Chapter 17: Noise

A. INTRODUCTION

This chapter assesses the potential for the Proposed Actions to result in significant adverse noise impacts. The analysis determines whether the Proposed Actions 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 on the projected and potential developments that could result from the Proposed Actions.

The analysis presented in Chapter 14, "Transportation," found that the Proposed Actions would not generate traffic volumes that 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 is necessary to cause a perceptible increase in noise levels. However, ambient noise levels adjacent to the development sites also must be examined to address any noise attenuation requirements, as found in the 2020 *City Environmental Quality Review (CEQR) Technical Manual*, for interior noise levels.

PRINCIPAL CONCLUSIONS

A noise assessment was undertaken to determine the levels of noise attenuation that may be needed to achieve interior noise levels that are acceptable and in accordance with the *CEQR Technical Manual* guidance. The *CEQR Technical Manual* has noise attenuation values for buildings based on exterior $L_{10(1)}$ noise levels for the purposes of achieving interior noise levels of 45 dBA or lower for residential and community facility uses and 50 dBA or lower for commercial office uses. The With Action condition $L_{10(1)}$ noise levels were determined by adjusting the existing noise measurements to account for future increases in traffic with the Proposed Actions based on the Noise PCE proportional analysis results including the noise contribution from vehicular traffic on adjacent roadways and by calculating the cumulative noise level in the future condition based on the playground noise and future vehicular traffic noise on adjacent roadways.

Based on the projected noise levels, up to 33 dBA window/wall attenuation would be required to achieve acceptable interior noise levels per the *CEQR Technical Manual* noise exposure guideline at residential and community facility uses.

To implement the attenuation requirements at non-residential spaces within the GSD and at projected and potential development sites not within the GSD, an (E) designation for noise would be applied specifying the appropriate window/wall attenuation. By meeting the design guidelines specified in the Noise (E) Designation, buildings developed as a result of the Proposed Actions would provide sufficient attenuation to achieve the *CEQR Technical Manual* interior noise level guidelines of 45 dBA L_{10} for residential or community facility uses and 50 dBA L_{10} for commercial office uses.

For the condition in which a newly introduced noise-sensitive use (i.e., residential or daycare) would exist on the same lot with manufacturing use, the two uses would be separated by a demising partition. Demising partitions separating residential or community facility use from

manufacturing use on the same lot would be required to provide sufficient attenuation to result in interior L_{eq} and L_{10} noise levels not greater than 45 dBA in the residential units and/or community facility spaces and to achieve a minimum attenuation of 50 dBA. This requirement would be implemented by application of a newly-introduced (E) Designation. With these measures in place, there would be no significant adverse impacts with the Proposed Actions on lots with mixed uses.

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 17-1**, 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 17-1
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 Actions, 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* sets external noise exposure standards; these standards are shown in **Table 17-2**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable.

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 17-3**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential or community facility uses and 50 dBA or lower for commercial office uses, and are determined based on exterior $L_{10(1)}$ noise levels.

Table 17-2
Noise Exposure Guidelines For Use in City Environmental Impact Review

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 ----------	**NA**	**NA**	**NA**	(i) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn	**NA**	---------- Ldn ≤ 75 dBA ----------
Hospital, nursing home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA	---------- 60 < Ldn ≤ 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	$L_{10} \leq 55$ 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, outpatient 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	

Notes:

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

Table Notes:

1 Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.

2 Tracts of land where serenity and quiet are extraordinarily important and serve an important public need, and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks, or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and nursing homes.

3 One may use FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.

4 External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).

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

Table 17-3
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 and community facility uses. Commercial 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. EXISTING NOISE LEVELS

SELECTION OF NOISE RECEPTOR LOCATIONS

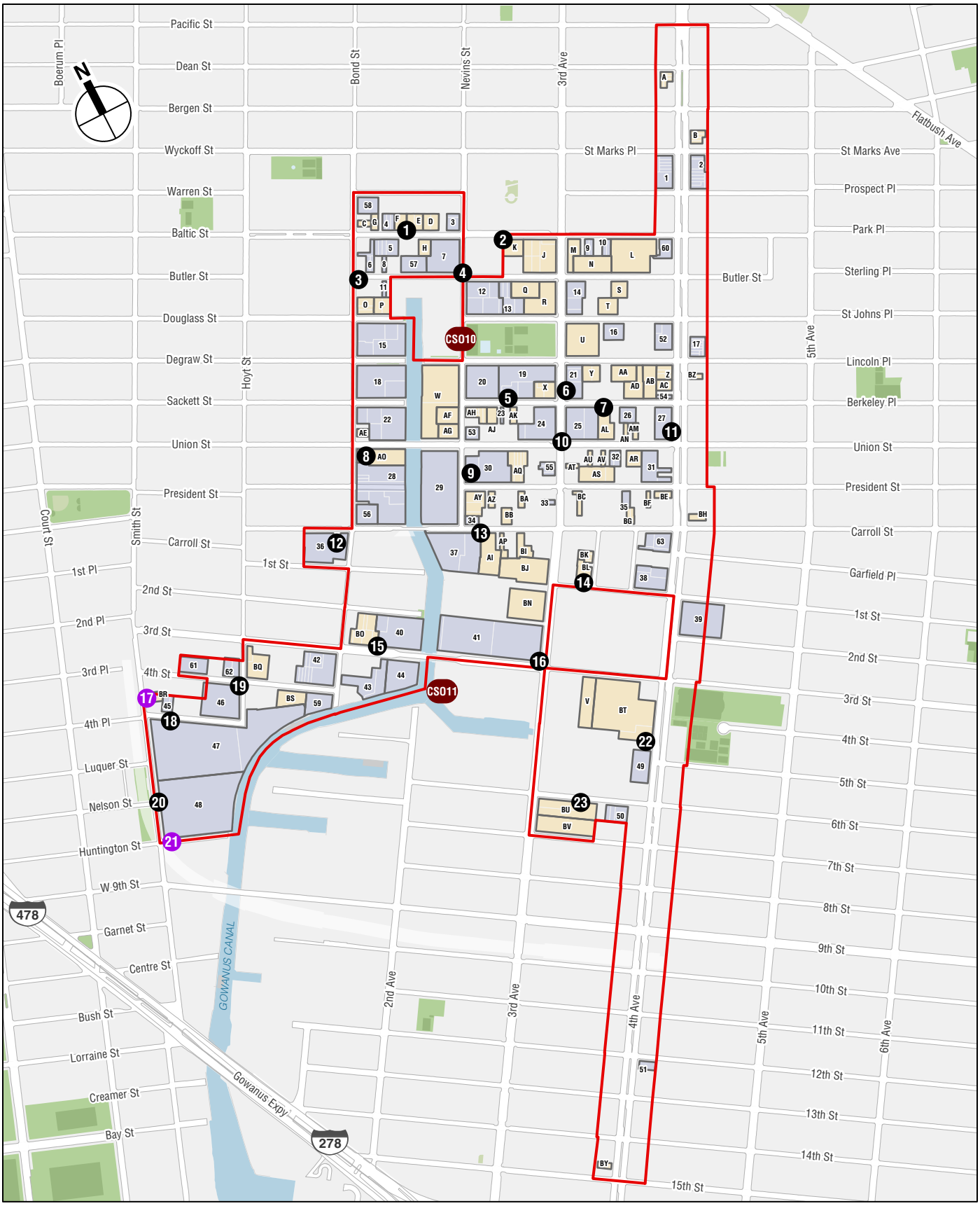
A total of 23 receptor locations within the Project Area were selected for evaluation of noise attenuation requirements. These locations are detailed below in **Table 17-4** and shown in **Figure 17-1**. The receptor locations were selected based on the following criteria: (1) locations near development sites; and (2) to provide comprehensive geographic coverage throughout the study area to get an accurate picture of the ambient noise environment. In addition to these 23 sites, the results of existing noise measurements at two sites conducted for the Gowanus Canal Combined Sewer Overflow Facilities Final Environmental Impact Statement (CEQR# 17DEP040K) will be used to establish existing noise levels within the Project Area. These receptors, due to their proximity to the development sites, provide an effective and conservative representation of existing ambient noise levels at the projected and potential development sites.

Table 17-4
Noise Receptor Locations

Noise Receptor	Location	Duration
1	Baltic Street between Bond Street and Nevins Street	20 minutes
2	Baltic Street between Nevins Street and 3rd Avenue	20 minutes
3	Bond Street at Butler Street	20 minutes
4	Nevins Street at Butler Street	20 minutes
5	Sackett Street between Nevins Street and 3rd Avenue	20 minutes
6	3rd Avenue between Degraw Street and Sackett Street	20 minutes
7	Sackett Street between 3rd Avenue and 4th Avenue	20 minutes
8	Bond Street at Union Street	20 minutes
9	Nevins Street between Union Street and President Street	20 minutes
10	3rd Avenue at Union Street	20 minutes
11	4th Avenue between Sackett Street and Union Street	20 minutes
12	Bond Street between Carroll Street and 1st Street	20 minutes
13	Carroll Street between Nevins Street and 3rd Avenue	20 minutes
14	1st Street at Whitewell Place	20 minutes
15	3rd Street between Bond Street and Gowanus Canal	20 minutes
16	3rd Street at 3rd Avenue	20 minutes
17	Smith Street between 4th Street and 5th Street	60 minutes
18	5th Street between Smith Street and Hoyt Street	20 minutes
19	4th Street at Hoyt Street	20 minutes
20	Smith Street at Nelson Street	60 minutes
21	Smith Street at Huntington Street	60 minutes
22	4th Avenue between 3rd Street and 5th Street	20 minutes
23	6th Street between 3rd Avenue and 4th Avenue	20 minutes
CSO10	Nevins Street between Douglass Street and Degraw Street	24-hr
CSO11	Southwest corner of Whole Food Market Outdoor Space	24-hr

NOISE MONITORING

At each receptor location, existing noise levels were determined by field measurements. Noise monitoring was performed on March 30, April 2, 3, 6, 13, 17, May 7, 18, 29, June 1, 5, and 12, 2019. At receptor locations 17, 20, and 21, located adjacent to the elevated New York City Transit (NYCT) F and G rail lines, a 1-hour duration measurement was conducted during each time period. At all other receptor locations, 20-minute duration measurements were conducted. All measurements were performed during the weekday AM (7:15 AM—9:15 AM), midday (12:00 PM—2:00 PM), PM (4:00 PM—6:00 PM), and weekend midday (12:00 PM—2:00 PM)



Noise Measurement Locations

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 17-1

peak periods. At all noise measurement locations except 17 and 21, 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. At Site 17, the microphone was located approximately 12 feet above grade, which was approximately level with the NYCT F and G rail lines. Site 21 was located approximately 15 feet above grade, which was the maximum available height from a hand-held extension pole.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using two Brüel & Kjær Type 2260 Sound Level Meters (SLMs), two Brüel & Kjær Type 2250 SLMs, three Brüel & Kjær Type 2270 SLMs, seven Brüel & Kjær Type 4189 1/2-inch microphones, and five Brüel & Kjær Type 4231 Sound Level Calibrators. Additonally, two NTi Type XL2 SLMs, two NTi Type M2230 1/2-inch microphones, and two NTi Class 1 calibrators were used during the measurements. The Brüel & Kjær and NTi 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 SLM was calibrated before and after readings with either a Brüel & Kjær Type 4231 or NTi Class 1 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}, and L_{90}. Windscreens were 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 17-5**. Roadway traffic was the dominant noise source for all receptor locations, with contribution from nearby subway trains or overhead aircraft. Noise levels are low to moderate, and reflect the level of activity present on the adjacent roadways and subway rail lines, and the amount of air traffic overhead.

In terms of *CEQR Technical Manual* criteria, receptor locations 1, 2, 5, 7, 8, 9, 13, 14, 15, 18, 19, and 23 are categorized as "marginally acceptable," and receptor locations 3, 4, 6, 10, 11, 12, 16, 17, 20, 21, and 22 are categorized as "marginally unacceptable."

GOWANUS CANAL COMBINED SEWAGE OVERFLOW FACILITIES FEIS NOISE MEASUREMENTS

As part of the construction noise analysis for the Gowanus Canal Combined Sewer Overflow Facilities Final Environmental Impact Statement, noise measurements were conducted at 11 sites. Continuous 24-hour noise measurements were performed at two sites (described here as CSO10 and CSO11) weekday on October 5, 2016 through October 6, 2016, and during the weekend on July 9 through 10 and 15 through 16, 2017. Weekday measurements were conducted between Tuesday and Thursday on weeks when New York City Public Schools were in session as recommended by the *CEQR Technical Manual*. Additional measurements were conducted on July 9, 10, 15 and 16, 2017 to document weekend noise levels. The measurements were performed using Type 1 Sound Level Meter (SLM) instruments according to ANSI Standard S1.4-1983 (R2006). The SLMs had laboratory calibration dates within one year of the date of the measurements. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

Table 17-5
Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Baltic Street between Bond Street and Nevins Street	AM	64.5	74.4	66.0	58.0	54.7
		MD	62.5	71.9	65.9	57.9	54.6
		PM	63.2	73.1	66.8	57.0	53.2
		WE	62.4	73.5	65.2	55.5	50.6
2	Baltic Street between Nevins Street and 3rd Avenue	AM	61.0	71.3	64.1	57.2	55.2
		MD	62.4	72.5	65.1	57.0	53.8
		PM	60.2	68.8	63.5	57.2	53.2
		WE	58.8	70.3	61.2	54.5	52.0
3	Bond Street at Butler Street	AM	68.6	79.5	72.2	62.2	55.1
		MD	67.1	79.4	68.6	61.2	56.4
		PM	63.4	73.2	66.9	59.6	53.9
		WE	61.4	70.9	64.3	58.7	53.0
4	Nevins Street at Butler Street	AM	70.3	82.9	71.6	63.4	59.4
		MD	67.8	81.5	69.0	60.6	53.7
		PM	66.0	78.3	68.1	60.8	53.5
		WE	65.1	76.6	67.1	58.7	51.0
5	Sackett Street between Nevins Street and 3rd Avenue	AM	58.9	68.4	61.5	54.3	51.0
		MD	60.5	68.6	61.6	55.5	51.5
		PM	59.2	70.1	60.8	53.4	49.7
		WE	58.4	69.4	59.2	53.0	50.1
6	3rd Avenue between Degraw Street and Sackett Street	AM	69.1	79.8	72.4	63.9	54.7
		MD	66.4	76.5	68.2	61.4	56.4
		PM	66.3	76.1	69.3	63.1	55.3
		WE	66.6	77.5	70.0	60.7	55.8
7	Sackett Street between 3rd Avenue and 4th Avenue	AM	63.8	74.1	65.6	57.7	52.9
		MD	64.5	77.6	63.0	53.6	50.0
		PM	61.2	73.5	64.3	54.9	51.4
		WE	59.7	70.8	63.1	53.9	51.2
8	Bond Street at Union Street	AM	66.9	77.8	69.5	61.8	56.2
		MD	66.7	77.0	67.2	59.5	55.1
		PM	66.8	79.1	68.4	62.9	57.8
		WE	65.5	75.1	67.4	61.4	55.0
9	Nevins Street between Union Street and President Street	AM	60.7	70.9	64.0	56.6	52.1
		MD	61.2	71.8	64.1	54.0	50.8
		PM	62.4	73.5	65.7	55.0	49.4
		WE	64.3	76.0	64.8	54.5	50.5
10	3rd Avenue at Union Street	AM	67.2	75.5	70.8	63.9	58.2
		MD	67.3	77.2	68.7	63.0	57.5
		PM	65.7	75.9	68.0	63.2	58.7
		WE	65.3	74.4	68.5	62.8	59.1
11	4th Avenue between Sackett Street and Union Street	AM	69.6	76.9	72.9	67.9	62.6
		MD	68.1	76.0	71.2	66.3	61.3
		PM	69.6	77.4	72.5	68.1	61.6
		WE	66.7	73.0	66.8	62.6	58.9
12	Bond Street between Carroll Street and 1st Street	AM	68.6	76.7	70.8	64.6	58.4
		MD	63.4	71.4	67.3	58.5	52.2
		PM	66.7	77.5	69.3	61.1	53.6
		WE	65.4	74.4	68.3	60.4	52.6
13	Carroll Street between Nevins Street and 3rd Avenue	AM	60.0	73.1	61.8	51.2	48.6
		MD	64.5	78.0	64.8	55.3	50.7
		PM	62.2	74.8	65.2	54.4	48.0
		WE	62.7	74.9	65.1	54.4	47.9

Table 17-5 (cont'd)
Existing Noise Levels (in dBA)

Receptor	Measurement Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
14	1st Street at Whitewell Place	AM	59.5	68.4	61.9	57.2	54.6
		MD	59.6	68.7	63.2	56.3	52.4
		PM	63.6	75.1	65.1	57.9	53.3
		WE	58.7	65.5	61.8	56.8	53.8
15	3rd Street between Bond Street and Gowanus Canal	AM	65.8	74.3	69.3	63.1	58.1
		MD	68.6	80.6	69.4	63.7	60.9
		PM	65.4	73.0	68.3	62.2	56.5
		WE	65.0	73.6	68.8	60.7	54.5
16	3rd Street at 3rd Avenue	AM	71.6	80.7	74.4	68.6	64.2
		MD	70.3	80.7	73.2	65.9	60.0
		PM	67.2	75.8	70.4	65.3	58.6
		WE	69.4	80.1	71.3	66.4	62.4
17	Smith Street between 4th Street and 5th Street	AM	69.5	80.2	72.6	64.4	57.6
		MD	68.3	78.5	71.3	64.2	58.2
		PM	67.2	76.5	70.4	63.6	58.5
		WE	67.2	78.0	70.6	62.5	57.7
18	5th Street between Smith Street and Hoyt Street	AM	65.3	75.4	66.3	59.7	53.2
		MD	65.6	77.1	65.3	59.8	56.3
		PM	63.5	71.6	67.5	60.4	55.5
		WE	62.5	73.4	65.1	57.7	54.1
19	4th Street at Hoyt Street	AM	63.9	75.3	66.3	58.6	54.3
		MD	62.6	71.9	65.6	60.4	57.1
		PM	63.5	72.6	65.6	60.2	56.5
		WE	59.6	71.0	62.2	54.1	49.5
20	Smith Street at Nelson Street	AM	68.4	76.7	72.5	65.4	58.1
		MD	67.4	76.3	71.0	63.6	58.6
		PM	68.3	75.5	71.9	66.3	61.5
		WE	66.4	74.9	69.3	63.0	58.5
21	Smith Street at Huntington Street	AM	69.9	79.1	74.6	64.9	59.9
		MD	69.8	78.4	74.1	64.0	58.6
		PM	69.2	77.4	73.8	65.0	60.5
		WE	67.9	78.3	70.9	64.1	60.8
22	4th Avenue between 3rd Street and 5th Street	AM	69.8	77.4	73.1	68.4	57.3
		MD	69.2	78.1	72.8	66.0	55.7
		PM	71.4	79.2	74.2	70.1	58.4
		WE	68.9	76.2	72.8	65.7	56.3
23	6th Street between 3rd Avenue and 4th Avenue	AM	60.5	70.0	62.9	57.1	54.3
		MD	59.4	69.0	60.5	55.8	52.3
		PM	58.9	69.4	61.6	55.4	51.1
		WE	59.0	66.4	61.4	57.0	54.1

Note: Field measurements were performed by AKRF, Inc. on March 30, April 2, 3, 6, 13, 17, May 7, 18, 29, June 1, 5, and 12, 2019

In addition to the peak hour noise levels shown in **Table 17-6**, the noise level evaluation at CSO10 and CSO11 considered all hourly noise levels measured at these locations. The existing $L_{eq(1)}$ and $L_{10(1)}$ noise levels measured at each measurement location from the Gowanus Canal Combined Sewer Overflow Facilities FEIS during the weekday and weekend peak time periods and during the hour of maximum measured L_{10} value are summarized in **Table 17-6**.

Table 17-6
Noise Survey Results from Gowanus Canal CSO Facilities FEIS (in dBA)

Site	Location	Time	L_{eq}	L_{10}
CSO10	Nevins Street between Douglass Street and Degraw Street	AM[2]	65.6	67.4
		MD	65.5	67.1
		PM	64.1	66.0
		WE	68.2	71.2
CSO11	Southwest corner of Whole Food Market Outdoor Space	AM	63.3	66.2
		MD[2]	65.0	67.2
		PM	56.2	58.1
		WE	58.3	60.6

Notes:
[1] Continuous noise level measurements were conducted by AKRF, Inc. on October 5, 2016 (Wednesday) through October 6, 2016 (Thursday), July 8, 2017 (Saturday) through July 9, 2017 (Sunday) and July 15, 2017 (Saturday) through July 16, 2017 (Sunday), and are representative of weekday and weekend conditions.
[2] Measurements during this time period indicate the maximum values measured at this location.

Source: Gowanus Canal Combined Sewer Overflow Facilities FEIS, 17DEP040K.

E. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels (including in the future without the Proposed Actions and the future with the Proposed Actions) 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 weekend midday peak hours at all receptor locations. 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 14, "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 condition and With Action condition noise levels. Vehicular traffic volumes are converted into Noise Passenger Car Equivalent (Noise 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 Noise PCEs

E PCE = Existing Noise 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 Noise 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.

PLAYGROUND NOISE

At each of the noise receptor locations that has a direct line of sight to a playground, noise associated with any nearby playground was estimated using the Early Childhood playground boundary noise level (to conservatively represent children of any age using the playground) and any applicable noise level reduction due to distance.

Table 17-7 shows measured maximum hourly playground boundary noise levels. These values are based upon measurements made at a series of New York City school playgrounds for the New York City School Construction Authority (SCA).[1] The noise associated with nearby playgrounds was estimated using the Early Childhood playground boundary noise level to conservatively represent children of any age using the playground. Playground L_{10} noise levels are assumed to be 3 dBA greater than projected L_{eq} values or the difference between the measured L_{eq} and L_{10} values, whichever is most conservative. At receptors with line-of-sight to both existing and proposed playgrounds, cumulative noise levels including contribution from traffic on adjacent roadways and playground noise is calculated.

Table 17-7
Playground Boundary Noise $L_{eq(1)}$ Noise Levels (in dBA)

Early Childhood	Elementary Schools	Intermediate Schools	High Schools
71.5	71.4	71.0	68.2
Source: SCA Playground Noise Study, AKRF, Inc., October 23, 1992.			

F. THE FUTURE WITHOUT THE PROPOSED ACTIONS

Using the methodology previously described, No Action condition noise levels were calculated at the 25 mobile source noise analysis receptors for the 2035 analysis year. These No Action values are shown in **Table 17-8**.

[1] SCA Playground Noise Study, AKRF, Inc., October 23, 1992.

Table 17-8
2035 No Action Condition Noise Levels (in dBA)

Receptor	Measurement Location	Time	Existing $L_{eq(1)}$	No Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No Action $L_{10(1)}$
1	Baltic Street between Bond Street and Nevins Street	AM	64.5	66.2	1.7	67.7
		MD	62.5	63.4	0.9	66.8
		PM	63.2	64.1	0.9	67.7
		WE	62.4	63.3	0.9	66.1
2	Baltic Street between Nevins Street and 3rd Avenue	AM	61.0	61.4	0.4	64.5
		MD	62.4	63.0	0.6	65.7
		PM	60.2	60.6	0.4	63.9
		WE	58.8	59.2	0.4	61.6
3	Bond Street at Butler Street	AM	68.6	69.5	0.9	73.1
		MD	67.1	68.4	1.3	69.9
		PM	63.4	64.9	1.5	68.4
		WE	61.4	62.3	0.9	65.2
4	Bond Street at Butler Street Nevins Street at Butler Street	AM	70.3	72.3	2.0	73.6
		MD	67.8	70.0	2.2	71.2
		PM	66.0	67.9	1.9	70.0
		WE	65.1	66.8	1.7	68.8
5	Sackett Street between Nevins Street and 3rd Avenue	AM	58.9	61.0	2.1	63.6
		MD	60.5	64.3	3.8	65.4
		PM	59.2	61.7	2.5	63.3
		WE	58.4	60.3	1.9	61.1
6	3rd Avenue between Degraw Street and Sackett Street	AM	69.1	70.6	1.5	73.9
		MD	66.4	68.3	1.9	70.1
		PM	66.3	67.8	1.5	70.8
		WE	66.6	67.9	1.3	71.3
7	Sackett Street between 3rd Avenue and 4th Avenue	AM	63.8	64.8	1.0	66.6
		MD	64.5	66.0	1.5	64.5
		PM	61.2	62.3	1.1	65.4
		WE	59.7	60.5	0.8	63.9
8	Bond Street at Union Street	AM	66.9	67.9	1.0	70.5
		MD	66.7	67.8	1.1	68.3
		PM	66.8	67.8	1.0	69.4
		WE	65.5	66.2	0.7	68.1
9	Nevins Street between Union Street and President Street	AM	60.7	65.3	4.6	68.6
		MD	61.2	64.8	3.6	67.7
		PM	62.4	64.8	2.4	68.1
		WE	64.3	66.6	2.3	67.1
10	3rd Avenue at Union Street	AM	67.2	68.7	1.5	72.3
		MD	67.3	69.1	1.8	70.5
		PM	65.7	67.4	1.7	69.7
		WE	65.3	66.5	1.2	69.7

Table 17-8 (cont'd)
2035 No Action Condition Noise Levels (in dBA)

Receptor	Measurement Location	Time	Existing $L_{eq(1)}$	No Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No Action $L_{10(1)}$
11	4th Avenue between Sackett Street and Union Street	AM	69.6	70.4	0.8	73.7
		MD	68.1	69.1	1.0	72.2
		PM	69.6	70.4	0.8	73.3
		WE	66.7	67.5	0.8	67.6
12	Bond Street between Carroll Street and 1st Street	AM	68.6	69.4	0.8	71.6
		MD	63.4	64.6	1.2	68.5
		PM	66.7	67.7	1.0	70.3
		WE	65.4	66.2	0.8	69.1
13	Carroll Street between Nevins Street and 3rd Avenue	AM	60.0	61.9	1.9	63.7
		MD	64.5	66.6	2.1	66.9
		PM	62.2	63.9	1.7	66.9
		WE	62.7	63.9	1.2	66.3
14	1st Street at Whitewell Place	AM	59.5	59.8	0.3	62.2
		MD	59.6	59.6	0.0	63.2
		PM	63.6	63.5	-0.1	65.0
		WE	58.7	58.8	0.1	61.9
15	3rd Street between Bond Street and Gowanus Canal	AM	65.8	66.6	0.8	70.1
		MD	68.6	69.7	1.1	70.5
		PM	65.4	66.5	1.1	69.4
		WE	65.0	65.8	0.8	69.6
16	3rd Street at 3rd Avenue	AM	71.6	72.8	1.2	75.6
		MD	70.3	71.7	1.4	74.6
		PM	67.2	68.6	1.4	71.8
		WE	69.4	70.4	1.0	72.3
17	Smith Street between 4th Street and 5th Street	AM	69.5	70.5	1.0	73.6
		MD	68.3	69.5	1.2	72.5
		PM	67.2	68.7	1.5	71.9
		WE	67.2	68.1	0.9	71.5
18	5th Street between Smith Street and Hoyt Street	AM	65.3	67.2	1.9	68.2
		MD	65.6	68.6	3.0	68.3
		PM	63.5	67.3	3.8	71.3
		WE	62.5	65.5	3.0	68.1
19	4th Street at Hoyt Street	AM	63.9	65.6	1.7	68.0
		MD	62.6	65.2	2.6	68.2
		PM	63.5	66.3	2.8	68.4
		WE	59.6	61.8	2.2	64.4
20	Smith Street at Nelson Street	AM	68.4	69.2	0.8	73.3
		MD	67.4	68.5	1.1	72.1
		PM	68.3	69.8	1.5	73.4
		WE	66.4	67.2	0.8	70.1
21	Smith Street at Huntington Street	AM	69.9	70.8	0.9	75.5
		MD	69.8	70.9	1.1	75.2
		PM	69.2	70.5	1.3	75.1
		WE	67.9	68.7	0.8	71.7
22	4th Avenue between 3rd Street and 5th Street	AM	69.8	70.7	0.9	74.0
		MD	69.2	70.2	1.0	73.8
		PM	71.4	72.2	0.8	75.0
		WE	68.9	69.7	0.8	73.6
23	6th Street between 3rd Avenue and 4th Avenue	AM	60.5	60.9	0.4	63.3
		MD	59.4	59.3	-0.1	60.4
		PM	58.9	58.6	-0.3	61.3
		WE	59.0	59.1	0.1	61.5
CSO10	Nevins Street between Douglass Street and Degraw Street	AM	65.6	69.0	3.4	70.8
		MD	65.5	68.0	2.5	69.6
		PM	64.1	66.0	1.9	67.9
		WE	68.2	70.2	2.0	73.2

Table 17-8 (cont'd)
2035 No Action Condition Noise Levels (in dBA)

Receptor	Measurement Location	Time	Existing $L_{eq(1)}$	No Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No Action $L_{10(1)}$
CSO11	Southwest corner of Whole Food Market Outdoor Space	AM	63.3	64.4	1.1	67.3
		MD	65.0	66.3	1.3	68.5
		PM	56.2	57.4	1.2	59.3
		WE	58.3	59.1	0.8	61.4
Note: Noise levels at all receptor locations were calculated by using proportional modeling.						

By 2035, the maximum increase in $L_{eq(1)}$ noise levels for the No Action condition would be 4.6 dBA or less at the mobile source noise analysis receptors. Changes of this magnitude would be noticeable. In terms of CEQR noise exposure guidelines, noise levels at receptor locations 14, and 23 are categorized as "acceptable," receptor locations 1, 2, 5, 7 9, 13, 19, 23, and CSO11 are categorized as "marginally acceptable," and noise levels at receptor locations 3, 4, 6, 8, 10, 11, 12, 15, 16, 17, 18, 20, 21, 22 and CSO10 are categorized as "marginally unacceptable."

G. THE FUTURE WITH THE PROPOSED ACTIONS

TRAFFIC NOISE

Using the methodology previously described, With Action condition noise levels were calculated at the 25 mobile source noise analysis receptors for the 2035 analysis year. These With Action values are shown in **Table 17-9**.

By 2035, the maximum increase in $L_{eq(1)}$ noise levels for the With Action condition would be 2.5 dBA or less at all 25 mobile source noise analysis receptors. Changes of this magnitude would be considered "just noticeable" according to *CEQR Technical Manual* guidance and would fall below the CEQR threshold for a significant adverse noise impact. In terms of CEQR noise exposure guidelines, noise levels at receptor location 23 remain in the "acceptable" category, noise levels at receptor locations 1, 2, 5, 7, 9, 13, 14, and CSO11 are categorized as "marginally acceptable," and noise levels at receptor locations 3, 4, 6, 8, 10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22 and CSO10 are categorized as "marginally unacceptable."

PLAYGROUND NOISE

Development on Projected Development Site 47 may include a newly introduced playground, which would constitute a stationary source of noise. The nearest noise receptor to Projected Development Site 47 is at minimum 40 feet away from the development site, at which distance playground noise levels would be less than 64.6 dBA and would not have the potential to result in an increase of 3 dBA or more over the minimum existing noise level at this receptor of 65.5 dBA (as established by measured levels at receptor location 18). Consequently, the playground on Projected Development Site 47 would not have the potential to result in a significant increase in noise levels.

Table 17-9
2035 With Action Condition Noise Levels (in dBA)

Receptor	Measurement Location	Time	No Action $L_{eq(1)}$	With Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With Action $L_{10(1)}$
1	Baltic Street between Bond Street and Nevins Street	AM	66.2	66.5	0.3	68.0
		MD	63.4	63.7	0.3	67.1
		PM	64.1	64.5	0.4	68.1
		WE	63.3	63.6	0.3	66.4
2	Baltic Street between Nevins Street and 3rd Avenue	AM	61.4	61.4	0.0	64.5
		MD	63.0	63.1	0.1	65.8
		PM	60.6	60.7	0.1	64.0
		WE	59.2	59.3	0.1	61.7
3	Bond Street at Butler Street	AM	69.5	70.2	0.7	73.8
		MD	68.4	69.4	1.0	70.9
		PM	64.9	65.7	0.8	69.2
		WE	62.3	62.9	0.6	65.8
4	Bond Street at Butler Street Nevins Street at Butler Street	AM	72.3	72.6	0.3	73.9
		MD	70.0	70.3	0.3	71.5
		PM	67.9	68.3	0.4	70.4
		WE	66.8	67.0	0.2	69.0
5	Sackett Street between Nevins Street and 3rd Avenue	AM	61.0	61.6	0.6	64.2
		MD	64.3	64.8	0.5	65.9
		PM	61.7	62.0	0.3	63.6
		WE	60.3	60.6	0.3	61.4
6	3rd Avenue between Degraw Street and Sackett Street	AM	70.6	70.8	0.2	74.1
		MD	68.3	68.7	0.4	70.5
		PM	67.8	67.9	0.1	70.9
		WE	67.9	68.0	0.1	71.4
7	Sackett Street between 3rd Avenue and 4th Avenue	AM	64.8	65.7	0.9	67.5
		MD	66.0	66.3	0.3	64.8
		PM	62.3	62.9	0.6	66.0
		WE	60.5	61.2	0.7	64.6
8	Bond Street at Union Street	AM	67.9	68.4	0.5	71.0
		MD	67.8	68.7	0.9	69.2
		PM	67.8	68.8	1.0	70.4
		WE	66.2	66.8	0.6	68.7
9	Nevins Street between Union Street and President Street	AM	65.3	65.5	0.2	68.8
		MD	64.8	65.1	0.3	68.0
		PM	64.8	65.1	0.3	68.4
		WE	66.6	66.6	0.0	67.1
10	3rd Avenue at Union Street	AM	68.7	69.0	0.3	72.6
		MD	69.1	69.3	0.2	70.7
		PM	67.4	67.5	0.1	69.8
		WE	66.5	66.6	0.1	69.8
11	4th Avenue between Sackett Street and Union Street	AM	70.4	70.5	0.1	73.8
		MD	69.1	69.2	0.1	72.3
		PM	70.4	70.5	0.1	73.4
		WE	67.5	67.6	0.1	67.7
12	Bond Street between Carroll Street and 1st Street	AM	69.4	70.2	0.8	72.4
		MD	64.6	65.9	1.3	69.8
		PM	67.7	68.8	1.1	71.4
		WE	66.2	66.8	0.6	69.7
13	Carroll Street between Nevins Street and 3rd Avenue	AM	61.9	62.5	0.6	64.3
		MD	66.6	67.3	0.7	67.6
		PM	63.9	64.6	0.7	67.6
		WE	63.9	64.4	0.5	66.8

Table 17-9 (cont'd)
2035 With Action Condition Noise Levels (in dBA)

Receptor	Measurement Location	Time	No Action $L_{eq(1)}$	With Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With Action $L_{10(1)}$
14	1st Street at Whitewell Place	AM	59.8	59.9	0.1	62.3
		MD	59.6	60.0	0.4	63.6
		PM	63.5	63.7	0.2	65.2
		WE	58.8	59.0	0.2	62.1
15	3rd Street between Bond Street and Gowanus Canal	AM	66.6	68.0	1.4	71.5
		MD	69.7	71.1	1.4	71.9
		PM	66.5	67.5	1.0	70.4
		WE	65.8	66.5	0.7	70.3
16	3rd Street at 3rd Avenue	AM	72.8	73.2	0.4	76.0
		MD	71.7	72.1	0.4	75.0
		PM	68.6	68.9	0.3	72.1
		WE	70.4	70.6	0.2	72.5
17	Smith Street between 4th Street and 5th Street	AM	70.5	71.7	1.2	74.8
		MD	69.5	70.8	1.3	73.8
		PM	68.7	69.7	1.0	72.9
		WE	68.1	68.9	0.8	72.3
18	5th Street between Smith Street and Hoyt Street	AM	67.2	68.7	1.5	69.7
		MD	68.6	70.5	1.9	70.2
		PM	67.3	69.2	1.9	73.2
		WE	65.5	67.0	1.5	69.6
19	4th Street at Hoyt Street	AM	65.6	67.8	2.2	70.2
		MD	65.2	67.7	2.5	70.7
		PM	66.3	67.8	1.5	69.9
		WE	61.8	63.6	1.8	66.2
20	Smith Street at Nelson Street	AM	69.2	69.9	0.7	74.0
		MD	68.5	69.1	0.6	72.7
		PM	69.8	70.3	0.5	73.9
		WE	67.2	67.7	0.5	70.6
21	Smith Street at Huntington Street	AM	70.8	71.1	0.3	75.8
		MD	70.9	71.2	0.3	75.5
		PM	70.5	70.9	0.4	75.5
		WE	68.7	69.0	0.3	72.0
22	4th Avenue between 3rd Street and 5th Street	AM	70.7	70.7	0.0	74.0
		MD	70.2	70.2	0.0	73.8
		PM	72.2	72.3	0.1	75.1
		WE	69.7	69.7	0.0	73.6
23	6th Street between 3rd Avenue and 4th Avenue	AM	60.9	60.2	-0.7	62.6
		MD	59.3	57.5	-1.8	58.6
		PM	58.6	57.8	-0.8	60.5
		WE	59.1	58.6	-0.5	61.0
CSO10	Nevins Street between Douglass Street and Degraw Street	AM	69.0	68.9	-0.1	70.7
		MD	68.0	68.0	0.0	69.6
		PM	66.0	66.3	0.3	68.2
		WE	70.2	70.2	0.0	73.2
CSO11	Southwest corner of Whole Food Market Outdoor Space	AM	64.4	64.8	0.4	67.7
		MD	66.3	66.8	0.5	69.0
		PM	57.4	57.8	0.4	59.7
		WE	59.1	59.4	0.3	61.7

Note: Noise levels at all receptor locations were calculated by using proportional modeling.

H. NOISE ATTENUATION MEASURES

As shown in **Table 17-3**, the *CEQR Technical Manual* has set noise attenuation values for buildings based on exterior $L_{10(1)}$ noise levels in order to maintain interior noise levels of 45 dBA or lower for residential and community facility uses and 50 dBA or lower for commercial office uses.

Table 17-10 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 With Action condition $L_{10(1)}$ noise levels were determined by adjusting the existing noise measurements to account for future increases in traffic with the Proposed Actions based on the Noise PCE screening analysis results. The projected future $L_{10(1)}$ noise levels include the noise contribution from vehicular traffic on adjacent roadways.

Table 17-10
CEQR Required Attenuation at Noise Measurement Locations (in dBA)

Receptor	Location	Highest With Action $L_{10(1)}$ Value	Minimum Required Attenuation[1,2]
1	Baltic Street between Bond Street and Nevins Street	68.1	N/A
2	Baltic Street between Nevins Street and 3rd Avenue	65.8	N/A
3	Bond Street at Butler Street	73.8	31
4	Nevins Street at Butler Street	73.9	31
5	Sackett Street between Nevins Street and 3rd Avenue	65.9	N/A
6	3rd Avenue between Degraw Street and Sackett Street	74.1	31
7	Sackett Street between 3rd Avenue and 4th Avenue	67.5	N/A
8	Bond Street at Union Street	71.0	28
9	Nevins Street between Union Street and President Street	68.8	N/A
10	3rd Avenue at Union Street	72.6	28
11	4th Avenue between Sackett Street and Union Street	73.8	31
12	Bond Street between Carroll Street and 1st Street	72.4	28
13	Carroll Street between Nevins Street and 3rd Avenue	67.6	N/A
14	1st Street at Whitewell Place	65.2	N/A
15	3rd Street between Bond Street and Gowanus Canal	71.9	28
16	3rd Street at 3rd Avenue	76.0	31
17	Smith Street between 4th Street and 5th Street	74.8	31
18	5th Street between Smith Street and Hoyt Street	73.2	31
19	4th Street at Hoyt Street	70.7	28
20	Smith Street at Nelson Street	74.0	31
21	Smith Street at Huntington Street	75.8	31
22	4th Avenue between 3rd Street and 5th Street	75.1	31
23	6th Street between 3rd Avenue and 4th Avenue	62.6	N/A
CSO10	Nevins Street between Douglass Street and Degraw Street	73.2	31
CSO11	Southwest corner of Whole Food Market Outdoor Space	69.0	N/A

Notes:
[1] Attenuation values are shown for residential or community facility uses; commercial office uses would require 5 dBA less attenuation.
[2] "N/A" 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.

Table 17-11 shows the minimum window/wall attenuation necessary to meet *CEQR Technical Manual* requirements for internal noise levels at each of the development sites with line-of-sight to any existing or newly-introduced playgrounds. The projected future $L_{10(1)}$ noise levels include the noise contribution from vehicular traffic on adjacent roadways as well as projected contribution from nearby playgrounds, as described above.

Table 17-11
Projected Playground With Action Noise and CEQR Required Attenuation (in dBA)

Development Site	Maximum With Action $L_{eq(1)}$		Highest Total With Action $L_{eq(1)}$ Value	Highest With Action $L_{10(1)}$ Value	Minimum Required Attenuation[1]
	Without Playground	With Playground			
12	70.2	70.8	70.8	73.8	31
13	70.2	70.8	70.8	73.8	31
14	70.9	71.4	71.4	74.7	31
19	70.9	71.4	71.4	74.7	31
20	70.2	70.8	70.8	73.8	31
21	70.9	71.4	71.4	74.7	31
45	70.5	71.5	71.5	74.5	31
46	70.5	71.2	71.2	74.2	31
47	70.5	73.0	73.0	76.4	33
48	70.3	71.5	71.5	75.3	31
59	70.5	73.0	73.0	76.4	33
J	63.1	65.2	65.2	68.2	N/A[2]
K	63.1	65.2	65.2	68.2	N/A[2]
R	70.9	71.4	71.4	74.7	31
U	70.9	71.4	71.4	74.7	31
W	70.2	70.8	70.8	73.8	31
BS	70.5	73.0	73.0	76.4	33
BT	72.3	72.5	72.5	75.5	31

Notes:
[1] Attenuation values are shown for residential or community facility uses; commercial office uses would require 5 dBA less attenuation.
[2] "N/A" 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.

Based on the noise levels shown in **Table 17-10** and **Table 17-11**, up to 33 dBA window/wall attenuation would be required to provide acceptable interior noise levels per the *CEQR Technical Manual* noise exposure guideline. These noise levels account for noise from projected vehicular traffic in the future as well as contribution from existing and proposed playgrounds with the Proposed Actions.

Based on the values shown in **Table 17-10** and **Table 17-11**, required attenuation levels in order to provide an interior noise level of 45 dBA for residential or community facility uses and 50 dBA for commercial office uses were determined for all development sites. These values are shown in **Table 17-12**.

Table 17-12
Minimum Required Attenuation at Development Sites (in dBA)

Development Site	Block(s)	Lot(s)	Representative Receptor Site	Required Attenuation[1]
Projected Development Sites				
1	395	30, 32-37	11	31
2	934	1-7,10,12,74	11	31
3	399	39, 41	1, 4	31
4	399	58,59, 60	1	N/A[2]
5	405	13,14,15,16	1	N/A[2]
6	405	12, 63, 64	1, 3	31
7	405	27	1, 4	31
8	405	60	1, 3	31
9	407	8,9	2	N/A[2]
10	407	12,13	2	N/A[2]
11	411	12	3	31
12	412	1,6,15,50,51	4,CSO10	31[3]
13	412	18,19,20,45,48	2, 4, CSO10	31[3]
14	413	1,2,7	2, 6	31[3]
15	417	1,10,14,21	3, 8	31
16	420	19	7	N/A[2]
17	946	1,3-7, 84,85,101	11	31
18	424	1,20	3, 8	31
19	426	17, 44, 49	5, 6	31[3]
20	426	1	5, CSO10	31[3]
21	427	1,7,10	6, 7	31[3]
22	431	12,17,7,43	8	28
23	433	18	5	N/A[2]
24	433	28, 46	6	31
25	434	1,12	6, 7, 10	31
26	434	24	7	N/A[2]
27	434	35	11	31
28	438 / 445	1,2,3 / 8,11,20,50	8, 13	28
29	439	1	9, 13	N/A[2]
30	440	1,12	9,10	28
31	441	24,33,35	7, 10, 11	31
32	441	16,18	10	28
33	447	32	10	28
34	447	1	9, 13	N/A[2]
35	448	25	7	N/A[2]
36	451	25	12	28
37	453	1,21	13	N/A[2]
38	456	1,34,6	11	31
39	969	1	11	31
40	462	12,14	15	28
41	972	1,43,58	16	31
42	465	27-29,33,46-50	12	28
43	466	17,60	12,15	28
44	466	19	15, CSO11	28
45	468	59,60	18	31
46	468	25	18, 19	31[3]
47	471	1,100	17, 18, 20	33[3]
48	471	200	20, 21	31[3]
49	980	77	22	31
50	992	24,26,29	23	N/A[2]

Table 17-12 (cont'd)
Minimum Required Attenuation at Development Sites (in dBA)

Development Site	Block(s)	Lot(s)	Representative Receptor Site	Required Attenuation[1]
Projected Development Sites (continued)				
51	1028	7	22	31
52	420	34,37	7, 11	31
53	433	1	9, 10	28
54	427	47	11	31
55	440	35,36,38	10	28
56	445	1	12	28
57	405	51	3, 4	31
58	399	6	3	31
59	471	125	19	33[3]
60	407	26	11	31
61	464	51	19	28
62	464	41,45	19	28
63	456	13,17,23	11, 13	31
Potential Development Sites				
A	198	34-38	11	31
B	932	2,3,4,5	11	31
C	399	2	3	31
D	399	47,49	1	N/A[2]
E	399	51,53	1	N/A[2]
F	399	55	1	N/A[2]
G	399	62	1	N/A[2]
H	405	24	1	N/A[2]
J	406	25,27,50,52,69,71	2, 6	31
K	406	18	2	N/A[2]
L	407	41	2	N/A[2]
M	407	1	6	31
N	407	52	2, 4	31
O	411	1,2,3	3	31
P	411	58,60	3	31
Q	412	21	2	N/A[2]
R	412	29	2, 6	31[3]
S	413	21	7	N/A[2]
T	413	58	7	N/A[2]
U	420	1	6	31[3]
V	980	19	16	31
W	425 / 432	1 / 15	CSO10	31[3]
X	426	36,41	5, 6	31
Y	427	12,15	7	N/A[2]
Z	427	37,38,40	11	31
AA	427	21	7	N/A[2]
AB	427	31	7	N/A[2]
AC	427	42	11	31
AD	427	52	7	N/A[2]
AE	431	2	8, 9	28
AF	432	25	9	N/A[2]
AG	432	7501	8, 9	28
AH	433	8,9,10,12,13	5	N/A[2]
AI	453	26	13	N/A[2]
AJ	433	14	5	N/A[2]
AK	433	21	5	N/A[2]
AL	434	16	7, 10	28
AM	434	52	10	28
AN	434	55	10	28
AO	438	7	8	28
AP	453	31	13	N/A[2]

Table 17-12 (cont'd)
Minimum Required Attenuation at Development Sites (in dBA)

Development Site	Block(s)	Lot(s)	Representative Receptor Site	Required Attenuation[1]
AQ	440	21,23-26,47,48	9, 10	28
AR	441	21	10	28
AS	441	50,53	7	N/A[2]
AT	441	4	10	28
AU	441	11	10	28
AV	441	14	10	28
AY	447	3,4,7	9	N/A[2]
AZ	447	13	5	N/A[2]
BA	447	22	5	N/A[2]
BB	447	50	13	N/A[2]
BC	448	12	7	N/A[2]
BE	448	34	11	31
BF	448	31	7	N/A[2]
BG	448	52,53	13	N/A[2]
BH	958	2	11	31
BI	453	36	13	N/A[2]
BJ	453	54	14,16	33
BK	454	24,25,27	14	N/A[2]
BL	454	33,31	14	N/A[2]
BN	967	24	16	31
BO	462	6,8,9,42, 44,50	15	28
BQ	465	1,10	19	28
BR	468	3	17	31
BS	471	116	19	33[3]
BT	980	23,49	22	31[3]
BU	992	5,7	23	N/A[2]
BV	992	1	23	N/A[2]
BY	1040	46, 47	22	31
BZ	949	7, 8	11	31

Notes:
[1] Attenuation values are shown for residential or community facility uses; commercial office uses would require 5 dBA less attenuation.
[2] "N/A" 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.
[3] Attenuation requirement based on cumulative noise level prediction including contribution from traffic on adjacent roadways and projected playground noise.

To require attenuation at projected and potential development sites, an (E) designation (E-601) for noise would be applied, specifying the appropriate amount of window/wall attenuation. The text of the (E) designation would be as follows:

To ensure an acceptable interior noise environment, future development must provide minimum building façade attenuation as shown in Table 17-12 in order to maintain an interior noise level not greater than 45 dBA for residential and community facility uses or not greater than 50 dBA for commercial office uses. To maintain a closed-window condition, an alternate means of ventilation must also be provided. Alternate means of ventilation includes, but is not limited to, air conditioning.

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 composite window/wall attenuation greater than or equal to the attenuation requirements listed in **Table 17-12**.

By adhering to the (E) Designation described above, buildings to be developed as a result of the Proposed Actions would provide sufficient attenuation to achieve the *CEQR Technical Manual* interior noise level guidelines of 45 dBA L_{10} for residential or community facility uses and 50 dBA L_{10} for commercial office uses.

MANUFACTURING USE DEMISING PARTITION NOISE ATTENUATION REQUIREMENTS

For the condition in which a newly introduced noise-sensitive use (i.e., residential or community facility use) would exist on the same lot with manufacturing use, noise could reach the noise-sensitive use via the demising partition separating it from the manufacturing use. Residential uses would be required by DOB Building Code to have demising partitions that meet at least Sound Transmission Class (STC) 50. Noise levels were measured at an existing representative manufacturing use, and based on the measured level and the code-required demising wall noise attenuation, maximum noise levels were projected for a residential space adjacent to manufacturing use. As with the façade attenuation analysis described above, the acceptable interior noise level threshold is 45 dBA or lower for residential uses.

The $L_{eq(1)}$ noise level descriptor was used to evaluate the manufacturing use-generated noise within one lot, because it includes all acoustical energy incident during a measurement.

NOISE SURVEY PROCEDURES AND RESULTS

The Fodera Bass Guitar workshop located in the Industry City complex in Brooklyn New York was selected as a representative manufacturing use to establish worst-case interior noise levels for existing and future manufacturing uses. Noise levels in the workshop include woodworking machinery (e.g., saws, routing machines, sanders, etc.) as well as ventilation equipment. The measured noise levels, shown in **Table 17-13** and in **Appendix I**, serve as a conservative representation of the types of light manufacturing and industrial work that make up expected manufacturing uses.

Table 17-13
Measured Sound Pressure Levels at the Fodera Guitar Workshop (in dBA)

Description	L_{eq}	L_1	L_{10}	L_{50}	L_{90}	L_{min}	L_{max}
Ambient Workshop Noise (includes routers, saws, sanders, and ventilation equipment)	90.1	96.3	93.6	89.3	82.1	78.9	96.5

For any newly constructed building with manufacturing use, specifically, Projected Development Sites 22, 29, 41, 44, 47, 48 and Potential Development Sites P, AK, BL, and BO, the design of the demising partitions between the manufacturing space and any residential/community facility space would be required to provide sufficient attenuation to result in interior L_{eq} and L_{10} noise levels not greater than 45 dBA in the residential units and/or community facility spaces and to achieve a minimum attenuation of 50 dBA. This requirement would be implemented by application of an (E) Designation (E-601). The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

The text of the E-Designation would be as follows:

Block 431, Lots 7, 12, 17, and 43 (Projected Development Site 22): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 439, Lot 1 (Projected Development Site 29): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 972, Lots 1, 43, and 58 (Projected Development Site 41): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 466, Lot 19 (Projected Development Site 44): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 471, Lots 1 and 100 (Projected Development Site 47): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 471, Lot 200 (Projected Development Site 48): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 411, Lots 58 and 60 (Potential Development Site P): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses

are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 433, Lot 21 (Potential Development Site AK): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 454, Lots 31 and 33 (Potential Development Site BL): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

Block 462, Lots 6, 8, 9, 42, 44, and 50 (Potential Development Site BO): Sufficient partitions/attenuation between the Manufacturing/Industrial uses and the residential units and/or community facility uses are required to achieve an interior L_{eq} and L_{10} noise level not greater than 45 dBA in the residential units and/or community facility space and to achieve a minimum attenuation of 50 dBA. The attenuation provided by an interior partitions may be evaluated using the measured manufacturing use noise levels (as shown in **Table 17-13** and in **Appendix I** of *Gowanus Neighborhood Rezoning Environmental Impact Statement*) as representative source levels.

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 Actions would not result in any significant adverse noise impacts related to building mechanical equipment. ✷