Chapter 20: Noise

A. INTRODUCTION

This chapter assesses the potential noise effects of the Proposed Actions, and includes: (1) the noise effects of project-generated vehicular trips on existing and future noise-sensitive uses in the area; and (2) the effects on new noise-sensitive land uses created by the Proposed Actions (e.g., residences, schools, etc.) from noise generated by nearby existing and future noise sources (e.g., vehicular traffic, playground, helicopter operations, cooling tower fans, heating, ventilation, and air conditioning [HVAC] systems, etc.).

This chapter also describes applicable regulations and impact criteria regarding noise; explains the methodology used to complete the assessments; describes existing and future noise conditions; assesses the operational effects of the Proposed Actions; and discusses measures to avoid or mitigate a potential significant adverse impact. Noise due to construction is discussed in Chapter 21, "Construction Impacts."

PRINCIPAL CONCLUSIONS

The Proposed Actions would not result in significant adverse exterior noise impacts from increased traffic, proposed playgrounds, or building mechanical equipment. However, without noise attenuation, interior noise levels in the proposed buildings would be above City Environmental Quality Review (CEQR) significant impact criteria and New York City Noise Code limits. As part of the Proposed Actions, however, the proposed buildings would include noise attenuation measures as part of the building design and would meet interior noise standards. Therefore, no significant adverse noise impacts or violations of New York City Noise Code limits would occur as a result of the Proposed Actions.

For the Development Site, projected noise levels in the Future with the Proposed Actions would be the greatest along Twelfth and Eleventh Avenues, with lower levels along West 33rd and West 30th Streets. Window wall building attenuation of 40 decibels would be required along building façades on the Development Site facing Eleventh and Twelfth Avenues, with lower attenuation requirements on West 30th and West 33rd Streets and on the interior façades. These measures would be included in the Restrictive Declaration for the Development Site. For the Additional Housing Sites, various façades would require between 25- and 35-decibel window wall building attenuation; which would be included in a Memorandum of Understanding (MOU) between the New York City Department of City Planning (DCP), the New York City Department of Housing Preservation and Development (HPD), and the New York City Department of Environmental Protection (DEP).

In addition, noise levels within the new open space areas on the Development Site that would be created by the Proposed Actions would be above the *CEQR Technical Manual* noise exposure guideline of 55 dBA $L_{10(1)}$ for outdoor areas requiring serenity and quiet. Although noise levels in the new open space areas would be above the CEQR guideline, they would be comparable to

noise levels in other open space areas and parks located in Midtown Manhattan, including Hudson River Park, Riverside Park, Central Park, and Bryant Park, and would not result in a significant adverse noise impact.

B. BACKGROUND

INTRODUCTION

Noise is generally defined as unwanted sound and is typically measured in A-weighted decibels (dBA), the noise metric best correlated to human hearing. Environmental noise is defined as the sound in a community emanating from man-made sources and activities at industrial facilities or transportation systems, as well as natural sources such as insects and wind.[1]

Since environmental noise can vary greatly with time, a number of noise metrics, which account for the variability of sound, are used to quantify noise levels over specified time periods. The measures included in the *CEQR Technical Manual* for noise impact assessment include an energy-equivalent sound level (L_{eq}) and a day–night equivalent sound level (L_{dn}).

- The L_{eq} is the equivalent steady sound level that would contain the same sound energy as the time varying signal during a given time period; alternatively, it is the level corresponding to the averaged energy of sound over a given time period. $L_{eq(1)}$ denotes levels averaged over a 1-hour time period.
- The L_{dn} is the equivalent sound level during a 24-hour time period with a 10 decibel weighting applied to the equivalent sound level during the nighttime hours of 10 PM to 7 AM.

Typical noise levels (L_{dn}) a person can encounter during daily activities are presented in Figure 20-1.

Other noise descriptors provided in the CEQR Noise Exposure Guidelines include the L_1, L_{10}, L_{50}, and L_{90} percentile levels. L_1 is the sound pressure level (SPL) exceeded 1 percent of the time and is usually regarded as the average maximum noise level. L_{10} is usually regarded as the intrusive noise level and is equivalent to the SPL exceeded ten percent of the time. L_{50} is the median noise level, while L_{90} is usually regarded as the residual or background noise level.

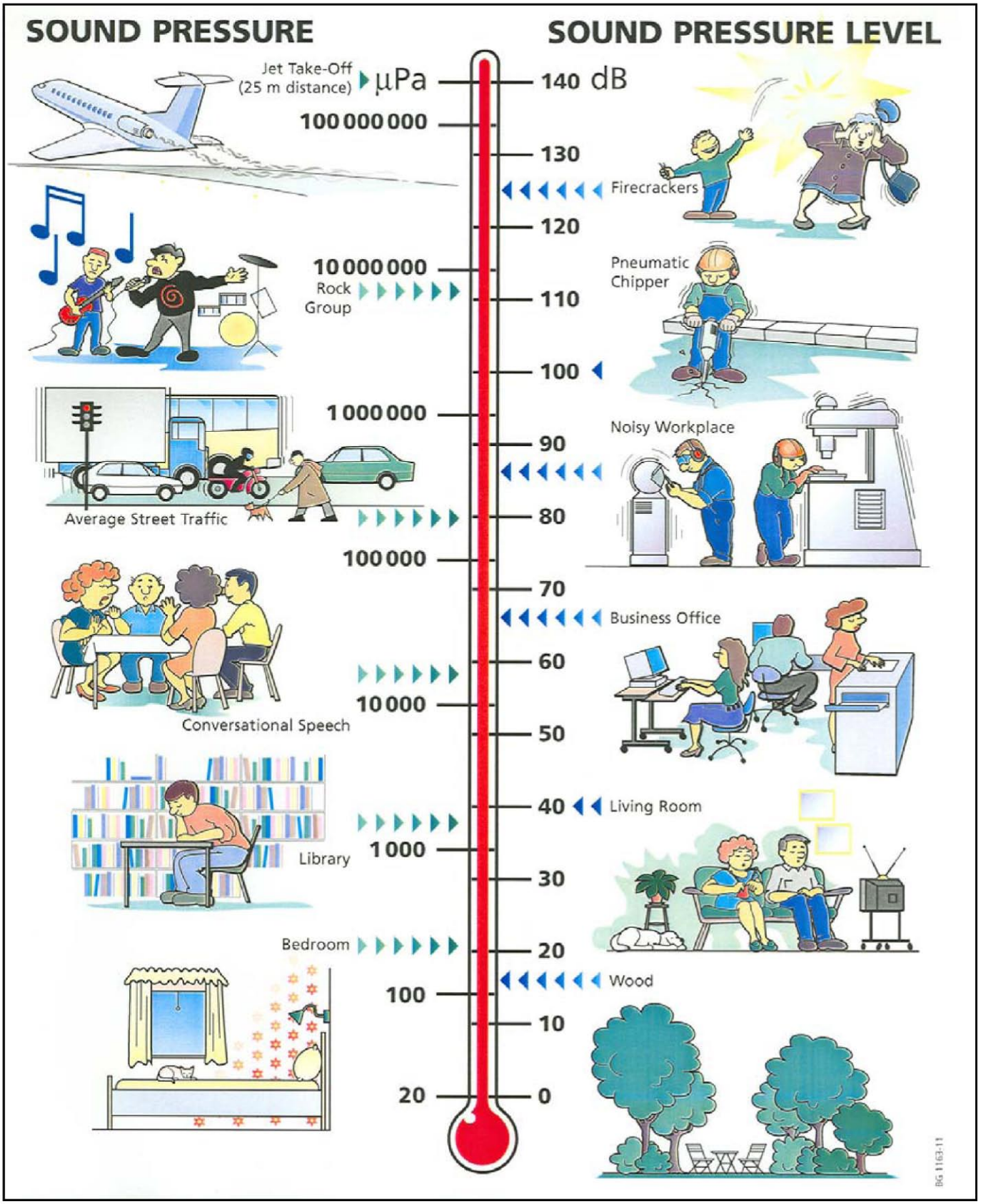
SENSITIVE LAND USES

A noise-sensitive location (known as a "receptor") is defined as an area where human activity may be adversely affected when noise levels exceed predefined thresholds of acceptability, or when noise levels increase by an amount exceeding a predefined threshold of change. These locations can be indoors or outdoors. Indoor receptors include uses such as residences, hotels, motels, health care facilities, nursing homes, schools, houses of worship, public meeting facilities, and libraries. Outdoor receptors include uses such as parks, outdoor theaters, and public open spaces.

NOISE ASSESSMENT STANDARDS AND GUIDELINES

The average ability of an individual to perceive changes in noise levels is shown in Table 20-1. Generally, changes in noise levels less than 3 dBA are barely perceptible to most listeners,

[1] EPA. 1972. Report to the President and the Congress on noise. Senate Document No. 92-63.



Sound Pressure and Sound Pressure Levels

Figure 20-1

whereas 10 dBA changes are normally perceived as doubling (or halving) in loudness. These guidelines permit estimation of an individual's probable perception of changes in noise levels.

Table 20-1
Average Ability to Perceive Changes in Noise Levels

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

Notes:
1. EPA. 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. 550/9-74-004.
2. Bolt Beranek and Newman. 1973. *Fundamentals and Abatement of Highway Traffic Noise*. NTIS PB-222-703.

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 community response is to change noise levels incorporated into the community response scale developed by the International Standards Organization (ISO)[1] (see Table 20-2). This scale permits direct estimation of the probable response of a community to a projected change in noise levels.

Table 20-2
ISO Community Response to Increases in Noise Levels

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

Note: 1. ISO 150/TC43. 1969. Noise Assessment with respect to Community Response.

APPLICABLE NOISE CODES AND IMPACT CRITERIA

Noise generated by the operations of the Proposed Actions is generally subject to the provisions of the New York City Noise Control Code and evaluated using noise impact criteria provided in the *CEQR Technical Manual*.

NEW YORK CITY NOISE CODE

The New York City Noise Control Code, which was enacted in December 2005 and became effective July 1, 2007, establishes sound-level standards for motor vehicles, air compressors, and paving breakers; requires that all exhausts be muffled; and prohibits all unnecessary noise adjacent to schools, hospitals, or courts. The amended noise code contains prohibitions regarding unreasonable noise; contains guidelines and sets limits for noise generated from construction activities; and provides specific noise standards, including plainly audible criteria for specific noise sources. In addition, the amended code specifies that no sound source operating in

[1] ISO 150/TC43. 1969. *Noise Assessment with respect to Community Response.*

connection with any commercial or business enterprise may exceed the decibel levels in the designated octave bands shown in Table 20-3 at the specified receiving properties.

Table 20-3
New York City Noise Codes

Octave Band Frequency (Hz)	Maximum Sound Pressure Levels (dB) as Measured within a Receiving Property as Specified Below	
(One-third Octave Band Frequency Level)	*Residential receiving property for mixed-use buildings 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

CEQR NOISE EXPOSURE ASSESSMENT CRITERIA

DEP, Division of Noise Abatement, has set noise exposure guidelines for use in CEQR (see Table 20-4). Under these guidelines, noise exposure is classified into four categories: "Acceptable," "Marginally Acceptable," "Marginally Unacceptable," and "Clearly Unacceptable." The guidelines are based on the need to maintain an interior noise level of 45 dBA for the "worst" noise hour based on L_{10} values (i.e., the hour at which noise levels would be at their highest).

As described in the *CEQR Technical Manual*, DEP has also established noise attenuation values required to maintain acceptable interior noise levels (i.e., interior noise levels in buildings at 45 dBA or lower, based on exterior L_{10} noise levels with a proposed action) [see Table 20-5]). Exterior L_{10} noise levels are determined for each peak hour traffic analysis time period, and these estimated noise levels are compared with the noise level categories shown in Table 20-5 to establish the required attenuation needed to maintain a 45 dBA interior noise level. If noise levels exceed the "Marginally Acceptable" levels shown in Table 20-5, a significant noise impact would occur unless the buildings include noise attenuation features, at the values indicated, to reduce the interior noise to an acceptable level.

Table 20-4
Noise Exposure Guidelines for Use in City Environmental Impact Quality 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
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
Hospital, Nursing Home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA		$65 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
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	
	10 PM to 7 AM	L10 ≤ 55 dBA		$55 < L_{10} \leq 70$ dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
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)	
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	

Source: DEP (adopted policy 1983).

(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more;

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. The FAA-approved L_{dn} contours supplied by the Port Authority may be used, 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 referenced 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).

Table 20-5
CEQR Exterior Noise Standards and Attenuation Values

Noise Category	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Noise level with proposed action	$65<L_{10}\leq70$	$70<L_{10}\leq75$	$75<L_{10}\leq80$	$80<L_{10}\leq85$	$85<L_{10}\leq90$	$90<L_{10}\leq95$
Attenuation*	25 dBA	(I) 30 dBA	(II) 35 dBA	(I) 40 dBA	(II) 45 dBA	(III) 50 dBA

Notes:

1. Different descriptors are used for each noise source: L_{10} for vehicular traffic; Ldn for train noise; and L^{y}_{dn} (Ldn Contour) for aircraft noise.*†
2. The various noise sources at a receptor location are measured and reported separately in accordance with generally accepted procedures for assessing an overall noise level. Cases where there is not a clearly dominant noise source require a judicious decision based on adequate field experience and analysis to determine the final noise category that is deemed appropriate for the overall noise exposure at each noise receptor site.
3. The above composite window-wall attenuation values are for residential dwellings. Commercial office spaces and meeting rooms would be 5 dBA less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.

* L_{dn} requires a 24-hour measurement or supportive analysis if a shorter period is employed.

† L^{y}_{dn} = "L_{dn} Contour" is an annual average of L_{dn} values ("y" indicates "yearly average").

CEQR IMPACT DEFINITION

The *CEQR Technical Manual* establishes criteria to determine whether a proposed action would result in a significant adverse noise impact, based on a comparison of future noise levels with the proposed action and future noise levels without the proposed action. As recommended in the *CEQR Technical Manual*, the following criteria were used to define a significant adverse noise impact:

- An increase of 5 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the Future without the Proposed Actions, if the No Build 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 Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the Future without the Proposed Actions, if the No Build levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period;
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the Future without the Proposed Actions, if the No Build 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 Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the Future without the Proposed Actions, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10:00 PM and 7:00 AM).

As discussed below, all existing and future No Build noise levels exceed 62 dBA $L_{eq(1)}$. Therefore, an increase of 3 dBA or more would constitute a significant adverse impact.

C. METHODOLOGY

MOBILE SOURCE ASSESSMENT

As specified in the *CEQR Technical Manual*, potential impacts of the Proposed Actions were first screened, using the CEQR proportionality equation, to determine whether detailed mobile source noise analyses were necessary. According to CEQR guidelines, if a proposed action's traffic volumes, in passenger car equivalent (PCE) values, would exceed existing traffic volumes by 100 percent or more at any roadways (with traffic mitigation measures), detailed analyses would be required.

Noise impact assessments associated with mobile sources (i.e., vehicular activities) at the Development Site were analyzed for the Proposed Actions during the four peak travel periods evaluated in Chapter 17, "Traffic and Parking": AM, midday, and PM peak traffic periods for assessment of weekday impacts; and Saturday midday (12:00 PM to 1:00 PM) for assessment of weekend impacts.

No mobile source noise analyses were conducted near the Additional Housing Sites, because the project-generated traffic in this area would be minimal. However, analyses to establish window wall attenuation requirements were conducted for the Additional Housing Sites.

Noise analyses consisted of the following tasks:

- Noise-sensitive receptor locations that have the greatest potential for being adversely affected by project-generated noise in the 2019 analysis year were identified;
- Noise measurements were taken at the identified noise sensitive sites during the four peak-noise time periods;

- Existing noise levels were determined through field measurements;
- Future (2019) noise levels with and without the Proposed Actions were predicted using the PCE-based proportionality equation per CEQR guidelines;
- Future (2019) noise levels with the Proposed Actions were compared with future noise levels without the Proposed Actions to determine, by applying CEQR impact criteria, whether the Proposed Actions have the potential to result in a significant adverse impact;
- A cumulative analysis was also conducted at the Development Site to assess the combined effects of noise from vehicular traffic, proposed playground facilities, and helicopter operations. The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5 was utilized in this evaluation;
- Noise levels were determined at exterior building façades at all proposed buildings;
- In compliance with CEQR requirements to ensure an acceptable interior space noise environment, façade-based window wall attenuation specifications for all proposed Development Site buildings were determined based on future projected cumulative maximum exterior L_{10} noise exposure with the Proposed Actions; and
- In compliance with CEQR requirements to ensure an acceptable interior noise environment, façade-based window wall attenuation requirements for each of the proposed Additional Housing Site buildings were determined based on the measured maximum exterior L_{10} noise levels recorded along each of the roadways fronting the proposed Additional Housing Site buildings.

STATIONARY NOISE SOURCES

The potential effects on the noise-sensitive land uses of the Proposed Actions (i.e., residences and school) from noise generated by playgrounds, helicopters, and mechanical systems were evaluated.

PLAYGROUND NOISE

The Developer has committed to build two outdoor playgrounds on the Development Site; however, the final locations have not been determined. This analysis assumes that one playground would be located in the large lawn in the central portion of the Development Site, and the other would occupy a portion of the lawn in the southwestern section of the Development Site, between buildings WR-2 and WR-3. The potential effects of noise generated from the proposed playground facilities onto residential and representative open space receptors within the Development Site were assessed using playground noise source emission data and noise drop-off rate methodology developed by the New York State School Construction Authority (SCA). According to a 1992 survey conducted by SCA, school playground activities register a maximum hourly noise level of 74.5 dBA L_{10} at the playground boundary.

HELICOPTER NOISE

Potential effects of noise generated by helicopter operations at Liberty Helicopter Tours (located adjacent to the Hudson River at Twelfth Avenue and West 30th Street) onto sensitive receptors of the Development Site were evaluated qualitatively based on the results of the noise monitoring that was conducted for a continuous 24-hour time period at a location adjacent to the Liberty Helicopter Tours facility. The measured noise levels included contributions from noise generated by heavy traffic on Twelfth Avenue and noise from helicopter operations at the

heliport. The helicopter-related noise included noise from helicopters idling on the ground and from helicopters hovering in the area between takeoffs and landings.

Helicopter noise originates from three components of the helicopter: the rotors, engine, and transmission. Helicopters are not usually louder than other aircraft, but can be identified easily by a characteristic sound when "blade slap" occurs. Helicopters are also slower than fixed-wing aircraft and can be heard for a longer period of time.

Existing noise levels at one site facing the 34th Street heliport and Twelfth Avenue traffic were monitored continuously for 24 hours. Helicopter noise in built-up areas of New York City typically adds approximately 2 dBA to road traffic noise when the helicopter operations take place near heavily traveled roadways. Long-term traffic noise, which was monitored near the Development Site facing Twelfth Avenue, includes the contribution from helicopter noise at the 34th Street heliport. The 2dBA increase in L_{eq} and L_{10} noise levels from helicopter activities are included in the future noise level estimates at the new residential buildings.

MECHANICAL SYSTEMS

Ventilation fan plants would be constructed at the Development Site to meet fire and life safety requirements, and maintain air temperature and circulation underneath the Development Site platform. A ventilation facility is also proposed for the Tenth Avenue Site over the Amtrak cut to exhaust emissions from diesel-powered locomotives. All building mechanical and HVAC systems would be required to comply with New York City Building Code and New York City Noise Control Code requirements. The proposed ventilation facilities for the Development Site would also be required to conform to Metropolitan Transportation Authority (MTA) ventilation noise control design specifications (both the New York City Building Code and the MTA mandate that community noise levels resulting from ventilation can be no higher than 55 dBA at any adjacent residential or noise-sensitive receptor). The ventilation facilities at the Tenth Avenue Site would need to comply with Amtrak requirements; therefore, the operation of HVAC or other equipment would not result in a significant adverse impact.

The ventilation facilities would need to satisfy the outdoor and indoor noise level requirements of the New York City Noise Code as follows:

- **Outdoor Noise:** According to CEQR guidelines, ventilation noise levels under normal operations should not increase the existing daytime noise level beyond 65 dBA or increase the existing nighttime noise level by 3 dBA or more. However, in New York City the daytime noise levels are often higher than 65 dBA; therefore, it is practical and reasonable to specify that the daytime noise levels from ventilation operations should not increase the existing daytime level by 3 dBA or more. Future nighttime noise levels should not exceed the existing noise levels by 3 dBA or more. Fan-generated noise at sensitive locations (e.g., pedestrian sidewalks and open areas) must also meet the requirements of the New York City Noise Code.
- **Indoor Noise:** The New York City Noise Code specifies that ventilation noise levels resulting primarily from the operation of fans should not exceed 42 dBA inside a receiving property dwelling unit at a distance of three feet from an open window or terrace of the property.

CUMULATIVE NOISE EVALUATION

A cumulative analysis was conducted to consider the combined effect of all on-site and off-site noise sources—including the effects of vehicular traffic, playground, mechanical systems, and helicopter noise—to determine if it would be necessary to establish building window wall attenuation requirements for proposed buildings at the Development Site. FHWA's TNM noise model was used for this assessment to determine the level of window/wall attenuation requirements to attain acceptable interior noise levels.

D. EXISTING CONDITIONS

MONITORING SITES

Noise-sensitive locations for field measurement and analysis were identified according to guidelines in the *CEQR Technical Manual*. These included noise-sensitive locations with the greatest potential for being significantly adversely affected by project-generated noise (i.e., locations where the greatest percentage increases in traffic were predicted to occur, or where new noise sources would be introduced).

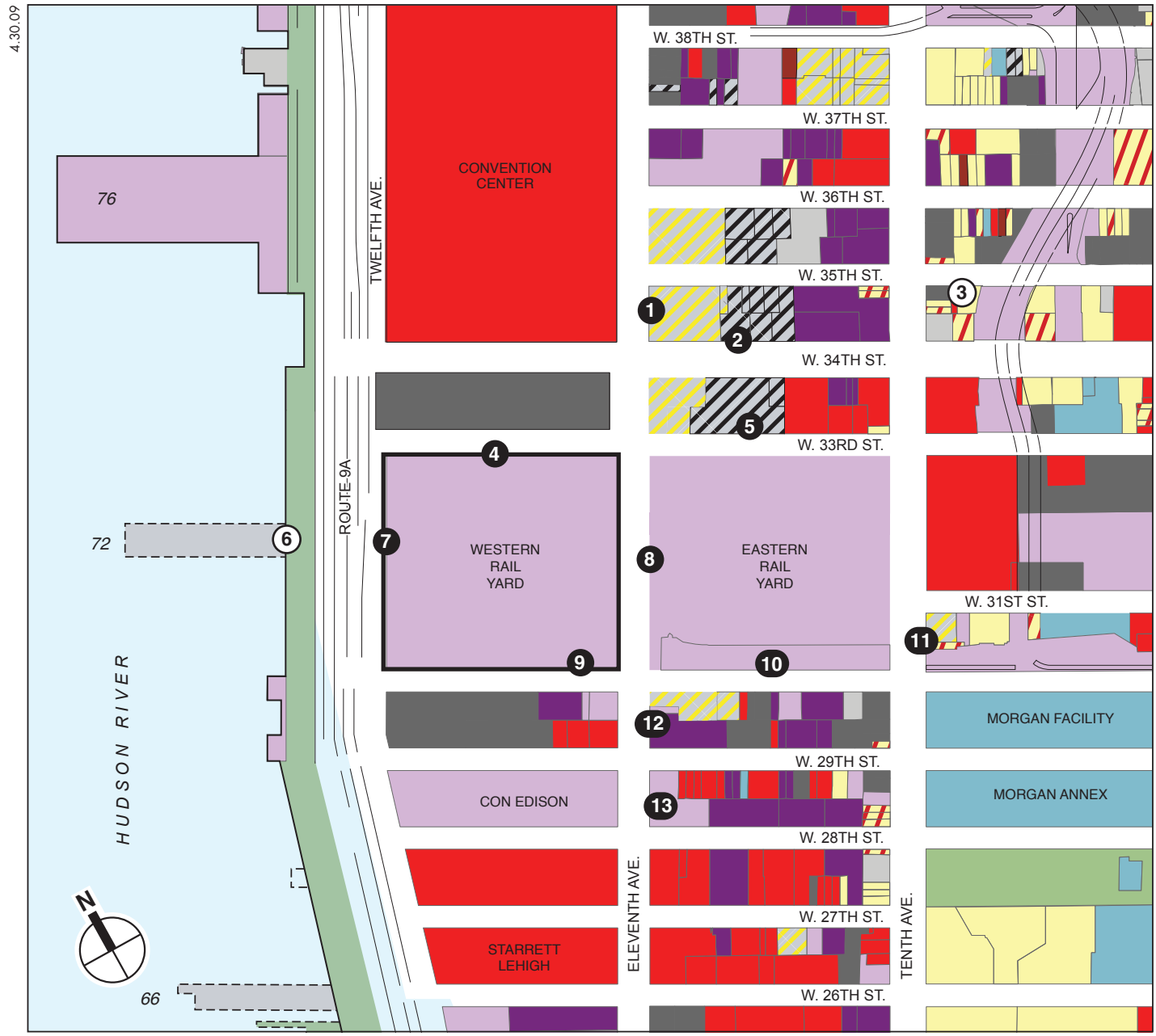
Noise measurements were taken at 13 locations to document existing noise levels in the Development Site study area. These monitoring locations (1 through 13), which were selected because they are adjacent to roadways where estimated traffic trip generation is expected to be greatest, are shown in Figure 20-2a and are listed in Table 20-6. These locations include future properties that are expected to be built by 2019, such as hotels and mixed-use residential/commercial towers. Five of the locations (4, 6, 7, 8, and 9) are in the immediate vicinity of the Development Site; several are near existing outdoor recreational spaces, such as Hudson River Park, and at existing residential properties that are expected to remain in 2019. In addition to the peak hour monitoring at all 13 sites, a continuous 24-hour noise measurement was also recorded at Site 7 to establish the ambient diurnal noise effects of the adjacent heliport on the Development Site.

In addition to the 13 noise measurement sites in the Development Site study area, five other locations (14 through 18) were selected to document existing noise levels in the immediate vicinity of the Additional Housing Sites. These are shown in Figure 20-2b and listed in Table 20-6.

MONITORING PROGRAM

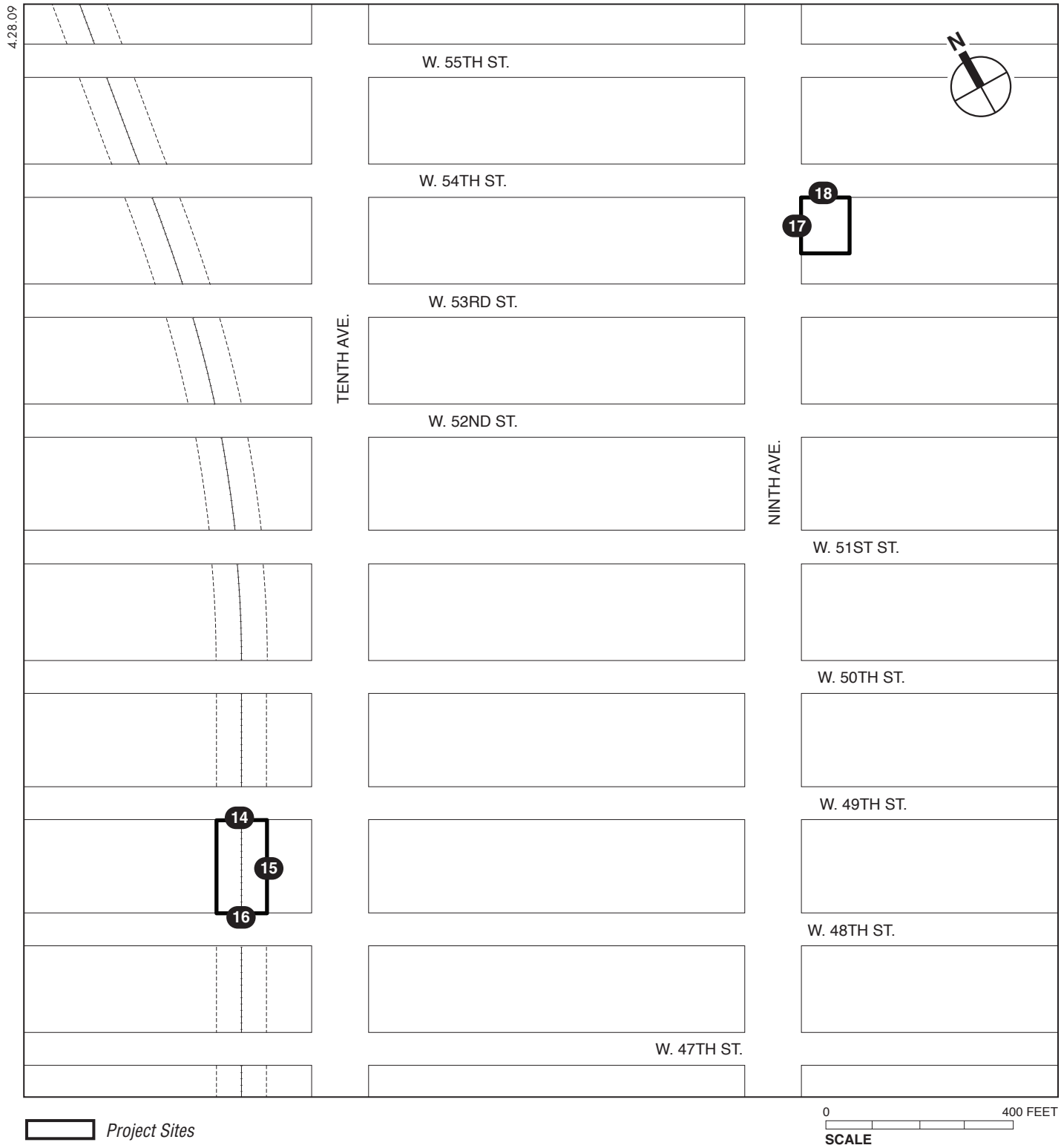
Twenty-minute noise samples were taken at each monitoring location during the weekday AM (8:00 AM to 9:00 AM), midday (12:00 PM to 1:00 PM), PM (5:00 PM to 6:00 PM), and Saturday midday (12:00 PM to 1:00 PM) peak periods in the spring and fall of 2008. The 24-hour measurement was collected in the fall of 2008. The following instruments were used:

- Brüel & Kjær 2260 Precision Sound Level Meter;
- Brüel & Kjær 2231 Precision Sound Level Meter;
- Brüel & Kjær 2238 Precision Sound Level Meter;
- Brüel & Kjær half-inch Wind Screens;
- Brüel & Kjær 4165 half-inch Microphones with Preamp; and
- Brüel & Kjær 4230 Calibrators.



Development Site Boundary
Residential
Residential (with Commercial Below)
Commercial and Office Buildings
Entertainment
Hotel
Public Facilities and Institutional
Transportation and Utility
Industrial and Manufacturing
Open Space
Parking Facility
Vacant
Under Construction
Vacant Building
(1) *Noise Monitoring Location (Site Chosen Based on Existing Land Use and Project Peak Hour AM and PM Trip Generation Traffic Volume)*
(2) *Noise Monitoring Location (Site Chosen Based on Future Land Use and Project Peak Hour AM and PM Trip Generation Traffic Volume)*

Noise Monitoring Locations: Development Site
Figure 20-2a



Noise Monitoring Locations: Additional Housing Sites

Figure 20-2b

Table 20-6
Noise Monitoring Locations and Adjacent Land Use

Site	Site Location	2008 Land Use	Expected Land Use in 2019	Year of Development
1	Eleventh Ave between West 34th and West 35th Streets	Under Construction	Mixed-use Residential, Office and Retail	By 2019
2	West 34th Street between Tenth and Eleventh Avenues	Vacant Building	Open Space: Hudson Park & Blvd	By 2019
3	West 35th Street between Tenth and Dyer Avenues	Existing Residential	Existing Residential	Existing
4	West 33rd Street between Eleventh and Twelfth Avenues	Western Rail Yard (Industrial)	Mixed-use Residential, Office, and Retail	By 2019
5	West 33rd Street between Tenth and Eleventh Avenues	Vacant Building	Open Space: Hudson Park & Blvd	By 2019
6	Twelfth Avenue between West 30th and West 33rd Streets	River Side (Open Space)	Outdoor Recreation	Existing
7	Twelfth Avenue between West 30th and West 33rd Streets	Western Rail Yard (Industrial)	Outdoor Recreation	By 2019
8	Eleventh Avenue between West 30th and West 33rd Streets	Eastern Rail Yard (Industrial)	Mixed-use Residential, Office and Retail	By 2019
9	West 30th Street between Eleventh and Twelfth Avenues	Western Rail Yard (Industrial)	Mixed-use Residential, Office and Retail	By 2019
10	West 30th Street between Tenth and Eleventh Avenues	Eastern Rail Yard (Industrial)	Mixed-use Hotel and Retail	By 2019
11	Tenth Avenue between West 30th and West 31st Streets	Under Construction	Mixed-use Hotel and Residential	By 2019
12	Eleventh Ave between West 29th and West 30th Streets	Under Construction (Industrial)	Mixed-use Residential and Retail	By 2019
13	Eleventh Ave between West 28th and West 29th Streets	Transportation & Utility (Industrial)	Mixed-use Residential and Retail	By 2019
14	West 49th Street between Tenth and Eleventh Avenues	Industrial (Amtrak rail cut)	Mixed-use Residential and Retail	By 2019
15	Tenth Avenue between West 48th and West 49th Streets	Industrial (Amtrak rail cut)	Mixed-use Residential and Retail	By 2019
16	West 48th Street between Tenth and Eleventh Avenue	Industrial (Amtrak rail cut)	Mixed-use Residential and Retail	By 2019
17	Ninth Avenue between West 53rd and West 54th Streets	MTA Employee Active Parking Lot	Mixed-use Residential, Office and Retail	By 2019
18	West 54th Street between Eighth and Ninth Avenues	MTA Employee Active Parking Lot	Mixed-use Residential, Office and Retail	By 2019

The instruments meet ANSI S1.4 Type I or II specifications. They were calibrated before and after each measurement period and operated on slow response according to the manufacturer's instructions. The data were digitally recorded by the meters and displayed and tallied on a data sheet at the end of the 20-minute measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, L_{90}, and L_{99}. Noise was measured in conformance with ANSI S1.13. Weather conditions during noise monitoring time periods were noted as follows: wind speed under 15 mph, relative humidity under 80 percent, and air temperatures in the range of 65 to 90° F.

MEASURED NOISE LEVELS

Table 20-7 summarizes the results of the noise-monitoring program based on the L_{eq} noise descriptor. The results of this noise-monitoring program indicate that avenues generally have weekday daytime noise levels (dBA) in the mid- to high-70s, while most cross-town streets have noise levels (dBA) in the high-60s to low-70s. Levels along the West 34th Street corridor were higher due to the high traffic volumes traveling along this primary east-west route. Noise levels at or above 80 dBA were measured on Twelfth Avenue at Sites 6 and 7, near the heliport. These high

levels are a result of the close proximity of these sites to helicopter noise and heavy traffic volumes along Twelfth Avenue (Route 9A).

Table 20-7
Measured Hourly Noise Levels (L_{eq}) in dBA and Highest Hour L_{eq}

Site	Weekday AM	Weekday Midday	Weekday PM	Saturday	Highest L_{eq}[1]
1	72	76	72	71	76
2	74	72	74	70	74
3	72	74	76	69	76
4	70	72	71	67	72
5	70	67	67	65	70
6	77	81	79	72	81
7	78	76	80	78	80
8	73	75	75	72	75
9	69	68	67	71	71
10	70	72	74	68	74
11	76	75	76	75	76
12	75	72	70	72	75
13	75	72	69	68	75
14	71	70	69	70	71
15	75	72	74	73	75
16	68	68	66	64	68
17	73	71	73	72	73
18	66	67	64	65	67

Note: [1] Highest L_{eq} for the periods for which readings were taken.

Table 20-8 summarizes the results of the noise-monitoring program based on the L_{10} noise descriptor. The L_{10} noise descriptor is commonly used for the assessment of intrusive noise (such as traffic) and is generally 2 to 4 decibels greater than the corresponding measured L_{eq} reading recorded. The *CEQR Technical Manual* procedures apply the L_{10} descriptor to locations where traffic noise dominates, as it does in these study areas. L_{10} noise levels (dBA) varied from the high-60s to the mid-80s with the highest L_{10} noise levels recorded on Twelfth Avenue adjacent to Sites 6 and 7, which are near the Liberty Tours heliport. These noise levels are considered typical of most areas in Midtown Manhattan. The results of the existing noise level measurement program, in percentile and hourly L_{eq} levels, are shown in Table 20-9.

Table 20-8
Measured Hourly Noise Levels (L_{10}) in dBA and Highest L_{10}

Site	Weekday AM	Weekday Midday	Weekday PM	Saturday	Highest L_{10}[1]
1	75	78	75	75	78
2	78	76	78	74	78
3	75	76	78	72	78
4	72	73	74	69	74
5	72	69	68	68	72
6	82	85	82	74	85
7	82	79	83	81	83
8	76	77	79	76	79
9	71	71	70	74	74
10	73	75	78	71	78
11	79	79	79	78	79
12	77	76	74	74	77
13	78	75	72	72	78
14	74	72	73	73	74
15	78	75	77	76	78
16	70	70	68	67	70
17	77	74	74	75	77
18	69	68	66	67	69

Note:[1] Highest L_{10} for the periods for which readings were taken.

Table 20-9
Measured Hourly Percentile and L_{eq} Noise Levels in dBA

Location	Time Period	L_{eq}	L_1	L_{10}	L_{50}	L_{90}	L_{99}
1	AM	72	80	75	71	68	66
	Midday	76	82	78	75	73	72
	PM	72	78	75	71	68	67
	Saturday	71	80	75	67	62	58
2	AM	74	83	78	71	66	64
	Midday	72	81	76	69	65	64
	PM	74	83	78	71	66	64
	Saturday	70	79	74	68	62	58
3	AM	72	82	75	68	63	60
	Midday	74	84	76	69	65	63
	PM	76	84	78	75	70	68
	Saturday	69	79	72	65	60	54
4	AM	70	77	72	69	64	63
	Midday	72	83	71	65	63	62
	PM	71	82	74	66	63	61
	Saturday	67	74	69	65	61	57
5	AM	70	80	72	66	63	60
	Midday	67	75	69	65	63	62
	PM	67	76	68	64	61	60
	Saturday	65	72	68	64	60	58
6	AM	77	85	82	75	64	59
	Midday	81	88	85	80	62	58
	PM	79	88	82	76	72	70
	Saturday	72	78	74	71	61	56
7	AM	78	86	82	74	67	65
	Midday	76	85	79	74	69	67
	PM	80	86	83	79	67	61
	Saturday	78	85	81	76	70	68
8	AM	73	80	76	71	69	68
	Midday	75	81	77	73	69	67
	PM	75	82	79	73	65	63
	Saturday	72	80	76	67	62	60
9	AM	69	80	71	64	58	58
	Midday	68	77	71	66	60	58
	PM	67	75	70	65	63	62
	Saturday	71	82	74	68	64	63
10	AM	70	82	73	65	60	57
	Midday	72	83	75	66	61	59
	PM	74	86	78	69	62	59
	Saturday	68	79	71	64	60	58
11	AM	76	87	79	73	65	63
	Midday	75	84	79	73	66	63
	PM	76	84	79	73	67	65
	Saturday	75	83	78	73	64	60
12	AM	75	83	77	71	68	67
	Midday	72	82	76	69	64	60
	PM	70	78	74	67	62	58
	Saturday	72	83	74	67	63	60
13	AM	75	85	78	71	65	63
	Midday	72	82	75	68	63	60
	PM	69	79	72	66	62	60
	Saturday	68	77	72	65	61	59
14	AM	71	81	74	69	62	60
	Midday	70	79	72	65	61	60
	PM	69	79	73	63	59	58
	Saturday	70	82	73	63	60	58
15	AM	75	82	78	74	67	65
	Midday	72	79	75	71	66	63
	PM	74	84	77	72	65	62
	Saturday	73	81	76	71	65	63
16	AM	68	79	70	65	62	61
	Midday	68	77	70	65	62	61
	PM	66	77	68	61	57	54
	Saturday	64	73	67	62	58	56

Table 20-9 (cont'd)
Measured Hourly Percentile and L_{eq} Noise Levels in dBA

Location	Time Period	L_{eq}	L_1	L_{10}	L_{50}	L_{90}	L_{99}
17	AM	73	82	77	68	62	60
	Midday	71	79	74	67	61	59
	PM	73	79	74	67	61	59
	Saturday	72	79	75	70	61	59
18	AM	66	73	69	65	60	58
	Midday	67	76	68	63	59	57
	PM	64	70	66	62	58	57
	Saturday	65	72	67	62	58	57

The continuous 24-hour noise measurements collected at Site 7 for all noise descriptors are summarized in Table 20-10. Hourly readings collected at Site 7 yielded noise levels which show the disproportionate influence of helicopter noise as the dominant noise source in this area, particularly during daytime hours. In general, with the exception of the noise measurements recorded at Sites 6 and 7, hourly noise readings collected in the study area are within the typical range of ambient noise levels in Midtown Manhattan, which are influenced largely by vehicular traffic during peak time periods.

Table 20-10
Measured Twenty-four Hour Noise Percentile and L_{eq} Levels in dBA at Site 7

Start Hour	L_{eq}	L_1	L_{10}	L_{50}	L_{90}	L_{99}
2 PM	74	83	77	71	66	63
3 PM	80	88	82	73	67	64
4 PM	80	87	83	79	68	64
5 PM	80	86	83	79	67	61
6 PM	80	86	83	79	64	60
7 PM	79	86	83	75	66	60
8 PM	75	83	80	72	67	64
9 PM	75	84	79	72	67	64
10 PM	76	84	80	72	67	65
11 PM	75	84	79	72	68	65
12 PM	75	84	78	71	67	64
1 AM	73	83	77	69	65	63
2 AM	72	82	76	69	64	63
3 AM	72	82	75	68	64	63
4 AM	72	83	76	68	63	62
5 AM	75	84	79	70	65	62
6 AM	77	86	82	72	66	64
7 AM	78	86	82	74	67	65
8 AM	78	86	82	75	68	65
9 AM	78	86	82	74	67	64
10 AM	77	85	81	73	67	64
11 AM	75	84	79	73	69	64
12 PM	76	85	79	74	69	67
1 PM	75	85	78	73	68	65

EXISTING NOISE EXPOSURE CLASSIFICATIONS

Based on the results of the noise-monitoring program, using the noise classification defined in the City Noise Exposure Guidelines, the existing general noise environment of the study area can be characterized as "Marginally Unacceptable," except for locations along Twelfth Avenue, which can be characterized as "Clearly Unacceptable." Overall, the study area is typical of many

areas in Manhattan, with $L_{eq\ (1)}$ noise levels ranging between 65 and 80 dBA, and with lower levels typically occurring at night and on weekends.

Traffic is the dominant source of noise in the study area. Other notable noise contributors include helicopters from Liberty Helicopter Tours (located southwest of the Jacob K. Javits Convention Center), subway-related noise discharged from the subway vents/emergency exits along Eighth Avenue, construction noise, sirens from police and other emergency vehicles, and the ubiquitous car/truck horns and squealing brakes characteristic of New York City streets.

Based on the CEQR Noise Exposure classifications provided in Table 20-4, current classifications of the noise receptor locations are summarized in Table 20-11 as follows: Sites 6 and 7, located adjacent to Route 9A and the Liberty Helicopter heliport, are classified as "Clearly Unacceptable" (CU). All other locations, with the exception of Site 18, which is just within the "Marginally Acceptable" (MA) range, are classified as "Marginally Unacceptable" (MU). The "Marginally Unacceptable" classification is typical for areas in Manhattan with significant levels of traffic.

Table 20-11
Existing Noise Exposure at Noise Receptor Locations

Site	Receptor Type	Highest L_{10}	Classification
1	Transportation	78	MU
2	Residential / Commercial / Transportation	78	MU
3	Commercial / Transportation	78	MU
4	Open Space / Industrial	74	MU
5	Transportation / Commercial / Industrial	72	MU
6	Residential / Commercial	85	CU
7	Residential / Commercial / Transportation	83	CU
8	Residential / Commercial / Transportation / Industrial	79	MU
9	Residential / Commercial / Transportation	74	MU
10	Residential / Institutional / Commercial	78	MU
11	Residential / Commercial	79	MU
12	Residential / Institutional / Commercial	77	MU
13	Residential / Commercial	78	MU
14	Residential / Commercial	74	MU
15	Residential / Commercial	78	MU
16	Residential / Commercial	70	MU
17	Residential / Commercial	77	MU
18	Residential / Commercial	69	MA

Notes:
CU Clearly Unacceptable
MU Marginally Unacceptable
MA Marginally Acceptable

E. THE FUTURE WITHOUT THE PROPOSED ACTIONS

As described above in Section C, "Methodology," noise levels from vehicular traffic in the Future without the Proposed Actions in 2019 were calculated for the weekday AM, midday, PM, and Saturday midday analysis periods, using the CEQR Proportionality Equation (see Appendix G, "Noise"). Projected future noise levels ($L_{eq\ (l\text{-}hr)}$ dBA) in the Future without the Proposed Actions at each analysis site are presented in Table 20-12. Increases in noise levels would vary from 0.3 dBA (at Sites 2 and 6) to 5.6 dBA (at Site 5) above existing noise levels.

Table 20-12
2019 Future Noise Levels Without the Proposed Actions (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Build $L_{eq(1)}$	$L_{eq(1)}$ Change	No Build $L_{10(1)}$
1	Eleventh Ave between West 34th and West 35th Streets	AM	72.1	72.7	0.6	75.2
		Midday	75.8	76.9	1.1	78.7
		PM	71.9	72.9	1.0	75.6
		Saturday	71.0	72.0	1.0	75.6
2	West 34th Street between Tenth and Eleventh Avenues	AM	73.9	74.5	0.6	78.2
		Midday	71.9	73.1	1.2	76.8
		PM	73.9	74.4	0.5	78.1
		Saturday	70.2	70.5	0.3	74.4
3	West 35th Street between Tenth and Dyer Avenues	AM	71.8	73.4	1.6	76.7
		Midday	73.6	75.6	2.0	78.1
		PM	76.0	77.7	1.7	79.8
		Saturday	69.1	70.6	1.5	73.1
4	West 33rd Street between Eleventh and Twelfth Avenues	AM	70.4	72.5	2.1	74.0
		Midday	72.3	76.1	3.8	77.2
		PM	70.6	71.5	0.9	75.0
		Saturday	66.7	67.7	1.0	70.0
5	West 33rd Street between Tenth and Eleventh Avenues	AM	69.6	73.1	3.5	75.9
		Midday	67.4	73.0	5.6	75.0
		PM	67.2	69.7	2.5	70.9
		Saturday	65.4	68.1	2.7	70.8
6	Twelfth Avenue between West 30th and West 33rd Streets	AM	77.4	77.8	0.4	81.9
		Midday	80.9	81.4	0.5	85.0
		PM	78.9	79.5	0.6	82.6
		Saturday	71.8	72.1	0.3	74.3
7	Twelfth Avenue between West 30th and West 33rd Streets	AM	78.2	78.7	0.5	82.4
		Midday	76.2	76.8	0.6	80.0
		PM	80.4	81.0	0.6	84.0
		Saturday	78.0	78.4	0.4	81.4
8	Eleventh Avenue between West 30th and West 33rd Streets	AM	73.0	74.0	1.0	76.9
		Midday	74.5	76.2	1.7	78.7
		PM	74.7	76.7	2.0	81.1
		Saturday	71.8	73.1	1.3	77.3
9	West 30th Street between Eleventh and Twelfth Avenues	AM	68.7	70.0	1.3	71.9
		Midday	67.9	69.4	1.5	72.1
		PM	67.0	68.1	1.1	71.2
		Saturday	71.3	72.4	1.1	74.7

Table 20-12 (cont'd)
2019 Future Noise Levels Without the Proposed Actions (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No Build $L_{eq(1)}$	$L_{eq(1)}$ Change	No Build $L_{10(1)}$
10	West 30th Street between Tenth and Eleventh Avenues	AM	70.1	72.9	2.8	75.4
		Midday	71.9	75.1	3.2	78.3
		PM	74.0	76.6	2.6	80.2
		Saturday	68.0	70.1	2.1	72.7
11	Tenth Avenue between West 30th and West 31st Streets	AM	76.0	76.8	0.8	80.0
		Midday	75.2	76.2	1.0	79.6
		PM	75.6	76.8	1.2	80.3
		Saturday	74.5	75.7	1.2	78.8
12	Eleventh Ave between West 29th and West 30th Streets	AM	74.6	75.2	0.6	77.7
		Midday	72.2	73.3	1.1	76.7
		PM	70.0	71.5	1.5	75.1
		Saturday	71.5	72.4	0.9	74.5
13	Eleventh Ave between West 28th and West 29th Streets	AM	74.6	75.1	0.5	78.6
		Midday	71.6	73.8	2.2	77.3
		PM	69.0	70.4	1.4	73.0
		Saturday	68.1	69.0	0.9	72.5

Noise level increases of this magnitude would generally vary from imperceptible to barely perceptible to most listeners. Increases greater than 3 dBA at Sites 4, 5, and 10 would result from vehicular traffic associated with future development projects that are expected to be built by 2019. Noise exposure at Sites 1, 2, 3, 4, 5, 9, 12, and 13 would remain in the "Marginally Unacceptable" category; noise levels at Sites 8, 10 and 11 would change from the "Marginally Unacceptable" category to the "Clearly Unacceptable" category; and noise levels at Sites 6 and 7 would remain in the "Clearly Unacceptable" category.

F. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

MOBILE SOURCE ASSESSMENT

As described above in Section C, "Methodology," noise levels from vehicular traffic in the Future with the Proposed Actions in 2019 were calculated for the weekday AM, midday, PM, and Saturday midday analysis periods, using the CEQR Proportionality Equation. A summary of noise levels ($L_{eq\ (1\text{-}hr)}$ dBA) in the Future with the Proposed Actions at each analysis site is presented in Table 20-13. Noise level estimates are predicted to increase by 2.5 dBA or less at all analysis sites. Noise level changes of this magnitude would generally be imperceptible to most listeners and are below the CEQR threshold for a significant adverse noise impact. Noise exposure at Sites 1, 2, 4, 5, 9, 12, and 13 would remain in the "Marginally Unacceptable" category, as in the Future without the Proposed Actions; noise levels at Sites 3, 8, 10, and 11 would change from the "Marginally Unacceptable" category to the "Clearly Unacceptable" category, as in the Future without the Proposed Actions; and noise levels at Sites 6 and 7 would remain in the "Clearly Unacceptable" category, as in the Future without the Proposed Actions.

Table 20-13
2019 Future Noise Levels With the Proposed Action (in dBA)

Receptor	Location	Time	No Build $L_{eq(1)}$	Build $L_{eq(1)}$	$L_{eq(1)}$ Change	Build $L_{10(1)}$
1	Eleventh Ave between West 34th and West 35th Streets	AM	72.7	72.9	0.2	75.4
		Midday	76.9	77.1	0.2	78.9
		PM	72.9	73.2	0.2	75.9
		Saturday	72.0	72.3	0.3	75.9
2	West 34th Street between Tenth and Eleventh Avenues	AM	74.5	74.7	0.2	78.4
		Midday	73.1	73.4	0.3	77.1
		PM	74.4	74.5	0.1	78.2
		Saturday	70.5	70.8	0.3	74.7
3	West 35th Street between Tenth and Dyer Avenues	AM	73.4	73.7	0.3	77.0
		Midday	75.6	75.9	0.3	78.4
		PM	77.7	78.1	0.4	80.2
		Saturday	70.6	71.0	0.4	73.5
4	West 33rd Street between Eleventh and Twelfth Avenues	AM	72.5	73.8	1.3	75.3
		Midday	76.1	77.4	1.3	78.5
		PM	71.5	74.0	2.5	77.5
		Saturday	67.7	69.6	1.8	71.9
5	West 33rd Street between Tenth and Eleventh Avenues	AM	73.1	73.9	0.8	76.7
		Midday	73.0	73.7	0.7	75.7
		PM	69.7	70.4	0.7	71.6
		Saturday	68.1	69.2	1.1	71.9
6	Twelfth Avenue between West 30th and West 33rd Streets	AM	77.8	77.8	0.0	81.9
		Midday	81.4	81.4	0.1	85.0
		PM	79.5	79.5	0.1	82.6
		Saturday	72.1	72.2	0.1	74.4
7	Twelfth Avenue between West 30th and West 33rd Streets	AM	78.7	78.8	0.1	82.5
		Midday	76.8	76.9	0.1	80.1
		PM	81.0	81.0	0.0	84.0
		Saturday	78.4	78.5	0.1	81.5
8	Eleventh Avenue between West 30th and West 33rd Streets	AM	74.0	74.2	0.2	77.1
		Midday	76.2	76.5	0.3	79.0
		PM	76.7	77.1	0.4	81.5
		Saturday	73.1	73.6	0.5	77.8
9	West 30th Street between Eleventh and Twelfth Avenues	AM	70.0	70.6	0.5	72.5
		Midday	69.4	69.8	0.4	72.5
		PM	68.1	68.4	0.4	71.5
		Saturday	72.4	72.9	0.5	75.2
10	West 30th Street between Tenth and Eleventh Avenues	AM	72.9	73.4	0.5	75.9
		Midday	75.1	75.6	0.5	78.8
		PM	76.6	77.1	0.5	80.7
		Saturday	70.1	71.0	0.8	73.6
11	Tenth Avenue between West 30th and West 31st Streets	AM	76.8	77.0	0.2	80.2
		Midday	76.2	76.3	0.1	79.7
		PM	76.8	76.9	0.2	80.4
		Saturday	75.7	75.9	0.3	79.0
12	Eleventh Ave between West 29th and West 30th Streets	AM	75.2	75.4	0.2	77.9
		Midday	73.3	73.5	0.2	76.9
		PM	71.5	71.8	0.3	75.4
		Saturday	72.4	72.8	0.3	74.9
13	Eleventh Ave between West 28th and West 29th Streets	AM	75.1	75.3	0.1	78.8
		Midday	73.8	73.9	0.1	77.4
		PM	70.4	70.7	0.3	73.3
		Saturday	69.0	69.2	0.2	72.7

MECHANICAL SYSTEMS

Exterior noise levels from the proposed ventilation plants would be consistent with CEQR noise criteria, which limit ventilation noise levels to levels equal to or less than a 3 dBA increase over the existing noise level during the daytime and less than a 3-dBA increase over the nighttime L_{eq} noise level. Meeting this requirement would be accomplished by establishing appropriate noise-related specifications for the ventilation system, including ventilation duct work, airflow velocities, louvered openings in the ventilation plant exterior walls, fan type, fan size, pressure drop, and silencer characteristics. In general, fan noise would be controlled using a combination of in-duct splitter attenuators that can achieve between 20 to 30 dBA reductions in noise, sound absorptive plenums (large rooms enclosed by acoustic materials that can achieve between 10 and 15 dBA reductions), and acoustic louvers. The ventilation plants would be designed structurally to accommodate HVAC and mechanical equipment within the plants to minimize noise impacts to adjacent uses and public areas. The Restrictive Declaration would require silencers and/or enclosures to minimize these impacts to achieve compliance with the New York City Noise Code.

CUMULATIVE NOISE IMPACT ASSESSMENT

A cumulative analysis was conducted to examine the combined effect of all on-site and off-site noise sources, including the effects of vehicular traffic, playground, mechanical, and helicopter noise to determine the appropriate window wall attenuation needed on all proposed building façades within the Development Site, in accordance with CEQR requirements.

As discussed above, FHWA's TNM model was used for establishing exterior traffic noise levels at each building façade, and adjustments to noise levels for playground and helicopter noise were made. Once the exterior noise level at each building façade was determined, the appropriate window wall attenuation requirements were established based on the CEQR land use-based maximum interior noise level. Residential buildings (including hotels) are required to be designed to maintain an interior L_{10} noise level of 45 dBA or lower; commercial buildings are required to maintain interior L_{10} noise level of 50 dBA or less.

Table 20-14 provides a summary of the required window wall attenuation for each proposed building façade as per the CEQR requirements shown in Table 20-5. Figure 20-3 illustrates the window wall requirement along each building façade for all proposed buildings. As described in Chapter 2, "Framework for Analysis," three development scenarios are proposed for the Development Site: Maximum Residential Scenario-Hotel Option, Maximum Residential Scenario-Office Option, and Maximum Commercial Scenario. For the Maximum Commercial Scenario and Maximum Residential Scenario-Office Option, building WC-1 is proposed as an office tower, which would require 5 decibels less noise reduction than a residential building. Interior noise levels for WC-1 for the Maximum Commercial Scenario and Maximum Residential Scenario-Office Option must not exceed an L_{10} level of 50 dBA. For the Maximum Residential Scenario-Hotel Option, building WC-1 is proposed as a hotel, which, like a residence, would require interior noise levels not to exceed the 45 dBA L_{10} level. (See Appendix G, "Noise" for Figure G-1: 2019 Proposed Actions Cumulative Noise Level Estimates by Building Façade.) Noise attenuation recommendations shown in Table 20-14, were derived to satisfy the requirements of the CEQR "Exterior Noise Standards and Attenuation Values," shown in Table 20-5, specifying acceptable noise level limits in building interior spaces as described in the *CEQR Technical Manual*. These window wall attenuation measures will be included in the Restrictive Declaration for the Development Site.



Window-Wall Noise Attenuation Requirements by Building Facade

Figure 20-3

Table 20-14
Development Site: Building Window Wall Attenuation Specifications in Compliance with CEQR Interior Space Requirements for 2019 (in dBA)

Building Identification	Building Façade Face	Maximum Commercial Scenario		Maximum Residential Scenario-Office Option		Maximum Residential Scenario-Hotel Option	
		CEQR Building Interior Space L_{10} (dBA) Requirements	Building Attenuation Needed to Satisfy CEQR Requirements	CEQR Building Interior Space L_{10} (dBA) Requirements	Building Attenuation Needed to Satisfy CEQR Requirements	CEQR Building Interior Space L_{10} (dBA) Requirements	Building Attenuation Needed to Satisfy CEQR Requirements
WR-1	F1	45	35	45	35	45	35
	F2	45	30	45	30	45	30
	F3	45	35	45	35	45	35
	F4	45	40	45	40	45	40
WR-2	F1	45	30	45	30	45	30
	F2	45	30	45	30	45	30
	F3	45	30	45	30	45	30
	F4	45	35	45	35	45	35
	F5	45	40	45	40	45	40
	F6	45	40	45	40	45	40
WR-3	F1	45	30	45	30	45	30
	F2	45	30	45	30	45	30
	F3	45	35	45	35	45	35
	F4	45	35	45	35	45	35
	F5	45	35	45	35	45	35
	F6	45	35	45	35	45	35
WR-4	F1	45	40	45	40	45	40
	F2	45	30	45	30	45	30
	F3	45	30	45	30	45	30
	F4	45	40	45	40	45	40
WR-5	F1	45	35	45	35	45	35
	F2	45	30	45	30	45	30
	F3	45	30	45	30	45	30
	F4	45	35	45	35	45	35
WR-6	F1	45	30	45	30	45	30
	F2	45	35	45	35	45	35
	F3	45	35	45	35	45	35
	F4	45	30	45	30	45	30
WR-7	F1	45	40	45	40	45	40
	F2	45	35	45	35	45	35
	F3	45	35	45	35	45	35
	F4	45	35	45	35	45	35
WC-1	F1	50	30	50	30	45	35
	F2	50	30	50	30	45	35
	F3	50	30	50	30	45	35
	F4	50	25	50	25	45	30
	F5	50	30	50	30	45	35
	F6	50	35	50	35	45	40

Noise levels in all of the new open space areas on the Development Site would be above 55 dBA $L_{10(1)}$, exceeding the *CEQR Technical Manual* noise exposure guidelines for outdoor areas requiring serenity and quiet (see Table 20-4). One-hour L_{10} noise levels would be in the range of 65 to 75 dBA. There are no practical and feasible mitigation measures to reduce noise levels to below the 55 dBA $L_{10(1)}$ guideline. However, the noise levels in these new open space areas would be comparable to noise levels in several other open space areas that are also located adjacent to heavily trafficked roadways, including Hudson River Park (where measured $L_{10(1)}$ levels collected at Site 6 were recorded above 80 dBA), Riverside Park, Bryant Park, and portions of Central Park. Although the 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet, this relatively low noise level is typically not achieved in parks and open space areas in New York City. Consequently, noise levels in the Proposed

Actions' new open space areas, while exceeding the 55 dBA $L_{10(1)}$ CEQR guideline value, would not result in a significant adverse noise impact.

ADDITIONAL HOUSING SITES: WINDOW WALL ATTENUATION REQUIREMENTS

Window wall attenuation requirements at the Additional Housing Sites were determined from the highest measured L_{10} noise levels recorded adjacent to these proposed residential buildings. Noise measurement locations are depicted in Figure 20-2b and a summary of the window wall noise attenuation requirements necessary to comply with CEQR interior noise requirements is provided in Table 20-15. These noise attenuation measures for the Additional Housing Sites would be included in a Memorandum of Understanding between DCP, HPD, and DEP.

Table 20-15
Additional Housing Sites: Building Attenuation Requirements

Project Building	Façade On	Maximum Measured L_{10} Level dBA	CEQR Required Interior Noise Level L_{10} dBA	CEQR Required Window Wall Attenuation
Site 1 Located on Tenth Avenue between West 49th and West 50th Streets	East	78	45	35
	North	74	45	30
	South	70	45	25
	West*	NA*	NA*	NA*
Site 2 Located on Corner of Ninth Avenue and West 54th Street	East*	NA*	NA*	NA*
	North	69	45	25
	South*	NA*	NA*	NA*
	West	77	45	35

* No attenuation necessary. Building façade facing interior section of street block or proposed building façade is abutting other adjacent buildings.

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