A. INTRODUCTION

This chapter considers the potential for the proposed actions to result in significant adverse noise impacts. As described in Chapter 1, "Project Description," the applicants, the New York City Department of City Planning (DCP) and SJC 33 Owner 2015 LLC, are proposing a series of discretionary actions (the proposed actions) that would facilitate the redevelopment of St. John's Terminal Building at 550 Washington Street (Block 596, Lot 1) (the development site) with a mix of residential and commercial uses, and public open space (the proposed project) in Manhattan Community District 2. According to the 2014 *City Environmental Quality Review (CEQR) Technical Manual,* a noise analysis may be required when a project would generate mobile or stationary sources of noise and/or would be located in an area with existing high ambient noise levels.

The proposed project would not generate sufficient traffic to 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 would be necessary to cause a 3 dBA increase in noise levels). However, since the project would be located in an area with existing high ambient noise levels (e.g., noise from vehicular traffic), this chapter includes an analysis that determines the level of building attenuation necessary to ensure that the proposed buildings' interior noise levels satisfy applicable CEQR interior noise criteria.

PRINCIPAL CONCLUSIONS

The analysis finds that the proposed actions would not result in any significant adverse noise impacts. The proposed project would not generate sufficient traffic to have the potential to cause a significant noise impact (mobile sources). It is assumed that the building's mechanical systems would be designed to meet all applicable noise regulations 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 (stationary sources).

Due to existing high levels of ambient noise in the area, building attenuation would be required to ensure that interior noise levels meet CEQR criteria. The proposed design for the building includes acoustically-rated windows and central air conditioning as an alternate means of ventilation. The proposed buildings would provide sufficient attenuation to achieve the CEQR interior $L_{10(1)}$ noise level guideline of 45 dBA or lower for residential uses and hotel rooms and 50 dBA or lower for retail or office uses. The window/wall attenuation and alternate means of ventilation requirements would be codified in a Noise (E) Designation on the project site. ~~The window/wall attenuation requirements may be altered because new measurements will be conducted in all four receptor locations between the Draft Environmental Impact Statement (DEIS) and Final Environmental Impact Statement (FEIS) to account for the new truck traffic generated by the nearby Department of Sanitation of New York (DSNY) garage.~~

The analysis of noise levels was conservative as it assumed that ~~at~~ the structure and public open space over West Houston Street would not act as a barrier to traffic noise. The proposed publicly accessible open space analysis concludes that noise levels would be greater than the 55 dBA $L_{10(1)}$ CEQR guideline, but would be comparable to other parks around New York City. Therefore, the future projected noise levels would not constitute a significant adverse noise impact to the proposed project's open space.

B. ANALYSIS APPROACH

As described in Chapter 2, "Analytical Framework," in the future with the proposed actions (the With Action condition), the development site is assumed to be redeveloped with one of two development programs: the proposed project or the proposed project with big box retail. In addition, under both of these scenarios, the South Site could contain either hotel or office use. Both of these scenarios, including the potential for hotel or office use on the South Site, are considered in this detailed analysis.

C. ACOUSTICS 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; 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.

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.

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.

SOUND LEVEL DESCRIPTORS

Because the sound pressure level unit of dBA describes a noise level at just one moment and 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., one 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 little, L_{eq} will approximately 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 project, the L_{10} descriptor has been selected as the noise descriptor to be used in this noise impact evaluation. 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 17-2**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA or lower for residential uses and interior noise levels of 50 dBA or lower for commercial/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 requirements are for residential dwellings and community facility development. Commercial uses would require 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.

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 Actioin $L_{eq(1)}$ 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

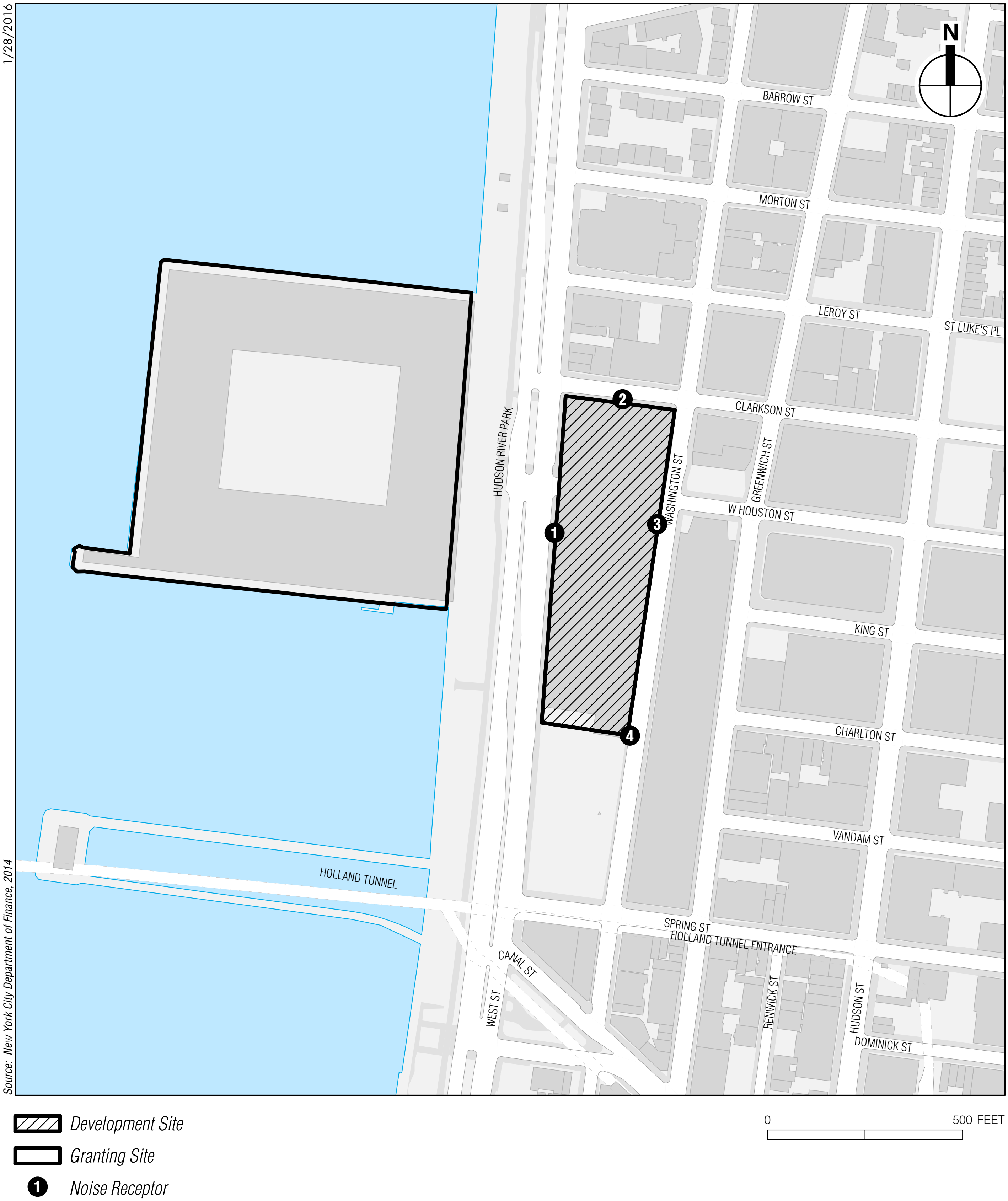
Existing noise levels at the development site were measured at four locations. Receptor site 1 was located on West Street between West Houston and Spring Streets; site 2 was located on Clarkson Street between West and Washington Streets; site 3 was located on Washington Street near West Houston Street; and site 4 was located further south on Washington Street between West Houston and Spring Streets closer to the entrance/exit to the adjacent Department of Sanitation of New York (DSNY) facility (see **Figure 17-1**).

Because the noise level measurements conducted as part of the DEIS analysis included measurements both prior to and after the opening of the Department of Sanitation of New York (DSNY) garage on Washington Street adjacent to the project site, noise level measurements at each of the four receptor sites were repeated to ensure that noise from operation of the DSNY facility was included in the measured existing condition noise levels. The results of the updated noise survey have been substituted in place of the noise survey results used in the DEIS.

All four receptor sites were used to evaluate noise at the project site, primarily associated with general vehicular traffic on adjacent roadways during the traffic peak periods. At these receptor sites, the existing noise levels were measured for a 20-minute period during the following time periods: weekday AM (7:00 AM to 9:00 AM), midday (MD) (12:00 to 2:00 PM), pre-PM (2:30 to 3:30 PM) and PM (4:30 PM to 6:30 PM); as well as Saturday AM (Sat AM) (5:45-6:45 AM) and midday (Sat MD) (12:30 to 1:30 PM). These hours account for the typical peak noise exposure periods as well as the DSNY facility's peak operating hours. The DSNY facility's peak operating hours include weekday AM (6:45– 7:45 AM), MD (11:15 AM to 12:15 PM), Pre-PM (2:30 to 3:30 PM), as well as Saturday AM (5:45-6:45 AM) and MD (12:30 to 1:30 PM). the three weekday peak periods AM (7:00 AM to 9:00 AM), midday (MD) (12:00 PM to 2:00 PM), and PM (4:30 PM to 6:30 PM). Some of these measurement time periods represent the typical peak hours for noise exposure. The DSNY facility's peak operating hours include AM (6:45 7:45 AM), MD (11:15 AM to 12:15 PM), Pre-PM (2:30 to 3:30 PM), and Saturday AM (5:45-6:45 AM) and Saturday MD (12:30 to 1:30 PM). Measurements were taken June 23, 2015, June 24, 2015, September 29, 2015, October 22, 2015, and March 10, 20161 and 4, 2016.

At receptor sites 1 through 3, noise measurements were conducted in 2015, prior to the operation of the DSNY facility. At these locations future noise level calculations took into account the projected increase in traffic resulting from operation of the DSNY facility. Since the DSNY facility is now in operation, a new set of measurements will be conducted to assess the existing noise levels at receptors sites 1 through 3 between the DEIS and FEIS. Measurements will be conducted during the following time periods: weekday AM (7:00 AM to 9:00 AM), midday (MD) (12:00 to 2:00 PM), pre-PM (2:30 to 3:30 PM) and PM (4:30 PM to 6:30 PM); as well as Saturday AM (Sat AM) (5:45-6:45 AM) and Saturday midday (Sat MD) (12:30 to 1:30 PM) . These hours account for the typical peak noise exposure periods as well as the DSNY facility's peak operating hours. The new measurements will replace the existing measurements and the analysis will be updated accordingly.

At Receptor site 4, noise measurements were conducted during the AM, MD and PM peak period while the DSNY facility was in operation. Between the DEIS and FEIS, measurements will be conducted at site 4 during the Weekday Pre-PM (2:30 to 3:30 PM), Sat AM (5:45-6:45 AM) and Sat MD (12:30 to 1:30 PM) time periods to account for peak DSNY vehicle activity, and these time periods will be added to the noise analysis.



Source: New York City Department of Finance, 2014

550 WASHINGTON STREET

Noise Measurement Locations

Figure 17-1

EQUIPMENT USED DURING NOISE MONITORING

Measurements were performed using a Brüel & Kjær Sound Level Meter (SLM) Type 2260, a Brüel & Kjær ½-inch microphone Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The SLM has a valid laboratory calibration within 1 year, as is standard practice. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The microphone was mounted at a height of approximately five feet above the ground surface on a tripod and at least approximately 5 feet away from any large reflecting surfaces. The SLM was calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements were made on the dBA. The data were digitally recorded by the sound level meter 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 17-3**[1].

Table 17-3
Existing Noise Levels in dBA

Site	Location	Time Period	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	340 West Street between West Houston and Spring Street	AM	78.9	86.4	82.8	76.9	67.4
		MD	79.1	88.9	80.2	72.9	68.0
		Pre-PM	77.7	85.0	81.5	74.5	65.9
		PM	78.0	85.8	82.4	73.6	66.5
		Sat AM	82.7	85.6	80.6	70.3	61.6
		Sat MD	76.8	84.7	81.0	71.9	65.0
2	Middle of Clarkson between West Street and Washington Street	AM	71.7	80.7	74.0	68.6	66.5
		MD	74.4	81.1	76.0	73.3	72.0
		Pre-PM	71.9	77.8	73.7	71.0	69.8
		PM	72.2	80.2	74.6	70.4	67.6
		Sat AM	70.0	77.9	72.5	68.3	65.2
		Sat MD	71.3	79.0	73.1	70.0	67.9
3	Washington Street near West Houston Street	AM	68.2	80.1	68.6	62.2	60.2
		MD	71.6	83.9	72.5	66.7	64.3
		Pre-PM	70.4	82.3	71.8	63.8	60.7
		PM	68.9	79.9	69.2	63.4	60.9
		Sat AM	65.0	77.4	66.2	58.8	58.0
		Sat MD	70.7	81.1	66.9	60.7	59.2
4	Washington Street between West Houston Street and Spring Street near DSNY facility	AM	70.6	79.1	73.6	67.8	66.4
		MD	69.8	78.2	71.6	68.0	66.3
		Pre-PM	66.3	75.5	68.9	63.7	61.3
		PM	69.5	78.2	71.8	67.5	64.6
		Sat AM	66.2	75.0	70.4	62.4	60.0
		Sat MD	70.0	82.8	71.3	64.2	62.3

Note: Noise measurements were performed on June 1, 2016 and June 4, 2016.

At each of the receptor sites, general vehicular traffic on adjacent roadways was the dominant noise source. Measured levels at the site 1 are relatively high and measured levels at ~~Sites~~ sites 2, 3, and 4 are moderate, reflecting the level of vehicular activity on the adjacent roadways. DSNY trucks were the dominant noise source only at sites 3 and 4 and only during the Saturday

[1] This table has been updated for the FEIS.

AM time period. In terms of the CEQR criteria, the existing noise levels at sites 2, 3, and 4 are in the “marginally acceptable” category and the existing noise levels at site 1 are in the “clearly unacceptable” category.

F. NOISE PREDICTION METHODOLOGY

GENERAL METHODOLOGY

At the receptor sites included in the noise study, the dominant operational noise source is traffic on adjacent and nearby streets. Operational noise from project-generated traffic was calculated using the TNM model (the Federal Highway Administration’s [FHWA] *Traffic Noise Model* version 2.5). The predictive noise analysis examined four peak time periods: weekday AM (7:00 AM to 9:00 AM), midday (MD) (12:00 to 2:00 PM), PM (4:30 PM to 6:30 PM), and Saturday midday (Sat MD) (12:30 to 1:30 PM). Since the traffic analysis does not include traffic data for the weekday pre-PM time period or the Saturday AM time period, the noise level increments calculated for the weekday PM and Saturday mid-day time periods, respectively, were conservatively applied to measured noise levels to determine future noise levels during these time periods.

TRAFFIC NOISE MODEL (TNM)

At all locations the TNM was used to calculate noise levels. The TNM is a computerized model developed for the FHWA that takes into account various factors, including traffic volumes, vehicle mix (i.e., percentage of autos, light duty trucks, heavy duty trucks, buses, etc.), sources/receptor geometry, and shielding (including barriers and terrain, ground attenuation, etc.). It is a model recommended in the *CEQR Technical Manual* for traffic noise analysis.

ANALYSIS PROCEDURE

The following procedure was used in performing the noise analysis:

- Noise receptor sites were selected adjacent to the project site;
- Existing noise levels were determined at each of the four receptor sites listed above, for the applicable analysis time periods, by performing field measurements;
- The TNM was used to calculate existing $L_{eq(1)}$ noise levels based on existing traffic data during the weekday AM, midday and PM and Saturday midday time periods. The difference between calculated and measured existing levels in each time period was used to determine site and time-specific adjustment factors;
- Based on the results of the traffic study, future $L_{eq(1)}$ noise levels both without and with the proposed project during the weekday AM, midday and PM and Saturday midday time periods were calculated using the TNM;
- The site-specific site and time-specific adjustment factors were used to adjust the TNM-calculated noise levels to actual predicted noise levels;
- The noise level increments between existing and future with and without the project for the weekday PM and Saturday midday time periods were applied, respectively, to the weekday pre-PM and Saturday AM time periods to determine future $L_{eq(1)}$ noise levels during these time periods at each receptor in the future with and without the proposed project;

- The difference between measured $L_{eq(1)}$ and $L_{10(1)}$ for each site during each time period were added to the predicted future $L_{eq(1)}$ noise levels to determine future $L_{10(1h)}$ noise levels;
- Levels of building attenuation necessary to satisfy CEQR requirements were determined for each project building based on the predicted $L_{10(1h)}$ noise levels; and

Based on the levels of construction noise at project buildings as described in Chapter 20, "Construction," the prescribed level of building attenuation for each building from the noise analysis in this chapter was evaluated to determine if sufficient protection from construction noise would be provided.Future noise levels were calculated with a proportional modeling technique used as a screening tool to estimate changes in noise levels. The proportional modeling technique is an analysis methodologies recommended for analysis purposes in the *CEQR Technical Manual*. The noise analysis examined the weekday AM, MD, and PM peak hours. The selected time periods are when traffic levels at the project site would be at the maximum level and therefore result in the maximum noise exposure at the proposed project buildings. Both the traffic study and this noise analysis consider two With Action scenarios, including with big box retail and without big box retail (discussed in greater detail in Chapter 14, "Transportation"). The proportional modeling procedures used for the noise analysis are described below.

PROPORTIONAL MODELING

Proportional modeling was used to determine future noise levels at the project site. 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 levels (including with and without big box retail). 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.

ANALYSIS PROCEDURE

The following procedure was used in performing the noise analysis:

- Noise receptor sites were selected adjacent to the project site.
- Existing noise levels were determined at each of the four receptor sites listed above, for the applicable analysis time periods, by performing field measurements.
- For all receptor sites, at which vehicular traffic on adjacent roadways is the dominant noise source, future noise levels were determined using proportional modeling based on the results of the traffic analyses presented in Chapter 14, "Transportation."
- A detailed analysis using the Traffic Noise Model (TNM) will be conducted between the DEIS and FEIS to assess the potential noise contribution generated by the vehicular traffic on the new private roadway proposed to be created between the Center Site and the South Site. The detailed analysis using the TNM and the updated noise level measurements will replace the results of the existing analysis.
- Lastly, the level of building attenuation to satisfy CEQR requirements was determined for the proposed project buildings based on the noise monitoring and proportional modeling results. The building attenuation analysis will be updated based on the results of the detailed analysis using the TNM and revised proportional modeling results.

G. NOISE ANALYSIS RESULTS

MOBILE NOISE SOURCE SCREENING ANALYSIS

Using the methodology described above, future noise levels were determined at each of the noise receptor sites where general vehicular traffic on adjacent streets is the dominant noise source (i.e., sites 1-3). As shown in **Table 17-4** the maximum increase in noise levels resulting from the proposed actions is predicted to be 1.4 dBA with big box retail or 1.2 dBA without big box retail at receptor site 2. Noise levels of this magnitude would not be considered perceptible and would not be considered significant according to *CEQR Technical Manual* impact criteria. At all three four receptor sites the increases in noise levels would not be considered perceptible, and no significant adverse noise impacts would be expected. The findings of the screening analysis in **Table 17-4** may be altered between the DEIS and FEIS based on the updated noise measurements, proportional modeling results and detailed analysis using TNM.

Table 17-4
Noise ~~Screening~~ Analysis Results in dBA

Site	Time	Existing L_{eq}	Existing L_{10}	No Action L_{eq}	No Action L_{10}	No Action Increment	Proposed Project L_{eq}	Proposed Project L_{10}	Proposed Project Increment	Proposed Project with Big Box Retail L_{eq}	Proposed Project with Big Box Retail L_{10}	Proposed Project with Big Box Retail Increment
1	AM	78.9	82.8	80.4	84.3	1.5	80.4	84.3	0.0	80.4	84.3	0.0
	MD	79.1	80.2	79.8	80.9	0.7	79.8	80.9	0.0	79.7	80.8	-0.1
	Pre-PM	77.7	81.5	78.3	82.1	0.6	78.3	82.1	0.0	78.2	82.0	-0.1
	PM	78.0	82.4	78.6	83.0	0.6	78.6	83.0	0.0	78.5	82.9	-0.1
	Sat AM	82.7	80.6	83.3	81.2	0.6	83.4	81.3	0.1	83.3	81.2	0.0
	Sat MD	76.8	81.0	77.4	81.6	0.6	77.5	81.7	0.1	77.4	81.6	0.0
2	AM	71.7	74.0	73.8	76.1	2.1	74.0	76.3	0.2	73.9	76.2	0.1
	MD	74.4	76.0	76.0	77.6	1.6	76.2	77.8	0.2	75.9	77.5	-0.1
	Pre-PM	71.9	73.7	72.8	74.6	0.9	72.8	74.6	0.0	72.7	74.5	-0.1
	PM	72.2	74.6	73.1	75.5	0.9	73.1	75.5	0.0	73.0	75.4	-0.1
	Sat AM	70.0	72.5	70.6	73.1	0.6	70.9	73.4	0.3	70.7	73.2	0.1
	Sat MD	71.3	73.1	71.9	73.7	0.6	72.2	74.0	0.3	72.0	73.8	0.1
3	AM	68.2	68.6	70.1	70.5	1.9	70.3	70.7	0.2	70.1	70.5	0.0
	MD	71.6	72.5	73.7	74.6	2.1	73.9	74.8	0.2	73.6	74.5	-0.1
	Pre-PM	70.4	71.8	72.0	73.4	1.6	72.4	73.8	0.4	72.1	73.5	0.1
	PM	68.9	69.2	70.5	70.8	1.6	70.9	71.2	0.4	70.6	70.9	0.1
	Sat AM	65.0	66.2	65.9	67.1	0.9	66.2	67.4	0.3	66.0	67.2	0.1
	Sat MD	70.7	66.9	71.6	67.8	0.9	71.9	68.1	0.3	71.7	67.9	0.1
4	AM	70.6	73.6	71.1	74.1	0.5	71.7	74.7	0.6	71.4	74.4	0.3
	MD	69.8	71.6	71.9	73.7	2.1	72.4	74.2	0.5	71.9	73.7	0.0
	Pre-PM	66.3	68.9	67.3	69.9	1.0	68.0	70.6	0.7	67.3	69.9	0.0
	PM	69.5	71.8	70.5	72.8	1.0	71.2	73.5	0.7	70.5	72.8	0.0
	Sat AM	66.2	70.4	66.8	71.0	0.6	67.1	71.3	0.3	66.8	71.0	0.0
	PM	70.0	71.3	70.6	71.9	0.6	70.9	72.2	0.3	70.6	71.9	0.0

H. 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 uses and 50 dBA or lower for commercial/office uses. The results of the building attenuation analysis are summarized in **Table 17-5**.

Table 17-5
CEQR Building Attenuation Requirements

Site	Façade Location	Associated Noise Receptor Site	Maximum L_{10} (in dBA)	Attenuation Required[1] (in dBA)
North	West, North (within 50 feet of West Street), South (within 50 feet of West Street)	1	~~84.4~~84.3	41
	North (more than 50 feet from West Street)	2	77.8~~1~~	33
	East, South (more than 50 feet from West Street)	2, 3	77.8~~79.2~~	3~~5~~3
Center	West, North (within 50 feet of West Street), South (within 50 feet of West Street)	1	84.3~~0~~	41~~0~~
	North (more than 50 feet from West Street)	2	77.8~~1~~	33
	East, South (more than 50 feet from West Street)	3, 4	74.8~~9.2~~	3~~5~~1
South	West, North (within 50 feet of West Street), South (within 50 feet of West Street)	1	84.3~~84.4~~	41~~41~~
	North (more than 50 feet from West Street), East, South (more than 50 feet from West Street)	3, 4	74.8~~79.2~~	31~~35~~

Notes: [1] The CEQR attenuation requirements shown are for residential use and hotel rooms; commercial uses would require 5 dBA less attenuation.

To implement the attenuation requirements shown in **Table 17-5**, an (E) designation for noise (E-384) would be applied to the 550 Washington Street site (Block 596, Lot 1) specifying a requirement for the appropriate amount of window/wall attenuation and an alternate means of ventilation. The text for the (E) designation for window/wall attenuation of 40 dB(A) or less would be as follows:

> **To ensure an acceptable interior noise environment, the building façade(s) or future development at Block 596 Lot 1 must provide minimum composite building façade attenuation as shown in Table 17-5 to ensure an interior L_{10} noise level not greater than 45 dBA for residential and hotel uses or 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 text for the (E) designation for window/wall attenuation greater than 40 dB(A) would be as follows:

> **In order to ensure an acceptable interior noise environment, future residential/commercial uses must provide a closed window condition with a minimum of 41 dBA window/wall attenuation in order to maintain an interior noise level of 45 dBA. To achieve 41 dBA of building attenuation, special design features that go beyond the normal double-glazed windows are necessary and may include using specially designed windows (i.e., windows with small sizes, windows with air gaps, windows with thicker glazing, etc.), and additional building attenuation. In order 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, central 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 consists of wall, glazing, and any vents or louvers associated with the building mechanical systems in various ratios of area. The proposed design for the building includes acoustically-rated windows and central air conditioning as an alternate means of ventilation. The proposed building's façades, including these elements, would be designed to provide a composite Outdoor-Indoor Transmission Class (OITC) rating[2] greater than or equal to those listed in above in **Table 17-45**, along with an alternative means of ventilation in all habitable rooms of the residential units. By adhering to the design specifications included in the Noise (E) designation (E-384), the proposed buildings would provide sufficient attenuation to achieve the CEQR interior $L_{10(1)}$ noise level guideline of 45 dBA or lower for residential uses and hotel rooms and 50 dBA or lower for retail or office uses, which would be considered acceptable according to CEQR interior noise level guidelines.

I. NOISE AT PROPOSED PUBLICLY ACCESSIBLE OPEN SPACE

Based on predicted noise levels at receptors 1, 2, and 3, $L_{10(1)}$ noise levels at the proposed project's elevated publicly accessible open space are expected to be above 55 dBA. The analysis of noise levels was conservative as it assumed that the structure and public open space over

[2] The OITC classification is defined by ASTM International (ASTM E1332) 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.

West Houston Street would not act as a barrier to traffic noise. This Predicted noise levels exceeds the recommended noise level for outdoor areas requiring serenity and quiet contained in the *CEQR Technical Manual* noise exposure guidelines (see **Table 17-2**). Because the dominant noise at the project site results from traffic noise on West Street, there are no practical and feasible mitigation measures that could be implemented to reduce noise levels to below 55 dBA $L_{10(1)}$ within the proposed open space. Although noise levels in the proposed open space would be above the guideline noise level threshold, they would be comparable to noise levels in a number of existing open space areas that are located adjacent to roadways, including Hudson River Park (directly across West Street from the project site), Riverside Park, Bryant Park, Fort Greene Park, and other urban open space areas. The guidelines are a worthwhile goal for outdoor areas requiring serenity and quiet, such as passive open spaces. However, due to the level activity on the surrounding streets present at most New York City open space areas and parks, a relatively low noise level is often not achieved, and noise levels can be much louder at open space near highways, such as the proposed open space to be included in the proposed project or the existing Hudson River Park on the other side of West Street from the project site. Therefore, the future projected noise levels would not constitute a significant adverse noise impact to the proposed project's open space areas.

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. ✷