Chapter 12: Water and Sewer Infrastructure

A. INTRODUCTION

This chapter considers the potential for the proposed actions to result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system. As described in Chapter 1, "Project Description," the applicants, the New York City Department of City Planning (DCP) and SJC 33 Owner 2015 LLC, are proposing a series of discretionary actions (the proposed actions) that would facilitate the redevelopment of St. John's Terminal Building at 550 Washington Street (Block 596, Lot 1) (the development site) with a mix of residential and commercial uses, and public open space (the proposed project) in Manhattan Community District 2. 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 development site is in an area of Manhattan that is served by a combined sewer system, and the proposed actions would result in approximately 1,586 residential units (including approximately 476 affordable units) on the development site. The development site is not in an area that experiences low water pressure. Following the guidelines of the *CEQR Technical Manual*, an analysis of the proposed actions' potential impacts on the wastewater and stormwater conveyance and treatment system was performed. As described below, the proposed actions do not warrant an analysis of water supply.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed project would not result in any significant adverse impacts on the City's water supply or wastewater and stormwater conveyance and treatment infrastructure. The proposed project would result in an increase in water consumption and sewage generation on the development site as compared with the No Action condition. While the proposed project would result in an incremental water demand of 312,710 gpd, this would not represent a significant increase in demand on the New York City water supply system. An analysis of water supply is not warranted since it is expected that 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.

While the proposed project would generate 420,756 gpd of sanitary sewage, an increase of 183,656 gpd above the No Action condition, this incremental increase in sewage generation would be approximately 0.08 percent of the average daily flow at the Newtown Creek Wastewater Treatment Plant (WWTP) and would not result in an exceedance of the plant's permitted capacity. Because

there are two combined sewer lines beneath the existing St. John's Terminal building, the proposed project would reroute the wastewater flow that is currently conveyed through them. Plans for rerouting the flow are currently being coordinated with New York City Department of Environmental Protection's (DEP's) Bureau of Water and Sewer Operations. The applicant will conduct additional analysis and investigation to consider the project's effects on the capacities of the local sewers and combined sewer overflow (CSO) at the downstream regulator in the corresponding street frontages. Once DEP has reviewed and approved the rerouting, the changes or upgrades to such infrastructure would be reflected on an amended drainage plan as required per DEP rules and regulations. In addition, DEP's approval and sign-off would be required to obtain building permits. The Final Environmental Impact Statement will include any additional information that may become available. Therefore, the proposed project would not result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system.

The overall volume of stormwater runoff and the peak stormwater runoff rate from the development site is expected to decrease due to the increase in landscaped and paved area and reduction of fully impervious rooftop area. With the incorporation of selected stormwater source control best management practices (BMPs) that would be required as part of the site connection approval process, subject to the review and approval by DEP, the peak stormwater runoff rates would be reduced.

B. METHODOLOGY

WATER SUPPLY

The *CEQR Technical Manual* recommends a preliminary water 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 development site is not in an area that experiences low water pressure. While the proposed project would result in an incremental water demand of 312,710 gpd,[1] this would not represent a significant increase in demand on the New York City water supply system. Therefore, an analysis of water supply is not warranted since it is expected that 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 development site is in a combined sewer area in Manhattan, and the proposed project would exceed the *CEQR Technical Manual* threshold of 1,000 residential units. Therefore, this chapter includes an analysis of the proposed project's potential impacts on the 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 project is assessed by estimating existing sewage generation rates and comparing these existing rates with the With Action condition, per *CEQR Technical Manual* methodology.

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[1] See Table 12-3 and Table 12-4, which include calculations of the development site's total water demand in the No Action condition (421,380 gpd) and the With Action condition (734,090 gpd)

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

C. EXISTING CONDITIONS

CONVEYANCE SYSTEM

The development site is in a part of New York City 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 development site is served by sewer lines running along Clarkson and West Houston Streets, as well as two lines that run underneath the development site from King and Charlton Streets to the east. These sewer lines connect to a sewer line running underneath West Street, which connects to Regulator NC-M1, located underneath West Street near Clarkson 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-M1, 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 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 218 mgd,[1] 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 development site is located within one CSO drainage area: in wet weather, sanitary flow and stormwater runoff is conveyed to CSO outfall NCM-076, located at the end of Pier 40, where it is discharged into the Hudson River.

SANITARY FLOWS

As described in Chapter 1, "Project Description," the development site currently contains the St. John's Terminal Building, a portion of which spans West Houston Street. While the portion of the building north of West Houston Street is largely vacant, the south building is occupied by commercial tenants (office, back office and communications) and is also used as temporary event space (fashion shows, exhibits, etc.). For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated by the occupied portions of the development site, excepting water used by air conditioning, which is typically not discharged to the sewer system. It is estimated that the current commercial tenants occupy a total of approximately 324,355 gross square feet (gsf) within the building and the event space occupies approximately 73,539 gsf. For purposes of analysis, the commercial space is estimated to have water demand

[1] 12-month period through July 2015.

and sewage generation at the rates of commercial office space, and the event space is estimated to have water demand and sewage generation at the rates of retail space, as outlined in the *CEQR Technical Manual*. As shown on **Table 12-1**, the development site currently generates an estimated 50,085 gpd of sanitary sewage with a total water demand of 117,727 gpd.

Table 12-1
Existing Water Consumption and Sewage Generation

Use	Floor Area	Rate*	Consumption (gpd)
Event Space			
Domestic	73,539 gsf	0.24 gpd/sf	17,649
Air Conditioning	73,539 gsf	0.17 gpd/sf	12,502
Commercial Office			
Domestic	324,355 gsf	0.10 gpd/sf	32,436
Air Conditioning	324,355 gsf	0.17 gpd/sf	55,140
Total Water Supply Demand			**117,727**
Total Sewage Generation			**50,085**
Notes: * Rates are from the *CEQR Technical Manual*, Table 13-2.			

STORMWATER FLOWS

The development site has a total area of approximately 213,654 sf (4.90 acres). As noted above, the St. John's Terminal Building spans the entire development site, including the portion of West Houston Street that runs through the development site. Therefore, the surface area of the development site is entirely rooftop area. **Table 12-2** summarizes the existing surface coverage of the development site, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff).

Table 12-2
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
NCM-076	Area (percent)	100%	0%	0%	0%	**100%**
	Surface Area (acres)	4.90	0	0	0	**4.90**
	Runoff Coefficient*	1.00	0.85	0.85	0.20	**1.00**
Notes: * Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual*, retrieved September, 2015.						

D. THE FUTURE WITHOUT THE PROPOSED ACTIONS

As described in Chapter 1, "Project Description," in the future without the proposed actions (the No Action condition), the St. John's Terminal Building will be demolished and the development site is expected to be redeveloped with new commercial space utilizing the available unused floor area of 242,819 zoning square feet (zsf) as well as the existing floor area above West Houston Street that would be demolished and reused on the north site. In total, the No Action development is expected to include approximately 322,000 gsf of retail uses (including 61,500 gsf of local retail and 260,500 gsf of destination retail), 427,000 gsf of office space, a 285,000-gsf hotel (438 rooms), and approximately 176 accessory parking spaces.

CONVEYANCE SYSTEM

In the No Action condition, there would be no changes to the wastewater conveyance system serving the development site. Wastewater would continue to be conveyed to Regulator NC-M1 and the Newtown Creek WWTP, and CSO would continue to be discharged to the Hudson River through outfall NCM-076.

SANITARY FLOWS

Table 12-3 summarizes the water demand and sewage generation of the No Action development. As noted above, event space is estimated to have water demand and sewage generation at the rates of retail space, as outlined in the *CEQR Technical Manual*. The No Action development is expected to generate an estimated 237,100 gpd of daily sanitary sewage with a total water demand of 421,380 gpd.

Table 12-3
No Action Water Consumption and Sewage Generation

Use	Floor Area/Persons	Rate[1]	Consumption (gpd)
Retail			
Domestic	322,000 gsf	0.24 gpd/sf	77,280
Air Conditioning	322,000 gsf	0.17 gpd/sf	54,740
Commercial Office			
Domestic	427,000 gsf	0.10 gpd/sf	42,700
Air Conditioning	427,000 gsf	0.17 gpd/sf	72,590
Hotel			
Domestic	876 persons[2]	120 gpd/room/occupant	105,120
Air Conditioning	285,000 gsf	0.17 gpd/sf	48,450
Event Space			
Domestic	50,000	0.24 gpd/sf	12,000
Air Conditioning	50,000	0.17 gpd/sf	8,500
Total Water Supply Demand			**421,380**
Total Sewage Generation			**237,100**

Notes: 1. Rates are from the *CEQR Technical Manual*, Table 13-2.
2. Assumes two occupants per room (438 rooms)

STORMWATER FLOWS

The No Action development is expected to include buildings on the northern and southern portions of the development site. The area above West Houston Street connecting the buildings will contain private open space for the use of the buildings' tenants. In addition, there is expected to be a courtyard on a portion of the ground floor of the southern building that would be used as circulation space leading to the building's office lobby, and the southern end of the development site is expected to contain an alley providing access to the building's service entrance. These changes are anticipated to result in the introduction of semi-impervious (paved) surface area where this is now fully impervious rooftop area. As a result, the weighted runoff coefficient of the development site, currently the maximum of 1.00, is expected to decrease in the No Action condition.

E. THE FUTURE WITH THE PROPOSED ACTIONS

With the proposed actions, the development site would be redeveloped with a mix of uses including approximately 1,586 residential units (including approximately 476 affordable units),

approximately 160,000 gsf of retail uses (or 255,000 gsf of retail uses in the proposed project with big box retail scenario), 229,700 gsf of hotel (or office) space, 14,200 sf of publicly accessible open space. This analysis considers the proposed project with big box retail scenario, since it would result in greater water demand and sewage generation.

In addition, with the proposed project, there would be an elevated open space spanning West Houston Street between the new buildings on the North Site and Center Site. The elevated open space would include openings to allow light and air to reach the street level. The proposed project would include a viewing garden in the area between the buildings on the Center Site, a courtyard between the Center and South Sites to provide circulation space, and a service alley at the southern end of the development site.

CONVEYANCE SYSTEM

The proposed project would reroute the wastewater flow that is currently conveyed through the site via two existing combined sewers that are located beneath the existing building. The final routing of flow is currently being coordinated with DEP. Wastewater would continue to be conveyed to Regulator NC-M1 and the Newtown Creek WWTP, and CSO would continue to be discharged to the Hudson River through outfall NCM-076.

SANITARY FLOWS

Table 12-4 summarizes the water demand and sewage generation of the proposed project, which includes residential, retail, hotel, and event space. For the purposes of a conservative analysis, the water demand and sewage generation estimates are based on the development scenario that includes big box retail, which features a higher amount of retail space (250,000 gsf, compared to 160,000 gsf in the proposed development scenario) and less parking area; because retail space both requires water service and generates sewage, while parking does not, the big box retail option would result in the higher water demand and sewage generation of the two development scenarios. The proposed project is expected to generate an estimated 420,756 gpd of daily sanitary sewage with a total water demand of 736,990 gpd.

The incremental sanitary sewage generated by the proposed project, as compared with the No Action development, would be 183,656 gpd. This incremental increase in sewage generation would is approximately 0.08 percent of the average daily flow at the Newtown Creek WWTP (218 mgd) and would not result in an exceedance of the plant's permitted capacity of 310 mgd. The applicant will conduct additional analysis and investigation to consider the project's effects on the capacities of the local sewers and CSO at the downstream regulator in the corresponding street frontages. Once DEP has reviewed and approved the rerouting, the changes or upgrades to such infrastructure would be reflected on an amended drainage plan as required per DEP rules and regulations. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), the proposed project would be required to utilize low-flow plumbing fixtures, which would reduce sanitary flows to the plant. Therefore, the proposed project would not result in a significant adverse impact to the City's sanitary sewage conveyance and treatment system.

Table 12-4
Proposed Project Water Consumption and Sewage Generation

Use	Floor Area/Units/Persons	Rate[1]	Consumption (gpd)
Residential			
Domestic	2,649 persons[2]	100 gpd/person	264,900
Air Conditioning	1,334,100 gsf	0.17 gpd/sf	226,797
Retail			
Domestic	255,000	0.24 gpd/sf	61,200
Air Conditioning	255,000	0.17 gpd/sf	43,350
Hotel[3]			
Domestic	706 persons	120 gpd/room/occupant	84,720
Air Conditioning	229,700	0.17 gpd/sf	39,049
Event Space			
Domestic	41,400	0.24 gpd/sf	9,936
Air Conditioning	41,400	0.17 gpd/sf	7,038
Total Water Supply Demand			**736,990**
Total Sewage Generation			**420,756**

Notes: 1. Rates are from the *CEQR Technical Manual*, Table 13-2.
2. Residential population based on Community District 2 average household size of 1.67 persons per household, applied to the total number of proposed residential units (1,586 units)
3. Assumes two occupants per room (353 rooms). If office use were built on the South Site, there would be approximately 61,750 gpd less domestic water consumption and sewage generation.

STORMWATER FLOWS

As described above, the proposed project includes the introduction of semi-impervious surface area on the development site, where there is now rooftop. The building rooftop area of the proposed project would be smaller than the current rooftop area, and the viewing garden between the buildings on the Center Site would result in approximately 16,367 sf (0.38 acres) of landscaped area. The alterations to the area above West Houston Street,[1] as well as the courtyard and service access, would result in the introduction of paved surface area and landscaping on other portions of the development site currently covered by rooftop. With the reduction of rooftop surface area and increase in both landscaped and paved surface areas, the weighted runoff coefficient would decrease to 0.90 (compared to 1.00 in the existing condition). **Table 12-5** summarizes the proposed project's surface coverage and the weighted runoff coefficient.

Table 12-5
Proposed Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	Total
NCM-076	Area (percent)	66%	26%	0%	8%	**100%**
	Surface Area (acres)	3.25	1.28	0	0.38	**4.90**
	Runoff Coefficient*	1.00	0.85	0.85	0.20	**0.90**

Notes: *Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual*, retrieved September, 2015.
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 project (the With Action condition). The calculations from the Flow Volume Calculation Matrix help to determine the

[1] Although the elevated open space above West Houston Street would contain some landscaped area, it is assumed for analysis purposes to be a paved area.

change in wastewater flow volumes to the combined sewer system from existing to 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 12-6**.

Table 12-6
DEP Flow Volume Matrix: Existing and Build 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)*
NCM-076		Existing				With Action				NCM-076 Increment
		213,654 square feet (4.90 acres)				213,654 square feet (4.90 acres)				
0.00	3.80	0.00	0.00	0.01	**0.01**	0.00	0.00	0.07	**0.07**	0.06
0.40	3.80	0.00	0.05	0.01	**0.06**	0.00	0.05	0.07	**0.11**	0.05
1.20	11.30	0.00	0.16	0.02	**0.18**	0.00	0.14	0.20	**0.34**	0.16
2.50	19.50	0.00	0.33	0.04	**0.37**	0.00	0.30	0.34	**0.64**	0.27

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 12-6**, in all rainfall volume scenarios flow to CSO outfall NCM-076 would increase. The increase in flow is attributable to the increase in sanitary flow resulting from the proposed project: because the existing St. John's Terminal Building is largely vacant, there is relatively little water demand and sewage generation on the development site.[1] Due to the increase in landscaped and paved area and reduction of rooftop area, the proposed project would result in a reduction in fully impervious surface area.

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 project 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 in order to bring the building into compliance with the required stormwater release rate. Specific BMP methods will be determined with further refinement of the building design and in consultation with DEP, but may include on-site stormwater detention systems such as planted rooftop spaces ("green roofs") and/or vaults.

The incorporation of the appropriate sanitary flow and stormwater source control BMPs that would be required as part of the site connection approval process, with the review and approval of DEP, would reduce the overall volume of sanitary sewer discharge and stormwater runoff as well as the peak stormwater runoff rate from the development site. Sewer conveyance near the development site and the treatment capacity at the Newtown Creek WWTP is sufficient to handle wastewater flow resulting from the proposed project; therefore, there would be no significant adverse impacts on wastewater treatment or stormwater conveyance infrastructure. ✷

[1] As noted above, the Flow Volume Calculation Matrix compares runoff and sanitary flows between existing and With Action conditions and does not account for the changes to the development site expected to occur in the No Action condition. The No Action development on the site would generate a higher level of sanitary flow than the existing St. John's Terminal Building on the site; therefore, the incremental increase in sanitary flow resulting from the proposed project is smaller than is indicated in Table 12-6.