# Chapter 17: Noise

## A. INTRODUCTION

Ambient noise levels adjacent to the project site were considered in order to address City Environmental Quality Review (CEQR) noise abatement guidelines for the proposed project. Additionally, the design of the proposed Bleecker Building includes a rooftop play area to be used by a future school.[1] An analysis of the potential for a noise impact to result from the proposed rooftop play area is provided.

CEQR prescribes a detailed mobile source noise analysis in cases where there is a potential for a doubling of Noise passenger car equivalents [PCEs] which would be necessary to cause a 3 dBA increase in noise levels, which could result in an impact. The proposed action would not generate sufficient traffic to have the potential to cause a significant adverse noise impacts (see **Appendix D** for Noise PCE screening analysis results). However, the building attenuation analysis accounts for the Noise PCE screening analysis results.

## B. PRINCIPAL CONCLUSIONS

The analysis finds that the Proposed Actions would not result in any significant adverse noise impacts due to operations of the proposed project.

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 proposed buildings' mechanical systems (i.e., heating, ventilation, and air conditioning systems) would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code and Section 926 of the New York City Department of Buildings Mechanical Code) and to avoid producing levels that would result in any significant increases in ambient noise levels, and was therefore not analyzed.

The analysis of the potential noise effects from the proposed relocation of the Mercer-Houston Dog Run concludes that noise level increases at nearby noise-sensitive locations would be less than 3 dBA and would not be considered a significant adverse noise impact.

The rooftop play area noise analysis concludes that noise level increases at all nearby noise sensitive locations are anticipated to be less than 3 dBA and would not be considered a significant adverse noise impact.

The CEQR building attenuation analysis concludes that in order to meet CEQR interior noise level requirements, the analysis prescribes up to 33 dBA of building attenuation for project

[1] If by 2025 the New York City School Construction Authority (SCA) does not exercise its option to build the public school, NYU would build and utilize the 100,000-square-foot space for its own academic purposes.

buildings. Because the project buildings would be designed to satisfy these specifications, there would be no significant adverse noise impact with respect to building attenuation. Noise levels in the newly created open spaces would be greater than the 55 dBA $L_{10(1)}$ CEQR guideline, but would be comparable to other parks around New York City. Therefore, there would be no significant adverse noise impacts associated with the newly created open spaces.

## C. 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 discernable 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.

### SOUND LEVEL DESCRIPTORS

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

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

For purposes of the proposed action, the $L_{eq}$ and $L_{10}$ descriptors have been selected as the noise descriptors 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.

## D. NOISE STANDARDS AND CRITERIA

### NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION

The New York City Department of Environmental Protection (NYCDEP) has set 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 noise level guideline for outdoor areas requiring serenity and quiet is 55 dBA $L_{10}$.

### NEW YORK CEQR NOISE CRITERIA

The *CEQR Technical Manual* (January 2012 Edition) defines attenuation requirements for buildings based on exterior noise level (see **Table 17-3**, "Required Attenuation Values to Achieve Acceptable Interior Noise Levels"). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential and academic uses and 50 dBA or lower for retail and athletic uses and are determined based on exterior $L_{10(1)}$ noise levels.

## IMPACT DEFINITION

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

**Table 17-2**
**Noise Exposure Guidelines**
**For Use in City Environmental Impact Review[1]**

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

**Notes:**
(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more;
[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (ANSI) Standards; all values are for the worst hour in the time period.
[2] Tracts of land where serenity and quiet are extraordinarily important and serve an important public need and where the preservation of these qualities is essential for the area to serve its intended purpose. Such areas could include amphitheaters, particular parks or portions of parks or open spaces dedicated or recognized by appropriate local officials for activities requiring special qualities of serenity and quiet. Examples are grounds for ambulatory hospital patients and patients and residents of sanitariums and old-age homes.
[3] One may use the FAA-approved $L_{dn}$ contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.
[4] External Noise Exposure standards for industrial areas of sounds produced by industrial operations other than operating motor vehicles or other transportation facilities are spelled out in the New York City Zoning Resolution, Sections 42-20 and 42-21. The referenced standards apply to M1, M2, and M3 manufacturing districts and to adjoining residence districts (performance standards are octave band standards).
**Source:** New York City Department of Environmental Protection (adopted policy 1983).

**Table 17-3**
**Required Attenuation Values to Achieve Acceptable Interior Noise Levels**

| | Marginally Unacceptable | | | | Clearly Unacceptable |
|---|---|---|---|---|---|
| Noise Level With Proposed Action | 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 uses 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.

- An increase of 5 dBA, or more, in Build Leq(1) noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over those calculated for the No Build condition, if the No Build levels are less than 60 dBA Leq(1) and the analysis period is not a nighttime period.
- An increase of 4 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are greater than 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

## E. NOISE PREDICTION METHODOLOGY

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 noise impact. Additionally, the buildings' mechanical systems (i.e., heating, ventilation, and air conditioning systems) would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code and Section 926 of the New York City Department of Buildings Mechanical Code) and to avoid producing levels that would result in any significant increase in ambient noise levels. Therefore these were not analyzed.

The analysis presenting the noise from the relocated dog run, rooftop play area, and a building attenuation analysis are presented below.

### NOISE FROM THE RELOCATED DOG RUN

With the Proposed Actions the existing Mercer-Houston Dog Run, located at the northwest corner of West Houston and Mercer Streets, would be relocated to the western side of the proposed Zipper Building, adjacent to West Houston Street and the proposed Greene Street Walk.

The analysis of the proposed dog run relocation consisted of the following procedure:

- Noise measurements were made at a dog run in Washington Square Park[1];
- Measurements were performed using two sound level meters simultaneously – one sound level meter ran continuously and the second sound level meter was paused to filter-out dog run related noise events;
- Using acoustical fundamentals and the noise measurement results, a spreadsheet was used to calculate/isolate the "dog run only" noise component;

[1] Noise measurements were not collected at the existing Mercer-Houston Dog Run because ambient noise levels at the dog run are moderately high due to a combination of vehicular activity—which includes buses and trucks on West Houston and Mercer Streets—and mechanical equipment noise associated with louvers on the Coles Sports and Recreation Center building. Consequently, isolating dog-related noise levels at the existing dog run was determined to be infeasible at this location.

- At the noise sensitive locations closest to the dog run relocation site, existing noise levels were calculated based on measured values;
- Dog run noise levels were calculated at the noise sensitive locations closest to the dog run relocation site; and
- Existing and dog run calculated noise levels were combined to determine future noise levels with the proposed project for purposes of impact determination.

**NOISE FROM THE ROOFTOP PLAY AREA**

The school is expected to include two rooftop play areas. The analysis results are based on the following assumptions:

- The play areas would be located on the roof of the school at a height of approximately 105 feet;
- The south side the play area would be set back 15 feet from the building wall;
- The two rooftop play areas would be used by elementary and intermediate school students (pre-kindergarten to 8th grade); and
- The rooftop play areas were assumed to have a 10 foot high absorptive sound barrier wall on the south side of the roof.

The *CEQR Technical Manual* provides the following guidance to determine sound effects of the proposed play area at the project site:

> *"…based upon noise measurements made at 10 school playground sites in 1987, it may be assumed that $L_{eq(1)}$ noise levels at the boundary would be 75 dB(A), 15 feet from the boundary would be 73 dB(A), 30 feet from the boundary would be 70 dB(A), and the noise level would decrease by 4.5 dB(A) per doubling of distance beyond 30 feet."*

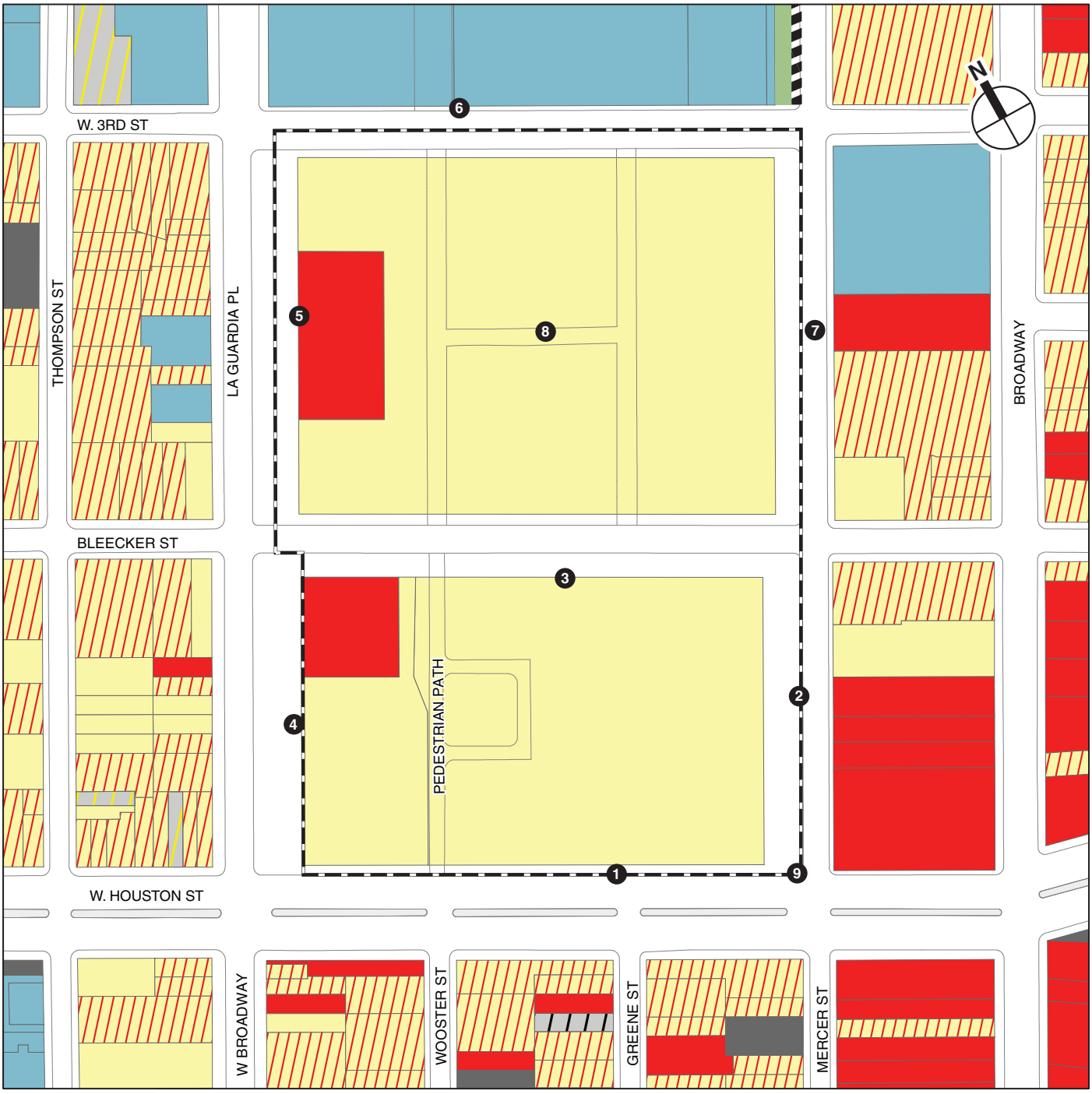
The analysis of the proposed rooftop play areas consisted of the following procedure:

- Existing noise measurements were made at the project site;
- The distance between the play area boundary and nearby noise-sensitive buildings were determined;
- Using the *CEQR Technical Manual* guidance outlined above, a spreadsheet was used to predict play area noise levels;
- Play area noise levels were combined with the measured existing noise levels to determine future noise levels with the proposed project; and
- Future noise levels with the proposed project were compared to noise levels without the proposed project for purposes of impact determination.

## F. EXISTING NOISE LEVELS

Existing noise levels at the project site were measured at nine (9) locations as shown below in **Table 17-4** (also see **Figure 17-1**).

12.6.11




- Proposed Development Area Boundary
- Mercer Plaza Area
- Residential
- Residential with Commercial Below
- Hotels
- Commercial and Office Buildings
- Industrial and Manufacturing
- Transportation and Utility
- Public Facilities and Institutions
- Open Space and Outdoor Recreation
- Parking Facilities
- Vacant Land
- Vacant Building
- Under Construction

**Note:** Each color indicates the dominant land use on each lot

1 Noise Receptor Location

**NYU Core**

# Noise Receptor Locations
Figure 17-1

**Table 17-4**
**Noise Receptor Locations**

| Receptor | Location | Use |
|---|---|---|
| 1 | West Houston Street at Greene Street | Zipper Building South Façade |
| 2 | Mercer Street between Bleecker and West Houston Streets | Zipper Building East Façade |
| 3 | Bleecker Street between Mercer Street and LaGuardia Place | Zipper Building North Façade<br>Bleecker Building North Façade |
| 4 | LaGuardia Place between West Houston and Bleecker Streets | Bleecker Building West Façade |
| 5 | LaGuardia Place between Bleecker and West 3rd Streets | LaGuardia Building West Façade |
| 6 | West 3rd Street between Mercer Street and LaGuardia Place | LaGuardia Building North Façade |
| 7 | Mercer Street between West 3rd and Bleecker Streets | Mercer Building East Façade<br>Mercer Building South Façade |
| 8 | Courtyard of Washington Square Village | LaGuardia Building Interior Facades<br>LaGuardia Building South Façade<br>Mercer Building Interior Facades<br>Mercer Building North Façade |
| 9 | Corner of Mercer and West Houston Streets | Zipper Building South and East Facades |

At all Receptor Sites, noise levels were measured for 20-minute periods during the three weekday peak periods—AM (7:00 – 9:00 AM), midday (MD) (12:00 PM to 2:00 PM), and PM (4:30 – 6:30 PM). Measurements were taken between September 23, 2009 and May 10, 2011.

**EQUIPMENT USED DURING NOISE MONITORING**

Measurements were performed using Brüel & Kjær Sound Level Meters (SLMs) Type 2260 (S/Ns 2375602 and 2384814), Type 2250 (S/N 2717693), and Type 2270 (S/N 2706757), Brüel & Kjær ½-inch microphones Type 4189 (S/Ns 2378182, 2385722, 2695523, and 2703402), and Brüel & Kjær Sound Level Calibrators Type 4231. The SLMs were calibrated within one year of use. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The microphone was mounted on a tripod at a height of approximately 5 feet above the ground and was mounted at least approximately 5 feet away from any large reflecting surfaces. The SLMs' calibration was field checked before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA). The data were digitally recorded by the SLMs and displayed at the end of the measurement period in units of dBA. Measured quantities included $L_{eq}$, $L_1$, $L_{10}$, $L_{50}$, $L_{90}$, and 1/3 octave band levels. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005.

The results of the existing noise level measurements are summarized in **Table 17-5**.

At all receptor sites, vehicular traffic was the dominant source of noise. With the exception of Site 8, which is shielded and set back from the adjacent roadways, measured noise levels are moderate to high and reflect the level of vehicular activity on the adjacent streets. In terms of the CEQR criteria, the existing noise levels at Site 8 are in the "acceptable" category, existing noise levels at Sites 3, 4, 5, 6, and 7 are in the "marginally acceptable" category, and existing noise levels at Sites 1, 2, and 9 are in the "marginally unacceptable" category.

**Table 17-5**
**Existing Noise Levels (in dBA)**

| Site | Measurement Location | Time | $L_{eq}$ | $L_1$ | $L_{10}$ | $L_{50}$ | $L_{90}$ |
|---|---|---|---|---|---|---|---|
| 1 | West Houston Street at Greene Street | AM | 73.7 | 83.4 | 77.3 | 69.8 | 62.0 |
| | | MD | 73.5 | 81.0 | 77.4 | 70.6 | 64.3 |
| | | PM | 72.8 | 81.9 | 76.2 | 69.3 | 63.4 |
| 2 | Mercer Street between Bleecker and West Houston Streets | AM | 67.9 | 80.0 | 69.4 | 63.6 | 60.3 |
| | | MD | 64.2 | 72.1 | 67.5 | 61.8 | 59.3 |
| | | PM | 66.8 | 74.6 | 70.2 | 64.2 | 62.0 |
| 3 | Bleecker Street between Mercer Street and LaGuardia Place | AM | 63.6 | 72.3 | 66.2 | 61.3 | 58.6 |
| | | MD | 63.4 | 71.7 | 65.8 | 61.5 | 59.2 |
| | | PM | 65.4 | 75.2 | 68.4 | 61.6 | 58.9 |
| 4 | LaGuardia Place between West Houston and Bleecker Streets | AM | 66.6 | 75.9 | 69.5 | 62.3 | 58.4 |
| | | MD | 66.1 | 75.4 | 68.9 | 63.2 | 59.5 |
| | | PM | 63.6 | 70.5 | 66.6 | 62.0 | 58.9 |
| 5 | LaGuardia Place between Bleecker and West 3rd Streets | AM | 63.6 | 72.0 | 66.9 | 60.5 | 57.5 |
| | | MD | 63.4 | 72.2 | 65.4 | 61.1 | 58.9 |
| | | PM | 62.9 | 69.3 | 65.3 | 61.5 | 59.6 |
| 6 | West 3rd Street between Mercer Street and LaGuardia Place | AM | 66.5 | 72.9 | 69.8 | 64.4 | 60.2 |
| | | MD | 64.4 | 74.7 | 67.5 | 60.9 | 57.9 |
| | | PM | 65.7 | 76.6 | 67.2 | 60.7 | 57.4 |
| 7 | Mercer Street between West 3rd and Bleecker Streets | AM | 65.2 | 73.3 | 67.6 | 64.2 | 57.3 |
| | | MD | 65.3 | 76.1 | 66.6 | 60.3 | 57.9 |
| | | PM | 60.3 | 68.4 | 62.9 | 58.2 | 56.1 |
| 8 | Courtyard of Washington Square Village | AM | 56.0 | 60.1 | 58.0 | 55.5 | 54.0 |
| | | MD | 56.4 | 59.6 | 57.7 | 56.0 | 55.0 |
| | | PM | 57.9 | 61.3 | 59.3 | 57.6 | 56.5 |
| 9 | Corner of Mercer and West Houston Streets | AM | 73.7 | 81.7 | 76.7 | 71.2 | 66.9 |
| | | MD | 72.9 | 81.1 | 75.7 | 70.9 | 68.2 |
| | | PM | 73.9 | 82.8 | 76.9 | 71.3 | 68.0 |

**Note:** Measurements were conducted by AKRF Acoustics Department between September 23, 2009 and May 10, 2011.

## G. FUTURE WITHOUT THE PROPOSED ACTIONS

In the future without the Proposed Actions, noise conditions in the project area would be comparable to existing conditions. The dog run would be expected to continue to function at the existing location, and there would not be any rooftop school playground. Any increase in noise levels would be due to the growth in traffic, which would be expected to be very small, and imperceptible. See Appendix D for the Noise PCE calculations that include noise level and $L_{10}$ calculations for the future without the Proposed Actions.

## H. FUTURE WITH THE PROPOSED ACTIONS

The Proposed Actions would result in some changes in future noise conditions in the project area. Traffic volumes changes would be small and a screening analysis showed that these changes would not have the potential for resulting in significant increases in ambient noise levels (i.e., a screening analysis using proportional modeling techniques showed that the increase in passenger car equivalents (PCEs) would result in an increase in noise levels of less than 3 dBA). Consequently, while traffic increases were utilized for determining building attenuation requirements, 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. Three separate noise analyses were performed; the first to evaluate potential impacts due to the proposed relocated dog run; the second to evaluate potential impacts due to the proposed rooftop school playground, and; the third to analyze building attenuation requirements for the buildings proposed as part of the Proposed Actions. These results of these analyses are presented below. See Appendix D for the Noise PCE calculations that include noise level and $L_{10}$ calculations for the future with the Proposed Actions.

**DOG RUN NOISE**

Using the methodology previously described, an assessment was made of potential noise impacts at sensitive receptor locations adjacent to the proposed dog run relocation site. Noise sensitive receptor locations were determined to be 110 Silver Towers and the proposed Zipper Building; these are the residential buildings closest to the proposed dog run relocation site. The facades of these buildings that directly face the proposed dog run would have the greatest potential to be impacted.

At 110 Silver Towers, exterior noise levels would increase by 2.0 dBA $L_{eq(1)}$ or less during the hours when the proposed dog run is producing the maximum noise levels. This was based on the lowest measured $L_{eq(1)}$. At the proposed Zipper Building, exterior noise levels would increase by 2.7 dBA $L_{eq(1)}$ or less during the hours when the proposed dog run is producing the maximum noise levels. This was based on the lowest measured $L_{eq(1)}$. To be conservative, for analysis purposes, it was assumed that noise levels in the future without the proposed project would be the same as the existing noise levels. (Details of the analysis are presented in **Appendix D**). Noise level increases of this magnitude would be considered barely perceptible, but would not be considered a significant adverse noise impact.

In terms of building attenuation, the dog run is expected to produce a maximum of 66.2 dBA $L_{10}$ at the west façade of the Zipper Building (at locations further from the dog run, the dog run noise levels would be less). The dog run noise contribution was accounted for in the building attenuation analysis. As shown in **Table 17-6**, attenuation requirements will range from 28 dBA up to 33 dBA. Starting from the southern edge of the west façade and moving north, the first 10 feet will require 33 dBA of attenuation, the next 25 feet will require 31 dBA of attenuation, the next 60 feet will require 28 dBA of attenuation, and the rest of the west façade will have no CEQR attenuation requirements. The noise level drop-off rate for building attenuation calculation was based on a 3 dBA reduction per doubling of distance from the dominant noise sources (i.e., West Houston Street and the dog run).

**ROOFTOP PLAY AREA NOISE**

Using the methodology previously described, an assessment was made of potential noise impacts at noise sensitive receptor locations adjacent to the project site. Noise sensitive receptor locations were determined to be the residential buildings located at Washington Square Village 3 and 505 Laguardia Place because these are the residential buildings closest to the rooftop play areas. The façade of the proposed school facing the play areas was also analyzed for building attenuation purposes. The facades of these buildings that directly face the proposed rooftop play areas would have the greatest potential to be impacted.

**Table 17-6**
**Phase 1 CEQR Attenuation Requirements**

| Building | Proposed Building Façade Locations | Associated Receptor Site | Maximum Predicted Vehicular $L_{10}$ due to Traffic Only (in dBA) | Maximum Predicted $L_{10}$ Due to Dog Run Only (in dBA) | Maximum Predicted $L_{10}$ Due to School Playground (in dBA) | Maximum Predicted Total $L_{10}$ (in dBA) | Attenuation Required (in dBA)[1,2] |
|---|---|---|---|---|---|---|---|
| Zipper | North Façade (facing Bleecker Street) | 3 | 69.1 | - | - | 69.1 | NA[3] |
| | East Façade (facing Mercer Street) | 1, 2 | 77.4, 71.1 | - | - | 77.4, 71.1 | 28 up to 33 |
| | South Façade (facing West Houston Street) | 1 | 77.9 | - | - | 77.9 | 33 |
| | West Façade (facing Silver Towers) | 1 | 77.4 | 66.2 | - | 77.7[4] | 28 up to 33 |
| Bleecker | North Façade (facing Bleecker Street) | 3 | 69.1 | - | - | 69.1 | NA[3] |
| | East Façade (facing Silver Towers) | 3 | 69.1 | - | - | 69.1 | NA[3] |
| | East Façade (facing playgrounds) | Calculated[5] | - | - | 77.4 | 77.4 | 28 up to 33[5] |
| | South Façade (facing Silver Towers) | 4 | 70.0 | - | - | 70.0 | NA[3] |
| | West Façade (facing LaGuardia Place) | 4 | 70.0 | - | - | 70.0 | NA[3] |

**Notes:**
Attenuation requirements are for spaces containing noise sensitive uses.
(1) Non-residential uses, such as retail and athletic, would require 5 dBA less attenuation.
(2) CEQR attenuation requirements do not apply to mechanical space uses.
(3) "NA" indicates that the maximum measured $L_{10}$ is below 70 dBA. The *CEQR Technical Manual* does not address noise levels this low, therefore there is no minimum attenuation guidance.
(4) Calculated based on the maximum noise level at Receptor Site 1 (adjusted for the distance between the Zipper Building and West Houston Street) of 77.4 dBA and the proposed dog run $L_{10}$ (66.2 dBA).
(5) Calculated using the noise drop-off for the rooftop play area as outlined above in the *CEQR Technical Manual*.

For the receptor locations at 505 Laguardia Place, exterior noise levels would increase by 1.3 dBA or less during the hours when the proposed play areas are producing the maximum noise levels. For the receptor locations at Washington Square Village 3, exterior noise levels would increase by 2.4 dBA or less during the hours when the proposed play areas are producing maximum noise levels. ). To be conservative, for analysis purposes, it was assumed that noise levels in the future without the proposed project would be the same as the existing noise levels. (Details of the analysis are presented in **Appendix D**). Noise level increases of this magnitude would be perceptible but would not be considered a significant adverse noise impact.

In terms of building attenuation, the eastern façade of the proposed Bleecker Building overlooking the play areas would require a range of attenuation values from 33 dBA of attenuation to 28 dBA of attenuation. The 8th and 9th floors would require 33 dBA of attenuation, the 10th floor would require 31 dBA of attenuation, and the floors above the 10th floor would require 28 dBA of attenuation. The building attenuation calculations were based on the previously-mentioned *CEQR Technical Manual* guidance for noise drop-off at specific distances from the play area boundary.

**PROJECT INTERIOR NOISE LEVELS**

As shown in **Table 17-3**, the *CEQR Technical Manual* has set noise attenuation quantities 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 academic uses and 50 dBA or lower for retail and athletic uses. The building attenuation analysis conservatively includes the mobile source noise contribution from the Noise PCE screening analysis. The results of the building attenuation analysis for Phase 1 and Phase 2 are summarized in **Tables 17-6** and **17-7**.

**Table 17-7**
**Phase 2 CEQR Attenuation Requirements**

| Building | Proposed Building Façade Locations | Associated Receptor Site | Maximum $L_{10}$ (in dBA) | Attenuation Required (in dBA)[1] |
|---|---|---|---|---|
| Mercer | All Facades | 7 | 68.2 | NA[2] |
| LaGuardia | All Facades | 5 | 67.1 | NA[2] |

**Notes:**
Attenuation requirements are for spaces containing noise sensitive uses.
The proposed relocated dog run and proposed rooftop playground do not affect the Phase 2 Proposed Actions' buildings.
(1) CEQR attenuation requirements do not apply to mechanical space uses.
(2) "NA" indicates that the maximum measured $L_{10}$ is below 70 dBA. The *CEQR Technical Manual* does not address noise levels this low, therefore there is no minimum attenuation guidance.

A range of attenuation values is present for several building façades. The west façade of the proposed Zipper Building was outlined above. Attenuation requirements would range from 28 dBA to 33 dBA. Starting from the southern edge of the west façade, the first 10 feet would require 33 dBA of attenuation, the next 25 feet would require 31 dBA of attenuation, the next 60 feet would require 28 dBA of attenuation, and the rest of the west façade would have no attenuation requirements. The east façade of the proposed Zipper Building also requires a range of attenuation values. Starting from the southern edge of the east façade, the first 10 feet would require 33 dBA of attenuation, the next 25 feet would require 31 dBA of attenuation, and the rest of the east façade would require 28 dBA of attenuation. The noise level drop-off rate for building attenuation calculation was based on a 3 dBA reduction per doubling of distance from the dominant noise sources (i.e., West Houston Street and the dog run).

The eastern façade of the proposed Bleecker Building overlooking the play areas would require a range of attenuation values from 33 dBA of attenuation to 28 dBA of attenuation. The 8th and 9th floors would require 33 dBA of attenuation, the 10th floor would require 31 dBA of attenuation and the floors above the 10th floor would require 28 dBA of attenuation. The building attenuation calculations were based on the previously-mentioned *CEQR Technical Manual* guidance for noise drop-off at specific distances from the play area boundary.

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 consists of wall, glazing, and any vents or louvers associated with the building mechanical systems (HVAC) in various ratios of area. The proposed development's design would include acoustically rated windows and an alternate means of ventilation (i.e., air conditioning). The proposed development's façades would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating greater than or equal to the attenuation requirements listed in **Tables 17-6** and **17-7**. The OITC classification is defined by the American Society for Testing and Materials (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 specifications, the proposed buildings will thus provide sufficient attenuation to achieve the CEQR interior noise level guideline of 45 dBA or lower for residential and academic uses and 50 dBA or lower for retail and athletic uses.

As presented in **Table 17-2**, the *CEQR Technical Manual* has set noise exposure guidelines for open space, based on $L_{10(1)}$ noise levels. According to noise measurements in the Washington Square Village courtyard (Site 8), noise levels are currently, and would continue to be, slightly

above the 55 dBA $L_{10(1)}$ threshold for outdoor areas requiring serenity and quiet. The maximum dBA $L_{10(1)}$ would be expected to be in the high 50's and low 60's. Because the dominant noise at the project site results from traffic noise, there are no practical and feasible mitigation measures that could be implemented to reduce noise levels within the project site to below 55 dBA $L_{10(1)}$. Although noise levels in the project site are expected to continue to be above 55 dBA $L_{10(1)}$, these levels are comparable to or lower than noise levels in a number of the City's open spaces, including Hudson River Park, Riverside Park, Bryant Park, Prospect Park, Fort Greene Park, and other urban open space areas. The 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet; however, except for areas far away from traffic and other typical urban activities, this relatively low noise level is often not achieved. Consequently, noise levels in the proposed actions' new open space areas would be comparable to existing levels, while exceeding the 55 dBA $L_{10(1)}$ CEQR guideline value, would not result in a significant noise impact. ✷