Chapter 13: Noise

A. INTRODUCTION

The project site is located in a public park bordered by highways, and rail lines to the north. When event conditions are underway, it typically generates crowd activity and traffic that may be noisy. During other months of the year, the site is a relatively quiet public recreation facility.

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." As shown in the traffic analysis contained in Chapter 10, "Transportation," the proposed project would not generate sufficient traffic to have the potential to cause a significant noise impact (i.e., it would not result in a doubling of noise passenger car equivalents [Noise PCEs] on any roadway, which would be necessary to cause a 3 dBA increase in noise levels, see **Appendix F**), and it is assumed that any heating, ventilation, air conditioning/refrigeration (HVAC/R) equipment would be designed to meet applicable regulations and therefore not have the potential to result in any significant noise impacts. Consequently, a noise assessment was performed only to examine potential changes in noise levels at nearby sensitive receptors, including open space at Flushing Meadows Corona Park, resulting from:

- Noise generated by the proposed parking garages included in the design for the proposed project; and
- Stadium and spectator noise associated with the proposed changes to the NTC's boundaries, and proposed improvements, such as the relocated Grandstand Stadium (Stadium 3).

PRINCIPAL CONCLUSIONS

The proposed project would not generate sufficient traffic to have the potential to cause a significant noise impact (i.e., it would not result in a doubling of Noise Passenger Car Equivalents [Noise PCEs], which would be necessary to cause a 3 dBA increase in noise levels). Nor would the proposed changes to the NTC's boundaries, including the relocated Grandstand Stadium (Stadium 3), or new parking garages, have the potential to result in a significant noise impacts at any nearby sensitive receptors. With and without the project, noise levels in Flushing Meadows Corona Park adjacent to the project site would be expected to exceed the 55 dBA $L_{10(1)}$ guideline value recommended in the 2012 *City Environmental Quality Review (CEQR) Technical Manual* for open spaces. However, these conditions would be less than or comparable to noise levels in other parks and open spaces throughout New York City, and would not be perceptibly increased under the proposed project. Therefore, they would not constitute a significant noise impact.

B. ACOUSTICAL FUNDAMENTALS

Sound is a fluctuation in air pressure. Sound pressure levels are measured in units called "decibels" ("dB"). The particular character of the sound that we hear (a whistle compared with a French horn, for example) is determined by the speed, or "frequency," at which the air pressure fluctuates, or "oscillates." Frequency defines the oscillation of sound pressure in terms of cycles per second. One cycle per second is known as 1 Hertz ("Hz"). People can hear over a relatively limited range of sound frequencies, generally between 20 Hz and 20,000 Hz, and the human ear does not perceive all frequencies equally well. High frequencies (e.g., a whistle) are more easily discernible and therefore more intrusive than many of the lower frequencies (e.g., the lower notes on the French horn).

"A"-WEIGHTED SOUND LEVEL (DBA)

In order to establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the descriptor of noise levels most often used for community noise. As shown in **Table 13-1**, the threshold of human hearing is defined as 0 dBA; very quiet conditions (as in a library, for example) are approximately 40 dBA; levels between 50 dBA and 70 dBA define the range of noise levels generated by normal daily activity; levels above 70 dBA would be considered noisy, and then loud, intrusive, and deafening as the scale approaches 130 dBA.

Table 13-1
Common Noise Levels

Sound Source	(dBA)
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters	100
Freight train at 30 meters	95
Train horn at 30 meters	90
Heavy truck at 15 meters	80–90
Busy city street, loud shout	80
Busy traffic intersection	70–80
Highway traffic at 15 meters, train	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial areas, or residential areas close to industry	50–60
Background noise in an office	50
Suburban areas with medium-density transportation	40–50
Public library	40
Soft whisper at 5 meters	30
Threshold of hearing	0

Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decrease halves the apparent loudness.
Sources: Cowan, James P. *Handbook of Environmental Acoustics,* Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

In considering these values, it is important to note that the dBA scale is logarithmic, meaning that each increase of 10 dBA describes a doubling of perceived loudness. Thus, the background noise in an office, at 50 dBA, is perceived as twice as loud as a library at 40 dBA. For most people to perceive an increase in noise, it must be at least 3 dBA. At 5 dBA, the change will be readily noticeable.

EFFECTS OF DISTANCE ON SOUND

Sound varies with distance. For example, highway traffic 50 feet away from a receptor (such as a person listening to the noise) typically produces sound levels of approximately 70 dBA. The same highway noise measures 66 dBA at a distance of 100 feet, assuming soft ground conditions. This decrease is known as "drop-off." The outdoor drop-off rate for line sources, such as traffic, is a decrease of approximately 4.5 dBA (for soft ground) for every doubling of distance between the noise source and receiver (for hard ground the outdoor drop-off rate is 3 dBA for line sources). Assuming soft ground, for point sources, such as amplified rock music, the outdoor drop-off rate is a decrease of approximately 7.5 dBA for every doubling of distance between the noise source and receiver (for hard ground the outdoor drop-off rate is 6 dBA for point sources).

SOUND LEVEL DESCRIPTORS

Because the sound pressure level unit of dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise that fluctuates over extended periods have been developed. One way is to describe the fluctuating sound heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level" (L_{eq}) can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted by $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively.

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq} will approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} will be approximately equal to the L_{10} value. If extreme fluctuations are present, the L_{eq} will exceed L_{90} or the background level by 10 or more decibels. Thus the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise. In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}.

For the purposes of this Draft Environmental Impact Statement (DEIS) analysis, the maximum one-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. $L_{eq(1)}$ is the noise descriptor recommended for use in the *CEQR Technical Manual* for impact evaluation, and is used to provide an indication of highest expected sound levels. The 1-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for City environmental impact review classification.

C. NOISE STANDARDS AND CRITERIA

NEW YORK CEQR NOISE CRITERIA

The *CEQR Technical Manual* sets external noise exposure standards; these standards are shown in **Table 13-2**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable. The noise level specified for outdoor areas requiring serenity and quiet is 55 dBA $L_{10(1h)}$.

Table 13-2
Noise Exposure Guidelines For Use in City Environmental Impact Review[1]

<table>
<tr><th>Receptor Type</th><th>Time Period</th><th>Acceptable General External Exposure</th><th>Airport[3] Exposure</th><th>Marginally Acceptable General External Exposure</th><th>Airport[3] Exposure</th><th>Marginally Unacceptable General External Exposure</th><th>Airport[3] Exposure</th><th>Clearly Unacceptable General External Exposure</th><th>Airport[3] Exposure</th></tr>
<tr><td>Outdoor area requiring serenity and quiet[2]</td><td></td><td>$L_{10} \le 55$ dBA</td><td rowspan="7">---------- Ldn ≤ 60 dBA ----------</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td><td>NA</td></tr>
<tr><td>Hospital, nursing home</td><td></td><td>$L_{10} \le 55$ dBA</td><td>$55 < L_{10} \le 65$ dBA</td><td rowspan="6">---------- 60 < Ldn ≤ 65 dBA ----------</td><td>$65 < L_{10} \le 80$ dBA</td><td rowspan="6">(i) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn</td><td>$L_{10} > 80$ dBA</td><td rowspan="6">---------- Ldn ≤ 75 dBA ----------</td></tr>
<tr><td rowspan="2">Residence, residential hotel, or motel</td><td>7 AM to 10 PM</td><td>$L_{10} \le 65$ dBA</td><td>$65 < L_{10} \le 70$ dBA</td><td>$70 < L_{10} \le 80$ dBA</td><td>$L_{10} > 80$ dBA</td></tr>
<tr><td>10 PM to 7 AM</td><td>$L_{10} \le 55$ dBA</td><td>$55 < L_{10} \le 70$ dBA</td><td>$70 < L_{10} \le 80$ dBA</td><td>$L_{10} > 80$ dBA</td></tr>
<tr><td>School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, outpatient public health facility</td><td></td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td></tr>
<tr><td>Commercial or office</td><td></td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td><td>Same as Residential Day (7 AM-11 PM)</td></tr>
<tr><td>Industrial, public areas only[4]</td><td>Note 4</td><td>Note 4</td><td>Note 4</td><td>Note 4</td><td>Note 4</td></tr>
</table>

Notes:
(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more; (ii) *CEQR Technical Manual* noise criteria for train noise are similar to the above aircraft noise standards: the noise category for train noise is found by taking the L_{dn} value for such train noise to be an L^{y}_{dn} (L_{dn} contour) value.

Table Notes:
1 Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.
2 Tracts of land where serenity and quiet are extraordinarily important and serve an important public need, and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and nursing homes.
3 One may use FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.
4 External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).

Source: New York City Department of Environmental Protection (adopted policy 1983).

D. IMPACT DEFINITION

As recommended in the *CEQR Technical Manual*, this study uses the following criteria to define a significant adverse noise impact:

- An increase of 5 dBA or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over those calculated for the No-Action condition, if the No-Action levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period;
- An increase of 4 dBA or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No-Action condition, if the No-Action levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period;
- An increase of 3 dBA or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No-Action condition, if the No-Action levels are greater than 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period; and

- An increase of 3 dBA or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No-Action condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

E. NOISE PREDICTION METHODOLOGY

ANALYSIS OF NOISE IMPACTS DUE TO THE PROPOSED PARKING GARAGES

At locations adjacent to the project site, noise levels would have the potential to increase due to the existing parking Lots A and B associated with the NTC site being replaced by parking garages with greater capacity. Noise levels due to vehicles accessing and traversing the existing parking lots and proposed parking garages were determined using methodologies set forth in the Federal Transit Administration's (FTA) May 2006 version of the *Transit Noise and Vibration Impact Assessment* guidance manual. Specifically, the parking lots and garages were modeled using the techniques described for general noise assessment of park and ride lots and parking garages, respectively.

The general noise assessment methodology consists of the following steps:

- Determine the project noise exposure at 50 feet from the center of the parking facility, based on the maximum number of automobiles expected to enter and exit the facility in a given hour;
- Calculate project-generated noise levels at each of the sensitive receptor locations based on the L_{eq} at 50 feet and adjusted for the distance of each receptor relative to the center of the parking facility; and
- Logarithmically add the calculated L_{eq} at each receptor to the measured L_{eq} at that receptor in order to determine a resultant total $L_{eq.}$.

SPECTATOR AND STADIUM NOISE

The proposed project would result in a series of improvements to the project site, as summarized in **Table 13-3** and described in greater detail in Chapter 1, "Project Description." To accommodate the proposed project, 0.94 acres of land would be added to the NTC site, including 0.68 acres of park land that would be alienated, and 0.26 acres of previously alienated park land associated with the connector road that is outside the current lease. Outside of the NTC, the relocated connector road would be built on an approximately 0.3-acre area.

The NTC itself generates noise due to the spectators cheering and talking, as well as announcers, throughout the NTC, both within the various stadia, and in other spaces at the project site. The increased area of the NTC and proposed improvements could potentially result in greater noise levels generated by the NTC at nearby sensitive receptors.

Existing noise levels were measured at the NTC during the US Open on August 31 and September 3, 2011 (See **Appendix F** for the full results of the measurements at the existing NTC). Measurements were performed within various stadia and around the NTC at various times during the day while competition was taking place. The results of the measurements and field observations showed that in addition to noise associated with the individual stadia within the project site, noise associated with spectators throughout the NTC is a strong contributor to noise levels in and at locations adjacent to the NTC. In fact, noise levels were essentially constant throughout the NTC regardless of proximity to an actual stadium. This is due to spectators moving around the NTC, talking, cheering, and generally making noise. Consequently, noise due to the NTC was treated uniformly as a single noise source. Noise at nearby receptor locations adjacent to the NTC and within Flushing Meadows Corona Park can therefore be calculated based on proximity to the boundary of the NTC. This presents a conservative and reasonable way to treat the noise due to tennis-related activities.

Table 13-3
NTC Strategic Vision: List of Proposed Improvements

Map No.[1]	Name	Description
	Stadium Improvements and New Construction	
1	Grandstand Stadium (Stadium 3)	Demolition of existing 6,000-seat stadium and replacement with 8,000-seat stadium in southwest corner of NTC site
2	Louis Armstrong Stadium (Stadium 2)	Demolition of existing 10,500-seat stadium and replacement with 15,000-seat stadium in place
3	Arthur Ashe Stadium (Stadium 1)	Renovation and expansion to include 90,000-gsf administrative/operational space; and canopy above center court
	Tournament Court Modifications	
4	Northwest tournament courts	Replacement of existing courts with five practice courts, three tournament courts, and viewing platform
5	Southerly tournament courts	Relocation of existing courts 30 to 50 feet to the south
	Ancillary Building Construction	
6	New administrative and retail building	Construction of new 80,000-gsf administrative and retail building,, including four tennis courts on its roof, on former site of relocated Grandstand Stadium
	Parking and Transportation Improvements	
7	New Parking Garage A	Construction of new 423-space, 2-level garage, including a 6,500-sf transportation center.
8	New Parking Garage B	Construction of new 270-space, 3-level garage
9	Relocated connector road and related improvements	Relocation of connector road and sidewalks to new location south of United Nations Avenue North near Queens Museum of Art parking lot
	Pedestrian Enhancements	
10	Arthur Ashe Concourse	Expand existing concourse by 11,000-sf
11	New walkway	Construction of new walkway connecting the new Stadium 3 and Court 17

Notes: [1]See Figure 1-4 for the location of these elements under existing conditions. See Figure 1-5 for their proposed future location.
Source: USTA

The average L_{eq} noise level measured throughout the project site (with the exception of measurements performed within individual stadia) was 72.0 dBA. Measurements at various locations and times were all within 0.5 dBA of this value. This average value was assumed to apply throughout the NTC. In addition, this value was also conservatively assumed at a distance of up to 30 feet from the current boundary of the NTC. This method was used to calculate the noise level associated with operation of the NTC at the nearby sensitive receptors.

Specifically, the analysis of noise associated with the NTC included the following for each analyzed receptor:

- Determine the amount of noise associated with the existing NTC based on the distance the receptor from the existing boundaries of the NTC;
- Logarithmically subtract the noise associated with the existing NTC from the measured noise level to determine the non-tennis noise level, which was assumed to remain constant in the With Action condition;

- Determine the amount of noise associated with the proposed NTC based on the distance the receptor from the proposed future boundaries of the NTC;
- Logarithmically add the noise associated with the proposed future NTC to the non-tennis noise level to determine the total future noise level with the proposed future NTC;
- Compare the calculated total noise level in the With Action condition to the existing noise level to determine the project noise increment; and
- Add the project noise increment to the existing L_{10} value to calculate the future L_{10} value with the proposed project.

F. EXISTING NOISE LEVELS

Four (4) noise receptor locations within Flushing Meadows Corona Park were selected for noise impact analysis (see **Figure 13-1**). These locations represent various areas of Flushing Meadows Corona Park, which are adjacent to the project site, and would have the greatest potential to experience noise impacts as a result of the proposed project. They are locations of active park use, and would be considered open spaces requiring serenity and quiet. **Figure 13-**1 shows the location of the receptor site locations and **Table 13-4** lists the receptor site locations and their representative uses. Existing noise levels at sensitive receptors near the project site were measured at three (3) of the four (4) receptor locations, because the proximity of Sites 3 and 4 to the Grand Central Parkway would result in similar existing noise levels at both receptor sites, such that noise level measurements at Site 3 would be representative of the existing levels at Site 4. Site 3 represents the location of active park use closest to the southwestern corner of the NTC, where relocated Grandstand Stadium (Stadium 3) would be constructed, and where the greatest change in the boundaries of the NTC would occur, including Site 4. Site 2 represents a location with the lowest baseline levels to the immediate south of the NTC. Site 1 represents a location with the lowest baseline levels to the east of the NTC. Other sensitive receptors located closer to roadways with higher baseline levels would have less potential to experience noise impacts.

Table 13-4
Noise Receptor Locations

Receptor	Location	Representation
1	Promenade of Industry North of Industry Pond Fountain of the Planets within Flushing Meadows Corona Park	Open Space
2	Herbert Hoover Promenade between United Nations Avenue North and Avenue of Commerce within Flushing Meadows Corona Park	Open Space
3	United Nations Avenue North between Avenue of Science and Grand Central Parkway within Flushing Meadows Corona Park	Open Space
4	South of United Nations Avenue North between Meridian Road and Avenue of the States	Open Space

At Receptor Sites 1, 2, and 3, existing noise levels were measured for 20-minute periods at various times from approximately 11 AM to 8 PM during a typical weekday and weekend. These time periods correspond with the typical hours of use of the NTC. Measurements were taken on August 31, on which a New York Mets home game also occurred, and September 3, 2011, on which no Mets home game occurred. For the purposes of the analysis, the minimum measured

12.14.12

Project Site Boundary

1/4-Mile Study Area Boundary

Noise Receptor Location

0 400 1000 FEET

SCALE

Noise Receptor Locations

Figure 13-1

weekday and weekend noise levels at each receptor were used as the baseline noise levels for comparison with predicted future noise levels.

During the noise measurements, wind speed was less than 10mph, and there was no precipitation.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using a Brüel & Kjær Sound Level Meter (SLM) Type 2260, a Brüel & Kjær ½-inch microphone Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The SLM had a laboratory calibration date within one year of the dates of the measurements. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). For all receptor sites the instrument/microphone was mounted on a tripod at a height of approximately 5 feet above the ground. Microphones were mounted at least approximately 5 feet away from any large reflecting surfaces. The SLM was calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the sound level meter and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, L_{90}, and 1/3 octave band levels. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

The results of the existing noise level measurements are summarized in **Table 13-5**.

At all three noise measurement locations, contributing noise sources included traffic on roadways in and around Flushing Meadows Park, active recreation such as sports games taking place in Flushing Meadows Park, noise due to rail traffic on the nearby Long Island Rail Road (LIRR) railway, noise due to aircraft overflights, and noise associated with the existing NTC. At Sites 1 and 2, active recreation uses, such as children yelling, running, and playing soccer, were the dominant noise source, and at Site 3, traffic on the Grand Central Parkway was the dominant noise source. The measured L_{10} values at all three noise receptor locations, which include all of the noise sources mentioned above, exceed the CEQR 55 dBA $L_{10(1)}$ threshold for acceptability at an open space area requiring serenity or quiet. However, these measured levels are comparable to or lower than noise levels in a number of open space areas that are within range of substantial noise sources (e.g., roadways, aircraft, etc.), including Prospect Park, Brooklyn Bridge Park, and Fort Greene Park.

Table 13-5
Existing Noise Levels (in dBA)

Site	Measurement Location	Time		L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Promenade of Industry North of Industry Pond within Flushing Meadows Corona Park	Weekday	12:29 PM	63.1	72.9	63.8	61.1	59.6
		Weekday	4:31 PM	61.3	68.0	62.4	60.7	59.4
		Weekend	11:12 AM	61.7	70.1	63.5	60.0	58.6
		Weekend	12:58 PM	62.1	68.6	63.0	59.6	58.1
		Weekend	3:09 PM	62.1	66.6	63.0	61.6	60.6
		Weekend	4:54 PM	62.4	65.0	63.9	62.1	60.9
		Weekend	6:36 PM	61.8	64.2	63.1	61.7	60.4
		Weekend	8:13 PM	60.3	62.5	61.0	60.1	59.3
2	Herbert Hoover Promenade between United Nations Avenue North and Avenue of Commerce within Flushing Meadows Corona Park	Weekday	1:06 PM	55.9	61.5	57.5	55.2	53.8
		Weekday	5:07 PM	58.3	63.2	59.3	57.8	56.6
		Weekend	11:39 AM	57.8	64.7	59.4	56.9	55.5
		Weekend	1:28 PM	57.6	62.7	59.0	57.1	55.8
		Weekend	3:35 PM	59.9	64.4	61.3	59.4	58.2
		Weekend	5:22 PM	63.5	73.6	64.9	61.3	59.5
		Weekend	7:03 PM	63.6	71.3	65.8	62.0	60.1
3	United Nations Avenue North between Avenue of Science and Grand Central Parkway within Flushing Meadows Corona Park	Weekday	1:42 PM	63.2	69.4	64.8	62.3	61.2
		Weekday	5:48 PM	62.9	67.6	64.9	62.2	60.7
		Weekend	12:16 PM	64.4	72.0	65.4	63.2	62.1
		Weekend	2:04 PM	62.7	66.4	63.9	62.4	61.4
		Weekend	4:12 PM	64.2	67.4	65.5	63.8	62.9
		Weekend	5:57 PM	64.9	72.2	66.4	63.8	62.5
		Weekend	7:34 PM	63.6	68.4	64.6	63.0	62.0

Notes: Measurements were conducted by AKRF on August 31 and September 3, 2011.

G. FUTURE WITHOUT THE PROPOSED PROJECT

In the No-Action condition, noise levels in the vicinity of the NTC would be similar to existing conditions. There would be no appreciable change in noise levels. Future noise levels would be expected to be within 1 dBA of existing noise levels.

H. FUTURE WITH THE PROPOSED PROJECT

EVENT TRAFFIC

As described above, the proposed project, including the relocated connector road south of United Nations Avenue North, would not generate sufficient traffic to have the potential to cause a significant noise impact (i.e., it would not result in a doubling of Noise Passenger Car Equivalents [Noise PCEs], which would be necessary to cause a 3 dBA increase in noise levels).

PARKING GARAGE NOISE

Using the methodology from the FTA's guidance manual, noise levels associated with the existing parking lots and proposed future parking garages were calculated at various distances from the facilities. The results of the parking garage noise analysis show that the noise generated by the proposed future parking garages would be slightly less than or comparable to the noise generated by the existing parking lots, even though the parking garages would have greater capacity. This is due to the semi-enclosed nature of the parking garage, which provides some shielding of the noise associated with vehicles accessing the garage. For the same reason, while the proposed garage will be somewhat closer to the Passerelle Building than existing parking lots, it would not be expected to result in any significant increase in noise levels at this location. Consequently, the new parking garages associated with the proposed project would not have the potential to result in a significant noise impact.

The full results of the parking garage analysis are shown in **Appendix F**.

SPECTATOR AND STADIUM NOISE

Future noise levels in the With Action condition were calculated according to the methodology described above. (No changes in the types of events are anticipated due to the proposed project.) **Table 13-6** shows the results of the analysis of spectator and stadium noise associated with the proposed project.

Table 13-6
Spectator and Stadium Noise Analysis Results (in dBA

Site	Day	Existing/No-Action[1]					Future With Action					
		Distance to NTC Boundary	NTC L_{eq}	Non-Tennis L_{eq}	Total L_{eq}	Total L_{10}	Distance to NTC Boundary	NTC L_{eq}	Non-Tennis L_{eq}	Total L_{eq}	With Action Increment	Total L_{10}
1	Weekday	1250	39.6	61.3	61.3	62.4	1250	39.6	61.3	61.3	0.0	62.4
	Weekend			60.3	60.3	61.0			60.3	60.3	0.0	61.0
2	Weekday	900	42.5	55.7	55.9	57.5	860	42.9	55.7	55.9	0.0	57.5
	Weekend			57.5	57.6	59.0			57.5	57.6	0.0	59.0
3	Weekday	300	52.0	62.5	62.9	64.9	150	58.0	62.5	63.8	0.9	65.8
	Weekend			62.3	62.7	63.9			62.3	63.7	1.0	64.9
4	Weekday	220	54.7	61.7	62.5	62.9	120	60.0	61.7	63.9	1.4	64.3
	Weekend			61.5	62.3	61.9			61.5	63.8	1.5	63.4

Notes: [1]No-Action noise levels are conservatively assumed to be the equal to existing noise levels.

Comparing future With Action noise levels and existing noise levels, the maximum increase in $L_{eq(1)}$ noise level would not exceed 1.5 dBA, which would be barely perceptible and would not be considered significant according to *CEQR Technical Manual* noise impact criteria. While some locations immediately adjacent to the proposed boundary of the NTC may experience somewhat greater noise levels due to the NTC than those shown for the analyzed receptor locations, noise levels decrease fairly significantly with distance from the NTC boundary, and at passive open space locations noise levels would not be significantly different from No-Action values. In addition, at many locations traffic noise from the Grand Central Parkway is the dominant noise source. Consequently, the proposed future boundaries of the NTC would not have the potential to result in a significant noise impact at nearby sensitive open space receptors. The additional attendance that would be expected in the future With Action condition would also not be expected to result in substantially increased noise levels at the adjacent noise receptors, since the additional attendees would be distributed throughout the NTC; measurements made at the existing facility showed that existing noise levels are somewhat uniform throughout the NTC, including the areas adjacent to the stadiums.

As with existing and No-Action conditions, noise levels at the analyzed noise receptor sites—which include the noise associated with traffic vehicular traffic, rail traffic, aircraft traffic, and active recreation present in the existing and No-Action conditions as well as the noise associated with the NTC—are expected to be above the CEQR 55 dBA $L_{10(1)}$ guideline for open spaces requiring serenity and quiet. However, the predicted levels are comparable to or lower than noise levels in a number of open space areas that are within range of substantial noise sources (e.g., roadways, aircraft, etc.). While The 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet, due to the level of activity present at most open space areas and parks throughout New York City (except for areas far away from traffic and other typical urban activities), this relatively low noise level is often not achieved. Consequently, noise levels at the analyzed open space receptor sites, while exceeding the 55 dBA $L_{10(1)}$ *CEQR Technical Manual* guideline value, would not constitute a significant noise impact.

In addition, mechanical systems (i.e., heating, ventilation, and air conditioning systems) associated with the proposed project would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code and the New York City Department of Buildings Code) and to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore, the proposed project would not result in any significant adverse noise impacts. ✷