# Chapter 10: Water and Sewer Infrastructure

## A. INTRODUCTION

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. This chapter assesses 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 (CEQR) Technical Manual*.

As described in Chapter 1, "Project Description," the Proposed Project would redevelop a portion of Block 3247 in the Kingsbridge Heights neighborhood of the Bronx, which includes the Kingsbridge Armory ("the Armory") at 1 West Kingsbridge Road (Block 3247, Lot 10) and the New York National Guard (the "National Guard") Site (the "National Guard Site") at 10 West 195th Street (Block 3247, Lot 2) (collectively, the "Project Site"). The Proposed Project includes the adaptive reuse of the vacant, approximately 588,765-gross-square-foot (gsf) Armory to provide up to approximately 735,800 gsf of new uses, including a mix of community facility and cultural space, light manufacturing space, commercial office space, a 17,000-person capacity live event venue, and other entertainment uses, along with parking and loading docks. The National Guard Site would be redeveloped with a new residential building (up to approximately 494,500 gsf) containing 500 new permanently affordable dwelling units (DUs) and approximately 14,400 gsf of ground floor retail, replacing a one-story garage and a two-story office building. The Proposed Project would include a total of up to approximately 1,230,300 gsf of development at the Project Site.

### PRINCIPAL CONCLUSIONS

The Proposed Project would result in marginally increased flows to the City's combined sewer system that may be discharged as combined sewer overflow (CSO) during rain events. However, because of the available capacity at the Wards Island Wastewater Resource Recovery Facility (WRRF) and the incorporation of best management practices (BMP) to meet the City site connection requirement and compliance with the Unified Stormwater Rule, the Proposed Project would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure.

## B. METHODOLOGY

According to the *CEQR Technical Manual*, an analysis of an action's impact on the water supply system should be conducted only for actions that would have exceptionally large demand for water (generally over 1 million gallons per day [gpd]), such as power plants, very large cooling systems, or large developments. In addition, analysis should be conducted if a project is located in an area that experiences low water pressure (e.g., areas at the end of the water supply distribution system such as the Rockaway Peninsula and Coney Island). The Proposed Project does not meet any of these criteria,[1] and therefore, an analysis of water supply is not warranted.

The *CEQR Technical Manual* indicates that for wastewater and stormwater conveyance and treatment analyses, a preliminary assessment is warranted if a project is located in a combined sewer area and would have an incremental increase above the No Action condition of 400 residential units or 150,000 square feet (sf) of commercial, public facility, and institution and/or community facility space in the Bronx. Since the Project Site is located in a combined sewer area in the Bronx and the Proposed Project would exceed these thresholds, an assessment of wastewater and stormwater infrastructure is provided.

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

- A description of the existing water and sewer infrastructure serving the Project Site.
- A preliminary analysis that estimates water demand and sewage generation on the Project Site under existing and No Action conditions based on use generation rates provided in the *CEQR Technical Manual*. The preliminary analysis also calculates stormwater runoff and sanitary flows using the New York City Department of Environmental Protection (DEP) Volume Calculation Matrix. The preliminary analysis then forecasts water demand and sewage and stormwater generation by the Proposed Project under the Proposed Actions based on *CEQR Technical Manual* guidelines.
- An assessment of the effects of the With Action water demand and sewage and stormwater generation on the City's water and sewer infrastructure based on the preliminary analyses, pursuant to *CEQR Technical Manual* guidelines.

## C. EXISTING CONDITIONS

### SEWER SYSTEM AND WASTEWATER TREATMENT

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 stormwater. 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. The National Guard Site includes approximately 14,000 gsf of office space and currently generates sanitary sewage. This sanitary sewage is conveyed from the Project Site to a combined sewer in Davidson Avenue. From there, flow is conveyed

[1] As shown in **Table 10-3**, the Proposed Project would result in a total water demand of approximately 405,320 gpd and would not exceed 1 million gpd.

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 an interceptor which runs roughly along the Major Deegan Expressway and conveys sanitary sewage from the Project Site to the Wards Island WRRF.

At the Wards Island WRRF, 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 WRRF affects the level of treatment a plant can provide, the maximum permitted capacity for the Wards Island WRRF is 275 million gallons per day (mgd). The average monthly flow over the past 12 months for which data is available[2] is 209 mgd, well below the maximum permitted level.

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 WRRF, the regulators built into the system allow only approximately twice the amount of design dry weather flow into the interceptors. The interceptor then takes the allowable flow to the Wards Island WRRF, while the excess flow is discharged to the nearest waterbody as CSO. In wet weather, sanitary and stormwater runoff from the Project Site is conveyed to CSO outfall WIB-057 at the Harlem River near the end of Landing Road.

## SANITARY FLOWS

For purposes of analysis, the amount of sanitary sewage is estimated as all water demand generated on the Project Site, except water used by air conditioning, which is typically not discharged to the sewer system. Since the Armory is substantially vacant, it does not currently generate any meaningful quantity of sanitary sewage. **Table 10-1** shows the total estimated sanitary sewage currently generated by the approximately 14,000 gsf of office space on the National Guard Site is 1,400 gpd.

**Table 10-1**
**Existing Water Consumption and Wastewater Generation**

| Land Use | Water Consumption and Wastewater Generation Rates[1] | Area/Units | Domestic Water/ Wastewater Generation (gpd) | Air Conditioning (gpd) |
|---|---|---|---|---|
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 14,000 gsf | 1,400 | 2,380 |
| **Project Site—Total Water Demand** | | | | **3,780** |
| **Project Site—Total Wastewater Generation** | | | | **1,400** |

**Notes:**
gpd = gallons per day
[1] Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.

[2] Twelve-month period through August 2024.

## STORMWATER FLOWS

The Project Site is approximately 296,100 sf (6.80 acres). The Armory includes an approximately 180,000-gsf column-free drill hall; an approximately 88,000-gsf headhouse; and approximately 279,000-gsf contained in two levels below the drill hall. The outdoor areas surrounding the building include a paved parking area and approximately 20,000 sf of landscaped areas. The National Guard Site includes a one-story, approximately 12,000-gsf garage and a two-story, approximately 14,000-gsf building containing office spaces. **Table 10-2** summarizes the surfaces and surface areas on the Project Site, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type).

**Table 10-2**
**Existing Surface Coverage**

| Affected CSO Outfall | Surface Type | Roof | Pavement and Walkways | Other | Grass and Soft Scape | Total |
|---|---|---|---|---|---|---|
| WIB-057 | Area (percent) | 75% | 14% | 0% | 11% | **100%** |
| | Surface Area (sf) | 223,531 | 40,969 | 0 | 31,600 | **296,100** |
| | Runoff Coefficient | 1.00 | 0.85 | – | 0.20 | **0.89** |

**Notes:**
* The Runoff Coefficient is a weighted average. The calculations are based on the DEP Volume Calculation Matrix provided in the 2021 *CEQR Technical Manual.*

### *UNIFIED STORMWATER RULE*

In February 2022, DEP adopted the Unified Stormwater Rule, which amended on-site stormwater management requirements for new and redevelopment projects in combined sewer areas. The Unified Stormwater Rule was an update to the previous regulations (2012 Stormwater Rule) that reduce 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. Specifically, DEP adopted amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York (RCNY) as part of the Unified Stormwater Rule.

Under the 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 Application (SCP). Additionally, under the Chapter 19.1 amendments, sites that disturb 20,000 sf or more of soil or increase impervious surfaces by 5,000 sf or more will also be required to manage the Water Quality Volume (WQv), currently defined as 1.5 inches over the lot area, 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. For sites that trigger the Chapter 19.1 component of the Unified Stormwater Rule, the hierarchy is mandatory, meaning that developers must start with the most preferred SMP and provide documentation of site constraints that prevent implementation in order to move to the next SMP.

The Unified Stormwater Rule is expected to result in substantial improvements to the way that new and redeveloped individual properties manage stormwater compared with the 2012 Stormwater Rule it replaced. In some cases, stormwater will be entirely prevented from entering the sewer system through retention and, in most cases, stormwater that does enter the system will be reduced and/or treated and released at a lesser rate, allowing the system to operate more efficiently during peak wet weather events. In combined sewersheds, such as the portion of the Bronx that contains the Project Site, the Unified Stormwater Rule is expected to lead to a reduction in CSO volume as more lots redevelop over time. The analyses of stormwater flows presented in this assessment conservatively do not account for the recommendations of the Unified Stormwater Rule and design guidance included within.

## D. THE FUTURE WITHOUT THE PROPOSED PROJECT (NO ACTION CONDITION)

In the future without the Proposed Project, the Project Site would remain unchanged from its current state. The approximately 588,765-gsf Armory would remain vacant and substantially underutilized, and the two National Guard buildings totaling approximately 26,000 gsf would remain on the Project Site and in use by the National Guard. Total sanitary sewage generation and surface coverage conditions (including the weighted runoff coefficient) on the Project Site in the No Action condition would be the same as under the existing condition, as outlined above.

## E. THE FUTURE WITH THE PROPOSED PROJECT (WITH ACTION CONDITION)

In the future with the Proposed Project, the Proposed Project would implement adaptive reuse of the Armory and redevelopment of the National Guard Site. The With Action condition includes up to approximately 1,230,300 gsf of new development at the Project Site, including up to approximately 735,800 gsf of floor area at the Armory with a mix of community facility and cultural space, light manufacturing space, commercial office space, a 17,000-person capacity live event venue, and other entertainment uses, along with parking and loading docks; and up to approximately 494,500 gsf of new residential area at the National Guard Site, including up to 500 permanently affordable dwelling units and approximately 14,400 gsf of ground floor retail.

### SANITARY FLOWS

As shown in **Table 10-3**, in the With Action condition, wastewater generated on the Project Site would total approximately 243,718 gpd, which represents an incremental increase of approximately 242,318 gpd compared to the No Action condition. The incremental increase in sewage generation is the result of the reactivation of the Armory with new active uses, as well as the new residential development at the National Guard Site.

**Table 10-3**
**With Action Condition Water Consumption and Wastewater Generation**

| Land Use | Water Consumption and Wastewater Generation Rates[1] | Area/Units[2] | Domestic Water/Wastewater Generation (gpd) | Air Conditioning (gpd) |
|---|---|---|---|---|
| Residential | Domestic: 100 gpd/person[3]<br>A/C: 0.17 gpd/sf | 438,500 sf<br>(500 DUs) | 139,500 | 74,545 |
| Local Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 14,400 sf | 3,456 | 2,448 |
| Cultural/Museum[5] | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 30,200 sf | 7,248 | 5,134 |
| Community Facility[4] | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 54,200 sf | 5,420 | 9,214 |
| Recreation/ Entertainment Center[5] | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 65,500 sf | 15,720 | 11,135 |
| Commercial Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 73,000 sf | 7,300 | 12,410 |
| Light Industrial/ Production Space | Domestic: 0.23 gpd/sf[6]<br>A/C: 0.17 gpd/sf | 87,800 sf | 20,194 | 14,926 |
| Concert Hall/ Event Venue[5] | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 187,000 sf | 44,880 | 31,790 |
| **Project Site—Total Water Demand** | | | | **405,320** |
| **Project Site—Total Wastewater Generation** | | | | **243,718** |
| **Incremental Water Demand (No Action to With Action)** | | | | **401,540** |
| **Incremental Wastewater Generation (No Action to With Action)** | | | | **242,318** |

**Notes:**
Totals may not sum due to rounding.
gpd = gallons per day; DU = dwelling unit
[1] Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
[2] 279,700 sf of parking and back of house space will not generate wastewater and is not included in the table.
[3] Assumes 2.79 residents per DU—average household size of the Bronx Community District 7, 2020 U.S. Decennial Census
[4] Community Facility spaces are assumed to generate water demand and sanitary sewage at the rates for office space.
[5] Cultural/Museum, Recreation/Entertainment Center, and Concert Hall/Event Venue spaces are assumed to generate water demand and sanitary sewage at the rates for retail space.
[6] Based on *East New York Rezoning Proposal FEIS* (equal to 10,000 gpd/acre); calculated based on total building floor area.

The incremental increase in sewage generation would be approximately 0.12 percent of the average daily flow at the Wards Island WRRF and would not result in an exceedance of the WRRF's permitted capacity of 275 mgd. In addition, in accordance with the New York City Plumbing Code (Local Law 33 of 2007), all development on the Project Site would be required to utilize low-flow plumbing fixtures, which would help to further reduce sanitary flows to the WRRF.

Connecting to the City's sewer system requires certification from DEP as part of the building permit process, which is not a discretionary approval. An applicant would be required to file an SCP for approval from DEP to tie into the sewer system. The new residential building at the National Guard Site would require an SCP, and the Armory would also require an SCP. In this process, before a building permit can be issued, site connection proposals must be certified for sewer availability by DEP. An applicant would

be required to demonstrate that the existing sanitary system could handle the site-specific sanitary flows from the proposed development. Because the City's sewers are sized and designed based on the designated zoning of an area and related population density and surface coverage characteristics, the Proposed Project may result in development that is inconsistent with the design of the existing built sewer system. A site-specific hydraulic analysis of the existing sewer system may be required to determine whether the existing sewer system is capable of supporting higher density development and related increases in wastewater flows. Sewer upgrades may be required, including upgrades to the existing regulators, at the time of the SCP to accommodate the projected flows from the new development. In addition, there may be a need to amend the existing drainage plan based on the hydraulic analysis calculations.

As the Proposed Project is not expected to result in a significant increase in dry weather flows to the combined sewer system and the Wards Island WRRF, there would be no significant adverse impacts to sanitary sewage conveyance and treatment infrastructure.

### STORMWATER FLOWS

The With Action condition development would result in changes to surface coverage on the Project Site. On the Project Site, the development on the National Guard site involves the construction of a new building that would occupy a larger footprint than the two existing buildings, therefore there would be an increase in fully impervious rooftop area from existing conditions and a decrease in softscape area.

**Table 10-4** shows the surface coverage and weighted runoff coefficient on the Project Site in the With Action condition. The weighted runoff coefficient would increase from 0.89 in existing conditions to 0.93 in the With Action condition.

**Table 10-4**
**With Action Condition Surface Coverage**

| Affected CSO Outfall | Surface Type | Roof | Pavement and Walkways | Other | Grass and Soft Scape | Total |
|---|---|---|---|---|---|---|
| WIB-057 | Area (percent) | 80% | 14% | 0% | 6% | **100%** |
| | Surface Area[1] (sf) | 235,862 | 42,785 | 0 | 17,453 | **296,100** |
| | Runoff Coefficient | 1.00 | 0.85 | – | 0.20 | **0.93** |

**Notes:**
* The Runoff Coefficient is a weighted average. The calculations are based on the DEP Volume Calculation Matrix provided in the *CEQR Technical Manual*, retrieved November 2023.
[1] Surface area calculations include Armory and National Guard Site tax lot areas and does not account for sidewalk/streetbed area within the Project Site.
Totals may not sum due to rounding.

Using these sanitary and stormwater flow calculations, the DEP Volume Calculation Matrix was utilized to determine flows for the With Action condition. The calculations from the Volume Calculation Matrix help to determine the change in wastewater volumes to the combined sewer system from existing conditions to With Action condition, and include four rainfall runoff volume scenarios with varying durations. The drainage analysis assumes that all stormwater runoff from the Project Site would flow via the existing combined sewer infrastructure serving the Project Site. The summary tables of the Volume Calculation Matrix are included in **Table 10-5**.

As shown in **Table 10-5**, in all rainfall scenarios there would be a minor increase in flows to the combined sewer system under the With Action condition as compared to the existing condition volumes, as there would be an increase in sanitary sewage generation, however, there would only be a minor increase in stormwater runoff.

**Table 10-5**
**DEP Volume Calculation Matrix:**
**Existing/No Action and With Action Condition Volume Comparison**

| Rainfall Volume (in) | Rainfall Duration (hr) | Runoff Volume to SS (MG) | Runoff Volume to CSS (MG)* | Sanitary Volume to CSS (MG) | Total Volume to CSS (MG) | Runoff Volume to SS (MG) | Runoff Volume to CSS (MG)* | Sanitary Volume to CSS (MG) | Total Volume to CSS (MG) | Increased Total Volume to CSS (MG)* |
|---|---|---|---|---|---|---|---|---|---|---|
| WIB-057 | | Existing/No Action | | | | With Action | | | | WIB-057 Increment |
| | | 296,149 sf (6.80 acres) | | | | 296,149 sf (6.80 acres) | | | | |
| 0.00 | 3.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.04 |
| 0.40 | 3.80 | 0.00 | 0.07 | 0.00 | 0.07 | 0.00 | 0.07 | 0.04 | 0.11 | 0.04 |
| 1.20 | 11.30 | 0.00 | 0.20 | 0.00 | 0.20 | 0.00 | 0.21 | 0.11 | 0.32 | 0.12 |
| 2.50 | 19.50 | 0.00 | 0.41 | 0.00 | 0.41 | 0.00 | 0.43 | 0.20 | 0.63 | 0.21 |

**Notes:**
Totals may not sum due to rounding.
* Assumes no on-site detention or Best Management Practices (BMPs) for purposes of calculations.
SS = Storm Sewer; CSS = Combined Sewer System; MG = Million Gallons

The volume matrix calculations presented above do not reflect the use of any sanitary and stormwater source control BMPs to reduce sanitary volume 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 as required by the New York City Plumbing Code. In addition, stormwater detention would be required as part of the DEP SCP application process for new buildings connecting to the City's sewer system. As part of the SCP permit approval processes, developments must be in compliance with the required on-site stormwater volume requirements and stormwater release rate as detailed in the Unified Stormwater Rule. The performance standard is intended to reduce peak discharges to the City's sewer system during rain events by requiring greater onsite storage of stormwater runoff and slower release to the sewer system. The implementation of DEP's stormwater performance standard over time is expected to provide additional capacity to the existing sewer system, thereby improving its performance. The performance standard is a key element of the New York City Green Infrastructure Plan to promote green infrastructure and improve water quality in the City's surrounding waterbodies. Specific BMP measures for the Proposed Project would be confirmed in the future in consultation with DEP when specific designs are advanced. 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 the Armory because of its design and status as 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 may receive 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 noted above, because the City's sewers are sized and designed based on the designated zoning of an area, and related population density and surface coverage characteristics, the Proposed Project may result in development that is inconsistent with

the design of the existing built sewer system. If necessary, subject to additional consultation with DEP, an Amended Drainage Plan (ADP) would be prepared. In addition, a hydraulic analysis of the existing sewer system may be required as part of the SCP permit approval process. The hydraulic analysis calculations would inform the ADP process as necessary. Sewer improvements and/or incorporation of BMPs may also be required of the Applicants at the time of the site connection proposal.

The Proposed Project would result in marginally increased flows to the City's combined sewer system that may be discharged as CSOs during rain events. Because of the available capacity of the Wards Island WRRF, the projected increased flows to the combined sewer system would not have a significant adverse impact on water quality. In addition, with the incorporation of BMP measures to meet the City site connection requirement and compliance with the Unified Stormwater Rule, the Proposed Project would not result in a significant increase in stormwater runoff or CSO volumes/frequencies. Therefore, the Proposed Project would not result in significant adverse impacts to local water supply or wastewater and stormwater conveyance and treatment infrastructure. ✷