Chapter 20: Noise

A. INTRODUCTION

This chapter examines the potential effects of the proposed Willets Point Development Plan on noise levels in the Willets Point Development District and the surrounding area. In accordance with the approach outlined in Chapter 2, "Procedural and Analytical Framework," this chapter analyzes the cumulative impact of both the Willets Point Development Plan and the anticipated development on Lot B.

Noise pollution in an urban area comes from many sources. Some sources are activities essential to the health, safety, and welfare of a city's inhabitants, such as noise from emergency vehicle sirens, garbage collection operations, and construction and maintenance equipment. Other sources, such as traffic, stem from the movement of people and goods, activities that are essential to the viability of a city as a place to live and do business. Although these and other noise-producing activities are necessary to a city, the noise they produce is undesirable. Urban noise detracts from the quality of the living environment, and there is increasing evidence that excessive noise represents a threat to public health.

The proposed Willets Point Development Plan would change traffic patterns and volumes in the general vicinity of the Willets Point Development District. Since traffic is a main source of ambient noise, this could lead to changes in the ambient noise levels. An analysis was designed and conducted to identify and quantify any such impacts.

The noise analysis for the proposed Plan consists of three parts:

- A screening analysis to determine locations where traffic generated by the proposed Plan would have the potential to cause significant noise impacts;
- A detailed analysis at any location where traffic generated by the proposed Plan would have the potential to result in significant adverse noise impacts, to determine the magnitude of the increase in noise level; and
- An analysis to determine the level of building attenuation necessary to ensure that interior noise levels throughout the Willets Point Development District satisfy applicable interior noise criteria.

PRINCIPAL CONCLUSIONS

The analysis concludes that the traffic generated by the proposed Plan and Lot B would be expected to result in a significant increase in noise levels only at the World's Fair Marina Park north of the District and only during the Saturday midday time period; and under City Environmental Quality Review (CEQR) impact criteria, these increases would constitute a significant adverse impact. Despite these significant increases, the projected noise levels at the park are not expected to be higher than typical for parks in New York City. In addition, to meet CEQR interior noise level requirements, the analysis prescribes between 30 and 40 dB of

building attenuation for buildings within the District, which would be ensured through E-designations and/or subsequent Restrictive Declarations on the District.

NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well documented. If sufficiently loud, noise may adversely affect people in several ways. For example, noise may interfere with human activities, such as sleep, speech communication, and tasks requiring concentration or coordination. It may also cause annoyance, hearing damage, and other physiological problems. Although it is possible to study these effects on people on an average or statistical basis, it should be noted that all the stated effects of noise on people vary greatly with the individual. Several noise scales and rating methods are used to quantify the effects of noise on people. These scales and methods consider such factors as loudness, duration, time of occurrence, and changes in noise level with time.

"A"-WEIGHTED SOUND LEVEL (dBA)

Noise is typically measured in units called decibels (dB), which are 10 times the logarithm of the ratio of the sound pressure squared to a standard reference pressure squared. Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. Frequency is the rate at which sound pressures fluctuate in a cycle over a given quantity of time, and is measured in Hertz (Hz), where 1 Hz equals 1 cycle per second. Frequency defines sound in terms of pitch components. In the measurement system, one of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network—known as A-weighting—that simulates response of the human ear. For most noise assessments the A-weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In this analysis, all measured noise levels are reported in dBA or A-weighted decibels. Common noise levels in dBA are shown in Table 20-1.

COMMUNITY RESPONSE TO CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well documented (see Table 20-2). Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners, whereas 10 dBA changes are normally perceived as doublings (or halvings) of noise levels. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

It is also possible to characterize the effects of noise on people by studying the aggregate response of people in communities. The rating method used for this purpose is based on a statistical analysis of the fluctuations in noise levels in a community, and integrates the fluctuating sound energy over a known period of time, most typically during 1 hour or 24 hours. Various government and research institutions have proposed criteria that attempt to relate changes in noise levels to community response. One commonly applied criterion for estimating this response is incorporated into the community response scale proposed by the International Standards Organization (ISO) of the United Nations (see Table 20-3). This scale relates changes in noise level to the degree of community response and permits direct estimation of the probable response of a community to a predicted change in noise level.

Table 20-1
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	
Busy city street, loud shout	80
Busy traffic intersection	
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	
Background noise in an office	50
Suburban areas with medium density transportation	
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.
Source: Cowan, James P. Handbook of Environmental Acoustics. Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

Table 20-2
Average Ability to Perceive Changes in Noise Levels

Change (dBA)	Human Perception of Sound
2-3	Barely perceptible
5	Readily noticeable
10	A doubling or halving of the loudness of sound
20	A dramatic change
40	Difference between a faintly audible sound and a very loud sound

Source: Bolt Beranek and Neuman, Inc., *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

Table 20-3
Community Response to Increases in Noise Levels

Change (dBA)	Category	Description
0	None	No observed reaction
5	Little	Sporadic complaints
10	Medium	Widespread complaints
15	Strong	Threats of community action
20	Very strong	Vigorous community action

Source: International Standards Organization, Noise Assessment with Respect to Community Responses, ISO/TC 43 (New York: United Nations, November 1969).

NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

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 over extended periods have been developed. One way of describing fluctuating sound is to describe the fluctuating noise 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 sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90 and x percent of the time, respectively. Discrete event peak levels are given as L_1 levels. L_{eq} is used in the prediction of future noise levels, by adding the contributions from new sources of noise (e.g., increases in traffic volumes) to the existing levels and in relating annoyance to increases in noise levels.

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}. The relationship between L_{eq} and exceedance levels has been used in this analysis to characterize the noise sources and to determine the nature and extent of their impact at all receptor locations.

For the purposes of this analysis, the maximum 1-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 used in the *CEQR Technical Manual* for noise impact evaluation, and is used to provide an indication of highest expected sound levels. $L_{10(1)}$ is the noise descriptor used in the *CEQR Technical Manual* for building attenuation. Hourly statistical noise levels (particularly L_{10} and L_{eq} levels) are used to characterize the relevant noise sources and their relative importance at each receptor location.

B. METHODOLOGY

GENERAL METHODOLOGY

At all of the receptor sites in the vicinity of the District, the dominant operational noise sources are vehicular traffic on adjacent and nearby streets and roadways, and train traffic from the elevated No. 7 subway line, which runs along Roosevelt Avenue. The Federal Highway Administration [FHWA] *Traffic Noise Model* (TNM) version 2.5) was used to calculate noise from traffic on adjacent and nearby streets and roadways; and the Federal Transit Administration (FTA) model contained in FTA May 2006 guidance manual, *Transit Noise and Vibration Impact Assessment*, was used to calculate train noise from the elevated No. 7 subway line. The noise analysis examined four weekday conditions: AM, midday (MD), PM, and pre-game (before a baseball game at Shea Stadium) time periods, and three weekend conditions: midday (MD), pre-game (before a baseball game at Shea Stadium), and post-game (after a baseball game at Shea Stadium). The selected time periods are when the proposed Plan would have maximum traffic generation and/or the maximum potential for significant adverse noise impacts based on the traffic studies presented in Chapter 17, "Traffic and Parking."

The TNM model and the FTA guidance manual procedures used for analysis are described below.

TNM MODEL

Noise from street and roadway traffic was calculated using the TNM model, which calculates the noise contribution of each roadway segment to each noise receptor. The noise from each vehicle type is determined as a function of the reference energy-mean emission level, corrected for vehicle volume, speed, roadway grade, roadway segment length, and source-receptor distance. Further considerations included in modeling the propagation path include identifying the shielding provided by rows of buildings, analyzing the effects of different ground types, identifying source and receptor elevations, and analyzing the effects of any intervening noise barriers.

FTA GUIDANCE MANUAL

Noise from trains on the elevated No. 7 subway line was calculated using the procedures detailed in FTA guidance manual *Transit Noise and Vibration Impact Assessment*, which provides methodologies for determining noise levels produced by transit operations. In general for rail noise, the noise level at a receptor location is a function of source noise level, the number of locomotives and cars per train, the train speed, average hourly volume of train traffic, track type (continuously welded or jointed) and profile (at-grade or elevated), source/receptor distance, shielding, and special operational characteristics (e.g., curve squeal).

ANALYSIS PROCEDURE

In general, the following procedure was used in performing the noise analysis:

- Noise analysis sites were chosen at noise-sensitive locations where maximum project-generated traffic would occur, and at locations in and adjacent to the District where building attenuation analysis would be required;
- Existing noise levels were determined at each analysis (receptor) site, for each analysis time period, by performing field measurements;
- The traffic component of the existing noise levels was calculated based on existing traffic values (see Chapter 17) on adjacent and nearby streets, using the TNM model;
- The rail component of the existing noise level from trains on the No. 7 subway line was calculated based upon train schedules using FTA guidance manual procedures;
- The logarithmic sum of the calculated traffic and rail components of the existing noise level was subtracted arithmetically from the measured existing noise level, and the remainder was assumed to be a correction factor (to account for noise from parking lots, street noise, noise from manufacturing operations, model inaccuracies, etc.); and
- Noise levels for existing, No Build, and Build conditions for the analysis time periods were determined as the sum of the calculated noise components from traffic (based upon traffic values developed in Chapter 17), rail (based upon existing train schedules), and other sources or the calculated correction factor.

APPLICABLE NOISE CODES AND IMPACT CRITERIA

NEW YORK CITY NOISE CODE

The New York City Noise Control Code was amended in December 2005. The amended noise code contains: prohibitions regarding unreasonable noise; requirements for noise due to construction activities (including noise limits applicable to specific pieces of construction equipment, noise limits on total construction noise, limits on hours of construction [weekdays between 7:00 AM and 6:00 PM], and requirements for adopting and implementing noise mitigation plans for each construction site prior to the start of construction); and noise standards, including plainly audible criteria, for specific noise sources (e.g., refuse collection vehicles, air compressors, circulation devices, exhausts, paving breakers, commercial music, personal audio devices, sound reproduction devices, animals, motor vehicles including motorcycles and trucks, sound signal devices, burglar alarms, emergency signal devices, lawn care devices, snow blowers, etc.). In addition, the amended code specifies that no sound source operating in connection with any commercial or business enterprise may exceed the decibel levels in the designated octave bands shown in Table 20-4 at the specified receiving properties.

Table 20-4
New York City Noise Codes

Octave Band Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured Within a Receiving Property as Specified Below	
	Residential receiving property for mixed-use building and residential buildings (as measured within any room of the residential portion of the building with windows open, if possible)	*Commercial receiving property (as measured within any room containing offices within the building with windows open, if possible)*
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	34	39
4000	33	38
8000	32	37

Source: Section 24-232 of the Administrative Code of the City of New York, as amended December 2005.

NEW YORK CEQR NOISE STANDARDS

The New York City Department of Environmental Protection (DEP) has set external noise exposure standards. These standards are shown in Table 20-5. Noise exposure is classified into four categories: "acceptable," "marginally acceptable," "marginally unacceptable," and "clearly unacceptable." The standards shown are based on maintaining an interior noise level for the worst-case hour L_{10} less than or equal to 45 dBA. Attenuation requirements are shown in Table 20-6.

In addition, the *CEQR Technical Manual* uses the following criteria to determine whether proposed and future actions would result in a significant adverse noise impact. The impact assessments compare the projected Build condition $L_{eq(1)}$ noise levels to those calculated for the

No Build condition, for receptors potentially affected by the proposed and future actions. If the No Build levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period, the threshold for a significant impact would be an increase of at least 5 dBA $L_{eq(1)}$. For the 5 dBA threshold to be valid, the resultant Build condition noise level would have to be equal to or less than 65 dBA. If the No Build noise level is equal to or greater than 62 dBA $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the CEQR standards as being between 10 PM and 7 AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$. (If the No Build noise level is 61 dBA $L_{eq(1)}$, the maximum incremental increase would be 4 dBA, since an increase higher than this would result in a noise level higher than the 65 dBA $L_{eq(1)}$ threshold.)

Table 20-5
Noise Exposure Guidelines
For Use in City Environmental Impact Review[1]

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
1. Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	---- Ldn ≤ 60 dBA ----		---- 60 < Ldn ≤ 65 dBA ----		(1) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn		---- Ldn ≤ 75 dBA ----
2. Hospital, Nursing Home		$L_{10} \leq 55$ dBA		55 < $L_{10} \leq 65$ dBA		65 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
3. Residence, residential hotel or motel	7 AM to 10 PM	$L_{10} \leq 65$ dBA		65 < $L_{10} \leq 70$ dBA		70 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
4.	10 PM to 7 AM	$L_{10} \leq 55$ dBA		55 < $L_{10} \leq 70$ dBA		70 < $L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
5. School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, out-patient public health facility		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
6. Commercial or office		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)		Same as Residential Day (7 AM-10 PM)	
Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

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 old-age homes.

3 One may use the 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).

Table 20-6
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Noise Level With Proposed Action	$65 < L_{10} \leq 70$	$70 < L_{10} \leq 75$	$75 < L_{10} \leq 80$	$80 < L_{10} \leq 85$	$85 < L_{10} \leq 90$	$90 < L_{10} \leq 95$
Attenuation*	25 dB(A)	(I) 30 dB(A)	(II) 35 dB(A)	(I) 40 dB(A)	(II) 45 dB(A)	(III) 50 dB(A)

Note: * The above composite window-wall attenuation values are for residential dwellings. Commercial office spaces and meeting rooms would be 5 dB(A) less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.
Source: New York City Department of Environmental Protection

C. EXISTING CONDITIONS

STUDY AREA

The study area for this analysis is bounded to the east by Main Street, to the south by Roosevelt Avenue, to the west by 111th Street, and to the north by Flushing Bay. This area includes the District and nearby receptors that would experience increases in traffic on adjacent roadways as a result of the proposed Plan.

SELECTION OF NOISE RECEPTOR LOCATIONS

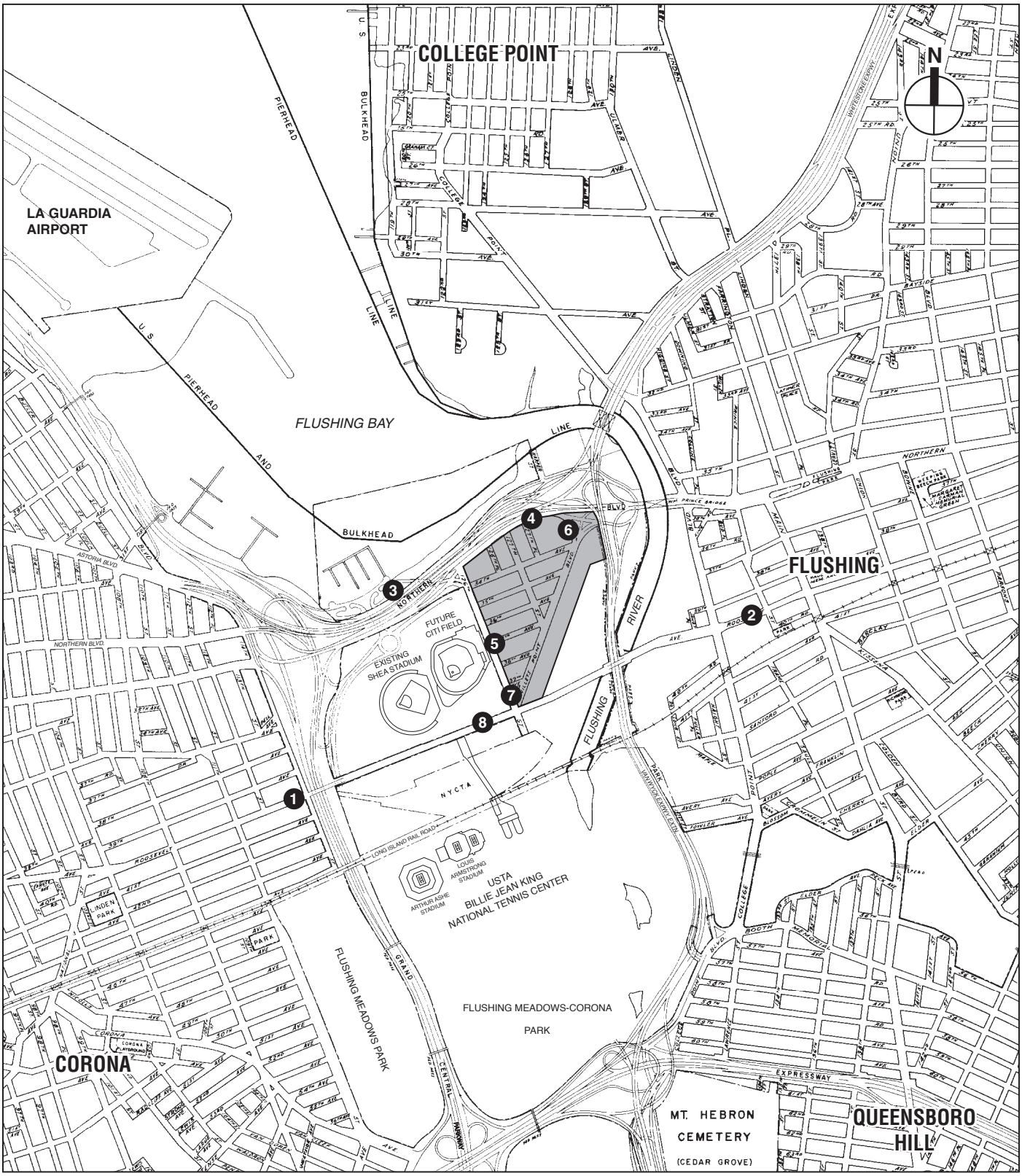
Based upon a screening analysis, eight noise receptor locations were chosen within and around the District (see Figure 20-1). Site 1 is located on Roosevelt Avenue between 114th Street and 111th Street. Site 2 is located on Roosevelt Avenue between College Point Boulevard and Prince Street. Site 3 is located in World's Fair Marina Park. Site 4 is located on Northern Boulevard between 127th Street and 127th Place. Site 5 is located on 126th Street between 36th Avenue and 37th Avenue. Site 6 is located on Willets Point Boulevard between 34th Avenue and Northern Boulevard. Site 7 is located on 126th Street between 39th Avenue and Roosevelt Avenue. Site 8 is located on Roosevelt Avenue between 114th Street and 126th Street.

Sites 1-3 were analyzed for impact assessment. These sites are representative of other locations in the immediate area, and are generally the locations where maximum impacts would be expected. These sites were used to assess the potential impacts due to traffic noise generated by the proposed and future actions. Noise generated by aircraft fly-overs was eliminated from measurements at these locations in order to show the lowest baseline condition, which allows for the most conservative impact analysis. Sites 4-8 were analyzed to determine the appropriate level of building attenuation for future development. Noise generated by aircraft fly-overs was included in measurements at these locations in order to show the highest existing L_{10} value, which allows for the most conservative building attenuation analysis.

NOISE MONITORING

At receptor sites 1-5, existing noise levels were determined for each of the seven noise analysis time periods by field measurements. At sites 6-8, existing noise levels were determined for each of the three weekdays, without-baseball-game noise analysis time periods. Noise monitoring was performed at all eight sites between May 23 and December 18, 2007. Twenty-minute spot measurements were taken during the three weekday without-baseball-game periods, one Saturday without-baseball-game period, one weekday with-baseball-game period and two Saturday with-baseball-game periods that reflect peak hours of trip generation: AM weekday

1.25.08



0 1000 2000 FEET

SCALE

Willets Point Development District

1 *Noise Receptor*

Figure 20-1

Noise Receptors

(7:45–8:45 AM), midday (MD) weekday (1:00–2:00 PM), PM weekday (5:15–6:15 PM), midday (MD) Saturday (1:00–2:00 PM), PM weekday pre-game (6:00–7:00 PM), midday (MD) Saturday pre-game (12:00–1:00 PM), and PM Saturday post-game (3:45–4:45 PM).

EQUIPMENT USED DURING NOISE MONITORING

The instrumentation used for the noise measurements was a Brüel & Kjær Type 4189 ½-inch microphone connected to a Brüel & Kjær Model 2260 Type 1 (according to ANSI Standard S1.4-1983) sound level meter. This assembly was mounted at a height of 5 feet above the ground surface on a tripod and at least 6 feet away from any large sound-reflecting surface to avoid major interference with sound propagation. The meter 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}, and L_{90}. A windscreen was used during all sound measurements except for calibration. All measurement procedures conformed to the requirements of ANSI Standard S1.13-1971 (R1976).

EXISTING NOISE LEVELS AT NOISE RECEPTOR LOCATIONS

MEASURED NOISE LEVELS

Noise monitoring results for the eight receptor locations are summarized in Tables 20-7 and 20-8. The elevated No. 7 subway line was the dominant noise source at Sites 1, 7, and 8. Traffic was the dominant noise source at Sites 2-6. Noise levels are generally relatively high, and reflect the level of activity in the area.

In terms of CEQR noise criteria, noise levels at Sites 3, 5, and 6 are in the "marginally unacceptable" category, and noise levels at Sites 1, 2, 4, 7, and 8 are in the "clearly unacceptable" category.

D. THE FUTURE WITHOUT THE PROPOSED PLAN

Using the methodology described above, future noise levels without the proposed Plan (i.e., No Build conditions) were calculated for receptors 1-3 for all seven analysis periods in the year 2017. Table 20-9 shows the calculated noise levels.

Comparing future 2017 No Build conditions with existing conditions, the maximum increase in $L_{eq(1)}$ noise levels would be less than 3 dB. Increases of this magnitude would be barely perceptible and insignificant under CEQR criteria. At some locations during certain time periods, decreases in noise levels are projected, due to decreased speeds on adjacent roadways as a result of increased traffic.

In terms of CEQR noise criteria, noise levels at Site 3 would remain in the "marginally unacceptable" category, Site 1 would remain in the "clearly unacceptable" category, and Site 2 would change from the "clearly unacceptable" category to the "marginally unacceptable" category.

Table 20-7
2007 Existing Noise Levels During Non-game Time Periods (in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Roosevelt Avenue between 114th Street and 111th Street	Weekday	AM	82.9	95.0	86.2	71.9	62.6
		Weekday	MD	81.4	94.6	83.4	70.5	64.6
		Weekday	PM	85.5	96.6	90.5	71.5	65.1
		Saturday	MD	82.8	95.0	85.7	68.4	61.1
2	Roosevelt Avenue between College Point Boulevard and Prince Street	Weekday	AM	67.3	76.3	69.9	65.3	60.6
		Weekday	MD	66.6	75.3	69.6	63.7	60.8
		Weekday	PM	66.8	75.3	69.8	64.4	61.0
		Saturday	MD	64.3	74.5	66.0	62.2	58.7
3	World's Fair Marina Park	Weekday	AM	69.3	73.7	70.8	68.9	67.0
		Weekday	MD	70.5	76.5	72.2	69.6	68.1
		Weekday	PM	71.9	76.7	73.3	71.5	69.7
		Saturday	MD	68.4	74.0	69.5	67.8	66.2
4	Northern Boulevard between 127th Street and 127th Place	Weekday	AM	79.3	90.0	81.7	75.4	73.1
		Weekday	MD	77.7	88.1	80.1	74.2	70.2
		Weekday	PM	76.9	85.7	78.9	74.0	70.6
		Saturday	MD	66.3	73.9	68.8	64.7	62.1
5	126th Street between 36th Avenue and 37th Avenue	Weekday	AM	72.9	81.7	76.6	69.7	65.2
		Weekday	MD	75.1	88.1	76.5	68.6	63.8
		Weekday	PM	72.9	82.5	76.6	66.7	62.4
		Saturday	MD	77.4	83.1	79.7	76.0	73.3
6	Willets Point Boulevard between 34th Avenue and Northern Boulevard	Weekday	AM	70.5	82.0	72.1	66.6	64.7
		Weekday	MD	68.4	79.4	70.7	62.9	59.6
		Weekday	PM	69.4	78.3	73.4	65.4	63.5
7	126th Street between 39th Avenue and Roosevelt Avenue	Weekday	AM	78.4	90.7	79.3	70.2	65.4
		Weekday	MD	75.8	85.8	80.7	69.7	64.8
		Weekday	PM	72.6	82.8	75.7	67.3	60.7
8	Roosevelt Avenue between 114th Street and 126th Street	Weekday	AM	84.8	97.3	85.7	75.7	68.1
		Weekday	MD	82.3	94.7	81.6	71.9	66.3
		Weekday	PM	76.5	87.5	81.7	68.7	62.2

Note: Field measurements were performed by AKRF, Inc. between May 23, 2007 and December 18, 2007.

Table 20-8
2007 Existing Noise Levels During Game Time Periods (in dBA)

Site	Measurement Location	Day	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Roosevelt Avenue between 114th Street and 111th Street	Weekday	pre-game	85.8	95.6	90.4	77.9	71.3
		Saturday	pre-game	83.9	96.3	88.0	69.1	63.6
		Saturday	post-game	83.3	96.2	86.1	69.7	64.9
2	Roosevelt Avenue between College Point Boulevard and Prince Street	Weekday	pre-game	77.4	84.5	80.5	74.9	70.9
		Saturday	pre-game	67.0	76.7	69.8	64.2	60.6
		Saturday	post-game	64.9	72.0	67.4	63.1	59.4
3	World's Fair Marina Park	Weekday	pre-game	71.1	82.3	72.9	67.1	65.3
		Saturday	pre-game	68.6	78.7	69.9	66.6	64.9
		Saturday	post-game	68.6	73.0	70.4	68.3	66.5
4	Northern Boulevard between 127th Street and 127th Place	Weekday	pre-game	77.4	83.9	79.8	76.2	72.9
		Saturday	pre-game	75.8	82.6	78.0	74.8	72.2
		Saturday	post-game	76.0	84.4	77.7	74.6	71.6
5	126th Street between 36th Avenue and 37th Avenue	Weekday	pre-game	69.7	80.1	73.1	65.4	62.8
		Saturday	pre-game	67.2	76.6	69.7	64.7	62.5
		Saturday	post-game	74.8	87.8	76.3	65.6	62.3

Note: Field measurements were performed by AKRF, Inc. between May 23, 2007 and December 18, 2007.

Table 20-9
2017 No Build Noise Levels (in dBA)

Site	Day	Time	Existing $L_{eq(1)}$	2017 No Build $L_{eq(1)}$	Change
1	Weekday	AM	82.9	83.0	0.1
	Weekday	MD	81.4	81.5	0.1
	Weekday	PM	85.5	85.6	0.1
	Saturday	MD	82.8	82.2	-0.6
	Weekday	pre-game	85.8	85.6	-0.2
	Saturday	pre-game	83.9	83.9	0.0
	Saturday	post-game	83.3	83.3	0.0
2	Weekday	AM	67.3	67.8	0.5
	Weekday	MD	66.6	68.7	2.1
	Weekday	PM	66.8	66.9	0.1
	Saturday	MD	64.3	67.0	2.7
	Weekday	pre-game	77.4	74.9	-2.5
	Saturday	pre-game	67.0	65.2	-1.8
	Saturday	post-game	64.9	64.1	-0.8
3	Weekday	AM	69.3	69.8	0.5
	Weekday	MD	70.5	70.9	0.4
	Weekday	PM	71.9	72.2	0.3
	Saturday	MD	68.4	68.7	0.3
	Weekday	pre-game	71.1	71.9	0.8
	Saturday	pre-game	68.6	69.4	0.8
	Saturday	post-game	68.6	67.8	-0.8

E. PROBABLE IMPACTS OF THE PROPOSED PLAN

Using the methodology described above, future noise levels with the proposed Plan and the potential future development on Lot B (i.e., Build conditions) were calculated for the four analysis periods in the year 2017. Table 20-10 shows the calculated noise levels.

Comparing future 2017 Build conditions with 2017 No Build conditions, the maximum increase in $L_{eq(1)}$ noise level would be less than 2 dB, with the exception of Site 3 in the Saturday midday (MD) period. Increases of this magnitude would be barely perceptible, and based upon CEQR impact criteria would not be significant. At some locations during certain time periods, projected decreases in noise levels are projected due to decreased speeds on adjacent roadways as a result of increased traffic.

However, the increase of 3.5 dB at Site 3 during the Saturday midday (MD) time period would be perceptible, and under CEQR impact criteria would be considered to be a significant adverse impact. Site 3 represents the World's Fair Marina Park, located along Flushing Bay to the north of the District. As a result of the proposed Plan and the potential future development on Lot B, a substantial amount of additional traffic would pass by this park when accessing the westbound Grand Central Parkway. There would be no feasible or practicable measures to mitigate this impact. Noise barriers or berms are impractical because of space constraints. As a result, this would be an unmitigatable significant adverse impact.

Table 20-10
2017 Build Noise Levels (in dBA)

Site	Day	Time	2017 No Build $L_{eq(1)}$	2017 Build $L_{eq(1)}$	Change
1	Weekday	AM	83.0	82.9	-0.1
	Weekday	MD	81.5	81.5	0.0
	Weekday	PM	85.6	85.6	0.0
	Saturday	MD	82.2	82.9	0.7
	Weekday	pre-game	85.6	86.3	0.7
	Saturday	pre-game	83.9	83.9	0.0
	Saturday	post-game	83.3	83.3	0.0
2	Weekday	AM	67.8	68.1	0.3
	Weekday	MD	68.7	69.4	0.7
	Weekday	PM	66.9	66.0	-0.9
	Saturday	MD	67.0	67.0	0.0
	Weekday	pre-game	74.9	75.9	1.0
	Saturday	pre-game	65.2	64.7	-0.5
	Saturday	post-game	64.1	63.4	-0.7
3	Weekday	AM	69.8	71.1	1.3
	Weekday	MD	70.9	72.8	1.9
	Weekday	PM	72.2	73.9	1.7
	Saturday	MD	68.7	72.2	3.5
	Weekday	pre-game	71.9	72.2	0.3
	Saturday	pre-game	69.4	69.6	0.2
	Saturday	post-game	67.8	68.3	0.5

While this noise level increase does exceed the CEQR threshold for a significant impact, the resultant L_{eq} of 72.2 dBA is not an uncommon level for a park in New York City. Noise levels of this magnitude frequently occur at parks or portions of parks that are adjacent to heavily trafficked roadways.

The noise levels and the impacts shown exclude noise from aircraft operations at LaGuardia Airport, which is adjacent to the District. Excluding aircraft noise results in lower baseline levels and therefore a more conservative analysis, as the project-generated noise causes a larger increase on a lower baseline level. If the noise from aircraft operations were included in the baseline noise levels, it is unlikely that the impact identified at the World's Fair Marina Park would occur.

In terms of CEQR noise criteria, noise levels at Sites 2 and 3 would remain in the "marginally unacceptable" category, and Site 1 would remain in the "clearly unacceptable" category.

MECHANICAL EQUIPMENT

No detailed designs of the buildings' mechanical systems (e.g., heating, ventilation, and air conditioning systems) are available at this time. However, based on the levels of building attenuation specified and Building Code regulations for isolation of mechanical noise from

residences, the mechanical equipment would be designed so as not to result in a significant impact on nearby residences.

ATTENUATION REQUIREMENTS

As shown in Table 20-6, the *CEQR Technical Manual* has set noise attenuation requirements for buildings, based on exterior noise levels. Recommended noise attenuation values for buildings, which are based on exterior $L_{10(1)}$ noise levels, are designed to maintain interior noise levels of 45 dBA or lower for residential use and 50 dBA or lower for commercial use.

Table 20-11 shows the highest calculated $L_{10(1)}$ noise levels at the receptor locations in the study area and the building attenuation that would be required to achieve acceptable interior noise levels at each location.

Table 20-11
Minimum Building Attenuation to Comply With CEQR Requirements

Site	Location	Maximum $L_{10(1)}$ (dBA)	Required Building Attenuation (dBA)*
4	Northern Boulevard between 127th Street and 127th Place	81.7	40
5	126th Street between 36th Avenue and 37th Avenue	79.7	40**
6	Willets Point Boulevard between 34th Avenue and Northern Boulevard	74.6***	30
7	126th Street between 39th Avenue and Roosevelt Avenue	80.7	40

Notes: *Because exact building locations and uses are not known at this time, attenuation figures conservatively assume future development to be residential at each Site. The required attenuation would be 5 dBA less for a commercial use.

**Due to future noise from Citi Field, noise levels at Site 5 could increase slightly over the maximum measured 79.7 dBA. Therefore, required building attenuation at this site is conservatively assumed to be 40 dBA rather than 35 dBA.

***This figure includes noise generated by the proposed additional Van Wyck Expressway on and off ramps.

To achieve 25 dBA of building attenuation, double-glazed windows with good sealing properties as well as an alternate means of ventilation, such as well-sealed window air conditioning, would be necessary; to achieve 30 dBA of building attenuation, double-glazed windows with good sealing properties as well as alternate means of ventilation, such as well-sealed through-the-wall air conditioning, would be necessary; and, to achieve 35 dBA of building attenuation, double-glazed windows with good sealing properties as well as alternate ventilation, such as central air conditioning, would be necessary; and to achieve 40 dBA of building attenuation or more, special design features which go beyond the normal double-glazed window and central air condition would be necessary, which may include using specially designed windows (e.g., small-size windows, windows with air gaps, windows with thicker glazing, etc.), and additional building insulation.

Designs for buildings on existing streets would be required to provide at least the level of building attenuation specified in Table 20-11 for the nearest receptor. Buildings on other streets that are part of the proposed Plan would be required to provide either a minimum of 35 dBA attenuation, or to provide noise analyses which show that sufficient building attenuation would be provided to satisfy CEQR building attenuation requirements, as shown in Table 20-6. It is expected that E-designations would be placed on the appropriate blocks and lots to ensure that these building attenuation requirements are met. These E-designations are shown in Table F-1 in Appendix F. As properties are acquired by the City, it is anticipated that Restrictive Declarations

would be placed on them, which would supersede the E-designation, but require implementation of the same measures.

LOT B

As described in Chapter 2, Lot B could potentially be developed in the future with the proposed Plan with a commercial use that would be subject to CEQR interior noise criteria. Based on measured noise levels at noise measurement locations 7 and 8 (see Table 20-7), and assuming that the lot would be build out with commercial uses only, it is expected that 35 dBA of building attenuation would be needed at Lot B to meet CEQR interior noise criteria. However, any future development at Lot B would be subject to a separate approval and environmental review process, and any required building attenuation would be developed at that time.

NO CONVENTION CENTER SCENARIO

In this scenario, the convention center would be replaced with additional residential and retail uses. As described in Chapter 17, the No Convention Center Scenario would likely generate less traffic than the proposed Plan, and therefore, is not expected to generate any additional noise impacts. ✷