

A. INTRODUCTION

Under the 2012 *City Environmental Quality Review (CEQR) Technical Manual* guidelines, a water and sewer infrastructure analysis evaluates the potential of a proposed project to affect New York City's infrastructure, including the City's water supply, sanitary sewage treatment, and stormwater discharge systems.

The USTA Billie Jean King National Tennis Center (NTC) Strategic Vision (the proposed project) would result in a series of improvements on the project site, as described in Chapter 1, "Project Description." Bordering the NTC are water mains and separate sanitary and stormwater pipes owned by New York City Department of Parks and Recreation (DPR). This chapter analyzes the effects of additional project-generated NTC attendees and staff, who would increase the project site's water demand and sewage generation. In addition, there would be an increase in impervious surfaces and stormwater runoff at the site, as compared to the future without the proposed project. However, all of the site stormwater runoff would continue to be discharged via an outfall to Flushing River. This assessment also discusses sustainability elements that would be incorporated into the proposed project to reduce the expected stormwater runoff volume to existing conditions levels. The analysis finds that the proposed project would not result in any significant adverse impacts to water and sewer infrastructure.

B. METHODOLOGY

This analysis follows the methodologies set forth in the 2012 *CEQR Technical Manual*. According to the *CEQR Technical Manual*, a preliminary water analysis would be needed if a project would result in an exceptionally large increase in demand of water of over 1 million gallons per day (mgd), 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 actions would not result in an incremental water demand exceeding 1,000,000 gallons per day (gpd). Therefore, further water analysis is not warranted; however, the total water demand has been calculated for purposes of the preliminary sewer assessment.

A preliminary sewer assessment would be warranted if a proposed project involves development on a site five acres or larger where the amount of impervious surface would increase. The proposed project meets this CEQR threshold; therefore, a preliminary sewer assessment has been conducted.

Existing and future water demands and sanitary sewage generation are calculated based on use generation rates set forth in the *CEQR Technical Manual*.¹ The New York City Department of

¹ *CEQR Technical Manual*, January 2012, p.13-12.

Environmental Protection (DEP) Volume Calculation Matrix was then used to calculate the overall combined sanitary sewage and stormwater runoff volume discharged to the separate sewer system for four rainfall volume scenarios with varying durations. The ability of the City's water and sewer infrastructure to handle the proposed project's anticipated demand is assessed by estimating existing water demand and sewage generation rates, and then comparing the future with and without the proposed actions. In addition, this chapter calculates the incremental water demand and sewage generated by comparing the demand from the proposed project in the With Action condition to the future without the proposed project (the No-Action condition), per *CEQR Technical Manual* methodology. This analysis considers conditions during the US Open, which represent the maximum extent of water demand and sewage generation on the project site.

C. EXISTING CONDITIONS

WATER SUPPLY

New York City obtains its water supply from the Delaware, Catskill, and Croton reservoir systems, which are operated by DEP. Some residents of southeast Queens obtain their water supply from New York City's groundwater system beneath Queens. The watersheds of the three reservoir systems extend as far as 125 miles north and west of the City, encompassing several reservoirs and lakes, with a storage capacity of over 550 billion gallons. Water is delivered from these watersheds to New York City through a network of reservoirs, aqueducts, and tunnels. Within the City, networks of underground pipes distribute water to consumers.

New York City water systems provide approximately 1.1 billion gallons per day (bgd) to the five boroughs as well as Westchester, Putnam, Ulster, and Orange counties. In 2005, 98 percent of New York City's water was supplied west of the Hudson River by the Catskill and Delaware systems located in Delaware, Greene, Schoharie, Sullivan, and Ulster counties; two percent of the City's water supply came from the Croton system with reservoirs in Putnam, Westchester, and Dutchess counties. New York City's Groundwater System in Queens supplied a daily average of 2.2 million gallons, less than 1 percent of the City's total usage.

Queens draws its water supply primarily from watershed areas in the Catskill Mountains via the Catskill and Delaware systems. The Ashokan and Rondout Reservoirs collect water within the system and deliver it through the Catskill and Delaware aqueducts, then into the Kensico Reservoir in Westchester County, and then into the Hillview Reservoir in the City of Yonkers. From Yonkers, water is distributed to the City through three tunnels, City Tunnel Nos. 1, 2 and 3. City Tunnel No. 1 delivers water through the Bronx and Manhattan to Brooklyn; City Tunnel No. 2 delivers water through the Bronx, Queens and Brooklyn to Staten Island; while City Tunnel No. 3 delivers via the Bronx and Manhattan to Queens.

Average daily water consumption in Queens is estimated at about 200 mgd and the water pressure in the area of the project site is 71 pounds per square inch (psi) based on a hydrant flow test conducted at the site in 2007. A pressure of 20 psi is the minimum water pressure acceptable for uninterrupted service and New York City Fire Department (FDNY) service requirements.

Water service is available to the project site via existing water mains in Meridian Road, United Nations Avenue North, and Path of the Americas. 12-inch diameter mains exist in Meridian Road North/South, 8-inch diameter mains exist in Meridian Road East/West, 8-inch to 20-inch diameter mains exist in United Nations Avenue North and a 20-inch diameter main exists in Path of the Americas. These mains provide service to the several fire hydrants located in the above streets adjacent to the project site.

Table 9-1 summarizes the current estimated water consumption of the project site during the US Open.

**Table 9-1
Existing Conditions: Project Site Water Consumption**

| Use | Unit | Size (Square feet) | Rate | Water Consumption (Gallons per day) |
|--|-----------------|--------------------|-----------------------------------|-------------------------------------|
| NTC Attendees | 40,000 (people) | NA | 5 gallons/person/day ¹ | 200,000 |
| NTC Event Staff | 8,000 (people) | NA | 5 gallons/person/day ¹ | 40,000 |
| Enclosed Space ² | | | | |
| Domestic | NA | 703,000 | 0.24 gpd/sf ³ | 168,720 |
| Air Conditioning | NA | 527,300 | 0.17 gpd/sf ³ | 89,641 |
| TOTAL (With A/C) | | | | 498,361 |
| TOTAL(Without A/C) | | | | 408,720 |
| Note: | | | | |
| 1. Rate from DEC Design Standards for Wastewater Treatment Works last revised 1988 (See Appendix D). | | | | |
| 2. Uses include administrative and operational support space, retail space and food service space. | | | | |
| 3. Rates from <i>CEQR Technical Manual</i> (2012 edition). | | | | |

SANITARY SEWAGE

For purposes of this analysis, the amount of sanitary sewage is conservatively estimated as all water demand excluding air conditioning, which is typically not discharged to the sewer system. The estimated amount of daily sanitary sewage currently generated by the project site is 408,720 gpd.

The project site is served by the Tallman Island Wastewater Treatment Plant (WWTP). The Tallman Island WWTP treats wastewater through full secondary physical and biological processes before the wastewater is discharged into the Flushing River. Secondary treatment includes the removal of a minimum of 85 percent of biological oxygen demand and total suspended solids in the influent. Effluent from this WWTP is regulated by the New York State Pollution Discharge Elimination System (SPDES) permit issued by the New York State Department of Conservation (DEC). The permit specifies the maximum limit for effluent parameters that include suspended solids, fecal coliform and other pollutants. The SPDES permit specifies the treatment capacity of the Tallman Island WWTP be limited to a maximum of 80 mgd. The running average monthly flow for the WWTP over the last 12 months is 62 mgd, below the permitted limit.

For the transport of sanitary sewage, the project site relies on DPR sanitary sewers that convey sanitary sewage to a DEP sanitary sewer located in Fowler Avenue from where it is conveyed further north to the Tallman Island WWTP.

There are two DPR sewers that serve the site. The first is a 12-inch sewer located in Path of the Americas that provides service for the Indoor Tennis Center in addition to park facilities. No new connections will be made to this sewer.

The second sewer enters the site from United Nations Avenue North, through the south gate and runs through the center of the site, exiting at the east plaza. This sewer services the remaining facilities on the site as well as the Queens Museum, Olmsted Center and park facilities west of Grand Central Parkway. It is a 12-inch sewer on United Nations Avenue North, and through the south plaza, where it serves the Queens Museum and the southwest portion of the site. It increases to 18-inch at the southeast corner of Arthur Ashe to pick up the stadium. It increases to

24-inch in the east plaza to pick up Louis Armstrong Stadium, the Olmsted Center, and the park facilities west of Grand Central. The segment through the site was constructed as part of the 1996 program that built Arthur Ashe Stadium.

STORMWATER

The project site is served by a network of stormwater drain inlets and storm sewers that collect and convey onsite stormwater runoff that ultimately discharge into the Flushing River. Direct discharge of stormwater runoff into the Flushing River does not affect combined sewer outfall (CSO) conditions in the City’s combined sewer system. The NTC, within the proposed leased boundaries, is approximately 42.59 acres in area, and it is estimated that approximately 3.60 acres (8 percent) of the project site is covered by building roof, 12.40 acres (29 percent) is courts and stadiums, 18.31 acres (43 percent) is concrete/asphalt pavement, and 8.28 acres (20 percent) is landscaped area.

Table 9-2 describes the surface types and areas of the project site, and how stormwater runoff is currently discharged.

**Table 9-2
Existing Conditions: Project Site Surface Coverage**

| Surface Type | Surface Areas (sf) | Discharge Method |
|--|--------------------|------------------------------|
| Building Roofs | 157,013 | Direct Drainage |
| Courts and Stadiums | 539,946 | Direct Drainage |
| Paved Surfaces | 797,546 | Direct Drainage |
| Landscaped Areas | 360,520 | Infiltration/Direct Drainage |
| Total | 1,855,025 | ---- |
| Sources: Site surfaces data provided by DeBruin Engineering | | |

The weighted runoff coefficient of the project site is calculated to be 0.74, which corresponds to the percentage of precipitation that becomes surface runoff.

D. FUTURE WITHOUT PROPOSED PROJECT

In the future No-Action condition, uses at the project site are not expected to change compared to existing conditions. As a result, water consumption, sanitary sewer generation, and stormwater runoff volumes are assumed to remain unchanged.

E. FUTURE WITH THE PROPOSED PROJECT

WATER SUPPLY

The existing water mains in and around the project site would be available for new service connections. These mains are expected to provide adequate water service for the proposed project. As a result of the proposed project, increases of approximately 10,000 attendees per day during the first ten days of the US Open and 100 US Open event staff are expected, as compared to the No-Action condition. The proposed project would also result in approximately 166,800 square feet (sf) of additional enclosed spaces, which include administrative and operational support spaces, retail spaces and food service spaces.

Table 9-3 summarizes the estimated water consumption of the proposed project by the mix of proposed uses during the US Open. The proposed uses on the project site are estimated to have a water demand of 614,872 gpd.

**Table 9-3
With Action Condition: Water Consumption**

| Use | Unit | Size (Square feet) | Rate | Water Consumption (Gallons per day) |
|---|-----------------|--------------------|---------------------------|-------------------------------------|
| NTC Attendees | 50,000 (people) | NA | 5 gpd/person ¹ | 250,000 |
| NTC Event Staff | 8,100 (people) | NA | 5 gpd/person ¹ | 40,500 |
| Enclosed Space² | | | | |
| Domestic | NA | 869,800 | 0.24 gpd/sf ³ | 208,752 |
| Air Conditioning | NA | 680,115 | 0.17 gpd/sf ³ | 115,620 |
| TOTAL(With A/C) | | | | 614,872 |
| TOTAL(Without A/C) | | | | 499,252 |
| Note: 1. Rate from DEC Design Standards for Wastewater Treatment Works last revised 1988 (See Appendix D). 2. Uses include administrative and operational support space, retail space and food service space. 3. Rates from CEQR technical Manual (2012 edition) | | | | |

While this new demand represents an increase over and above conditions in the No-Action condition of approximately 116,511 gpd, the incremental demand for water is not expected to place enough of a load on the water supply system to necessitate any upgrades to the existing supply system. The 614,872 gpd demand generated by the US Open after completion of the proposed project would represent approximately 0.06 percent of the City’s total daily demand (1.1 bgd), a minimal increase. In addition, local water pressure is not expected to be significantly affected. The small changes in demand are unlikely to affect water pressure and the overall water consumption rate, and would therefore not result in any significant adverse impacts on the water supply.¹

SANITARY SEWAGE

The estimated amount of sewage generated from the proposed project conservatively includes the water demand excluding air conditioning, which is typically not discharged into the sewer system. The estimated amount of sanitary sewage generated by the proposed project would therefore be 499,252 gpd. Peak flow is estimated at 2.1 cfs. The volume of sanitary sewage generated by the proposed project would be 0.6 percent of the permitted average daily flow of 80 mgd at the Tallman Island WWTP and would not result in an exceedance of the WWTP’s capacity. Therefore, the proposed project would not result in a significant adverse impact on the City’s sanitary sewage treatment system. Sanitary sewage from the project site would continue to be conveyed via the onsite sanitary sewers to the DEP sanitary sewer system. New sanitary sewer connections to the existing sanitary sewers from the new buildings and stadiums would be built. The increase of 0.3 cfs in estimated peak flow is well within the capacity of the existing sewers.

The small changes in sewage generation are unlikely to affect the overall sewage treatment capacity and would therefore not result in any significant adverse impacts on the sewage system supply. As per the New York City Plumbing Code (Local Law 33 of 2007), low-flow fixtures are required to be implemented and would help to reduce sanitary flows from the project site.

¹ CEQR Technical Manual, January 2012, p.13-8.

STORMWATER

Based on the proposed site plan, the project site would be developed, with 9.95 acres (23 percent) of the site occupied by building roofs, 12.90 acres (30 percent) occupied by courts and stadiums, 15.14 acres (36 percent) occupied by pavement, and 4.60 acres (11 percent) occupied by grassed areas and landscaping. Runoff from the site will be kept at the pre-development rates through the use of permeable pavers, landscaped areas, and leaching systems in the southern portion of the site.

Using the existing and proposed site data, the DEP Volume Calculation Matrix was completed for the existing and proposed actions under Phase 1. The summary tables, taken from the DEP Volume Matrix, are included in **Table 9-4**.

**Table 9-4
DEP Volume Calculation Matrix—Existing and
With Action Volume Comparison**

| | | Existing 1,855,025 sf / 42.59 Acres | | | | With Action 1,855,025 sf / 42.59 Acres | | | |
|--|-------------------------|--|---------------------------|-----------------------------|--------------------------|---|---------------------------|-----------------------------|--------------------------|
| Rainfall Volume (in.) | Rainfall Duration (hr.) | Runoff Volume To River (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) |
| 0.00 | 3.80 | 0.00 | 0.00 | 0.06 | 0.06 | 0.00 | 0.00 | 0.08 | 0.08 |
| 0.40 | 3.80 | 0.34 | 0.00 | 0.06 | 0.06 | 0.37 | 0.00 | 0.08 | 0.08 |
| 1.20 | 11.30 | 1.03 | 0.00 | 0.19 | 0.19 | 1.12 | 0.00 | 0.24 | 0.24 |
| 2.50 | 19.50 | 2.14 | 0.00 | 0.33 | 0.33 | 2.34 | 0.00 | 0.41 | 0.41 |
| Notes: CSS = Sanitary to Combined Sewer System; MG = Million Gallons Source: NYCDEP Volume Calculation Matrix (See Appendix D). | | | | | | | | | |

The calculations from the volume calculation matrix help to determine the change in wastewater volumes to the combined sewer system from existing conditions to the With Action condition. Runoff volumes were calculated for four rainfall volume scenarios with varying durations; however, all stormwater runoff would be directly discharged to Flushing River. The overall increase in sanitary sewer discharge from the project site for the above rainfall volume-duration scenarios would be 0.02MG, 0.02MG, 0.05MG and 0.08MG, respectively. The increase in flows would be due to an increase in sanitary sewer discharge from the proposed project.

Stormwater from the project site is directly discharged to the Flushing River and is not conveyed to the City’s combined or separate sewers; therefore the proposed project would have no impact on the City’s stormwater conveyance infrastructure.

As part of the proposed project, coverage under a DEC SPDES General Permit for Stormwater Discharges (GP-0-10-001) would be required. As part of this permit, a Stormwater Pollution Prevention Plan (SWPPP) would be prepared outlining specific erosion and sediment control and water quality treatment practices. A copy of the SWPPP would be provided to DEP for review.

STORMWATER BMP CONCEPT PLAN

The *DEC Stormwater Management Manual* (2010) requires that redevelopment of a site limits post-development discharge from the 90 percent rainfall event to predevelopment levels unless circumstances exist that prevent this from being possible. The objective of the Stormwater BMP concept plan for this site is to maintain the existing discharge to Flushing Creek from the site by

infiltrating the water quality volume for the southern portion of the site into the ground. This will be accomplished by a combination of landscaped areas, pervious pavement, and leaching systems, as shown in **Figure 9-1**.

F. CONCLUSIONS

The proposed project would result in an increased demand for water supply and an increase in sanitary sewage generation. These increases, however, would be minimal and would not significantly impact existing infrastructure. Stormwater runoff discharge in the With Action condition would be similar to runoff under the No-Action condition. As there is a stormwater outfall available to project site, through which stormwater runoff is directly discharged into the Flushing River, the City's stormwater conveyance infrastructure would not be affected. Overall, the proposed project would not result in any significant adverse impacts on the City's water supply, wastewater treatment, or stormwater conveyance infrastructure. *

