Chapter 8: Water and Sewer Infrastructure

A. INTRODUCTION

This chapter evaluates the potential for the proposed project to result in significant adverse impacts on the City's water supply and its wastewater and stormwater conveyance and treatment infrastructure.

As described in Chapter 1, "Project Description," the proposed project would result in the enlargement of the Staten Island Mall (the Mall) located at 2655 Richmond Avenue in the Heartland Village neighborhood of Staten Island. The Mall is located on a parcel generally bounded by Richmond Hill Road, Marsh Avenue, Platinum Avenue, and Richmond Avenue and currently contains three department stores (Macy's, Sears, and JCPenney). With the proposed project, the lots containing Macy's and the Mall/JCPenney, which contains a combined total of approximately 1,228,814 gsf of retail uses and parking lots with 5,844 parking spaces, would be merged into a single zoning lot and a 426,576-gsf enlargement of the Mall would be constructed on areas currently used for accessory parking. The displaced parking spaces would be partially replaced by a 1,413-space garage constructed adjacent to the Mall. The project site is located within a commercial zoning district (C4-1) and is in a separately sewered area.

PRINCIPAL CONCLUSIONS

The proposed project would increase the project site's water consumption, sewage generation, and stormwater runoff as compared to the No Action condition. However, the analysis finds that the proposed project would not result in any significant adverse impacts on the City's water supply, wastewater or stormwater conveyance, and wastewater treatment infrastructure.

WATER SUPPLY

The project site is not located in an area that experiences low water pressure and the proposed project would result in an incremental water demand of approximately 174,897 gallons per day (gpd). This increase in water demand does not meet the *CEQR Technical Manual* threshold requiring further analysis, and it is expected that there would be adequate water service to meet the incremental water demand resulting from the Mall enlargement, therefore that there would be no significant adverse impacts on the City's water supply.

SANITARY SEWAGE

The proposed project would result in an incremental increase of 102,379 gpd of sanitary sewage. This amount would represent approximately 0.36 percent of the average daily flow to the Oakwood Beach Wastewater Treatment Plant (WWTP). This volume would not exceed the WWTP's permitted capacity, and therefore would not create a significant adverse impact on the City's sanitary sewage conveyance and treatment system.

STORMWATER

The overall volume of stormwater runoff and the peak stormwater runoff rate from the project site is expected to increase slightly as a result of the proposed project, due to the reconfiguration of the project site's surface area to include additional rooftop area with a reduction of paved parking area, but would remain below the permitted flow rate for the project site under the New York City Department of Environmental Protection's (DEP) site connection regulations. Best management practices (BMPs) would be implemented to reduce the amount of sanitary flow to the sewer system and treat stormwater before it is released as direct drainage. Overall, the proposed project would not result in a significant adverse impact on the City's wastewater conveyance and treatment system.

B. METHODOLOGY

According to the *CEQR Technical Manual,* a preliminary water supply analysis is needed if a project would result in an exceptionally large demand of water (over 1,000,000 gpd) or is located in an area that experiences low water pressure (i.e., an area at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). The project site is not located in an area that experiences low water pressure and the proposed project would result in an incremental water demand of approximately 174,897 gpd.[1] While this would represent an increase in demand on the New York City water supply system, it does not meet the *CEQR Technical Manual* threshold requiring further analysis. Therefore, it is expected that there would be adequate water service to meet the incremental water demand resulting from the Mall enlargement, and that there would be no significant adverse impacts on the City's water supply.

The *CEQR Technical Manual* indicates that a preliminary sewer analysis is warranted if a project site is located in a separately sewered area and would exceed incremental development thresholds determined by the site's zoning; in non-residential zoning districts, these thresholds are 100 residential units or 100,000 square feet of commercial, institutional, or community facility uses. The proposed project, which would result in 426,576 gsf of additional retail space, exceeds the threshold for commercial development; therefore a preliminary sewer analysis was conducted to ensure that sufficient sewer capacity exists to handle the proposed project.

Existing and future water demand and sanitary sewage generation are calculated based on use generation rates set by the *CEQR Technical Manual.*[2] The New York City Department of Environmental Protection (DEP) Flow Volume Calculation Matrix is then used to calculate the overall sanitary sewage and stormwater runoff volume distributed to the 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 then comparing these existing rates to the future with and without the proposed project, per *CEQR Technical Manual* methodology.

[1] See **Tables 8-1 and 8-3**, which include a calculation of the project site's total water demand in existing conditions (503,813 gpd) and in the With Action condition (678,710 gpd).

[2] *CEQR Technical Manual*, March 2014, p. 13-12.

C. EXISTING CONDITIONS

CONVEYANCE SYSTEM

As described in Chapter 1, "Project Description," the project site for the proposed project does not include the zoning lot containing Sears or its adjacent parking area. The project site is located in a part of New York City served by a separated sewer system: sanitary sewage flows to a wastewater treatment plant and stormwater flows untreated through outfalls into nearby waterways. On the project site, sanitary sewage is conveyed through a connection with the City sanitary sewer running along Richmond Hill Road to the north of the project site. From the Richmond Hill Road sewers, sanitary sewage is conveyed to the Fresh Kills Interceptor Sewer, located along Richmond Avenue to the west of the project site. The interceptor connects the sewer to the city's sewage treatment system: the area of the project site is served by the Oakwood Beach Wastewater Treatment Plant (WWTP).

At the Oakwood Beach WWTP, wastewater is fully treated by physical and biological processes before it is discharged into Lower New York Bay. The quality of the effluent is regulated by a State Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (NYSDEC), 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 SPDES permit also establishes a maximum permitted capacity: for the Oakwood Beach WWTP, the maximum permitted capacity is 39.9 million gallons per day (mgd). The average monthly flow to the Oakwood Beach WWTP over the past 12 months is 28.8 mgd,[3] well below the maximum permitted capacity.

Stormwater on the project site is conveyed through a series of on-site pipes that connect the site to direct discharge systems. Two site connections located along Richmond Avenue convey stormwater from the northern and western portions of the project site to a drainage ditch in Freshkills Park, located immediately to the west of the project site across Richmond Avenue, where it is discharged into the wetlands around Springville Creek. Two additional site connections are located along Platinum Avenue and convey stormwater from the southeastern portion of the project site. These connections lead to a storm sewer that runs south from Platinum Avenue conveying stormwater to an outfall located in Latourette Park, located southeast of the project site, where it drains into the wetlands around Richmond Creek.

SANITARY FLOWS

For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated by the existing facilities on the project site, which contains 1,228,814 gsf of retail uses, except that used by air conditioning, which is typically not discharged to the sewer system. The estimated amount of daily sanitary sewage currently generated is approximately 294,915 gpd (see **Table 8-1**).

[3] 12-month period through June, 2014.

Table 8-1
Existing Water Consumption and Sewage Generation

Use	Size (gsf)	Rate	Consumption (gpd)
Retail			
Domestic	1,228,814	0.24 gpd/sf	294,915
Air Conditioning	1,228,814	0.17 gpd/sf	208,898
		Total Water Supply Demand	**503,813**
		Total Sewage Generation	**294,915**

Source: Rates from *CEQR Technical Manual,* Table 13-2.

STORMWATER FLOWS

The project site contains approximately 3,700,605 sf (84.95 acres) of space: the surface area of the project site is predominantly paved parking areas and building rooftops. **Table 8-2** summarizes the surfaces and surface areas, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type).

Table 8-2
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement and Walkways	Other	Grass and Soft Scape	TOTAL
N/A[1]	Area (percent)	18%	67%	0%	16%	**100%**
	Surface Area (acres)	15.02	56.51	0	13.42	**84.95**
	Runoff Coefficient[2]	0.95	0.85	0.85	0.20	**0.76**

Notes: 1. The project site is located in a separated sewer area; stormwater is directly discharged to nearby waterbodies and does not flow through a Combined Sewer Overflow (CSO) outfall.

2. Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual* and the runoff coefficients of the DEP *Guidelines for the Design and Construction of Stormwater Management Systems* (July 2012).

Sources: Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

D. FUTURE WITHOUT THE PROPOSED PROJECT

Absent the proposed project, no new development is anticipated to occur on the project site. The project site would continue in active use in its existing conditions, and the water demand, sewage generation, and surface area coverage levels would not change.

E. FUTURE WITH THE PROPOSED PROJECT

SEWER SYSTEM AND WWTP CAPACITY DEMAND

With the proposed project, an addition to the Mall would be constructed on the project site containing approximately 426,576 gsf of new retail facilities on areas currently containing parking lots, bringing the project site to a total of 1,655,390 gsf of space. The proposed project would also include a new parking garage constructed adjacent to the Mall addition to partially replace the displaced parking spaces. Landscape improvements would also be made throughout the project site's surface parking lot, such as new planting beds and trees along the edges of various parking areas. In support of the proposed project, on-site utilities would be reconfigured in the areas of the addition and new garage. In particular, the existing water main, sanitary sewer

pipe, and storm sewer pipe currently located underneath the parking area to be developed would be relocated to the parking area immediately adjacent to the addition and new garage. New stormwater best management practices (BMPs) would also be included in the proposed project, described in further detail below.

Table 8-3 shows the estimated water consumption and sewage generation on the project site with the proposed project. With the construction of the new addition, the project site would generate 397,294 gpd of sanitary flow from domestic water use (i.e., regular tap water use). The incremental sanitary sewage generated (compared to conditions in the No Action condition) would be 102,379 gpd. This amount would represent approximately 0.36 percent of the Oakwood Beach WWTP's average daily flow of 28.8 mgd, and would not exceed the WWTP's permitted capacity of 39.9 mgd. Therefore, the proposed project is not anticipated to result in a significant adverse impact on the City's sanitary sewage conveyance and treatment system. In addition, per the New York City Plumbing Code (Local Law 33 of 2007), low-flow fixtures would be required to be implemented and would help to reduce sanitary flows from the new enlargement.

Table 8-3
With Action Water Consumption and Sewage Generation

Use	Size (gsf)	Rate	Consumption (gpd)
Retail			
Domestic	1,655,390	0.24 gpd/sf	397,294
Air Conditioning	1,655,390	0.17 gpd/sf	281,416
		Total Water Supply Demand	**678,710**
		Total Sewage Generation	**397,294**
Source: Rates from *CEQR Technical Manual,* Table 13-2.			

Table 8-4
Comparison of No Action and With Action Sewage Generation

No Action condition	294,915 gpd[1]
With Action condition	397,294 gpd[2]
Increment	102,379 gpd
Notes: 1. See **Table 8-1** 2. See **Table 8-3**	

STORMWATER FLOWS

The proposed project would result in an increase of rooftop area on the project site and reduction of paved parking area, as well as a slight reduction in landscaped area. Therefore, the weighted runoff coefficient would increase slightly from 0.76 (see **Table 8-2**) to 0.78 (see **Table 8-5**).

Table 8-5
Proposed Project Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement & Walks	Other	Grass & Soft Scape	TOTAL
N/A[1]	Area	29%	55%	0%	16%	**100%**
	Surface Area (acres)	28.84	46.90	0	13.21	**84.95**
	Runoff Coefficient[2]	0.95	0.85	0.85	0.20	**0.78**

Notes: 1. The project site is located in a separated sewer area; stormwater is directly discharged to nearby waterbodies and does not flow through a Combined Sewer Overflow (CSO) outfall.
2. Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the *CEQR Technical Manual* and the runoff coefficients of the DEP *Guidelines for the Design and Construction of Stormwater Management Systems* (July 2012).

Sources: Langan Engineering, Environmental, Surveying and Landscape Architecture, D.P.C.

DEP FLOW VOLUME CALCULATION MATRIX

Using these sanitary and stormwater flow calculations, the DEP Flow Volume Calculation Matrix was completed for the No Action condition and the With Action condition. The calculations from the Flow Volume Calculation Matrix measure the change in wastewater flow volumes to the sewer system from No Action to With Action conditions, based on four rainfall volume scenarios with varying durations. The summary tables, taken from the Flow Volume Calculation Matrix, are included in **Table 8-6**.

Table 8-6
DEP Flow Volume Matrix:
No Action and With Action Volume Comparison

Rainfall Volume (in.)	Rainfall Duration (hr.)	Runoff Volume to Direct Drainage (MG)	Runoff Volume to SS* (MG)	Sanitary Volume to SS* (MG)	Total Volume to SS* (MG)	Runoff Volume to Direct Drainage (MG)	Runoff Volume to SS* (MG)	Sanitary Volume to SS* (MG)	Total Volume to SS* (MG)	Increased Total Volume to SS* (MG)	Percent Increase from No Action Condition
		No Action				With Action					
		3,700,605 sf/84.95 acres				3,700,605 sf/84.95 acres					
0.00	3.80	0.00	0.00	0.05	**0.05**	0.00	0.00	0.06	**0.06**	0.01	20%
0.40	3.80	0.71	0.00	0.05	**0.05**	0.72	0.00	0.06	**0.06**	0.01	20%
1.20	11.30	2.12	0.00	0.14	**0.14**	2.15	0.00	0.19	**0.19**	0.05	35%
2.50	19.50	4.41	0.00	0.24	**0.24**	4.49	0.00	0.32	**0.32**	0.08	33%

Notes: * The DEP Flow Volume Matrix measures combined stormwater and sanitary flows to a Combined Sewer System (CSS); however, the project site is located in a separately sewered area. Therefore, the matrix has been revised to indicate flows to the sanitary sewer system (SS).
MG = Million Gallons

As shown in **Table 8-6**, the percent increase in wastewater flows to the sanitary sewer system is minor, and is attributable to the minor increase in sanitary flow resulting from the proposed enlargement on the project site. Sewer conveyance near the project site and wastewater treatment capacity at the Oakwood Beach WWTP is sufficient to handle the increase in wastewater flows. Furthermore, the proposed project would incorporate sanitary source control best management practices (BMPs) to reduce sanitary volumes to the separated sewer system, including the installation of low-flow fixtures to reduce water consumption**.** Based on drainage plans reviewed with DEP at a December, 2013 meeting, the permitted stormwater flow rate for

the project site is 429.6 cubic feet per second (cfs); the existing flow rate for the project site is below the permitted rate at 389.8 cfs. While the stormwater flow rate on the project site would increase slightly due to the increase of rooftop area and reduction of paved parking area, as well as a slight reduction in landscaped area, the flow rate would remain below the permitted flow rate. In addition, hydrodynamic separators would be implemented to treat stormwater before it is discharged to the City sewer system. Using hydrodynamic separators, the proposed project would meet NYSDEC's water quality requirements for redevelopment projects. Therefore, there would be no significant adverse impacts on wastewater treatment or stormwater conveyance infrastructure as a result of the proposed project.

F. FUTURE WITH 2019 COMPLETION DATE

As detailed in Chapter 1, "Project Description," there is the possibility that Macy's would elect to postpone commencement of construction of its proposed 75,000-gsf enlargement, in which case the Macy's enlargement and a portion of the proposed structured parking garage would be expected to be complete by 2019, rather than by 2017. In this event, the effects of the proposed project on water and sewer infrastructure would be substantially similar to those described above for the 2017 full-build analysis. This 2019 Full-Build Scenario would delay the introduction of some additional retail uses to the study area, but would not change the overall square footage of retail space that would exist on the project site as compared to the 2017 With Action condition. The overall water demand, sewage generation, and surface coverage of the project site would remain as described above for the 2017 full-build analysis. Therefore, the completion of the proposed project by 2019 would not be expected to result in any significant adverse impacts to water and sewer infrastructure. ✷