Chapter 17: Noise

A. INTRODUCTION

The proposed project would not generate sufficient traffic to have the potential to cause a significant noise impact. However, the effect of ambient noise (i.e., noise from vehicular traffic, trains, and activities in baseball fields) is addressed in the following attachment and an analysis is presented that determines the level of building attenuation necessary to ensure that the proposed buildings' interior noise levels satisfy applicable CEQR interior noise criteria.

As described in Chapter 1, "Project Description," the proposed project would redevelop the northern portion of the Bronx Psychiatric Center (BPC) campus with a mix of commercial and medical office, bio-tech/research, hotel, accessory, college/trade school, community facility, and retail uses along with open space and parking facilities. For the purposes of this Environmental Impact Statement (EIS), it is assumed that in the future without the proposed project (the "No-Action" condition), the three primary, existing buildings (Bronx Children's Psychiatric, Thompson, and Parker Buildings) would remain vacant. The powerhouse, two metal shelters, and small storage building on the project site would also be vacated and decommissioned, and the ballfields would remain as in the existing condition. The proposed project would be completed in two phases, with 2023 as the analysis year for Phase I completion, and 2028 as the year for Phase II full build-out, or "With-Action" condition.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed project would not result in any significant adverse noise impacts at nearby noise receptors.

An analysis was completed to determine potential mobile source noise impacts at the New York State Office of Mental Health (OMH) Bronx Behavioral Health Center facility located immediately south of the project site. This analysis concludes that potential increases in traffic on roadways within or surrounding the OMH Bronx Behavioral Health Center facility would not result in significant adverse noise impacts in either Phase I or Phase II.

The proposed project buildings would be constructed using standard construction methods, including insulated glass windows and air conditioning as an alternate means of ventilation. The buildings' façades, including these elements, would be expected to satisfy the CEQR interior noise level requirements.

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 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_{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 NOISE CRITERIA

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 17-2**, "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, hotel guestroom, classroom, and inpatient medical uses and interior noise levels of 50 dBA or lower for retail, commercial office, conference center and medical office uses and are determined based on exterior $L_{10(1)}$ noise levels.

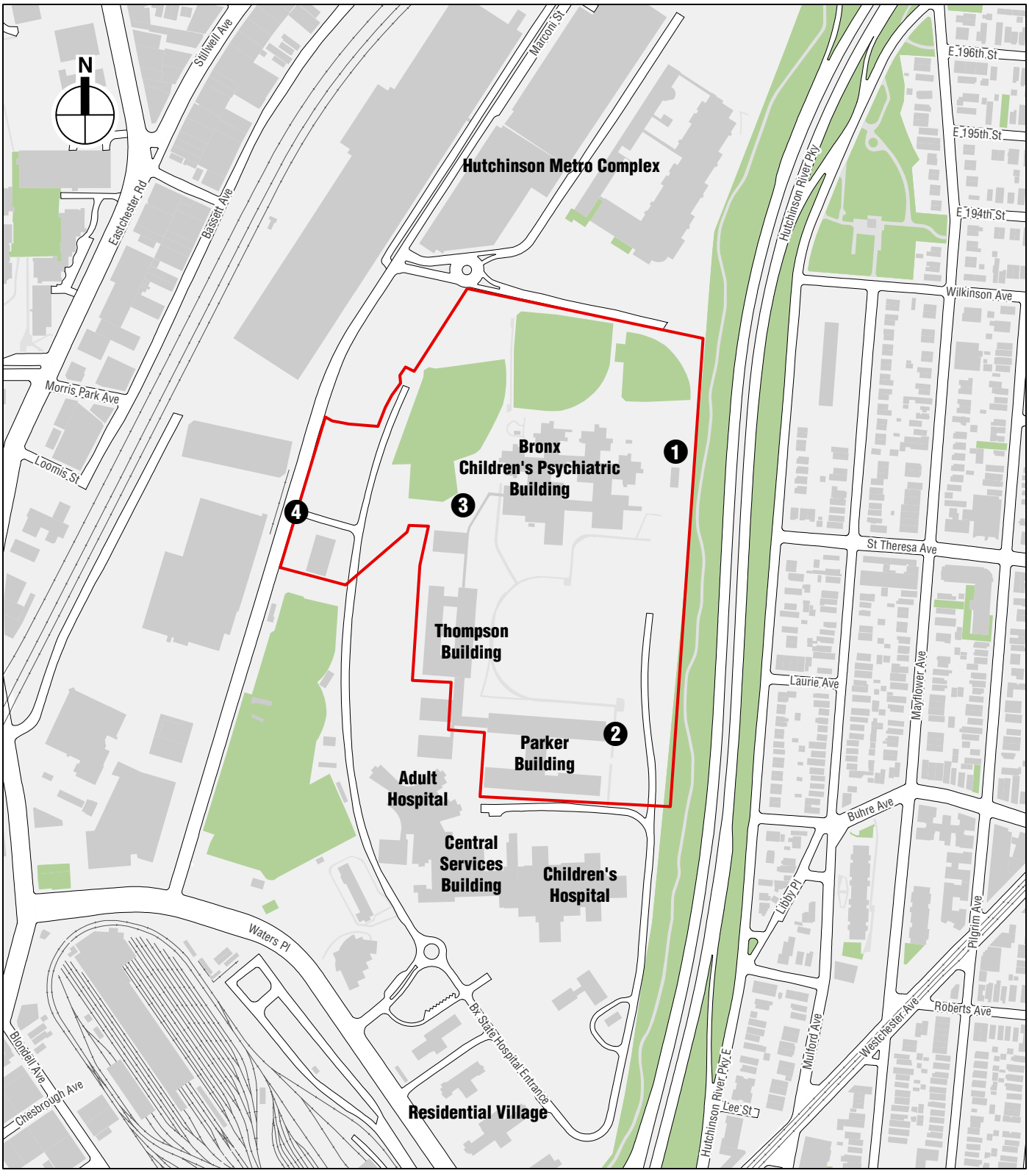
Table 17-2
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	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 hotel guestroom, classroom, and inpatient medical uses; requirements for retail, commercial office, and medical office 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

Four (4) receptor sites were selected for noise analysis. Site 1 was located at the northeast corner of the BPC campus near Hutchinson River Parkway, Site 2 was located east of the Parker Building, Site 3 was located at a BPC campus road near baseball fields, and Site 4 was located at Marconi Street near the BPC campus's entrance (see **Figure 17-1**).



Noise Receptor Locations

BRONX PSYCHIATRIC CENTER LAND USE IMPROVEMENT PROJECT

Figure 17-1

At each receptor site, existing noise levels were measured for 20-minute periods during the three weekday peak periods—AM (7:00 AM to 9:00 AM), midday (MD) (12:00 AM to 2:00 PM), and PM (4:00 PM to 5:30 PM). Measurements were taken on September 27, 2018.

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using Brüel & Kjær Sound Level Meter (SLM) Type 2260, Brüel & Kjær ½ inch microphones Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The SLM has a laboratory calibration date within one year of the date of the measurements. The microphone was mounted on a tripod at a height of approximately 5 feet above the ground and was mounted away from any large reflecting surfaces that could affect the sound level measurements. The SLM was calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements at the location were made on the A-scale (dBA). The data were digitally recorded by the SLM and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. A windscreen was used during all sound measurements except for calibration. All measurement procedures were based on the guidelines outlined in ANSI Standard S1.13-2005

NOISE SURVEY RESULTS

The results of the existing noise level measurements are summarized in **Table 17-3**. At all receptor sites, vehicular traffic noise on adjacent roadways was the dominant noise source. Measured levels were relatedly low to moderate and reflected the level of vehicular activity on the adjacent roadways. In terms of the CEQR criteria, the existing noise levels are in the "marginally acceptable" category at Sites 1, 2, and 4, and the existing noise levels are in the "acceptable" category at Site 3.

Table 17-3
Existing Noise Levels (in dBA)

Site	Measurement Location	Date	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Northeast Corner of Campus	Weekday	AM	65.8	71.5	66.7	65.3	64.0
			MD	63.2	65.7	64.5	63.2	61.5
			PM	64.8	67.4	65.7	64.7	63.5
2	East of Parker Building	Weekday	AM	64.9	70.9	65.7	64.4	63.5
			MD	61.7	65.0	62.8	61.5	60.2
			PM	62.9	66.1	64.0	62.6	61.6
3	Campus Road near Baseball Fields	Weekday	AM	57.8	66.6	58.5	56.2	55.3
			MD	52.4	56.5	53.6	52.0	50.9
			PM	56.2	62.8	57.6	55.1	53.9
4	Marconi Street near Campus Entrance	Weekday	AM	64.5	72.1	68.3	60.6	56.3
			MD	62.9	72.8	66.0	59.8	54.3
			PM	61.4	70.8	64.0	58.7	55.0

Note: Field measurements were performed by AKRF, Inc. on September 27, 2018.

E. NEW YORK STATE OFFICE OF MENTAL HEALTH BRONX BEHAVIORAL HEALTH CENTER FACILITY

An analysis was completed to determine potential mobile source noise impacts at the OMH Bronx Behavioral Health Center facility located immediately south of the proposed project site. In the 2023 Phase I analysis year, the proposed project would not generate sufficient traffic to have the

potential to cause a significant adverse noise impact along the access roads surrounding or within the OMH Bronx Behavioral Health Center (i.e., it would not result in a doubling of noise passenger car equivalents [Noise PCEs], which would be necessary to cause a 3 dBA increase in noise levels). In the 2028 Phase II analysis year, the proposed project would generate sufficient traffic along the BPC west access road in the OMH Bronx Behavioral Health Center facility to result in a noise level increase of 3 dBA during morning and midday peak time periods and a noise level increase of 4 dBA during the evening peak time period. However, the measured existing noise levels at the OMH facility are below 61 dBA during the morning peak time period and below 60 dBA during the midday and evening peak time periods and would require a 4 dBA increase and 5 dBA increase, respectively to constitute a significant adverse noise impact. Consequently, potential increases in traffic on roadways within or surrounding the OMH Bronx Behavioral Health Center facility would not result in significant adverse noise impacts in either Phase I or Phase II.

F. NOISE ATTENUATION MEASURES

As shown in Table 17-2, 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, hotel guestroom, classroom, and inpatient medical uses and interior noise levels of 50 dBA or lower for retail, commercial office, conference center and medical office. The proposed project buildings would be constructed using standard construction methods, including insulated glass windows and air conditioning as an alternate means of ventilation. The buildings' façades, including these elements, would be expected to provide a composite Outdoor-Indoor Transmission Class[1] (OITC) such that interior noise levels would satisfy the CEQR interior noise criteria mentioned above. Furthermore, because the measured exterior $L_{10(1)}$ noise levels at the project site would be less than 70 dBA, the *CEQR Technical Manual* does not provide a specific requirement for the level of window/wall attenuation.

G. MECHANICAL EQUIPMENT

It is assumed that the building's 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 project would not result in any significant adverse noise impacts related to building mechanical equipment. ✷

[1] 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. A building façade generally consists of wall, glazing, and any vents or louvers associated with building mechanical systems. The OITC classification is defined by the American Society of Testing and Materials ("ASTM") E1332-10 and is used in the acoustical design of building façades.