## Chapter 5: Noise

## A. INTRODUCTION

The noise analysis presented in this chapter focuses on whether traffic generated by the proposed project would have the potential to result in significant noise impacts. Assessments of interior noise levels and noise from stationary sources are not provided in this chapter because it was determined in the Environmental Assessment Statement (EAS) that this project would not have the potential for significant adverse noise impacts from stationary sources.

In this EIS, a screening analysis for mobile sources was conducted. As discussed below, increases in noise levels would be below the CEQR threshold for a significant adverse impact. Therefore, no further analysis is warranted, and the project would also not result in significant adverse noise impacts from mobile sources.

## B. NOISE FUNDAMENTALS

Quantitative information on the effects of airborne noise on people is well-documented. If sufficiently loud, noise may interfere with human activities such as sleep, speech communication, and tasks requiring concentration or coordination. It may also cause annoyance, hearing damage, and other physiological problems. Several noise scales and rating methods are used to quantify the effects of noise on people, taking into consideration such factors as loudness, duration, time of occurrence, and changes in noise level with time. However, it must be noted that all the stated effects of noise on people vary greatly with each individual.

### "A"-WEIGHTED SOUND LEVEL (dBA)

Noise is typically measured in units called decibels (dB), which are 10 times the logarithm of the ratio of the sound pressure squared to a standard reference presence squared. Because loudness is important in the assessment of the effects of noise on people, the dependence of loudness on frequency must be taken into account in the noise scale used in environmental assessments. One of the simplified scales that accounts for the dependence of perceived loudness on frequency is the use of a weighting network, known as "A"-weighting, in the measurement system to simulate the response of the human ear. For most noise assessments, the A-weighted sound pressure level in units of dBA is used in view of its widespread recognition and its close correlation with perception. In this chapter, all measured noise levels are reported in A-weighted decibels (dBA). Common noise levels in dBA are shown in **Table 5-1**.

### ABILITY TO PERCEIVE CHANGES IN NOISE LEVELS

The average ability of an individual to perceive changes in noise levels is well-documented (see **Table 5-2**). Generally, changes in noise levels of less than 3 dBA are barely perceptible to most listeners, whereas changes in noise levels of 10 dBA are normally perceived as doubling (or halving) of noise loudness. These guidelines permit direct estimation of an individual's probable perception of changes in noise levels.

**Table 5-1**
**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.

**Table 5-2**
**Average Ability to Perceive Changes in Noise Levels**

| Change (dBA) | Human Perception of Sound |
|---|---|
| 2–3 | Barely perceptible |
| 5 | Readily noticeable |
| 10 | A doubling or halving of the loudness of sound |
| 20 | A "dramatic change" |
| 40 | Difference between a faintly audible sound and a very loud sound |

**Source:** Bolt, Beranek and Newman, Inc., *Fundamentals and Abatement of Highway Traffic Noise*, Report No. PB-222-703. Prepared for Federal Highway Administration, June 1973.

## NOISE DESCRIPTORS USED IN IMPACT ASSESSMENT

Because the sound pressure level unit of dBA describes a noise level at just one moment, and because very few noises are constant, other ways of describing noise over more extended periods have been developed. One way is to describe the fluctuating noise heard over a specific 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 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 sometimes used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively. Discrete event peak levels are given as $L_{01}$ levels.

The maximum 1-hour equivalent sound level ($L_{eq(1)}$) 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 2010 *CEQR Technical Manual* for vehicular traffic and is used to provide an indication of highest expected sound levels.

## C. NOISE STANDARDS, CRITERIA, AND IMPACT DEFINITION

Noise levels associated with the construction and operation of the proposed actions would be subject to the emission source provisions of the New York City Noise Control Code and to noise criteria set for the CEQR process. Other standards and guidelines promulgated by federal agencies do not apply to project noise control, but are useful to review in that they establish measures of impacts.

The New York City Noise Control Code, amended in December 2005, contains prohibitions regarding unreasonable noise, requirements for noise due to construction activities, circulation devices, and specific noise standards, with some specific noise sources being prohibited from being “plainly audible” within a receiving property.

As recommended in the 2010 *CEQR Technical Manual*, this study uses the following criterion to define the potential for a significant adverse noise impact: an increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors (including residences, play areas, parks, schools, libraries, and houses of worship) over existing noise levels.

## D. NOISE PREDICTION METHODOLOGY

### PROPORTIONAL MODELING

In the study area, the dominant operational noise sources are vehicular traffic on adjacent and nearby streets and roadways. Noise from other sources, such as local or nearby industrial or commercial uses, are limited and do not contribute significantly to local ambient noise levels. To screen area roadways for the potential for a significant project impact, a proportional modeling technique was used to determine approximate increases in noise levels.

Using the proportional modeling technique, the prediction of future changes in noise levels, where traffic is the dominant noise source, is based on a calculation using predicted changes in traffic volumes. Using this methodology, vehicular traffic volumes (see Chapter 3, “Transportation”) were converted into Passenger Car Equivalent (PCE) values, for which one medium-duty truck (having a gross weight between 9,900 and 26,400 pounds) is assumed to generate the noise equivalent of 13 cars; 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 changes noise levels are calculated using the following equation:

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

where:

F NL = Future Noise Level
E NL = Existing Noise Level
F PCE = Future PCEs
E PCE = Existing PCEs

With this methodology, assuming 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.

### ANALYSIS PROCEDURE

To determine potential noise impacts from the project-generated traffic noise source, the following procedure was used in performing the noise analysis:

- Locations within the adjacent study area where the maximum project noise levels would be most likely to occur were determined;
- Changes in the future with the proposed project noise levels were calculated using the proportional technique previously described; and
- Predicted changes in noise levels were compared to CEQR noise impact criteria.

## E. THE FUTURE WITHOUT THE PROPOSED ACTIONS

As discussed in Chapter 3, "Transportation," future No Build traffic volumes were developed by applying a background traffic growth rate of 2 percent (0.5 percent per year). Traffic level increases of this amount would not result in a doubling of PCEs and would therefore cause increases in noise levels below 3.0 dBA. Changes of these magnitudes would be barely perceptible and insignificant.

## F. PROBABLE IMPACTS OF THE PROPOSED PROJECT

Using the methodology previously described, future changes in noise levels with the proposed project were calculated for the 2014 analysis year during the three project peak time periods (mid-day [MD] arrivals, mid-day [MD] departures, and evening [PM] arrivals) at adjacent locations with the highest likelihood for significant changes in noise levels. The values of the future changes in noise level with the proposed project are shown in **Table 5-3**.

**Table 5-3**
**Future Changes in Noise Levels With the Proposed Project (in dBA)**

| Site | Location | Peak Hour | Existing Noise PCEs | Build Generated and Diverted Noise PCEs | % Increase | dBA Increase | Potential Impact? |
|---|---|---|---|---|---|---|---|
| 1 | Flatbush Avenue and Regent Place and Tilden Avenue | MD Arrivals | 2973 | 351 | 11.8% | 0.5 | no |
| | | MD Departures | 2618 | 290 | 11.1% | 0.5 | no |
| | | PM | 2471 | 322 | 13.0% | 0.5 | no |
| 2 | Flatbush Avenue and Duryea Place and Beverly Road North | MD Arrivals | 3163 | 279 | 8.8% | 0.4 | no |
| | | MD Departures | 2641 | 281 | 10.6% | 0.4 | no |
| | | PM | 2604 | 271 | 10.4% | 0.4 | no |
| 3 | Flatbush Avenue and Beverly Road South | MD Arrivals | 2810 | 216 | 7.7% | 0.3 | no |
| | | MD Departures | 2712 | 244 | 9.0% | 0.4 | no |
| | | PM | 2480 | 220 | 8.9% | 0.4 | no |

In 2014, the increase in noise levels would be less than 1 dBA for all the analysis periods at all three analysis locations. Changes of these magnitudes would be barely perceptible and insignificant, and they would be below the CEQR threshold for a significant adverse impact. Therefore, no further analysis is warranted, and, in addition to the determination in the EAS that the project would not result in significant adverse noise impacts from stationary sources, the assessment above indicates that the project would also not result in significant adverse noise impacts from mobile sources. ✷