Chapter 15: Noise

A. INTRODUCTION

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

B. PRINCIPAL CONCLUSIONS

The noise analysis concludes that noise level increases of up to 3.1 dBA compared with the No Action condition at the receptor location on Richmond Valley Road between Arthur Kill Road and Page Avenue as a result of increased traffic generated by the Proposed Project on that block. A noise level increase of 3.1 dBA would be considered a significant adverse noise impact for residential uses. However, as there are currently no residential uses near this receptor location, and the M1-1 zoning designation precludes new residential development, this exceedance is not considered a significant adverse impact.

At all other noise receptor sites, the predicted noise level increases resulting from the Proposed Project would be no greater than 1.2 dBA, which would be considered imperceptible and not significant according to *CEQR Technical Manual* noise impact criteria.

The building attenuation analysis concludes that in order to ensure interior noise levels at the Proposed Project buildings that would meet CEQR interior noise level requirements, up to 30 dBA of building attenuation would be required. The attenuation requirements would be included in Noise (E) designation E-443. With the prescribed levels of building attenuation, noise exposure at the Proposed Project would not have the potential to result in a significant adverse impact.

C. ACOUSTICS FUNDAMENTALS

"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 15-1**, 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 15-1
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 ten 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 three dBA. At five 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 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., one 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 ten 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 maximum one-hour equivalent sound level (i.e., $L_{eq(1)}$) has been selected as the noise descriptor to be used in this noise impact evaluation. $L_{eq(1)}$ is the noise descriptor recommended for use in the *CEQR Technical Manual* for vehicular traffic and is used to provide an indication of highest expected sound levels. The one-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 CEQR NOISE CRITERIA

The *CEQR Technical Manual* defines attenuation requirements for buildings based on exterior noise level (see **Table 15-2**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 50 dBA or lower for retail/commercial uses and are determined based on exterior $L_{10(1)}$ noise levels.

Table 15-2
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With the Proposed Project	$70 < L_{10} \leq 73$	$73 < L_{10} \leq 76$	$76 < L_{10} \leq 78$	$78 < L_{10} \leq 80$	$80 < L_{10}$
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 classroom uses. Office/administrative 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 dB(A).
Source: New York City Department of Environmental Protection.

IMPACT DEFINITION

The determination of significant adverse noise impacts in this analysis is informed by the use of both absolute noise level limits and relative impact criteria. The *CEQR Technical Manual* states that "it is reasonable to consider 65 dBA $L_{eq(1)}$ as an absolute noise level that should not be significantly exceeded." Therefore, the determination of impacts first considers whether a projected noise increase would result in noise levels exceeding 65 dBA $L_{eq(1)}$. Where appropriate, this study also consults the following relative impact criteria to define a significant adverse noise impact, as recommended in the *CEQR Technical Manual*:

- An increase of 5 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over those calculated for the No Action condition, if the No Action levels are less than 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 4 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action condition, if the No Action levels are 61 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action condition, if the No Action 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 With Action $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Action 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. EXISTING NOISE LEVELS

SELECTION OF NOISE RECEPTOR LOCATIONS

A total of four (4) receptor sites adjacent to the Proposed Project were selected for evaluation of noise attenuation requirements and mobile source analysis. Receptor site 1 was located in the parking lot of 4849 Arthur Kill Road, receptor site 2 was located on Arthur Kill Road between South Bridge Street and Richmond Valley Road, receptor site 3 was located in the parking lot of 4915 Arthur Kill Road, and receptor site 4 was located on Richmond Valley Road between Arthur Kill Road and Page Avenue (see **Figure 15-1**).

Receptor sites 1 through 3 were used as part of the building attenuation analysis for the Proposed Project. Receptor sites 2 and 4 were analyzed for potential mobile source noise impacts.

NOISE MONITORING

At each receptor site, existing noise levels were determined by field measurements. Noise monitoring was performed between September 26, 2015 and July 16, 2016. At all receptor sites, 20-minute spot measurements were performed. All measurements were performed during the weekday peak periods—midday (MD) (12:00 to 2:00 PM), and PM (4:30 to 6:30 PM)—and during the Saturday peak period—midday (MD) (12:00 to 2:00 PM).

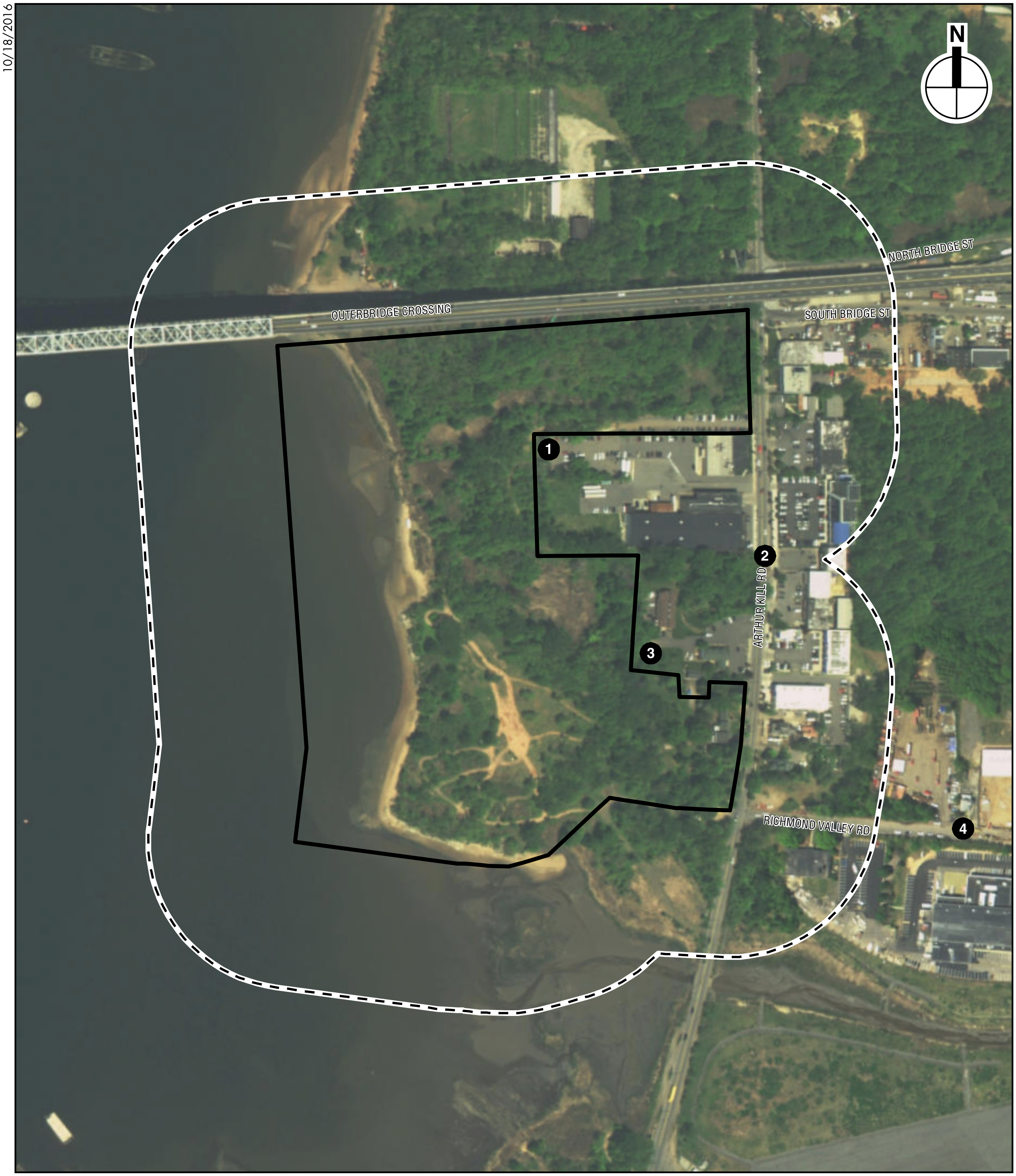
EQUIPMENT USED DURING NOISE MONITORING

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

MEASURED NOISE LEVELS

The results of the measurements of existing noise levels are summarized in **Table 15-3**.

10/18/2016



Development Site

Study Area (400-foot boundary)

Noise Receptor Location

0 200 FEET

RIVERSIDE GALLERIA

Noise Receptor Locations

Figure 15-1

Table 15-3
Existing Noise Levels (dBA)

Site	Measurement Location	Time		L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Parking Lot of 4849 Arthur Kill Road	Weekday	MD	54.1	58.5	55.4	53.7	52.5
			PM	54.5	60.5	55.3	53.9	52.9
		Saturday	MD	56.6	60.7	58.5	56.1	54.4
2	Arthur Kill Road between South Bridge Street and Richmond Valley Road	Weekday	MD	72.8	80.3	76.5	71.0	61.9
			PM	70.0	77.8	72.7	68.0	61.4
		Saturday	MD	72.5	81.0	76.1	70.0	62.8
3	Parking Lot of 4915 Arthur Kill Road	Weekday	MD	56.2	61.9	58.0	55.3	53.8
			PM	52.8	58.3	54.2	52.1	51.1
		Saturday	MD	53.5	57.5	55.3	53.0	51.6
4	Richmond Valley Road between Arthur Kill Road and Page Avenue	Weekday	MD	67.6	78.4	70.4	63.0	54.7
			PM	66.6	74.9	70.2	63.8	54.5
		Saturday	MD	65.3	73.6	69.8	60.4	50.4

Notes: Field measurements were performed by AKRF, Inc. between September 26, 2015 and July 16, 2016.

Vehicular traffic was the dominant noise source at all receptor sites. Noise levels range from low to relatively high and reflect the level of vehicular activity present on the adjacent roadways. Traffic volumes and vehicle classification counts were performed simultaneously with the noise monitoring.

In terms of CEQR Technical Manual criteria, existing noise levels at receptor sites 1 and 3 are in the "acceptable" category (i.e., $L_{10(1)}$ noise levels less than 65 dBA), existing noise levels at receptor sites 2 and 4 are in the "marginally unacceptable" category (i.e., $L_{10(1)}$ noise levels greater than 70 dBA and less than or equal to 80 dBA).

F. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

Future noise levels were calculated using a proportional modeling technique, which was used as a screening tool to estimate changes in noise levels. The proportional modeling technique is an analysis methodology recommended for analysis purposes in the CEQR Technical Manual. The noise analysis examined the weekday midday (MD) and PM peak hours as well as Saturday midday (MD). The selected time periods are when development facilitated by the Proposed Project would be expected to produce the maximum traffic generation (based on the traffic studies presented in Chapter 12, "Transportation") and therefore result in the maximum potential for significant noise level increases. The methodology used for the noise analysis is described below.

PROPORTIONAL MODELING

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

Using this technique, the prediction of future noise levels where traffic is the dominant noise source is based on a calculation using measured existing noise levels and predicted changes in traffic volumes to determine No Action and With Action noise levels. Vehicular traffic volumes are converted into Passenger Car Equivalent (PCE) values, for which one car or light truck (having a gross weight less than 9,900 pounds) is assumed to generate the noise equivalent of one car, 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 * log10 (F PCE / E PCE)

where:

F NL = Future Noise Level

E NL = Existing Noise Level

F PCE = Future PCEs

E PCE = Existing PCEs

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

G. THE FUTURE WITHOUT THE PROPOSED PROJECT

Using the methodology previously described, No Action noise levels for the 2019 analysis year were calculated at the four noise receptor sites. These No Action noise levels are shown in **Table 15-4**.

Table 15-4
2019 No Action Condition Noise Levels (dBA)

Receptor	Location	Time		Existing $L_{eq(1)}$	No Action $L_{eq(1)}$	$L_{eq(1)}$ Change	No Action $L_{10(1)}$
1	Parking Lot of 4849 Arthur Kill Road	Weekday	MD	54.1	55.4	1.3	56.7
			PM	54.5	55.8	1.3	56.6
		Saturday	MD	56.6	58.0	1.4	59.9
2	Arthur Kill Road between South Bridge Street and Richmond Valley Road	Weekday	MD	72.8	74.1	1.3	77.7
			PM	70.0	71.3	1.3	73.9
		Saturday	MD	72.5	73.9	1.4	77.4
3	Parking Lot of 4915 Arthur Kill Road	Weekday	MD	56.2	57.5	1.3	59.3
			PM	52.8	54.1	1.3	55.5
		Saturday	MD	53.5	54.9	1.4	56.7
4	Richmond Valley Road between Arthur Kill Road and Page Avenue	Weekday	MD	67.6	69.1	1.5	71.9
			PM	66.6	68.2	1.6	71.8
		Saturday	MD	65.3	67.0	1.7	71.5

Note: The $L_{eq(1)}$ Change from receptor site 2 was conservatively assigned to receptors sites 1 and 3.

In 2019, the maximum increase in $L_{eq(1)}$ noise levels for the No-Action condition would be 1.7 dBA. Changes of this magnitude would be imperceptible. In terms of CEQR noise exposure guidelines, noise levels at receptor sites 1 and 2 would remain in the “acceptable” category (i.e., $L_{10(1)}$ noise levels less than 65 dBA) and noise levels at receptor sites 2 and 4 would remain in the “marginally unacceptable” category (i.e., $L_{10(1)}$ noise levels greater than 70 dBA and less than or equal to 80 dBA).

H. THE FUTURE WITH THE PROPOSED PROJECT

Using the methodology previously described, With Action noise levels for the 2019 analysis year were calculated at the four noise receptor sites. The With Action noise levels are shown in **Table 15-5**.

Table 15-5
2019 With Action Condition Noise Levels (dBA)

Receptor	Location	Time		No Action $L_{eq(1)}$	With Action $L_{eq(1)}$	$L_{eq(1)}$ Change	With Action $L_{10(1)}$
1	Parking Lot of 4849 Arthur Kill Road	Weekday	MD	55.4	56.4	1.0	57.7
			PM	55.8	56.7	0.9	57.5
		Saturday	MD	58.0	59.2	1.2	61.1
2	Arthur Kill Road between South Bridge Street and Richmond Valley Road	Weekday	MD	74.1	75.1	1.0	78.7
			PM	71.3	72.2	0.9	74.8
		Saturday	MD	73.9	75.1	1.2	78.6
3	Parking Lot of 4915 Arthur Kill Road	Weekday	MD	57.5	58.5	1.0	60.3
			PM	54.1	55.0	0.9	56.4
		Saturday	MD	54.9	56.1	1.2	57.9
4	Richmond Valley Road between Arthur Kill Road and Page Avenue	Weekday	MD	69.1	71.4	2.3	74.2
			PM	68.2	70.2	2.0	73.8
		Saturday	MD	67.0	70.1	3.1	74.6

Note: The $L_{eq(1)}$ Change from receptor site 2 was conservatively assigned to receptors sites 1 and 3.

In 2019, the maximum increase in $L_{eq(1)}$ noise levels for the With Action condition compared to the No Action condition for receptor sites 1, 2, and 3 would be 1.2 dBA for each receptor site. Changes of this magnitude would be imperceptible and would not constitute a significant noise impact according to *CEQR Technical Manual* impact criteria. In terms of CEQR noise exposure guidelines, noise levels at receptor sites 1 and 3 would remain in the “acceptable” category (i.e., $L_{10(1)}$ noise levels less than 65 dBA) and noise levels at receptor sites 2 and 4 would remain in the “marginally unacceptable” category (i.e., $L_{10(1)}$ noise levels greater than 70 dBA and less than or equal to 80 dBA).

In 2019, the maximum increase in $L_{eq(1)}$ noise levels for the With Action condition compared to the No Action condition at receptor site 4 would be 3.1 dBA. This is a result of increased traffic traveling to and from the project site along Richmond Valley Road between Arthur Kill Road and Page Avenue in the future With Action condition. Changes of the magnitude predicted to occur at receptor site 4 would be “just noticeable” according to *CEQR Technical Manual* terminology. Therefore, noise level increases during the Saturday MD peak period would be considered a significant adverse noise impact for residential uses. However, as there are no residential uses located near receptor site 4, and the M1-1 zoning designation precludes new residential uses from being developed, this noise level increase is not considered a significant adverse noise impact.

During the weekday MD and PM peak periods, noise level increases are predicted to be no greater than 2.3 dBA and would not be considered a significant adverse noise impact.

I. NOISE ATTENUATION MEASURES

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

Table 15-6 shows the minimum window/wall attenuation necessary to meet *CEQR Technical Manual* requirements for internal noise levels at each of the noise measurement locations. The With Action condition $L_{10(1)}$ noise levels were calculated using the existing noise measurements and the traffic noise analysis. Based on the values shown in Table 15-6, required attenuation levels were determined for the Proposed Project. All façades located within 50 feet of Arthur Kill Road would be required to provide 30 dBA of window/wall attenuation.

Table 15-6
Required Attenuation at Noise Measurement Locations

Noise Receptor Location	Maximum Calculated Total $L_{10(1)}$ Noise Level in dBA	CEQR Minimum Required Attenuation in dBA[1,2]
1	66.6	N/A
2	78.7	30
3	67.6	N/A

Notes:
(1) Attenuation values are shown for retail/commercial uses; residential uses would require 5 dBA more attenuation.
(2) "N/A" indicates that the L10 value is less than 70 dB(A). The CEQR Technical Manual does not address noise levels this low, therefore there is no minimum attenuation guidance.

To implement the attenuation requirements shown in **Table 15-6**, an (E) designation for noise (E-443) would be applied to the Proposed Project specifying 30 dBA of window/wall attenuation. The text of the (E) designation would be as follows:

> **To ensure an acceptable interior noise environment, the building façade(s) of future development facing Arthur Kill Road must provide 30 dB(A) window/wall attenuation, in order to maintain an interior L_{10} noise level not greater than 50 dBA for commercial uses. To maintain a closed-window condition in these areas, an alternate means of ventilation that brings outside air into the building without degrading the acoustical performance of the building façade(s) must also be provided.**

The attenuation of a composite structure is a function of the attenuation provided by each of its component parts and the surface area of each part. Normally, a building façade consists of wall, glazing, and any vents or louvers associated with the building mechanical systems in various ratios of area. The designs for the Proposed Project would include acoustically rated windows and air conditioning (a means of alternate ventilation). The buildings would be designed, including these elements, to provide composite window/wall attenuation of 30 dBA, along with an alternative means of ventilation.

J. 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) 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. ✷