 11-5**.

Table 11-5

DEP Flow Volume Matrix: Existing and With Action Volume Comparison

Rainfall Volume (in.)	Rainfall Duration (hr.)	Runoff Volume to Direct Drainage (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Runoff Volume to River (MG)	Runoff Volume to CSS (MG)*	Sanitary Volume to CSS (MG)	Total Volume to CSS (MG)	Increased Total Volume to CSS (MG)*	Percent Increase from Existing Conditions (%)
NCM-063		Existing				With Action				NC-M21 Increment	
		285,598 square feet (6.56 acres)				285,598 square feet (6.56 acres)					
0.00	3.80	0.00	0.00	0.04	0.04	0.00	0.00	0.09	0.09	0.06	<u>153</u>
0.40	3.80	0.00	0.06	0.04	0.10	0.00	0.06	0.09	0.15	0.06	<u>57</u>
1.20	11.30	0.00	0.18	0.11	0.29	0.00	0.17	0.28	0.45	0.16	<u>57</u>
2.50	19.50	0.00	0.37	0.19	0.56	0.00	0.36	0.48	0.84	0.28	<u>50</u>
Notes:											
* Assumes no on-site detention or BMPs for purposes of calculations.											
CSS = Combined Sewer System; MG = Million Gallons.											
Totals may not sum due to rounding.											

As shown in **Table 11-5**, in all rainfall volume scenarios flow to the regulator NC-M21 drainage area would increase. The increase in flow is attributable to the increase in sanitary flow resulting from the proposed projects, due to the increase in residential units on the project sites.

The Flow Volume Matrix calculations do not reflect the use of any sanitary and stormwater source control BMPs to reduce sanitary flow and stormwater runoff volumes to the combined sewer system. As noted above, the proposed projects would incorporate low-flow plumbing fixtures to reduce sanitary flow in accordance with the New York City Plumbing Code. In addition, stormwater BMPs would be required as part of the DEP site connection approval process, for each proposed building, in order to bring each proposed building into compliance with the required stormwater release rate. A DEP-approved site connection proposal is a requirement for a new building approval issued by the NYC Department of Buildings (DOB). Specific BMP methods would be determined with further refinement of the building designs and in consultation with DEP, but may include on-site stormwater detention systems.

The incorporation of the appropriate sanitary flow and stormwater source control BMPs that would be required as part of the site connection approval process for each site, with the review and approval of DEP, would reduce the overall volume of sanitary sewer discharge as well as the peak stormwater runoff rate from the project sites. Sewer conveyance near the project sites and the treatment capacity at the Newtown Creek WWTP are sufficient to handle wastewater flow resulting from the proposed projects and would not result in an appreciable increase in flows to the City’s sanitary sewerage conveyance and treatment system; therefore, it is anticipated that there would be no significant adverse impacts from the proposed projects on the City’s wastewater and stormwater treatment and conveyance infrastructure. *