A. INTRODUCTION

This chapter assesses the potential for the Proposed Action to result in significant adverse noise impacts. The analysis determines whether the Proposed Action would result in increases in noise levels that could have a significant adverse impact on nearby sensitive receptors and also considers the effect of existing noise levels at the projected and potential development sites on the proposed uses.

The Proposed Action would not generate sufficient traffic to have the potential to cause a significant noise impact (i.e., it would not result in a doubling of noise passenger car equivalents [Noise PCEs] which would be necessary to cause a 3 dBA increase in noise levels). However, ambient noise levels adjacent to the projected and potential development sites also must be examined to address any noise attenuation requirements, as found in the 2012 *City Environmental Quality Review (CEQR) Technical Manual*, for interior noise levels. The building attenuation analysis also accounts for changes in noise due to increases in traffic in the future with the Proposed Action. This assessment is presented below.

PRINCIPAL CONCLUSIONS

The noise analysis has been updated to be consistent with the updated transportation analyses provided in this FEIS. The analysis finds that the Proposed Action would not result in any significant adverse noise impacts due to operations of the future development on projected and potential development and enlargement sites.

A detailed mobile source noise analysis was not required since the Proposed Action would not generate sufficient traffic to have the potential to cause a significant adverse noise impact.

The building attenuation analysis concludes that in order to meet *CEQR Technical Manual* interior noise level requirements, up to 35 dBA of building attenuation would be required for the Applicant's projected development and enlargement sites and up to 38 dBA of building attenuation would be required for other projected and potential development and enlargement sites. Because these specifications would be required by (E) designations (E-288), there would be no significant adverse noise impact with respect to building attenuation.

B. ACOUSTICAL FUNDAMENTALS

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

"A"-WEIGHTED SOUND LEVEL (DBA)

In order to establish a uniform noise measurement that simulates people's perception of loudness and annoyance, the decibel measurement is weighted to account for those frequencies most audible to the human ear. This is known as the A-weighted sound level, or "dBA," and it is the descriptor of noise levels most often used for community noise. As shown in **Table 16-1**, the threshold of human hearing is defined as 0 dBA; very quiet conditions (as in a library, for example) are approximately 40 dBA; levels between 50 dBA and 70 dBA define the range of noise levels generated by normal daily activity; levels above 70 dBA would be considered noisy, and then loud, intrusive, and deafening as the scale approaches 130 dBA.

Table 16-1
Common Noise Levels

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

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

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

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 as $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are used to indicate noise levels that are exceeded 1, 10, 50, 90 and x percent of the time, respectively.

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

For purposes of the Proposed Action, the L_{10} descriptor has been selected as the noise descriptor to be used in this noise impact evaluation. The 1-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for city environmental impact review classification.

C. NOISE STANDARDS AND CRITERIA

NEW YORK CEQR TECHNICAL MANUAL NOISE STANDARDS

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 16-2**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential uses and 50 dBA or lower for retail or office uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 16-2
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With Proposed Actions	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$80 < L_{10}$
Attenuation[A]	(I) 28 dB(A)	(II) 31 dB(A)	(III) 33 dB(A)	(IV) 35 dB(A)	$36 + (L_{10} - 80)^B$ dB(A)

Notes:
[A] The above composite window-wall attenuation values are for residential dwellings. Retail and office spaces 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.
[B] Required attenuation values increase by 1 dB(A) increments for L_{10} values greater than 80 dBA.
Source: New York City Department of Environmental Protection.

D. ANALYSIS APPROACH

As the acoustical analysis is a site specific-based technical analysis, the anticipated development on both projected and potential development sites form the basis for this impact assessment. As discussed in Chapter 1, two reasonable worst-case development scenarios (RWCDS) have been developed to represent potential development scenarios that could result from the Proposed Action. Under RWCDS 1, it is assumed that the maximum permitted residential development would occur on each of the development sites. Under RWCDS 2, it is assumed that community facility uses with sleeping accommodations (i.e., dormitories), rather than residential buildings, would be developed on two of the projected development sites. Because dormitory uses have the same noise attenuation requirements as residential uses under *CEQR Technical Manual* guidelines, the results of the noise attenuation analysis would be the same for RWCDS 1 and RWCDS 2.

E. EXISTING NOISE LEVELS

SELECTION OF NOISE RECEPTOR LOCATIONS

A total of 20 receptor locations within the Rezoning Area were selected for evaluation of noise attenuation requirements. These locations are detailed below and shown in **Figure 16-1.**

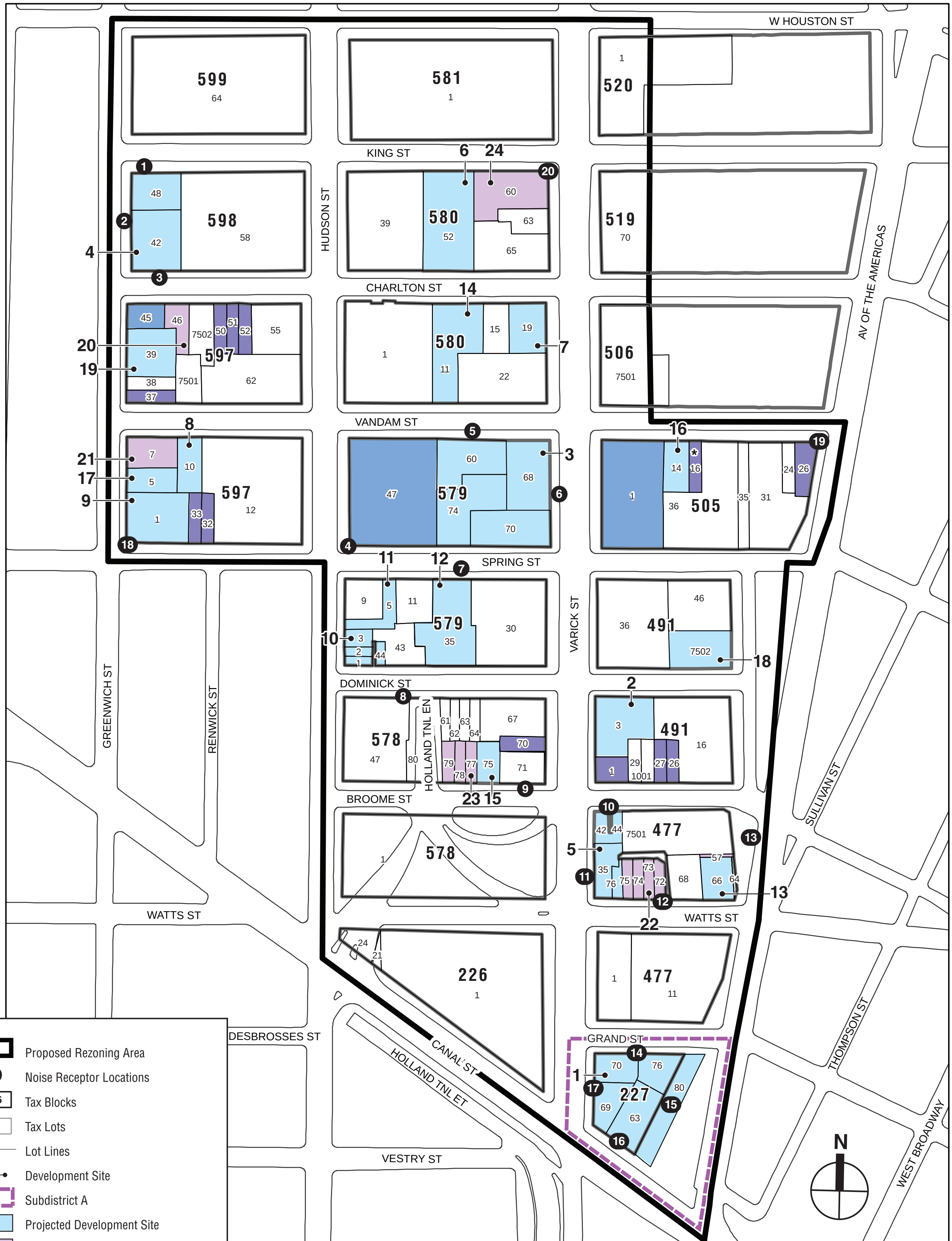
Noise receptor locations were selected based on the following criteria: (1) locations near projected and potential development sites; and (2) to provide comprehensive geographic coverage throughout the study area to get an accurate picture of the ambient noise environment.

- Receptor Location 1 is located on King Street between Greenwich Street and Hudson Street.
- Receptor Location 2 is located on Greenwich Street between Charlton and King Streets.
- Receptor Location 3 is located on Charlton Street between Greenwich and Hudson Streets.
- Receptor Location 4 is located on the corner of Hudson and Spring Streets.
- Receptor Location 5 is located on Vandam Street between Hudson and Varick Streets.
- Receptor Location 6 is located on Varick Street between Vandam and Spring Streets.
- Receptor Location 7 is located on Spring Street between Varick and Hudson Streets.
- Receptor Location 8 is located on Dominick Street between Hudson and Varick Streets.
- Receptor Location 9 is located on Broome Street between Hudson and Varick Streets.
- Receptor Location 10 is located on Broome Street between Avenue of the Americas and Varick Street.
- Receptor Location 11 is located on Varick Street between Watts and Broome Streets.
- Receptor Location 12 is located on Watts Street between Avenue of the Americas and Varick Street.
- Receptor Location 13 is located on Avenue of the Americas between Broome Street and Watts Street.
- Receptor Location 14 is located on Grand Street between Varick Street and Avenue of the Americas.
- Receptor Location 15 is located on Avenue of the Americas between Grand and Canal Streets.
- Receptor Location 16 is located on Canal Street between Avenue of the Americas and Varick Street.
- Receptor Location 17 is located on Varick Street between Canal and Grand Streets.
- Receptor 18 is located on the corner of Spring and Greenwich Streets.
- Receptor 19 is located on the corner of Vandam Street and Avenue of the Americas.
- Receptor 20 is located on the corner of King and Varick Streets.

NOISE MONITORING

At each receptor site, existing noise levels were determined by field measurements. Noise monitoring was performed on 11 separate days between May 22, 2010 and May 10, 2012. At all sites, 20-minute spot measurements were taken. All measurements were performed during the weekday peak periods—AM (7:30 to 9:30 AM), midday (MD) (12:00 to 2:00 PM), and PM

1.9.12



Proposed Rezoning Area
Noise Receptor Locations
226 Tax Blocks
Tax Lots
Lot Lines
22 Development Site
Subdistrict A
Projected Development Site
Potential Development Site
Projected Enlargement Site
Potential Enlargement Site

*NOTE: As discussed in the Foreword of the FEIS, since the issuance of the DEIS, a developer has purchased Block 505, Lot 16 (Potential Enlargement Site 4) and intends to utilize the available development rights as part of the adjacent One SoHo Square project. Therefore, an enlargement is not expected to occur there in the future.

0 250 FEET
SCALE

Noise Receptor Locations
Figure 16-1

(4:30 to 6:30 PM). Receptors 1 through 17 were also measured during the weekend peak period—Saturday midday (MD) (12:00 to 2:00 PM).

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meters (SLM) Type 2260, a Brüel & Kjær SLM Type 2250, a Brüel & Kjær SLM Type 2270, Brüel & Kjær ½-inch microphones Type 4189, and Brüel & Kjær Sound Level Calibrators Type 4231. The Brüel & Kjær SLMs are Type 1 instruments according to ANSI Standard S1.4-1983 (R2006). The SLMs have a laboratory calibration date within the past one year at the time of use. The microphones were mounted at a height of approximately five feet above the ground surface on a tripod and approximately six feet or more away from any large sound-reflecting surface to avoid major interference with sound propagation. The SLMs were calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. The data were digitally recorded by the SLMs and displayed at the end of the measurement period in units of dBA. Measured quantities included the L_{eq}, L_1, L_{10}, L_{50}, L_{90}, and 1/3 octave band data. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

EXISTING NOISE LEVELS AT NOISE RECEPTOR LOCATIONS

MEASURED NOISE LEVELS

The results of the measurements of existing noise levels are summarized in **Table 16-3**. Traffic was the dominant noise source for all receptor sites. Noise levels are moderate to relatively high and reflect the level of vehicular activity present on the adjacent roadways.

Table 16-3
Existing Noise Levels (in dBA)

Receptor #	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	King Street between Greenwich and Hudson Streets	AM	64.0	73.7	64.9	61.7	60.0
		MD	64.2	71.2	66.5	62.5	60.9
		PM	62.6	69.8	64.7	61.3	59.2
		SMD	61.1	65.2	62.2	59.9	58.8
2	Greenwich Street between Charlton and King Streets	AM	67.6	75.6	71.0	65.1	61.5
		MD	66.9	77.3	69.0	62.1	59.4
		PM	65.2	74.5	68.1	61.7	58.6
		SMD	64.6	73.1	68.0	62.1	60.8
3	Charlton Street between Greenwich and Hudson Streets	AM	63.1	68.9	65.3	62.3	60.2
		MD	64.6	70.6	67.0	63.3	61.8
		PM	63.5	70.6	65.0	62.2	61.2
		SMD	64.2	71.7	64.5	62.7	61.9
4	Corner of Hudson and Spring Streets	AM	73.5	83.7	76.8	69.6	63.8
		MD	70.0	77.6	73.6	67.7	63.9
		PM	66.7	75.3	68.4	64.9	63.1
		SMD	67.1	74.1	69.5	65.4	63.7
5	Vandam Street between Hudson and Varick Streets	AM	65.6	71.6	67.9	64.6	62.2
		MD	65.6	71.2	67.2	64.6	62.6
		PM	64.8	71.3	66.1	63.5	61.4
		SMD	64.6	68.0	65.6	64.3	63.5
6	Varick Street between Vandam and Spring Streets	AM	70.5	78.5	74.6	66.7	60.3
		MD	71.9	79.1	75.0	70.1	65.3
		PM	68.0	75.0	70.4	66.8	63.5
		SMD	69.4	77.3	71.7	67.9	65.3

Table 16-3 (cont'd)
Existing Noise Levels (in dBA)

Receptor #	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
7	Spring Street between Varick and Hudson Streets	AM	70.5	79.2	73.5	67.5	64.1
		MD	68.0	76.3	71.0	65.9	63.0
		PM	71.1	80.8	73.0	67.6	63.8
		SMD	66.1	73.0	68.4	64.3	63.0
8	Dominick Street between Hudson and Varick Streets	AM	65.3	72.3	67.0	64.1	62.1
		MD	64.8	71.7	66.7	63.8	61.9
		PM	62.2	68.8	64.4	61.2	59.0
		SMD	62.1	67.9	63.5	61.4	60.5
9	Broome Street between Hudson and Varick Streets	AM	65.3	71.5	67.5	64.3	62.3
		MD	63.6	70.1	65.9	62.6	60.1
		PM	63.4	70.7	65.3	62.4	60.4
		SMD	64.9	71.5	67.1	63.7	62.4
10	Broome Street between Avenue of the Americas and Varick Street	AM	64.3	70.6	66.5	63.2	60.4
		MD	63.8	69.7	66.2	62.9	60.1
		PM	66.4	77.0	68.1	63.6	61.5
		SMD	66.0	73.3	68.6	64.3	62.1
11	Varick Street between Watts and Broome Streets	AM	70.4	78.5	74.0	67.1	63.6
		MD	69.2	78.4	72.2	66.2	62.0
		PM	70.8	80.0	74.3	67.6	62.8
		SMD	68.5	76.4	71.7	66.4	61.2
12	Watts Street between Avenue of the Americas and Varick Street	AM	75.7	88.3	78.1	70.1	63.8
		MD	70.3	78.7	73.8	67.3	64.1
		PM	76.0	85.1	81.1	70.3	62.9
		SMD	67.5	75.7	70.0	65.7	62.7
13	Avenue of the Americas between Broome and Watts Streets	AM	72.8	83.5	76.7	66.7	63.4
		MD	69.9	77.6	72.8	67.7	64.3
		PM	69.4	77.3	73.1	65.7	61.9
		SMD	72.0	80.0	74.5	70.9	65.4
14	Grand Street between Varick Street and Avenue of the Americas	AM	67.6	73.1	69.2	66.9	64.7
		MD	65.2	71.4	67.4	64.4	61.4
		PM	65.1	71.0	67.3	64.3	62.0
		SMD	63.1	69.8	65.2	62.2	59.6
15	Avenue of the Americas between Grand and Canal Streets	AM	70.7	76.5	73.7	69.6	64.7
		MD	69.6	76.0	72.3	68.5	65.0
		PM	70.0	79.2	72.8	67.9	64.5
		SMD	69.0	76.1	72.2	67.2	62.8
16	Canal Street between Avenue of the Americas and Varick Street	AM	74.0	82.6	78.0	70.3	65.8
		MD	72.8	81.0	76.6	69.7	65.3
		PM	70.4	79.3	73.1	68.2	64.9
		SMD	69.1	77.4	72.0	66.7	64.1
17	Varick Street between Canal and Grand Street	AM	71.5	79.7	73.8	69.2	65.0
		MD	68.2	74.4	70.6	67.0	64.0
		PM	68.7	76.7	71.7	66.8	62.5
		SMD	67.3	76.5	70.0	64.4	61.1
18	Corner of Spring and Greenwich Streets	AM	70.7	80.5	74.2	66.4	61.7
		MD	68.3	78.2	71.1	65.1	62.2
		PM	67.5	76.2	69.4	65.4	62.6
19	Corner of Vandam Street and Avenue of the Americas	AM	71.3	79.8	75.4	67.7	61.6
		MD	69.8	79.2	73.3	65.5	60.4
		PM	68.5	77.8	71.8	65.7	60.2
20	Corner of King and Varick Streets	AM	74.8	84.7	77.6	72.1	68.6
		MD	72.5	81.5	75.4	70.6	66.9
		PM	70.7	77.7	74.1	68.5	65.1

Note: Field measurements were performed by AKRF, Inc. between May 22, 2010 and May 10, 2012.

In terms of *CEQR Technical Manual* criteria, receptor sites 1, 3, 5, 8, 9, 10, and 14 are in the “marginally acceptable” category, receptor sites 2, 4, 6, 7, 11, 13, 15, 16, 17, 18, 19, and 20 are in the “marginally unacceptable” category, and receptor site 12 is in the “clearly unacceptable” category.

F. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels were calculated using a proportional modeling technique, which was used as a screening tool to estimate changes in noise levels. The proportional modeling technique is an analysis methodology recommended for analysis purposes in the *CEQR Technical Manual*. The noise analysis examined the weekday AM, midday (MD), PM, and Saturday MD peak hours at receptor sites 1 through 17 and the weekday AM, MD, and PM peak hours at receptor sites 18-20. The selected time periods are when the proposed project would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 13, “Transportation”) and therefore result in the maximum potential for significant adverse noise impacts. The proportional modeling used for the noise analysis is described below.

PROPORTIONAL MODELING

Proportional modeling was used to determine locations with the potential for having significant noise impacts. Proportional modeling is one of the techniques recommended in the *CEQR Technical Manual* for mobile source analysis.

Using this technique, the prediction of future noise levels where traffic is the dominant noise source is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No-Action and With-Action noise levels. Vehicular traffic volumes are converted into Passenger Car Equivalent (PCE) values, for which one medium-duty truck (having a gross weight between 9,900 and 26,400 pounds) is assumed to generate the noise equivalent of 13 cars, and one heavy-duty truck (having a gross weight of more than 26,400 pounds) is assumed to generate the noise equivalent of 47 cars, and one bus (vehicles designed to carry more than nine passengers) is assumed to generate the noise equivalent of 18 cars. Future noise levels are calculated using the following equation:

$$F\ NL - E\ NL = 10 * \log_{10} (F\ PCE / E\ PCE)$$

where:

F NL = Future Noise Level

E NL = Existing Noise Level

F PCE = Future PCEs

E PCE = Existing PCEs

Sound levels are measured in decibels and therefore increase logarithmically with sound source strength. In this case, the sound source is traffic volumes measured in PCEs. For example, assume that traffic is the dominant noise source at a particular location. If the existing traffic volume on a street is 100 PCE and if the future traffic volume were increased by 50 PCE to a total of 150 PCE, the noise level would increase by 1.8 dBA. Similarly, if the future traffic were increased by 100 PCE, or doubled to a total of 200 PCE, the noise level would increase by 3.0 dBA.

G. THE FUTURE WITHOUT THE PROPOSED ACTION

Using the methodology previously described, No-Action noise levels were calculated at the 20 mobile source noise analysis receptors for the 2022 analysis year. These No-Action values are shown in **Table 16-4**.

Table 16-4
2022 No-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No-Action $L_{10(1)}$
1	King Street between Greenwich and Hudson Streets	AM	64.0	64.1	0.1	65.0
		MD	64.2	64.7	0.5	67.0
		PM	62.6	63.0	0.4	65.1
		SMD	61.1	62.1	1.0	63.2
2	Greenwich Street between Charlton and King Streets	AM	67.6	67.7	0.1	71.1
		MD	66.9	67.2	0.3	69.3
		PM	65.2	65.9	0.7	68.8
		SMD	64.6	65.3	0.7	68.7
3	Charlton Street between Greenwich and Hudson Streets	AM	63.1	63.3	0.2	65.5
		MD	64.6	64.8	0.2	67.2
		PM	63.5	64.3	0.8	65.8
		SMD	64.2	64.5	0.3	64.8
4	Corner of Hudson and Spring Streets	AM	73.5	73.8	0.3	77.1
		MD	70.0	70.4	0.4	74.0
		PM	66.7	67.0	0.3	68.7
		SMD	67.1	67.5	0.4	69.9
5	Vandam Street between Hudson and Varick Streets	AM	65.6	65.7	0.1	68.0
		MD	65.6	65.7	0.1	67.3
		PM	64.8	64.9	0.1	66.2
		SMD	64.6	64.6	0.0	65.6
6	Varick Street between Vandam and Spring Streets	AM	70.5	70.7	0.2	74.8
		MD	71.9	72.4	0.5	75.5
		PM	68.0	68.6	0.6	71.0
		SMD	69.4	69.9	0.5	72.2
7	Spring Street between Varick and Hudson Streets	AM	70.5	71.0	0.5	74.0
		MD	68.0	68.8	0.8	71.8
		PM	71.1	71.8	0.7	73.7
		SMD	66.1	66.8	0.7	69.1
8	Dominick Street between Hudson and Varick Streets	AM	65.3	65.2	-0.1	66.9
		MD	64.8	66.3	1.5	68.2
		PM	62.2	64.9	2.7	67.1
		SMD	62.1	66.2	4.1	67.6
9	Broome Street between Hudson and Varick Streets	AM	65.3	65.4	0.1	67.6
		MD	63.6	63.7	0.1	66.0
		PM	63.4	63.5	0.1	65.4
		SMD	64.9	65.0	0.1	67.2
10	Broome Street between Avenue of the Americas and Varick Street	AM	64.3	65.0	0.7	67.2
		MD	63.8	64.7	0.9	67.1
		PM	66.4	66.9	0.5	68.6
		SMD	66.0	66.6	0.6	69.2
11	Varick Street between Watts and Broome Streets	AM	70.4	70.8	0.4	74.4
		MD	69.2	70.0	0.8	73.0
		PM	70.8	71.5	0.7	75.0
		SMD	68.5	69.1	0.6	72.3
12	Watts Street between Avenue of the Americas and Varick Street	AM	75.7	75.9	0.2	78.3
		MD	70.3	70.6	0.3	74.1
		PM	76.0	76.4	0.4	81.5
		SMD	67.5	67.7	0.2	70.2

Table 16-4 (cont'd)
2022 No-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	Existing $L_{eq(1)}$	No-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No-Action $L_{10(1)}$
13	Avenue of the Americas between Broome and Watts Streets	AM	72.8	73.1	0.3	77.0
		MD	69.9	70.3	0.4	73.2
		PM	69.4	69.9	0.5	73.6
		SMD	72.0	72.4	0.4	74.9
14	Grand Street between Varick Street and Avenue of the Americas	AM	67.6	68.6	1.0	70.2
		MD	65.2	66.9	1.7	69.1
		PM	65.1	67.4	2.3	69.6
		SMD	63.1	65.4	2.3	67.5
15	Avenue of the Americas between Grand and Canal Streets	AM	70.7	70.9	0.2	73.9
		MD	69.6	69.9	0.3	72.6
		PM	70.0	70.3	0.3	73.1
		SMD	69.0	69.2	0.2	72.4
16	Canal Street between Avenue of the Americas and Varick Street	AM	74.0	74.2	0.2	78.2
		MD	72.8	73.2	0.4	77.0
		PM	70.4	70.8	0.4	73.5
		SMD	69.1	69.4	0.3	72.3
17	Varick Street between Canal and Grand Street	AM	71.5	71.7	0.2	74.0
		MD	68.2	68.7	0.5	71.1
		PM	68.7	69.1	0.4	72.1
		SMD	67.3	67.7	0.4	70.4
18	Corner of Spring and Greenwich Streets	AM	70.7	71.0	0.3	74.5
		MD	68.3	68.8	0.5	71.6
		PM	67.5	68.4	0.9	70.3
19	Corner of Vandam Street and Avenue of the Americas	AM	71.3	71.6	0.3	75.7
		MD	69.8	70.3	0.5	73.8
		PM	68.5	69.1	0.6	72.4
20	Corner of King and Varick Streets	AM	74.8	75.2	0.4	78.0
		MD	72.5	73.0	0.5	75.9
		PM	70.7	71.5	0.8	74.9

Notes: Noise levels at all receptor sites were calculated by using proportional modeling.

In 2022, the maximum increase in $L_{eq(1)}$ noise levels for the No-Action condition would be 2.3 dBA or less at 19 of the 20 mobile source noise analysis receptors. Changes of this magnitude would be imperceptible. At one mobile source noise analysis receptor (receptor 8), the maximum increase in $L_{eq(1)}$ noise levels in the No-Action condition would be up to 4.1 dBA in one analysis time period. This increase is due to development in the No-Action condition at Projected Development Site 3 (Block 579, Lots 60, 68, 70, and 74). In terms of CEQR noise exposure guidelines, noise levels at receptor sites 1, 3, 5, 8, 9, and 10 would remain in the "marginally acceptable" category, noise levels at receptor site 14 would change from the "marginally acceptable" category to the "marginally unacceptable" category, noise levels at receptor sites 2, 4, 6, 7, 11, 13, 15, 16, 17, 18, 19, and 20 would remain in the "marginally unacceptable" category, and noise levels at receptor site 12 would remain in the "clearly unacceptable" category.

H. THE FUTURE WITH THE PROPOSED ACTION

Using the methodology previously described, With-Action noise levels were calculated at the 20 mobile source noise analysis receptors for the 2022 analysis year. These With-Action values are shown in **Table 16-5**.

Table 16-5
2022 With-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	No-Action $L_{eq(1)}$	With-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With-Action $L_{10(1)}$
1	King Street between Greenwich and Hudson Streets	AM	64.1	64.3	0.2	65.2
		MD	64.7	64.8	0.1	67.1
		PM	63.0	63.1	0.1	65.2
		SMD	62.1	62.4	0.3	63.5
2	Greenwich Street between Charlton and King Streets	AM	67.7	68.0	0.3	71.4
		MD	67.2	67.5	0.3	69.6
		PM	65.9	66.0	0.1	68.9
		SMD	65.3	65.8	0.5	69.2
3	Charlton Street between Greenwich and Hudson Streets	AM	63.3	63.4	0.1	65.6
		MD	64.8	65.0	0.2	67.4
		PM	64.3	64.5	0.2	66.0
		SMD	64.5	64.7	0.2	65.0
4	Corner of Hudson and Spring Streets	AM	73.8	73.8	0.0	77.1
		MD	70.4	70.5	0.1	74.1
		PM	67.0	67.0	0.0	68.7
		SMD	67.5	67.6	0.1	70.0
5	Vandam Street between Hudson and Varick Streets	AM	65.7	65.7	0.0	68.0
		MD	65.7	65.7	0.0	67.3
		PM	64.9	64.9	0.0	66.2
		SMD	64.6	64.6	0.0	65.6
6	Varick Street between Vandam and Spring Streets	AM	70.7	70.8	0.1	74.9
		MD	72.4	72.4	0.0	75.5
		PM	68.6	68.7	0.1	71.1
		SMD	69.9	69.9	0.0	72.2
7	Spring Street between Varick and Hudson Streets	AM	71.0	71.3	0.3	74.3
		MD	68.8	69.0	0.2	72.0
		PM	71.8	72.2	0.4	74.1
		SMD	66.8	67.0	0.2	69.3
8	Dominick Street between Hudson and Varick Streets	AM	65.2	66.1	0.9	67.8
		MD	66.3	66.4	0.1	68.3
		PM	64.9	65.1	0.2	67.3
		SMD	66.2	66.2	0.0	67.6
9	Broome Street between Hudson and Varick Streets	AM	65.4	65.4	0.0	67.6
		MD	63.7	63.7	0.0	66.0
		PM	63.5	63.5	0.0	65.4
		SMD	65.0	65.0	0.0	67.2
10	Broome Street between Avenue of the Americas and Varick Street	AM	65.0	65.7	0.7	67.9
		MD	64.7	64.9	0.2	67.3
		PM	66.9	66.8	-0.1	68.5
		SMD	66.6	66.7	0.1	69.3
11	Varick Street between Watts and Broome Streets	AM	70.8	71.0	0.2	74.6
		MD	70.0	70.0	0.0	73.0
		PM	71.5	71.6	0.1	75.1
		SMD	69.1	69.2	0.1	72.4
12	Watts Street between Avenue of the Americas and Varick Street	AM	75.9	75.9	0.0	78.3
		MD	70.6	70.4	-0.2	73.9
		PM	76.4	76.3	-0.1	81.4
		SMD	67.7	67.7	0.0	70.2

Table 16-5 (cont'd)
2022 With-Action Condition Noise Levels (in dBA)

Receptor	Location	Time	No-Action $L_{eq(1)}$	With-Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With-Action $L_{10(1)}$
13	Avenue of the Americas between Broome and Watts Streets	AM	73.1	73.1	0.0	77.0
		MD	70.3	70.2	-0.1	73.1
		PM	69.9	69.9	0.0	73.6
		SMD	72.4	72.4	0.0	74.9
14	Grand Street between Varick Street and Avenue of the Americas	AM	68.6	68.6	0.0	70.2
		MD	66.9	66.4	-0.5	68.6
		PM	67.4	66.7	-0.7	68.9
		SMD	65.4	65.1	-0.3	67.2
15	Avenue of the Americas between Grand and Canal Streets	AM	70.9	70.9	0.0	73.9
		MD	69.9	69.9	0.0	72.6
		PM	70.3	70.3	0.0	73.1
		SMD	69.2	69.2	0.0	72.4
16	Canal Street between Avenue of the Americas and Varick Street	AM	74.2	74.2	0.0	78.2
		MD	73.2	73.2	0.0	77.0
		PM	70.8	70.8	0.0	73.5
		SMD	69.4	69.4	0.0	72.3
17	Varick Street between Canal and Grand Street	AM	71.7	72.0	0.3	74.3
		MD	68.7	68.9	0.2	71.3
		PM	69.1	69.2	0.1	72.2
		SMD	67.7	67.8	0.1	70.5
18	Corner of Spring and Greenwich Streets	AM	71.0	71.2	0.2	74.7
		MD	68.8	68.9	0.1	71.7
		PM	68.4	68.6	0.2	70.5
19	Corner of Vandam Street and Avenue of the Americas	AM	71.6	71.6	0.0	75.7
		MD	70.3	70.3	0.0	73.8
		PM	69.1	69.1	0.0	72.4
20	Corner of King and Varick Streets	AM	75.2	75.3	0.1	78.1
		MD	73.0	73.1	0.1	76.0
		PM	71.5	71.7	0.2	75.1

Notes: Noise levels at all receptor sites were calculated by using proportional modeling.

In 2022, the maximum increase in $L_{eq(1)}$ noise levels for the With-Action condition would be 0.7 dBA or less at all 20 mobile source noise analysis receptors. Changes of this magnitude would be imperceptible and would fall below the CEQR threshold for a significant adverse noise impact. In terms of CEQR noise exposure guidelines, noise levels at receptor sites 1, 3, 5, 8, 9, and 10 would remain in the "marginally acceptable" category, noise levels at receptor sites 2, 4, 6, 7, 11, 13, 14, 15, 16, 17, 18, 19, and 20 would remain in the "marginally unacceptable" category, and noise levels at receptor site 12 would remain in the "clearly unacceptable" category.

NOISE ATTENUATION MEASURES

The *CEQR Technical Manual* has set noise attenuation requirements for buildings based on exterior noise levels. Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential uses and 50 dBA or lower for retail and office uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 16-6 shows the minimum window/wall attenuation necessary to meet *CEQR Technical Manual* requirements for internal noise levels at each of the noise measurement locations. The build $L_{10(1)}$ noise levels were calculated using the existing noise measurements and the Noise PCE screening analysis results. See **Appendix 6** for details.

Table 16-6
Required Attenuation at Noise Measurement Locations

Receptor #	Location	Highest Calculated Build $L_{10(1)}$ Value	Minimum Required Attenuation
1	King Street between Greenwich and Hudson Streets	67.1	NA[1]
2	Greenwich Street between Charlton and King Streets	71.4	28
3	Charlton Street between Greenwich and Hudson Streets	67.4	NA[1]
4	Corner of Hudson and Spring Streets	77.1	33
5	Vandam Street between Hudson and Varick Streets	68.0	NA[1]
6	Varick Street between Vandam and Spring Streets	75.5	31
7	Spring Street between Varick and Hudson Streets	74.3	31
8	Dominick Street between Hudson and Varick Streets	68.3	NA[1]
9	Broome Street between Hudson and Varick Streets	67.6	NA[1]
10	Broome Street between Avenue of the Americas and Varick Street	69.3	NA[1]
11	Varick Street between Watts and Broome Streets	75.1	31
12	Watts Street between Avenue of the Americas and Varick Street	81.4	38
13	Avenue of the Americas between Broome and Watts Streets	77.0	33
14	Grand Street between Varick Street and Avenue of the Americas	70.2	28
15	Avenue of the Americas between Grand and Canal Streets	73.9	31
16	Canal Street between Avenue of the Americas and Varick Street	78.2	35
17	Varick Street between Canal and Grand Street	74.3	31
18	Corner of Spring and Greenwich Streets	74.7	31
19	Corner of Vandam Street and Avenue of the Americas	75.7	31
20	Corner of King and Varick Streets	78.1	35

Note:
Attenuation values are shown for residential uses; retail and office uses would be 5 dBA less.
(1) "NA" indicates that the highest calculated L_{10} is below 70 dBA. The *CEQR Technical Manual* does not specify minimum attenuation guidance for exterior L_{10} values below this level.

Attenuation would be required at certain receptor locations due to the high existing background noise levels to achieve interior noise levels of 45 dBA or lower for residential uses and 50 dBA or lower for retail or office uses. Based on the values shown in **Table 16-6**, required attenuation levels were determined for all projected and potential development and enlargement sites. These values are shown in **Table 16-7**.

The required attenuation levels would be mandated by (E) designations (E-288) on all affected development and enlargement sites specifying the appropriate amount of window/wall attenuation. There are five levels of required noise attenuation depending upon the ambient noise levels, 28 dBA, 31 dBA, 33 dBA, 35 dBA, and 38 dBA. The text of the (E) designation for sites requiring 28 dBA would be as follows:

"To ensure an acceptable interior noise environment, the building façade(s) of future residential uses must provide a minimum of 28 dBA composite building façade attenuation with windows closed, in order to maintain an interior noise level of 45 dBA. The minimum required composite building façade attenuation for future commercial uses would be 5 dBA less than that for residential uses. To maintain a closed-window condition, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided."

Table 16-7
Required Attenuation at Development Sites

Site Descriptor	Address	Block	Lots	Façade(s)	Representative Receptor Site	Minimum Required Attenuation[1]
Applicant's Projected Development Sites						
Projected Site 1	417 Canal Street	227	63	All	16	35
	74 Varick Street		69	South / East	16	35
				North / West	17	31
	76 Varick Street		70	West / South	17	31
				North / East	14	28
	11 Grand Street		76	All	14	28
	87 Ave of the Americas		80	North	15	31
				East / West	15	31
				South	16	35
Projected Site 2	114 Varick Street	491	3	All	6	31
Projected Site 3	50 Vandam Street	579	60	All	5	NA
	143 Varick Street		68	All	6	31
	137 Varick Street		70	All	6 / 7	31
	275 Spring Street		74	All	7	31
Projected Site 4	551 Greenwich Street	598	42	North / West	2	28
				South / East	3	NA
	561 Greenwich Street		48	North / East	1	NA
				South / West	2	28
Projected Enlargement Site 1	304 Hudson Street	579	47	North	4, 5	33 within 100' of Hudson St, 31 beyond 100' from Hudson St.
				East	7	31
				West	4	33
				South	4, 7	33 within 100' of Hudson St, 31 beyond 100' from Hudson St
Other Projected Development Sites						
Projected Site 5	94 Varick Street	477	35	West / North / East	11	31
				South	12	38 at elevations 0'-100', 35 at elevations above 100'
	104 Varick Street		42	North / East	10	NA
				West / South	11	31
	557 Broome Street		44	North / East	10	NA
				West / South	11	31
	66 Watts Street		76	All	12	38 at elevations 0'-100', 35 at elevations above 100'
Projected Site 6	82 King Street	580	52	All	7	31
Projected Site 7	163 Varick Street	580	19	All	20	35
Projected Site 9	515 Greenwich Street	597	1	All	18	31
Projected Site 10	282 Hudson Street	579	1	All	4	33
	284 Hudson Street		2	All	4	33
	286 Hudson Street		3	All	4	33
	49 Dominick Street		44	All	8	NA
Projected Site 11	290 Hudson Street	579	5	West/South	4	33
				North / East	7	31
Projected Site 12	Spring Street	579	35	North/East/West	7	31
				South	8	NA

Table 16-7 (cont'd)
Required Attenuation at Development Sites

Site Descriptor	Address	Block	Lots	Façade(s)	Representative Receptor Site	Minimum Required Attenuation[1]
Other Projected Development Sites (cont'd)						
Projected Site 13	6th Avenue	477	57	All	13	33
	113 Ave of the Americas		64	All	13	33
	48 Watts Street		66	All	12	38 at elevations between 0' - 100', 35 at elevations between 101' - 200', and 31 at elevations above 200'
Projected Site 16	30 Vandam Street	505	14	All	19	31
Projected Site 17	523 Greenwich Street	597	5	All	18	31
Projected Site 18	145 Ave of the Americas	491	7502	All	13	33
Projected Site 19	537 Greenwich Street	597	39	All	2	28
Projected Enlargement Sites						
Enlargement Site 2	150 Varick Street	505	1	All	6	31
Enlargement Site 3	547 Greenwich Street	597	45	West / South	2	28
				North / East	3	NA
Potential Development Sites						
Development Site 21	100 Vandam Street	597	7	All	18	31
Development Site 22	58 Watts Street	477	72	All	12	38 at elevations 0'-100', 35 at elevations above 100'
	60 Watts Street		73	All	12	38 at elevations 0'-100', 35 at elevations above 100'
	62 Watts Street		74	All	12	38 at elevations 0'-100', 35 at elevations above 100'
	64 Watts Street		75	All	12	38 at elevations 0'-100', 35 at elevations above 100'
Development Site 24	183 Varick Street	580	60	All	20	35
Potential Enlargement Sites						
~~Enlargement Site 4~~	~~26 Vandam Street~~	~~505~~	~~16~~	~~All~~	~~19~~	~~31~~
Enlargement Site 5	169 Ave of the Americas	505	26	All	19	31
Enlargement Site 6	305 Spring Street	597	32	All	18	31
Enlargement Site 7	307 Spring Street	597	33	All	18	31
Enlargement Site 11	558 Broome Street	491	1	West / North	11	31
				East / South	10	NA
Enlargement Site 14	117 Varick Street	578	70	All	6 / 11	31
Enlargement Site 15	533 Greenwich Street	597	37	All	2	28

Notes: As discussed in the Foreword of the FEIS, since the issuance of the DEIS, a developer has purchased Block 505, Lot 16 (Potential Enlargement Site 4) and intends to utilize the available development rights as part of the adjacent One SoHo Square project. A light and air easement has been provided to the existing building on Lot 16; therefore, an enlargement is not expected to occur there in the future, and no (E) designation is required on that property.

Projected Development Sites 8, 14, and 15, Potential Development Sites 20 and 23, and Potential Enlargement Sites 8, 9, 10, 12, and 13 would have no minimum required attenuation.

[1] Attenuation values are shown for residential uses; retail and office uses would be 5 dBA less.

[2] Development Site 13 could include buildings as tall as 320 feet, and would therefore require less attenuation at elevations above 100' due to lower noise levels at these higher elevations. Development Sites 5 and 22 could include buildings as tall as 120 feet, and would therefore require less attenuation at elevations above 100' due to lower noise levels at these higher elevations. Noise levels at the upper elevations were estimated based on a 3 dBA decrease in noise per doubling of distance from the roadway.

For sites requiring 31 dBA noise attenuation, the following (E) designation noise text would apply:

"To ensure an acceptable interior noise environment, the building façade(s) of future residential uses must provide a minimum of 31 dBA composite building façade attenuation with windows closed, in order to maintain an interior noise level of 45 dBA. The minimum required composite building façade attenuation for future commercial uses would be 5 dBA less than that for residential uses. To maintain a closed-window condition, an alternate means of ventilation that

brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided."

For sites requiring 33 dBA noise attenuation, the following (E) designation noise text would apply:

"To ensure an acceptable interior noise environment, the building façade(s) of future residential uses must provide a minimum of 33 dBA composite building façade attenuation with windows closed, in order to maintain an interior noise level of 45 dBA. The minimum required composite building façade attenuation for future commercial uses would be 5 dBA less than that for residential uses. To maintain a closed-window condition, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided."

For sites requiring 35 dBA noise attenuation, the following (E) designation noise text would apply:

"To ensure an acceptable interior noise environment, the building façade(s) of future residential uses must provide a minimum of 35 dBA composite building façade attenuation with windows closed, in order to maintain an interior noise level of 45 dBA. The minimum required composite building façade attenuation for future commercial uses would be 5 dBA less than that for residential uses. To maintain a closed-window condition, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided."

For sites requiring 38 dBA noise attenuation, the following (E) designation noise text would apply:

"To ensure an acceptable interior noise environment, the building façade(s) of future residential uses must provide a minimum of 38 dBA composite building façade attenuation with windows closed, in order to maintain an interior noise level of 45 dBA. To achieve 38 dBA of building attenuation, special design features that go beyond the normal double-glazed windows are necessary and may include using specially designed windows (i.e., windows with small sizes, windows with air gaps, windows with thicker glazing, etc.), and additional building attenuation. To maintain a closed-window condition, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided. Alternate means of ventilation includes, but is not limited to, central air conditioning. The minimum required composite building façade attenuation for future commercial uses would be 5 dBA less than that for residential uses, in order to maintain an interior noise level of 50 dBA.

The attenuation of a composite structure is a function of the attenuation provided by each of its component parts and how much of the area is made up of each part. Normally, a building façade is composed of the wall, glazing, and any vents or louvers for HVAC systems in various ratios of area. Buildings proposed to be located on the (E) designated sites would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating greater than or equal to the attenuation requirements listed in **Table 16-7**. The OITC classification is defined by ASTM International (ASTM E1332-10) and provides a single-number rating that is used for designing a building façade including walls, doors, glazing, and combinations thereof. The OITC rating is designed to evaluate building elements by their ability to reduce the overall loudness of ground and air transportation noise.

By adhering to these design guidelines, the Proposed Action would provide sufficient attenuation to achieve the *CEQR Technical Manual* interior noise level guidelines of 45 dBA L_{10} for residential uses and 50 dBA L_{10} for commercial uses.

I. MECHANICAL EQUIPMENT

It is assumed that the building mechanical systems (i.e., HVAC systems) would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control

Code, the New York City Department of Buildings Code) and to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore, the Proposed Action would not result in any significant adverse noise impacts related to building mechanical equipment. ✷