

A. INTRODUCTION

The *New York City Environmental Quality Review (CEQR) Technical Manual* outlines the following guidelines for the infrastructure assessment:

- *Water Supply.* An analysis of an action's impact on the New York City water supply system should be conducted only for actions that would have exceptionally large demand for water, such as power plants, very large cooling systems, or large developments (e.g., those that use more than 1 million gallons per day). In addition, actions located at the extremities of the water distribution system should be analyzed.
- *Sanitary Sewage and Wastewater Disposal.* Because the city is committed to adequately treating all wastewater generated in the city and to maintaining its wastewater treatment plants at or below the capacity permitted by applicable state and federal permits, orders, and decrees, only unusual actions with very large flows could have the potential for significant impacts on sewage treatment.

Because the proposed action would not trigger any of the CEQR thresholds, this chapter discloses the proposed action's water demands and wastewater generation and qualitatively discusses stormwater conditions. This chapter concludes that the proposed action would not have significant adverse impacts on infrastructure.

B. EXISTING CONDITIONS**WATER SUPPLY***WATER SUPPLY SYSTEM*

New York City gets its water from three watersheds and a network of reservoirs, aqueducts, and tunnels extending as far as 125 miles north of the city. Within the city, a grid of mains distributes water to individual buildings.

The Delaware and Catskill systems collect water from the Catskill Mountains and deliver it to the Hillview Reservoir in Yonkers. From there, it is distributed to the rest of the city through one of two tunnels: city Tunnel No. 1, which goes through the Bronx and Manhattan to Brooklyn, and city Tunnel No. 2, which goes through the Bronx, Queens, and Brooklyn (and from there through the Richmond Tunnel to Staten Island). A third tunnel, city Tunnel No. 3, is under construction, and the first portion became operational in August 1999 and serves Manhattan.

The Croton system collects water from Westchester and Putnam Counties and delivers it to the Jerome Park Reservoir in the Bronx. From there, it is distributed to the Bronx and Manhattan through the New Croton Aqueduct, which travels beneath the Bronx and Manhattan.

WATER CONSUMPTION

Water consumption in the City averages approximately 1.2 billion gallons per day (gpd). In Manhattan, average consumption is approximately 420 million gallons per day (mgd); peak consumption is approximately 500 mgd. The Croton system has lower pressure than the Delaware and Catskill systems and supplies domestic uses primarily in the lower elevations of Manhattan and the Bronx. The higher-pressure Delaware and Catskill systems serve all five boroughs and higher elevations where the water pressure of the Croton system would be inadequate. The Croton system supplies about 10 percent of the city's water needs, and the Catskill/Delaware systems supply the rest. Any of the three systems can serve the project site.

The project site includes two academic buildings totaling 545,199 square feet, an 850-bed dormitory, and open space areas. Based on recommended CEQR rates for water demand, at an average of 30 gallons per academic seat per day, the academic buildings (including air conditioning) are estimated to consume about 136,300 gpd.¹ Based on 112 gallons per student per day, the 850 dormitory residents are estimated to consume about 95,200 gpd. Overall about 231,500 gpd of water is currently consumed on-site, including air conditioning.

Croton water mains near the project block include a 36-inch main under Columbus Avenue and a 48-inch main under Amsterdam Avenue. A 36-inch main and 20-inch main under Broadway carry water from the Catskill/Delaware system. The cross streets bordering the project site are also underlain by water mains that serve the area: West 60th Street (12-inch main), West 61st Street (12-inch main), and West 62nd Street (18-inch).

SANITARY SEWAGE AND STORMWATER

NORTH RIVER WATER POLLUTION CONTROL PLANT

Sewage on the West Side of Manhattan north of Bank Street is conveyed to the North River Water Pollution Control Plant (WPCP), located on the Hudson River between West 137th and West 145th Streets. This plant began operation with primary treatment in March 1986. Prior to that time, sewage from the West Side of Manhattan was discharged untreated into the Hudson and Harlem Rivers.

Beginning in April 1991, the plant began operation of full secondary treatment. Secondary treatment removes biochemical oxygen demand (BOD) through an oxidation process that depends on biological growth. BOD is defined as the quantity of dissolved oxygen required by bacteria to oxidize organic matter. It is the most widely used measurement of pollution from sewage effluent. The plant is designed to have a BOD removal rate of 85 percent or better.

The State Pollution Discharge Elimination System (SPDES) permit for the North River WPCP contains limits on BOD and total suspended solids (TSS); both are measures of the organic strength of the sewage. The organic content of the sewage impairs water quality by using oxygen in the receiving water, in this case the Hudson River. The degree of removal of BOD and TSS is mandated by the Federal Clean Water Act at a minimum of 85 percent, or resulting in a maximum 30-day average concentration of 30 milligrams per liter of effluent (mg/l).

¹ Based on one seat per 200 square feet of academic space.

The SPDES permit further specifies a maximum mass loading discharge allowable for BOD and TSS. The limitations on BOD and TSS in the SPDES permit are set based on achieving water quality standards in the Hudson River.

As shown in Table 12-1, actual average monthly flows to the plant average about 128 mgd, well within the plant’s design and permit capacity of 170 mgd. In addition, on a monthly basis, the North River WPCP meets or exceeds its permit limitations for removing BOD and TSS.

**Table 12-1
Monthly Flow to North River WPCP**

Year	Month	Flow (mgd)
2004	May	125
	June	124
	July	139
	August	129
	September	148
	October	126
	November	132
	December	125
2005	January	126
	February	122
	March	129
	April	128
	12-month average	128
	SPDES permit limit	170
Source: New York City Department of Environmental Protection.		

STORMWATER CONTROL

The area around project site is served by a combined sewer system, which carries sanitary sewage during all times and carries stormwater as well as sanitary sewage during precipitation events, such as rain storms and snow melts. In order to protect the North River WPCP from flooding, the combined flow is directed to regulators which divert two times the design dry weather flow to the interceptors. Sanitary and storm flow in excess of two times the design dry weather flow is diverted into the Hudson River in a Combined Sewer Overflow (CSO).

C. THE FUTURE WITHOUT THE PROPOSED ACTION—2014

WATER SUPPLY

Because its water supply is finite, the city has initiated a comprehensive water conservation program that seeks to reduce water use by implementing metering and requiring low-flow fixtures in all new development projects and retrofits of existing fixtures (Local Law No. 29, 1989). Other measures, including leak detection programs and locking fire hydrant caps, are aimed at further reducing the city’s water needs.

The New York City Department of Environmental Protection (DEP) projects that the savings from these conservation measures will, over the next decade, exceed any increase in water

demand from added consumers—i.e., population and employment growth. Future water use for the entire Borough of Manhattan is conservatively projected to remain at or below the current average use of 420 mgd, with peak use of 500 mgd. By 2014 in the future without the proposed action, three residential buildings with 876 total units would be built on the project site. Based on CEQR rates of 112 gallons per person per day, the estimated 1,419 new residents would consume 158,928 gpd. Overall, this would be a minimal increase in water demand.

SANITARY SEWAGE AND STORMWATER

In the future without the proposed action, it is expected that the North River WPCP will continue to treat to full secondary treatment levels wastewater from the WPCP’s service area. In addition, it is expected that the North River WPCP will continue to meet or exceed its permit limitations for removing BOD and TSS. By 2014, 876 new residential units are expected to be built on the project site, resulting in a minimal increase in sewage (158,928 gpd).

No changes to the combined sewer system are expected in the future without the proposed action. However, two large projects, Hudson Yards and Columbia University, are expected to increase the number of large buildings and impervious surfaces within the North River WPCP service area. In order to prevent increases in stormwater flows and the number of CSO events, buildings in these projects will be required to install stormwater detention systems. In addition, some improvements to the combined sewer collection system are being required. These improvements in the sewer system are expected to reduce the number and frequency of the CSO events to some degree.

D. PROBABLE IMPACTS OF THE PROPOSED ACTION—2014

The initial phase of construction would result in new academic and dormitory facilities, which would place new demands on the city’s infrastructure. Specifically, by 2014 the proposed action would create a new Law School, new dormitory space, a Student Center, and below-grade parking. This section discloses the approximate anticipated future demand of the proposed action by 2014.

WATER SUPPLY

As shown in Table 12-2, water demands under the proposed action have been projected using the rates outlined in the *CEQR Technical Manual*.

**Table 12-2
2014 Estimated Water Demand**

Use	Size	Domestic demand	Air Conditioning	Total
Dormitory	695 beds	77,840	NA	77,840
Academic	382,421 square feet (or 1,912 seats)	57,360	38,242	95,602
Total	NA	135,200	38,242	173,442
Note: Usage rates from the <i>CEQR Technical Manual</i> . Dormitory use is treated as residential use and based on estimated usage per day per student/resident with an estimated rate of 112 gpd per student/resident, which includes air conditioning. Academic use is based on 30 gpd per seat plus a multiplier of 0.10 gpd/sf for air conditioning demand.				

Based on these rates, the proposed action would result in an increase of water use of 173,442 gpd. This represents approximately 0.04 percent of the average water consumption in Manhattan, an insignificant increase. As a result, it would not be expected that this added demand would overburden the city's water supply or the local conveyance system. The proposed project would also comply with the water conservation measures of the city as mandated by Local Law 19.

SANITARY SEWAGE AND STORMWATER

The proposed action is assumed to generate wastewater at a rate commensurate with domestic water consumption, or about 173,442 gpd. This amount of wastewater, representing about 0.10 percent of the North River WPCP's permitted capacity, is not expected to exceed the WPCP's capacity or affect its treatment efficiency. Likewise, the proposed action is not expected to overburden the local conveyance system.

The proposed action has the potential to increase the amount of land with impervious surfaces and decrease the amount with pervious surfaces. This would increase the volume of runoff because less stormwater would be able to percolate into the ground and become groundwater. However, before any new building can be connected to the sewer system, DEP must issue a sewer connection permit. As part of the sewer permitting processes, DEP does not allow increases in the stormwater flows into its system. An increase in stormwater flows would lead to an increase in the number and intensity of CSO events. DEP has in-place a major program to decrease the number and intensity of CSO events to protect water quality in the rivers and water bodies surrounding New York City. DEP would require Fordham to take measures to prevent any increase in stormwater flows and CSO events. These measures could include water conservation measures, green roofs, stormwater detention, stormwater retention for reuse, and improvements to the sewer collection system. The proposed actions would not lead to an increase in the number and intensity of CSO events because of DEP's CSO program and permitting authority.

POTENTIAL WATER CONSERVATION MEASURES

Fordham University is currently exploring ways to incorporate "green" building elements into the proposed buildings to maximize the efficiency with which they utilize resources, including water resources. Based on those outlined by the Leadership in Energy and Environmental Design (LEED) Certification by the United States Green Building Council (USGBC), such measures may be used in the design of buildings and facilities on the project site.

E. THE FUTURE WITHOUT THE PROPOSED ACTION—2032

WATER SUPPLY

Similar to conditions described in "The Future without the Proposed Action—2014," DEP projects that the savings from water conservation measures will exceed any increase in water demand from added consumers—i.e., population and employment growth.

SANITARY SEWAGE AND STORMWATER

In the future without the proposed action, it is expected that in 2032 the North River WPCP will continue to treat to full secondary treatment levels wastewater from the WPCP's service area. In

addition, it is expected that the North River WPCP will continue to meet or exceed its permit limitations for removing BOD and TSS.

The improvements in the sewer system discussed above are expected to continue.

F. PROBABLE IMPACTS OF THE PROPOSED ACTION—2032

As described in Chapter 1, “Project Description,” full development of the Master Plan would create 1,450 new dormitory beds and approximately 1.26 million square feet of new academic space. This section discloses the anticipated future demand of the proposed action upon full build-out.

WATER SUPPLY

Water demands under the proposed action have been projected using the rates outlined in the *CEQR Technical Manual* (see Table 12-3). Based on these rates, the proposed action would result in a total average water use of 478,356 gpd. This represents approximately 0.11 percent of the average daily water consumption in Manhattan, an insignificant increase. As a result, it would not be expected that this added demand would overburden the city’s water supply or the local conveyance system. The proposed project would also comply with the water conservation measures of the city as mandated by Local Law 19.

**Table 12-3
2032 Estimated Water Demand**

Use	Size	Domestic Demand	Air Conditioning	Total
Dormitory	1,450 beds	162,400	NA	162,400
Academic	1,263,861 square feet (or 6,319 seats)	189,570	126,386	315,956
Total	NA	351,970	126,386	478,356
Source: Usage rates from the <i>CEQR Technical Manual</i> . For dormitory use an estimated rate of 112 gpd per student was used. For academic uses 30 gpd per seat was used to project domestic demand, and a multiplier of 0.10 gpd/sf to estimate air conditioning demand.				

SANITARY SEWAGE AND STORMWATER

The proposed action is assumed to generate wastewater at a rate commensurate with domestic water consumption, or about 478,356 gpd. This amount of wastewater, representing about 0.28 percent of the North River WPCP’s permitted capacity, is not expected to exceed the WPCP’s capacity or affect its treatment efficiency. Likewise, the proposed actions are not expected to overburden the sewer collection system or increase the number and intensity of CSO events. *