Chapter 5: 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, as well as its wastewater and storm water conveyance and treatment infrastructure. As described in Chapter 1, "Project Description," the proposed project would redevelop the Kingsbridge Armory building with approximately 795,000 ~~794,900~~ gross square feet (gsf) of new uses, including nine ice rinks; approximately 64,000 gsf of related program space, including a wellness/off-ice training center, curling rinks, and lockers/equipment storage; approximately 58,000 gsf of related food and beverage, concession, and retail space; approximately 50,000 gsf of community facility space, which is assumed to include fitness and recreation facilities, multipurpose rooms, child care, business incubator space, and meeting rooms for local community use; and approximately 457 parking spaces. The project site occupies most of the block bounded by West 195th Street, Reservoir Avenue, West Kingsbridge Road, and Jerome Avenue (Block 3247, Lot 10 and a portion of Lot 2), in the Kingsbridge Heights neighborhood of the Bronx. The existing Kingsbridge Armory building is substantially vacant apart from the storage of graffiti removal trucks by the Mayor's Office's "Graffiti Free NYC" program.

PRINCIPAL CONCLUSIONS

The proposed uses and associated project-generated visitors and employees would increase the project site's water consumption and sewage generation, as compared to conditions in the future without the proposed project. Stormwater runoff is expected to increase slightly due to an increase in paved areas around the site. However, the following analysis finds that the proposed project would not result in any significant adverse impacts on the City's water supply, wastewater or storm water conveyance and treatment infrastructure.

B. METHODOLOGY

This analysis follows the methodologies set forth in the 2012 *City Environmental Quality Review* (*CEQR) Technical Manual.* According to the *CEQR Technical Manual,* a preliminary water analysis is needed if a project would result in an exceptionally large demand of water (over one million gallons per day [gpd]), or is located in an area that experiences low water pressure (i.e., 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 not result in water demand exceeding one million gpd. As described below, by the 2018 analysis year the proposed project would generate an incremental water demand of 219,369 gpd as compared to the future without the proposed project, which represents a fraction of a percent of New York City's overall water supply demand. Therefore, further water analysis was not warranted and the project would not result in any significant adverse impacts to the water supply system.

A preliminary sewer analysis is warranted if a project site is over five acres and would result in an increase of impervious surfaces on the site, or if a project located in a combined sewer area in the Bronx would result in the incremental development of 400 residential units or 150,000 square feet (sf) of commercial, public facility and institution and/or community facility space. The proposed project would result in the development of 794,000 gsf of new uses, and will result in a small increase in impervious surface on the site (which is over five acres in size) due to the addition of new access driveways. Therefore a preliminary sewer analysis was conducted.

Existing and future sanitary sewage generation is calculated based on use generation rates set by the *CEQR Technical Manual*.[1] The New York City Department of Environmental Protection (DEP) Flow Volume Calculation Matrix is then used to calculate the overall combined sanitary sewage and storm water 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 proposed project's anticipated demand is assessed by estimating existing sewage generation rates, and then comparing the future with and without the proposed project. In addition, this chapter compares the incremental volume of sewage generated from the proposed project to the future without the proposed project per *CEQR Technical Manual* methodology.

C. EXISTING CONDITIONS

SEWER SYSTEM

The project site is located in an area of the Bronx that is served by a combined sewer system which collects both sanitary sewage and storm water. In periods of dry weather, the combined sewers in the streets adjacent to the project site—which are sized to convey an amount of sanitary sewage that is based on zoning regulations—convey only sanitary sewage. Since the Armory is substantially vacant, it does not currently generate any sanitary sewage; however, any sanitary sewage generated at the project site would be conveyed from the project site via a connection under West Kingsbridge Road to combined sewers in Davidson Avenue. From there, flow would be conveyed via West 190th Street, West 188th Street, Father Zeiser Place, and Webb Avenue to Regulator 66 at the foot of Landing Road and the Major Deegan Expressway. Regulators are the structures that control the flow of sewage to interceptors, larger sewers that connect the combined sewer system to the city's sewage treatment system. Regulator 66 controls flow to the nearest interceptor to the project site, which runs roughly along the Major Deegan Expressway, and would convey sanitary sewage from the project site to the Wards Island Wastewater Treatment Plant (WWTP).

At the WWTP, wastewater is fully treated by physical and biological processes before it is discharged into the upper East River. The quality of the treated wastewater (effluent) is regulated by a New York State Pollution Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (DEC). The SPDES permit 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 Wards WWTP is 275 million gallons per day (mgd). The average monthly flow over the past 12 months for which data is available[2] is 200 mgd, well below the maximum permitted level.

[1] *CEQR Technical Manual*, June 2012, p.13-12.
[2] April 2012 through April 2013

During and immediately after wet weather, the combined sewers can experience a much larger flow due to storm water runoff collection. To control flooding at the Wards Island 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 Wards Island WWTP, while the excess flow is discharged to the nearest waterbody as combined sewer overflow (CSO). In wet weather, sanitary and storm water runoff from the project site is conveyed to CSO outfall WIB-057 at the Harlem River near the end of Landing Road.

SANITARY FLOWS (DRY WEATHER)

Since the project site is substantially vacant, it generates a negligible amount of sanitary sewage.

STORM WATER FLOWS (WET WEATHER)

The project site is approximately 244,800 sf (5.62 acres), comprising the existing Armory building and grounds. **Table 5-1** describes the surfaces and surface areas of the project site, and how storm water runoff is currently discharged from the site. The weighted runoff coefficient calculated for the CSO subcatchment area is listed in **Table 5-1**. This number corresponds to the percentage of precipitation that becomes surface runoff.

Table 5-1
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement	Other	Grass	TOTAL
WIB-057	**Area**	82%	10%	0%	8%	**100%**
	Surface Area (sq. ft.)[1]	200,790	23,910	0	20,100	**244,800**
	Runoff Coefficient	1.00	0.85	0.70	0.20	**0.92**
Note:	Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the 2012 *CEQR Technical Manual*.					
Source:	(1) BBB Architects, 2013.					

D. THE FUTURE WITHOUT THE PROPOSED PROJECT

In the future without the proposed project, the project site is anticipated to remain in its current substantially vacant condition.

E. PROBABLE IMPACTS OF THE PROPOSED PROJECT

SEWER SYSTEM AND WWTP TREATMENT CAPACITY DEMAND

The proposed project would result in the conversion of the Armory building into a public recreational amenity with 794,000 gsf of new uses, including nine ice rinks, support facilities (such as training areas and locker rooms), concession and retail areas, and community facility use. For the sanitary flow rates projected in **Table 5-2**, a peak daily occupancy was calculated for a projected peak-season weekend day. Consistent with the assumptions used to generate peak traffic demand estimates in Chapter 8, "Transportation," the analysis assumed that on this day, the main rink would host a 5,000-person afternoon event and a 1,500-person evening event; regularly scheduled activities would take place in the main rink for the rest of the day. For the other eight rinks, maximum attendance at games and practice events scheduled throughout the day was assumed, consistent with traffic demand assumptions. Process water demand (e.g., for ice resurfacing) was also included.

Table 5-2
The Future With the Proposed Project: Sanitary Flow

Use	Sq. ft.	Users	Rate (gallons per day)	Sanitary Flow (gallons per day)
Ice Rinks				
Main Rink	---	7,020	5.00[3]	35,100
Ice Rink Typical Daily Activities (8 Rinks)	---	5,995	5.00[3]	29,975
Rink Employees	---	65	20.00[3]	1,300
Related Program Space	64,300	---	0.10[1]	6,430
Community Facility	50,000	---	0.10[1]	5,000
Concessions and Retail	58,100	---	0.24[2]	13,944
Ice Resurfacing	---	---	---	23,940
			TOTAL	**115,689**

Notes: The proposed project would also include an ice plant which would create a water demand of 38,880 gpd; the project is also expected to use 64,800 gpd of water for air conditioning. This water would not be discharged to the sanitary sewer system.
Sources:
(1) *CEQR Technical Manual* commercial/office domestic rate, per square foot
(2) *CEQR Technical Manual* retail domestic rate, per square foot
(3) M-E Engineers, 2013.

Since the water demand currently generated on-site is negligible, compared to the No Build condition, the incremental sanitary sewage generated by the proposed development would be approximately 115,689 gpd. The sanitary flow would be generated from domestic water use (i.e. general tap water use) by athletes, coaching and training staff, and spectators; employees of the rinks, training center, and concessions/retail space; and users of the community facility space. Approximately 24,000 gpd would be used for ice resurfacing. The incremental sanitary sewage generated by the proposed project would represent approximately 0.08 percent of the average daily flow of 275 mgd at the Wards Island WWTP, and would not result in an exceedance of the plant's capacity. Therefore, the proposed project would not have 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 installed and would help to reduce sanitary flows from the renovated Armory building.

STORM WATER FLOWS

The weighted runoff coefficient of the CSO outfall subcatchment area (WIB-057) would remain largely the same since the site is already full developed. The proposed project would result in only a small net increase in impervious surface (approximately 1,000 square feet) from the addition of new driveways and loading docks (see **Table 5-3**).

Table 5-3
Existing Surface Coverage

Affected CSO Outfall	Surface Type	Roof	Pavement	Other	Grass	TOTAL
WIB-057	**Area**	82%	10%	0%	8%	**100%**
	Surface Area (sq. ft.)[1]	200,790	24,910	0	19,100	**244,800**
	Runoff Coefficient	1.00	0.85	0.70	0.20	**0.92**

Note: Weighted Runoff Coefficient calculations based on the DEP Flow Volume Calculation Matrix provided in the 2012 *CEQR Technical Manual*.
Source: (1) BBB Architects, 2013.

Using these sanitary and storm water flow calculations, the DEP Flow Volume Calculation Matrix was completed for the existing condition, No Build conditions, and conditions with the

proposed project (the "Build" condition). The calculations from the Flow Volume Calculation Matrix help to determine the change in wastewater flow volumes to the combined sewer system from No Build to Build conditions. The Flow Volume Calculation Matrix includes four rainfall volume scenarios with varying durations. The summary tables, taken from the DEP Flow Volume Calculation Matrix, are included in **Table 5-4.**

Table 5-4
DEP Flow Volume Matrix:
No Build and Build Volume Comparison

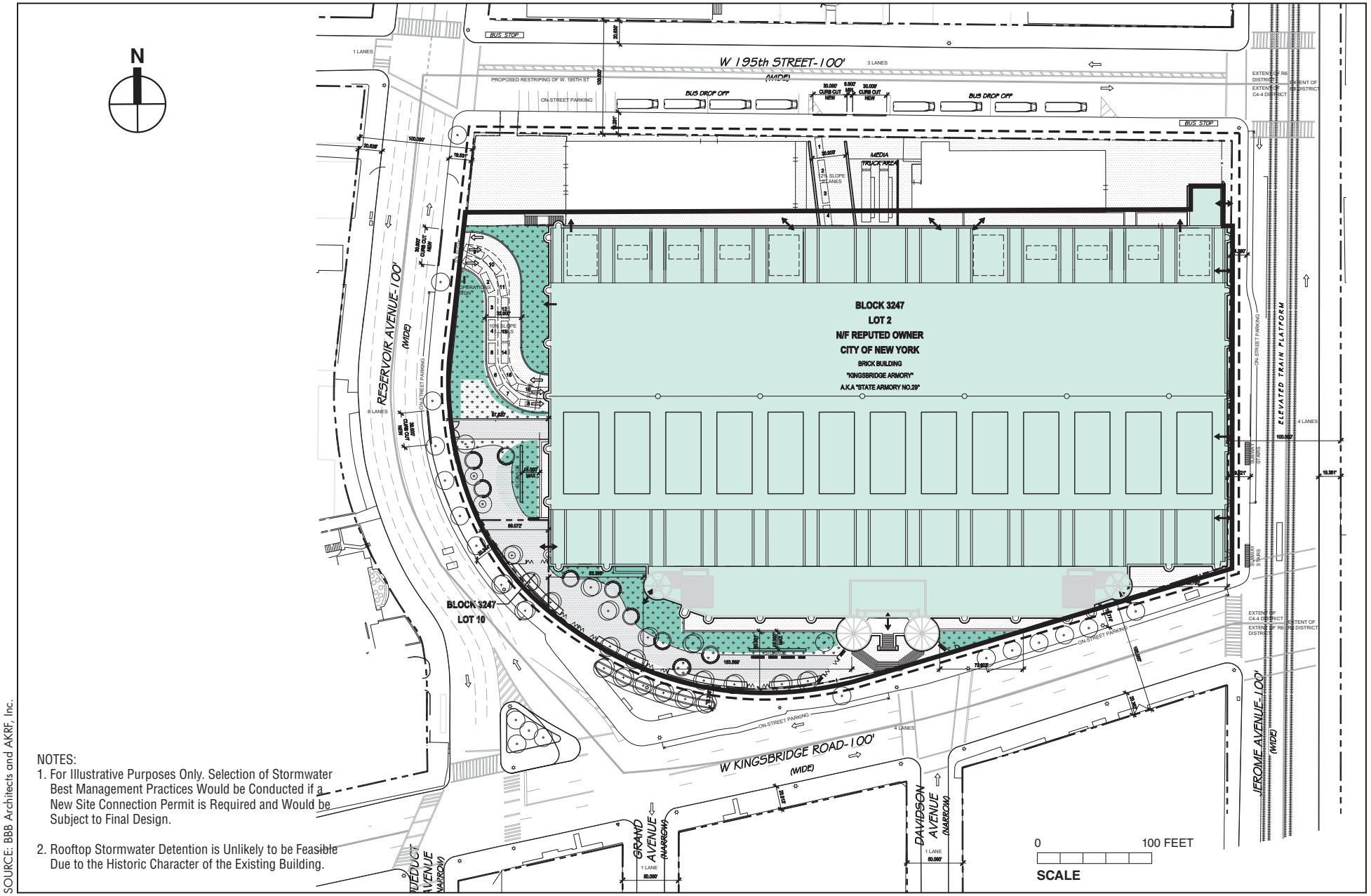
Rainfall Volume (in.)	Rainfall Duration (hr.)	Runoff Volume Direct Drainage (MG)	Runoff Volume To CSS** (MG)	Sanitary Volume To CSS (MG)	Total Volume To CSS (MG)	Runoff Volume To River (MG)	Runoff Volume To CSS** (MG)	Sanitary Volume To CSS (MG)	Total Volume To CSS (MG)	Increased Total Volume to CSS** (MG)	Percent Increase From No Build Conditions (%)
WIB-057		No Build				Build				WIB-057 Increment	
		244,800 sf / 5.62 acres				244,800 / 5.62 acres					
0.00	3.80	0.00	0.00	0.00	**0.00**	0.00	0.00	0.02	**0.02**	0.02	*
0.40	3.80	0.00	0.06	0.00	**0.06**	0.00	0.06	0.02	**0.07**	0.02	33%
1.20	11.30	0.00	0.17	0.00	**0.17**	0.00	0.17	0.05	**0.22**	0.05	33%
2.50	19.50	0.00	0.35	0.00	**0.35**	0.00	0.35	0.09	**0.45**	0.09	27%

Notes:
*Percent increase computed for rainfall events only.
** Assumes no on-site detention/BMPs for purposes of calculations
CSS = Combined Sewer System; MG = Million Gallons

As shown in **Table 5-4**, the total flow volume to the combined sewer system for the project's subcatchment area would increase in the future with the proposed project. The change in total flow volume would be the result of increases in sewage generation (i.e., sanitary flow volume) with the proposed project. As discussed above, the proposed project would increase sewage generation at the project site because it would introduce new users to a building that is currently substantially vacant and generates only negligible water demand. Stormwater runoff volumes would be unchanged since there would be relatively little change in impervious surface coverage on the site.

The Flow Volume Matrix calculations do not reflect the use of any sanitary and storm water source control best management practices (BMPs) to reduce sanitary and storm water runoff volumes to the combined sewer system. BMPs, such as low-flow fixtures and rainwater and grey water capture, would be required as a part of the DEP site connection approval process. **Figure 5-1** illustrates potential BMPs that could be utilized at the project site. With the incorporation of these select BMPs, the overall volume of sanitary sewer discharge and storm water runoff, and the peak storm water runoff rate would be reduced. Measures to recover some of the domestic and process water used by the facility would be incorporated into its design and may recover up to 30,000 gpd.

Because the proposed project would reuse an existing building, there would be no change to the size of the existing rooftop and thus there would be no increase in storm water flows from the building area as a result of the proposed project. If a new site connection permit is required, the applicant recognizes that the proposed project would be subject to DEP's storm water performance standard and compliance would be addressed at the time the permit is sought. The performance standard for new development requires that new site connections achieve a storm water release rate equal to the greater of 0.25 cubic feet per second or 10 percent of the new development's allowable flow. BMPs such as low-flow fixtures and rainwater and grey water



NOTES:
1. For Illustrative Purposes Only. Selection of Stormwater Best Management Practices Would be Conducted if a New Site Connection Permit is Required and Would be Subject to Final Design.

2. Rooftop Stormwater Detention is Unlikely to be Feasible Due to the Historic Character of the Existing Building.

SOURCE: BBB Architects and AKRF, Inc.

Project Site Boundary — — — *State/National Register, New York City Landmark Boundary* *Potential Stormwater Infiltration Area* *Use of Low Flow Fixtures*

Stormwater Best Management Practices Concept Plan

Figure 5-1

capture could be utilized to achieve the required release rate, and other measures such as subsurface detention may be considered. Certain BMPs that are frequently utilized to meet DEP's storm water performance standard for new development, such as rooftop detention, are unlikely to be feasible at this site because the proposed project involves the reuse of the existing Kingsbridge Armory building, which is a New York City Landmark (NYCL) and thus changes to the building require approval by the New York City Landmarks Preservation Commission (LPC). In addition, the proposed project is seeking federal historic preservation tax credits, which require that the Armory be rehabilitated to the Secretary of the Interior's Standards for Rehabilitation of Historic Properties.

As sewer conveyance near the project site and wastewater treatment capacity at Wards Island WWTP is sufficient to handle wastewater flow from the proposed project, the project would not result in any significant adverse impacts on wastewater treatment or storm water conveyance infrastructure. ✷