A. INTRODUCTION

The proposed action would result in demand on the City's infrastructure systems. This chapter describes existing infrastructure systems serving the project site and estimates service demand and needs generated by the project site in the future without and with the proposed action.

For CEQR analysis purposes, the City's "infrastructure" comprises the physical systems supporting its population, including water supply, wastewater treatment, and stormwater management. Other infrastructure components, such as solid waste management, energy, and transportation, are addressed separately under CEQR. Given the size of New York City's water supply system and the City's commitment to maintaining adequate water supply and pressures, few actions have the potential to cause significant adverse impacts on this system.

According to the *CEQR Technical Manual*, only actions that could affect water pressure have the potential for significant adverse impacts. These could include projects that would have exceptionally large demand for water (power plants, large cooling systems, etc.); large developments (e.g., those that use more than one million gallons per day); or actions taking place in locations that have weaknesses in the local water supply distribution systems (e.g. creating a large draw of water at locations at the end of the water system where water pressure is low or locations near pressure boundaries).

As also stated in the *CEQR Technical Manual*, the City is committed to adequately treating wastewater generated in the City and to maintaining its wastewater treatment plants at or below capacity permitted by applicable state and federal permits, orders, and decrees. Accordingly, only actions with very large flows have the potential for significant adverse impacts on sewage treatment.

The *CEQR Technical Manual* also states that a detailed analysis of stormwater management is warranted if a proposed action involves certain types of industrial activities (e.g., manufacturing, processing, or raw materials storage), actions that would greatly increase the amount of paved area, actions that would be served by a separate storm sewer system and that would involve construction activities, or construction of a new stormwater outfall. Stormwater management impacts would occur if the proposed action would result in significant degradation of the water quality of the Hudson River, increase the frequency or extent of flooding, or increase the levels of erosion and sedimentation from construction and operation activities. There is not expected to be any significant increase in stormwater volumes in the future with the proposed action as compared to the volumes expected in the future without the proposed action, because the amount of impervious surfaces on the project site would not change substantially. The project site is covered by impervious surfaces under existing conditions; this would continue under both No-Build and Build conditions.

Although the proposed action would generate demand on water supply, generate sewage, and may affect stormwater, it is unlikely to create an adverse impact on these services and infrastructure

systems. However, as recommended by the *CEQR Technical Manual*, this chapter discloses the project's potential infrastructure effects for informational purposes.

As discussed in Chapter 1, "Project Description," the proposed action would facilitate a mixed-use development on the project site consisting of 900 DUs; 8,800 sf of retail space; 330,000 sf of automobile dealership space; 20,000 sf of health club space; 36,000 sf of NYPD Mounted Unit stable facility; and 225 accessory parking spaces. As also discussed in Chapter 1, the 900 DUs would consist of approximately 80 percent market rate units and 20 percent affordable housing units and the residential units would have a total of approximately 1,631 residents.

As the analysis conservatively assumes that the project site will remain unoccupied under No-Build, the proposed project represents the net development expected to occur on the site as a result of the proposed action.

As shown in this analysis, the proposed action would not result in significant adverse impacts on infrastructure.

B. METHODOLOGY

The analysis of water supply includes information on the water supply network and capacity; a calculation of the proposed project's water demand using rates provided in the *CEQR Technical Manual*; and an assessment of the effects of the project's incremental demand on the water supply system to determine if there is sufficient capacity to maintain adequate supply and pressure to the service area. The analysis of sewage treatment includes information on the sewer and sewage treatment systems, including the water pollution control plant (WPCP) serving the project site; sanitary sewage generation for the project estimated using the water demand calculations; and an assessment of the effects of the project's incremental demand on the system to determine if there will be any impact on operations of the WPCP.

The analysis employs a Build analysis year of 2011. In the future without the proposed action, the analysis assumes that project site would be vacant and this would serve as the baseline for comparing the effects of the proposed project, which is defined in Chapter 1, with additional relevant information provided in this chapter to facilitate the assessment of the project's expected environmental effects on infrastructure.

C. EXISTING CONDITIONS

Water System

Water Supply

Most of New York City obtains drinking water from three surface water supply systems–Delaware, Catskill, and Croton–operated and maintained by the New York City Department of Environmental Protection (NYC DEP). These systems form a network of reservoirs, aqueducts, and tunnels

extending as far as 125 miles north of the City. The system has 18 collecting reservoirs, with a capacity of 550 billion gallons, two balancing reservoirs, several dams, three major aqueducts, two large water distribution tunnels, with a third major tunnel under construction and partially in use, and a system of water mains and other facilities.[1] The water flows to the City through aqueducts, reaching most consumers by gravity alone, although about four percent of the City's water must be pumped to maintain the desired pressure.[2] Potable water for the project site is provided through this water supply system. There are no sole source aquifers beneath Manhattan and neither the groundwater beneath Manhattan nor the waters of the lower Hudson River are used as a source for potable water or for other purposes, such as irrigation or industrial processes.

The NYC potable water supply is treated with a variety for chemicals for various reasons, including fluoride added for dental hygiene. NYC DEP conducts regular water quality monitoring to check the levels of treated water and to document compliance with federal and state water quality regulations. The City does not filter its drinking water supply; however, under a consent decree with the US Environmental Protection Agency (EPA) and the NY State Department of Health it is constructing a filtration plant in Van Cortlandt Park in the Bronx to filter water from the Croton system. Currently, the City is not required and is not planning to filter water from the Catskill and Delaware systems.[3]

The Croton system collects water from watershed areas in 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. The remaining two surface water systems, the Delaware and Catskill systems, collect water from watershed areas in the Catskill Mountains and deliver it to the Hillview Reservoir in Yonkers. From there, it is distributed to the City through three tunnels: City Water Tunnel No. 1, which goes through the Bronx and Manhattan; City Water Tunnel No. 2, which goes through the Bronx, Queens, and Brooklyn (and from there through the Richmond Tunnel to Staten Island); and City Water Tunnel No. 3, which currently serves the Bronx, upper Manhattan, and Roosevelt Island. The construction of City Water Tunnel No. 3 was begun in 1970 and is scheduled for completion in 2020. The addition of City Water Tunnel No. 3 is intended to improve the City's water supply while allowing for the inspection and repair of City Water Tunnels Nos. 1 and 2. The next phases of City Water Tunnel No. 3, currently under construction, is intended to provide service to Midtown Manhattan, Lower Manhattan, Brooklyn, and Queens. It is anticipated to be a supplemental water source and to provide redundancy and improve reliability to these areas, including the project site.

Manhattan is served by the Catskill/Delaware systems via City Water Tunnel No. 1 and the Croton system via the New Croton Aqueduct. Any of these three systems can serve the project site. The Croton system has lower pressure than the Catskill/Delaware systems and supplies domestic uses primarily in the lower elevations of Manhattan and the Bronx. The higher pressure

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[1] American Society of Civil Engineers, Metropolitan Section, *A Guide to Civil Engineering Projects in and Around New York City*, 1997.

[2] NYC DEP web site <http://home.nyc.gov/html/dep/html/history.html>

[3] Ascher, Kate, *The Words: Anatomy of a City*, 2005.

Catskill/Delaware systems serve all five boroughs including higher elevations where the water pressure of the Croton system would be inadequate.

From the water tunnels or aqueduct, water reaches the surface distribution system via large-diameter vertical shafts. From the vertical shafts a grid of underground distribution mains distribute water to consumers. Large "trunk" mains—up to 96 inches in diameter—feed smaller mains, such as 8, 12 and 20-inch mains, that distribute water to individual locations. These distribution mains also provide water to fire hydrants along many of the City's streets.

The water distribution system in each borough is divided into water pressure "zones" that have different levels of pressure in the pipes. Pressure zones are separated by boundary valves, which control the exchange of water between the zones. Pressure in each zone is maintained by regulator valves.

The project site is located near the boundary of three pressure zones: the Low Pressure Zone, generally located west of Tenth Avenue and south of W. 55th Street in this area of Manhattan and primarily fed by the Croton System; and the Middle Intermediate Pressure Zone; generally located east of Tenth Avenue and south of W. 54th Street in this area and supplied by the Catskill/Delaware systems via City Water Tunnel No. 1; and the North Intermediate Pressure Zone, generally located north of W. 56th Street and east of Eleventh Avenue in this area and also supplied by the Catskill/Delaware system via City Water Tunnel No. 1. The boundaries of the pressure zones were not established by specific streets but by the topography of the area.[4]

Water mains running adjacent to the site include a 12-inch diameter distribution main beneath W. 53rd Street and a 20-inch diameter distribution main beneath W. 54th Street. Along Eleventh Avenue there are both 12-inch distribution mains beneath the eastern and western sides of the avenue as well as a 36-inch trunk main. The W. 53rd Street and W. 54th Street water mains each connect to the 12-inch diameter water main beneath the eastern side of Eleventh Avenue. All of these distribution mains adjacent to the project site are located within the low pressure zone primarily supplied by the Croton system and all feed water to individual buildings as well as fire hydrants.

A network of 12-inch diameter distribution mains are located beneath the east-west cross-streets north and south of the project site, while east of the site beneath Tenth Avenue there are both 12-inch diameter distribution mains as well as a 48-inch diameter Croton system trunk main. NYC water mains are normally installed at depths ranging from 42 to 48 inches.

City Water Tunnel No. 3 Shaft 25B

As noted in Chapter 2, "Land Use, Zoning, and Public Policy," NYC DEP is currently constructing a shaft for City Water Tunnel No. 3 approximately a quarter-mile from the project site at 705 Tenth Avenue. This will be part of a network of shafts that bring water from the tunnel at depths of 600 to 800 feet up to the distribution system's water mains and achieve the tunnel's goals of improved water supply service on a local level.

[4] *City Tunnel No. 3, Stage 2 Manhattan Leg Shaft 33B Final EIS.*

Water Consumption

The New York City water supply system provides approximately 1.1 billion gallons per day of drinking water to most areas of New York City, as well as some customers in Westchester, Putnam, Ulster, and Orange counties. (Approximately 100,000 customers in southeastern Queens are supplied with groundwater from aquifers or a blend of groundwater and reservoir system water.)[5]

Project Site

As the project site is unoccupied and undergoing as-of-right construction under 2008 existing conditions, it is not currently generating any ongoing water demand, apart from water used for construction purposes (e.g., water used for dust control). The previous use, a Verizon vehicle storage/maintenance facility, generated water demand from employee use and for facility operations.

Wastewater Treatment and Stormwater Management

Wastewater Treatment System

Most sanitary sewage in the City is collected and conveyed through a combined sewer system operated and maintained by NYC DEP. This system receives sanitary sewage from residences, businesses, and municipal buildings, as well as stormwater accumulated in catch basins along the streets, from where the combined flow is sent for treatment at one of the City's water pollution control plants (WPCPs). The project site is served by the North River WPCP, located between W. 135th and W. 145th Streets along the Hudson River. The treated wastewater effluent from the facility is discharged into the Hudson River. The North River WPCP is regulated by a State Pollution Discharge Elimination System (SPDES) permit issued by the NYSDEC. The SPDES permit restricts the daily flow at North River WPCP to 170 mgd, based on a 12 month rolling average. A recent 12 month period (September 2006 to August 2007) daily flow averaged 127 mgd, well below the 170 mgd permitted limit, according to Table 11-1. During storm events, the North River WPCP is capable of processing up to a maximum of 340 mgd of wastewater.

During dry weather, sewer lines convey only sanitary sewage and carry it to the North River WPCP. However during and immediately after rain and snow, the sewer lines convey both sanitary sewage and stormwater. The larger volumes of stormwater exceed the capacity of the North River WPCP. In those situations, the North River WPCP treats its maximum volume of combined sewage, and the excess combined sewage overflows into the Hudson River without treatment at controlled points known as regulators.

The SPDES permit for the North River WPCP also contains limits on biochemical oxygen demand (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).

[5] NYC DEP, *New York City 2006 Drinking Water Supply and Quality Report.*

Table 11-1, North River WPCP Sewage Flows

Month	Year	Sewage Flow (mgd)
September	2006	127
October	2006	130
November	2006	129
December	2006	115
January	2007	119
February	2007	118
March	2007	125
April	2007	NA
May	2007	118
June	2007	131
July	2007	137
August	2007	137
12-month Average		127
SPDES Permit Limit		170

Source: NYCDEP
Notes: (1) "Daily" flow is an average daily flow that includes stormwater and sanitary volumes.
(2) "Dry" flow includes daily sanitary volumes only during dry weather conditions.

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

As shown in Table 11-1 actual average monthly flows to the plant average about 127 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.

Sewer Network

The sewer network in the vicinity of the project site includes collector (or feeder) sewers, trunk sewers, and an interceptor sewer. There are also "regulators" to control flows from the trunk sewers to the interceptor. NYC sewer lines are generally buried more than 10 feet below grade.

Collector sewers are under virtually every street in the area and collect sewage from the adjacent buildings. They have a variety of shapes and sizes. Adjacent to the project site, beneath W. 53rd

Street there is a collector sewer 3 feet, 6 inches by 2 feet in diameter, beneath W. 54th street there is a collector sewer 3 feet, 6 inches by 2 feet, 4 inches in diameter, and beneath Eleventh Avenue there is a collector sewer 4 feet by 2 feet, 4 inches in diameter. Collector sewers feed into trunk sewers.

Trunk sewers in this area of Manhattan typically run beneath selected crosstown streets, connect with a regulator near the Hudson River, and then extend to outfalls in the Hudson River typically located approximately 5 feet below mean low water. At their connection with the regulator, the trunk sewers also connect with the interceptor. The regulators control the flow of combined sewage from the trunk sewer to interceptor by allowing double the mean dry-weather flow into the interceptor. Thus, in dry weather, all sewage from the trunk sewers flow into the interceptor and are conveyed to the WPCP. However, in heavy storm events, if the flow of the trunk sewers exceed double the mean dry-weather flow due to stormwater, combined sewage and stormwater overflows are discharged directly into the Hudson River, bypassing the interceptor. The combined sewer overflow (CSO) consists largely of stormwater, but also contains sanitary sewage and floatables, i.e., street litter captured by catch basins. At the end of the outfalls there are devices called tidal gates which open when sufficient pressure is provided by CSOs but which otherwise are designed to remain closed to prevent river water from entering the sewer system.

Trunks sewers located near the project site include one which extends from W. 50th Street to an outfall with a 48-inch diameter near Hudson River Pier 90 and one which extends from W. 56th Street to an outfall with a 36-inch diameter near Hudson River Pier 96. Regulators for these trunk sewers are located beneath Twelfth Avenue.

To convey sewage to the North River WPCP, an interceptor sewer runs 11 miles along the West Side of Manhattan between Greenwich Village and Spuyten Duyvil. In the vicinity of the project site, the main branch of this interceptor sewer runs beneath Twelfth Avenue as far north as W. 52nd Street, then extends diagonally beneath De Witt Clinton Park and thence beneath Eleventh Avenue north of W. 54th Street. A spur branch of the interceptor extends underneath W. 56th Street from the regulator located beneath Twelfth Avenue and W. 56th Street to the main interceptor beneath Eleventh Avenue.

Wastewater Generation

Consistent with *CEQR Technical Manual* guidance, the amount of wastewater from a project site to be treated by the wastewater treatment system is assumed to be equal to the projected volume of potable water demand for the site. Wastewater generated by air conditioning is minimal because of the re-circulation and evaporation processes of water cooling systems, and is therefore not included in the overall wastewater volumes.

Stormwater Management

Stormwater runoff is collected in catch basins, located along streets, which drain into the combined sewer system. In the area surrounding the project site, a typical combined sewer has regulators that normally direct the wastewater and stormwater flows to the interceptor sewers, which in turn deliver the combined flows to the North River WPCP.

Project Site

As the project site is unoccupied and undergoing as-of-right construction under 2008 existing conditions, it is not currently generating any wastewater flows. The previous use, a Verizon vehicle storage/maintenance facility, generated wastewater flows from employee use and for facility operations.

The project site was entirely covered by impervious surfaces, i.e., pavement and buildings, prior to the commencement of demolition and excavation in fall 2007. As such, any stormwater from the site likely results in runoff that flows into the combined sewer system.

C. FUTURE WITHOUT THE PROPOSED ACTION

Water System

Project Site

The analysis conservatively assumes that the project site will remain unoccupied in the 2011 future without the proposed action. Accordingly, the project site would not generate ongoing demand for potable water.

City Water Tunnel No. 3 Shaft 25B

It is anticipated that City Water Tunnel Shaft 25B construction will be completed by 2010. Overall, it is anticipated that the Manhattan section of City Water Tunnel No. 3 currently under construction in Lower and Mid Manhattan will begin delivering water by 2012.

The Croton Water Treatment Plant, which will filter water from the Croton system, is scheduled to be completed and in operation by approximately 2012.

These changes are expected to advance the City's effort to improve the reliability, quality, and redundancy of the NYC water supply system.

Wastewater Treatment and Stormwater Management

Project Site

As the analysis conservatively assumes that the project site will remain unoccupied in the 2011 future without the proposed action, it would not be expected to generate any wastewater flows.

In the future without the proposed action, it is expected that the North River WPCP will continue to treat wastewater from the WPCP's service area to full secondary treatment levels. In addition, it is expected that it will continue to meet or exceed its permit limitations for removing BOD and TSS.

In terms of stormwater management, the project site was entirely covered by impervious surfaces and would remain so under the No-Build scenario. Therefore, in the future without the proposed action stormwater runoff from the project site would be similar or the same as under existing conditions and the amount of stormwater entering the combined sewer system would not change significantly.

D. FUTURE WITH THE PROPOSED ACTION

The proposed project would be a mixed-use development with the following program (all approximate): 900 DUs; 8,800 sf of retail space; 330,000 sf of automobile dealership space; 20,000 sf of health club space; 36,000 sf of NYPD Mounted Unit stable facility; and 225 accessory parking spaces. The 900 DUs are projected to be occupied by 1,631 residents.

Water System

Project Site

As shown in Table 11-2, in the 2011 future with the proposed action, total water usage, inclusive of domestic consumption and air conditioning, for the project site would be 470,234 gallons per day (gpd). This additional demand would represent an increase of less than 0.1 percent from the City's current water demand, an insignificant change. As such, the proposed project would not result in significant adverse impacts on the City's water supply nor on local water pressure. The proposed project would also comply with the water conservation measures mandated by the City's Local Law 19.

Wastewater Treatment and Stormwater Management

Project Site

As also shown in Table 11-2, sanitary sewage flows generated by the proposed project would be approximately 275,788 gpd. This increments represents about 0.2 percent of the SPDES permitted flow at the North River WPCP. With the North River WPCP operating substantially below capacity, the increase in sanitary sewage resulting from the proposed project is not anticipated to adversely impact WPCP operations nor cause it to exceed its design capacity or SPDES permit flow limit. As such, the proposed action would not result in significant adverse impacts upon the City's sanitary sewage and wastewater management system.

There would be no increase in stormwater flows from the project site as it would remain impervious under both No-Build and Build conditions. In fact, stormwater flows from the project site likely would decrease modestly under Build conditions. The proposed project would include two landscaped private open spaces on the roof of the building's 2-story base plus smaller terrace areas in the building "steps." These areas would likely absorb some stormwater, thus reducing runoff from the project site as compared to existing and No-Build conditions.

Table 11-2, Estimated Water Usage/Sewage Generation for the Proposed Project

Use	Size	Domestic Water/ Sanitary Sewage Generation (gpd)	Air Conditioning (gpd)	Total Water Usage (gpd)
Residential	729,000 sf; 1,631 residents	182,672	123,930	306,602
Retail	358,000 sf	60,996	60,996	121,992
Health Club	20,000 sf; 400 patrons/day	26,000	3,400	29,400
NYPD Stable	36,000 sf	6,120	6,120	12,240
Total		**275,788**	**194,446**	**470,234**

Source: Generation rates from *CEQR Technical Manual* Table 3L-2: residential domestic/sewage 112 gallons/day/person, air conditioning 0.17 gallons/day/person; retail/public use domestic/sewage 0.17 gallons/day/sf, air conditioning 0.17 gallons/day/sf (used for retail, auto dealership, and NYPD Stable facility); health club domestic/sewage 65 gallons/day/patron, air conditioning 0.17 gallons/day/sf.

E. CONCLUSION

The proposed project is not anticipated to result in significant adverse infrastructure impacts. Demand for drinking water on the project site with the proposed project would be approximately 470,234 gpd under 2011 Build conditions. This relatively small incremental demand is not large enough to significantly impact the operation of the City's water system. As such, the proposed project would not result in significant adverse impact on the City's water supply not local water pressure.

The proposed project would generate 275,788 gpd of new sewage flows to the North River WPCP. This increase in sanitary sewage is not anticipated to adversely impact the North River WPCP not cause it to exceed its design capacity or SPDES permit flow limit. As such, the proposed project would not result in significant adverse impacts on the City's sanitary sewage and wastewater management system.

There is not expected to be any increase in stormwater volumes as a result of the proposed project as compared to the No-Build condition. The amount of impervious surfaces would decrease slightly with the creation of landscaped planting areas within the proposed project's private open space areas and on its terraced steps.

Additionally, given the substantial capacity available in both the City's drinking water supply system and wastewater treatment system and the recent and ongoing improvements to these systems, such as the construction of City Water Tunnel No. 3, when combined with the No-Build developments summarized in Chapter 2, "Land Use, Zoning, and Public Policy," and other new developments expected by 2011, the proposed project would not cumulatively result in significant adverse infrastructure impacts.