CHAPTER 20: NOISE

20.1 Overview

Noise is defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants and highway vehicles. The magnitude of noise is described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, the decibel (dB). Sound pressures described in decibels are called sound pressure levels.

Sound levels measured using a weighted-A decibel scale is expressed as dBA. Throughout this analysis, all noise levels are expressed in dBA. Several examples of noise pressure levels in dBA are listed in Table 20-1.

The degree of disturbance or annoyance of unwanted sound depends essentially on three things:

- The amount and nature of the intruding noise;
- The relationship between the background noise and the intruding noise; and
- The type of activity occurring where the noise is heard.

In considering the first of these factors, it is important to note that individuals have different sensitivity to noise. Loud noises bother some people more than others, and some patterns of noise also enter into people's judgment of whether or not a noise is offensive.

With regard to the second factor, individuals tend to judge the annoyance of an unwanted noise in terms of its relationship to noise from other sources (background noise). The blowing of a car horn at night when background noise levels are approximately 45 dBA would generally be more objectionable than the blowing of a car horn in the afternoon when background noises might be 55 dBA.

The third factor is related to the interference of noise with activities of individuals. In a 60 dBA environment, normal work activities requiring high levels of concentration may be interrupted by loud noises, while activities requiring manual effort may not be interrupted to the same degree.

The sound level at a particular instant does not provide a good representation of a level of sound, which varies with time over a wide range. To provide a better assessment of time-varying sound levels, time-averaged descriptors are employed. The three most common noise descriptors used in community noise surveys are the equivalent sound level (L_{eq}), percentile distributions of sound levels ($L_{\%}$), and the day-night average sound level (L_{dn}).

The L_{eq} is an energy-averaged sound level that includes both steady background sounds and transient short-term sounds. The L_{eq} is equivalent in energy to the fluctuating sound

level over the measurement period. The L_{eq} is commonly used to describe traffic noise levels, which tend to be characterized by fluctuating sound levels.

The percentile sound levels ($L_{\%}$) indicate the sound level exceeded for a percentage of the measurement period. For example, the L_{90} is the sound level exceeded for 90 percent of the measurement period and is commonly used to represent background sound levels. The L_{10} is the sound level exceeded for 10 percent of the measurement period and represents the peak sound levels present in the environment.

The day-night average sound level (L_{dn}) is another descriptor used to evaluate community noise levels. The L_{dn} is a 24-hour average sound level, which includes a 10 dBA penalty added to nighttime sound levels (10:00 PM to 7:00 AM) because people tend to be more sensitive to noise during the nighttime. The day-night average sound level is commonly used to describe aircraft and train noise levels.

Table 20-1: A-Weighted (dBA) Sound Levels of Typical Noise Environments

A-Weighted	Overall Level	Noise Environment
120	Uncomfortably Loud (32 times as loud as 70 dBA)	Military jet takeoff at 50 ft
100	Very loud (8 times as loud as 70 dBA)	Jet flyover at 1,000 ft
80	Loud (2 times as loud as 70 dBA)	Propeller plane flyover at 1,000 ft Diesel truck 40 mph at 50 ft
70	Moderately loud	Freeway at 50 ft from pavement edge Vacuum cleaner (indoor)
60	Relatively quiet (1/2 as loud as 70 dBA)	Air condition unit at 10 ft Dishwasher at 10 ft (indoor)
50	Quiet (1/4 as loud as 70 dBA)	Large transformers Small private office (indoor)
40	Very quiet (1/8 as loud as 70 dBA)	Bird calls Lowest limit of urban ambient sound
10	Extremely quiet (1/64 as loud as 70 dBA)	Just audible
0	Threshold of hearing	

Source: Federal Agency Review of Selected Airport Noise Analysis Issues, 1992 (modified by The Louis Berger Group, Inc.).

Noise impact criteria are presented in the *CEQR Technical Manual* (see Tables 20-2 and 20-3). Allowable daytime noise levels for sensitive receptors, including residences, hotels, motels, schools, museums, libraries, courthouses, houses of worship, public meeting rooms, auditoriums, out-patient public health facilities, commercial use and office uses, are clearly acceptable in areas where L_{10} noise levels are less than or equal to 65 dBA; marginally acceptable in areas where L_{10} noise levels are less than or equal to 70 dBA; marginally unacceptable in areas where L_{10} noise levels are between 70 dBA and 80 dBA; and clearly unacceptable in areas where L_{10} noise levels exceed 80 dBA. In

addition, a noise impact occurs when any new activity increases the ambient noise level by three dBA or more. The *CEQR Technical Manual* also specifies a 24-hour noise standard that is applicable for airport environs and train noise. All land uses are clearly acceptable when L_{dn} levels are less than or equal to 60 dBA; marginally acceptable when L_{dn} levels are between 61 dBA and 65 dBA; and clearly unacceptable when L_{dn} levels are higher than 75 dBA.

Table 20-2: CEQR Noise Exposure Standards

Receptor Type	Time Period	Acceptable General External Exposure	Airport Environs	Marginally Acceptable General External Exposure	Airport Environs	Marginally Unacceptable General External Exposure	Airport Environs	Clearly Unacceptable General External Exposure
1. Outdoor area requiring serenity and quiet[2]		$L_{10} < 55$ dBA	$L_{dn} < 60$ dBA		$60 < L_{dn} < 65$ dBA		(1) $65 < L_{dn} < 70$ dBA, (II) $70 < L_{dn} < 75$	
2. Hospital, Nursing Home		$L_{10} < 55$ dBA		$55 < L_{10} < 65$ dBA		$65 < L_{10} < 80$ dBA		$L_{10} > 80$ dBA
3. Residence, residential, hotel or motel	7 AM-11 PM	$L_{10} < 65$ dBA		$65 < L_{10} < 70$ dBA		$70 < L_{10} < 80$ dBA		$L_{10} > 80$ dBA
	7 AM-11 PM	$L_{10} < 55$ dBA		$55 < L_{10} < 70$ dBA		$70 < L_{10} < 80$ dBA		$L_{10} > 80$ dBA
4. 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-11PM)		Same as Residential Day (7 AM-11PM)		Same as Residential Day (7 AM-11PM)		Same as Residential Day (7 AM-11PM)
5. Commercial or office		Same as Residential Day (7 AM-11PM)		Same as Residential Day (7 AM-11PM)		Same as Residential Day (7 AM-11PM)		Same as Residential Day (7 AM-11PM)
6. Industrial public areas only[3]	3	3		3		3		3

Notes:

(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more; (ii) CEQR Noise Standards for train noise are similar to the above aircraft noise standards: the noise category for train noise is found by taking the L_{dn} value for such train noise to be L_{dn} (L_{dn}^{y} Contour) value (see Table 2-4).*

1 Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by 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 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).

* $L_{dn}^{y} = L_{dn}$ Contour is an annual average of L_{dn} values ("y" indicates "yearly average").

Source: New York City Department of Environmental Protection (Adopted Policy 1983).

Table 20-3: CEQR Exterior Noise Standards and Attenuation Values

Noise Category	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Vehicular[1,2]	$65<L_{10}< 70$	$70<L_{10}<75$	$75<L_{10}<80$	$80<L_{10}<85$	$85<L_{10}<90$	$90<L_{10}<95$
Train[1,2]	$60<L_{dn}<65$	$65<L_{dn}<70$	$70<L_{dn}<75$	$75<L_{dn}<80$	$80<L_{dn}<85$	$85<L_{dn}<90$
Aircraft[1,2]	$60<L^{y}_{dn}<65$	$65<L_{dn}<70$	$70<L_{dn}<75$	$L_{dn}>75$	N/A	N/A
Required Attenuation[3]	25 dB(A)	(I) 30 dB(A)	(II) 35 dB(A)	(I) 40 dB(A)	(II) 45 dB(A)	(III) 50 dB(A)

Notes:
1 Different descriptors are used for each noise source: L_{10} for vehicular traffic; L_{dn} for train noise; and L^{y}_{dn} (L_{dn} Contour) for aircraft noise.*
2 The various noise sources at a receptor site are measured and reported separately in accordance with generally accepted procedures for assessing an overall noise level. Cases where there is not a clearly dominant noise source require a judicious decision based on adequate field experience and analysis to determine the final noise category that is deemed appropriate for the overall noise exposure at each noise receptor site.
3 The above composite window-wall attenuation values are for residential dwellings. Commercial office spaces and meeting rooms would be 5 dB(A) less in each category. All of the above categories require a closed window situation and hence an alternate means of ventilation.
* L_{dn} requires a 24-hour measurement of supportive analysis if a shorter period is employed.
L^{y}_{dn} = L_{dn} Contour is an annual average of L_{dn} values (y indicates "yearly average").
Source: *CEQR Technical Manual*, 2001.

In addition, the *CEQR Technical Manual* provides detailed noise assessment procedures for development projects in the City. The CEQR Noise Exposure Standards require that any new activity shall not increase the ambient noise level by three dBA or more. Since a three dBA increase in the level of noise is readily perceptible by human ear, it is used to identify project-related noise impacts.

New York City Noise Control Code promulgates sound-level standards for motor vehicles, air compressors, and paving breakers; requires that all exhausts be muffled; and prohibits all unnecessary noise adjacent to schools, hospitals, and courts. The code further limits construction activities to weekdays between 7 AM and 6 PM.

As detailed below, based on CEQR criteria, noise impacts attributable to mobile or stationary sources are not anticipated under the Build Condition. Residential development within the Project Area may result from the rezoning elements of the Proposed Action. Residential construction in this area would require proper attenuation in order to achieve acceptable indoor noise levels. The provision for providing sufficient building attenuation would be mandated by placing an (E) Designation on City Zoning Map for these tax lots. Therefore, the Proposed Action would not result in significant adverse noise impacts.

20.2 Methodology

Noise and vibration analyses associated with the construction and operation of the Proposed Action were conducted to identify potential sensitive receptors in the Project Area that might be impacted. The Project Area, as defined in Chapter 1, "Project

Description," was evaluated as to its level of acceptability based on CEQR noise criteria, and noise mitigation measures were recommended as necessary. As part of the analyses, existing noise levels were measured for multiple short-term periods during normal weekdays at six representative receptor locations near the Project Area. Future operational noise levels are anticipated to contribute to mobile (traffic) sources, and have been evaluated based on relative increases in Passenger Car Equivalents (PCEs) in accordance with CEQR procedures (defined below). A qualitative construction noise analysis was also conducted based on CEQR guidelines as part of this study (see Chapter 21, "Construction Impacts").

20.2.1 Mobile Sources

The term "mobile sources" refers to those noise sources that move in relation to a noise-sensitive receptor. Mobile sources include passenger cars, trucks, buses, passenger trains, and other heavy vehicles that travel along city streets in the proximity of the Project Area. Noise level changes attributable to mobile sources associated with operation as well as construction activities are directly related to the number of mobile sources, or levels of traffic volume, at a given location.

Because of the way sound is perceived, an increase in noise levels by three dBA requires a doubling of the intensity of the noise generating source. In the case of motor vehicle noise, a three dBA increase therefore relates to a doubling of the traffic volume. To account for trucks, buses, and other heavy vehicles creating more noise than passenger cars, guidelines presented in the *CEQR Technical Manual* provide a method to equate the noise of trucks and buses with that of several passenger cars, known as Passenger Car Equivalent (PCE). Traffic is expressed in PCEs for noise analysis purposes, thereby allowing the combination of noise levels from different types of vehicles including trucks and buses. Based on this, a three dBA increase relates to a doubling of PCEs.

20.2.2 Stationary Sources

The term "stationary source" refers to sources of noise that do not move in relation to a noise-sensitive receptor, such as activities associated with the operations of a building or spectators attending a sporting event. Stationary sources of noise that have been evaluated for the Proposed Action include rooftop HVAC units, mechanical systems for buildings, and boilers. These noise sources would be designed and/or placed as to minimize noise emission. Therefore, noise impacts attributed to stationary sources from building operations are not anticipated.

20.2.3 Train Noise Sources

Noise generated by SIR train activity was measured as the part of the ambient noise measurement program. The operation of the SIR trains is not expected to change as a result of the Proposed Action and, therefore, would not impact the existing sensitive receptors in the proximity of the railway. Noise levels from SIR operations are occasionally elevated during train passbys. However, these events are not considered to be a major noise source in the presence of local street traffic and other activities typical to urban environment. Noise from passenger train operations was evaluated based on

CEQR and Federal Transit Administration (FTA) guidelines at one of the receptor sites closest to the Project Area.

20.3 Existing Conditions

Land uses within and surrounding the Project Area include light industrial, manufacturing, commercial, transportation, parking, institutional, open space, mixed uses and residential. Land use maps were reviewed, in conjunction with field observations, to identify any residential or other sensitive receptors within close proximity to the Project Area. Six measurement sites were selected to represent the sensitive receptors in the immediate vicinity of the Project Area (see Figure 20-1).

Noise levels were measured in accordance with CEQR guidelines. Rion NL-22 and Bruel & Kjaer 2236 Precision Sound Level Meters (SLM) were used in the field to obtain measurements, which meets or exceeds the requirements set forth in the ANSI SI.4-1983 Standards for Type I & Type II quality and accuracy. The SLMs were operated on the A-weighting network and slow-meter response. A Bruel & Kjaer 4230 acoustical calibrator was used to adjust the meter before each measurement. A porous windscreen was used on the SLMs during all measurements, to guard from wind interference with noise level readings. The noise measurements were taken with the SLMs on a tripod-mount of approximately five feet in height, which is considered representative of an average person's ear level. Noise monitoring activities were conducted during a day with favorable weather conditions, with no high winds or rain. Unusual noise events such as a nearby car alarm were avoided during measurements. Measured quantities included L_{eq}, L_{10}, L_{50}, L_{90}, L_{max}, and L_{min}.

Existing noise levels were measured on September 13, 2005. The measurement results are detailed in Appendix F, and are supplemented with site diagrams and photos. Based on a review of traffic survey data that were collected for the Proposed Action, three time periods were chosen for noise sampling: AM (8:00 AM - 9:00 AM), Midday (12:30 AM - 1:30 PM) and PM peak (4:30 PM - 5:30 PM) hours. Data obtained at these six sites represent the baseline noise levels in the vicinity of the Proposed Action. The measured noise levels are presented in Table 20-4.

Overall, the area exhibited a moderate-to-high noise level typically associated with vehicular traffic and pedestrian activities which are the norm for metropolitan areas. The highest daytime noise level (L_{eq}), 74.8 dBA, was recorded at Site 6 during the AM peak period. The lowest daytime noise level (L_{eq}), 66.7 dBA, was observed at Site 5 during AM peak hour.

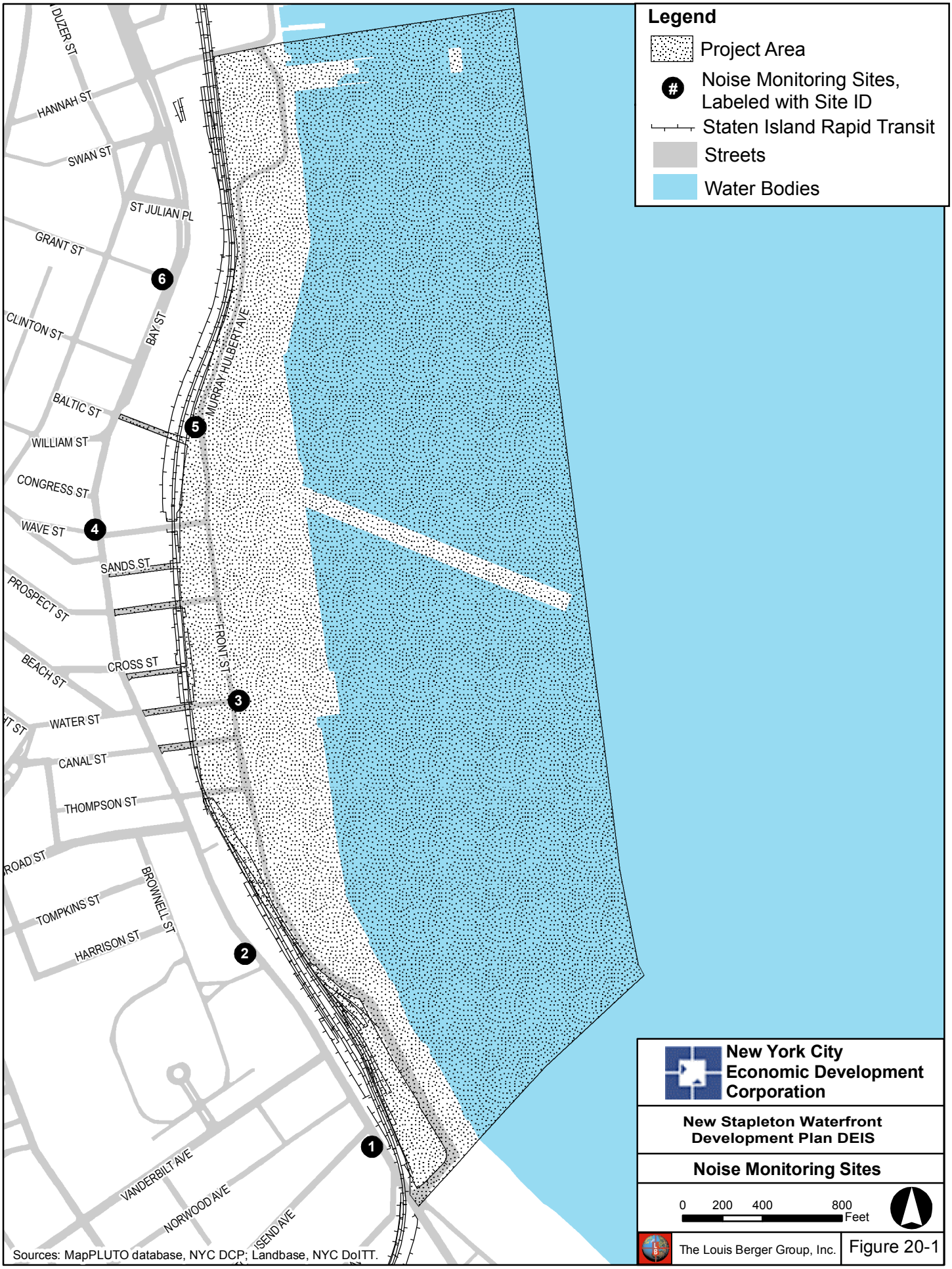

Legend
Project Area
Noise Monitoring Sites, Labeled with Site ID
Staten Island Rapid Transit
Streets
Water Bodies
HANNAH ST
SWAN ST
ST JULIAN PL
GRANT ST
CLINTON ST
BAY ST
MURRAY HULBERT AVE
BALTIC ST
WILLIAM ST
CONGRESS ST
WAVE ST
SANDS ST
PROSPECT ST
FRONT ST
BEACH ST
CROSS ST
WATER ST
CANAL ST
THOMPSON ST
TOMPKINS ST
BROWNELL ST
HARRISON ST
VANDERBILT AVE
NORWOOD AVE
1
2
3
4
5
6
New York City Economic Development Corporation
New Stapleton Waterfront Development Plan DEIS
Noise Monitoring Sites
0 200 400 800 Feet
The Louis Berger Group, Inc.
Figure 20-1
Sources: MapPLUTO database, NYC DCP; Landbase, NYC DoITT.

Table 20-4: Measured Existing Noise Levels

Site ID	Sites	Parameters (dBA)	AM Peak (8:00 AM - 9:00 AM)	Midday (12:30 PM - 1:30 PM)	PM Peak (4:30 PM- 5:30 PM)
1	Southwest corner of Townsend Avenue and Bay Street intersection	L_{eq}	**71.3**	**68.3**	**69.0**
		L_{10}	73.9	72.2	72.6
		L_{50}	67.1	65.4	66.9
		L_{90}	57.9	55.4	57.4
		L_{max}	93.3	79.6	81.5
		L_{min}	48.6	49.4	51.6
2	Bay Street (near Bayley Seton Hospital)	L_{eq}	**72.1**	**71.9**	**72.1**
		L_{10}	74.9	75.1	75.0
		L_{50}	69.1	67.7	69.4
		L_{90}	58.2	57.1	59.7
		L_{max}	88.3	87.5	86.4
		L_{min}	51.8	49.4	53.2
3	Front Street at Water Street	L_{eq}	**69.8**	**72.6***	**67.0**
		L_{10}	72.5	73.8	71.1
		L_{50}	66.9	69.0	63.6
		L_{90}	61.5	65.7	54.9
		L_{max}	85.5	93.2	77.5
		L_{min}	55.7	58.1	49.8
4	Northwest corner of Bay Street and Wave Street intersection	L_{eq}	**69.0**	**69.2**	**68.7**
		L_{10}	71.0	71.0	71.0
		L_{50}	65.5	64.5	65.5
		L_{90}	58.5	56.0	58.5
		L_{max}	83.5	87.9	84.1
		L_{min}	51.5	50.1	52.3
5	Front Street (Baltic Street vicinity)	L_{eq}	**66.7**	**65.2**	**65.6**
		L_{10}	70.5	69.5	69.5
		L_{50}	60.0	60.0	60.0
		L_{90}	51.0	53.0	53.0
		L_{max}	81.5	77.7	80.5
		L_{min}	49.1	50.5	51.0
6	Southwest corner of Bay Street and Grant Street intersection	L_{eq}	**74.8****	**68.6**	**69.0**
		L_{10}	77.0	72.0	72.0
		L_{50}	67.5	65.5	65.5
		L_{90}	57.5	55.5	57.0
		L_{max}	95.8	82.0	86.7
		L_{min}	52.2	53.4	53.4

***** Construction activity present during measurement.

****** More trucks and heavy trucks in the AM period.

Source: The Louis Berger Group, Inc., 2005.

20.3.1 Monitoring Sites

Site 1

Site 1 is situated at the southwest corner of the intersection of Bay Street and Townsend Avenue, and is surrounded by commercial buildings, residential homes and an SIR station. Bay Street has two lanes, one northbound and one southbound, and Townsend

Avenue is a two-lane, two-way (east-west) street. Most of the traffic travels on Bay Street with intermittent vehicles turning onto Townsend Avenue. This is a non-signalized intersection with frequent stop-and-go traffic and some idling activities at the intersection. The noise level measured during AM peak hour was at 71.3 dBA, which decreased to 69.0 dBA in the PM peak period. The lowest noise level was recorded at 68.3 dBA for the Midday peak period. The major noise sources were vehicular traffic on Bay Street, local traffic on Townsend Avenue, subway trains and pedestrian activity.

Site 2

Site 2 is located on Bay Street, adjacent to Bayley Seton Hospital and residences. Measurements at this site were conducted on the Bay Street sidewalk. Bay Street contains two travel lanes, one northbound and one southbound. There was minimal pedestrian activity at this site. Major noise sources included vehicular traffic on Bay Street, transit activity along the SIR line, and construction activity. The highest noise level of 72.1 dBA was measured during the AM and PM peak periods. The lowest noise level was recorded at 71.9 dBA for the Midday peak hour.

Site 3

Site 3 is located on the east side of Front Street at Water Street, in a light industrial/commercial area adjacent to the Homeport Site. Front Street is comprised of one northbound and one southbound lane and Water Street is a two-lane, two-way street. Most of the traffic travels on Front Street with intermittent vehicles turning onto Water Street. This is a non-signalized intersection with fairly heavy traffic on Front Street during the peak hour. The highest noise level was measured during Midday peak at 72.6 dBA, coinciding with construction activity. The noise levels observed for the AM and PM peak periods were 69.8 dBA and 67 dB, respectively. The major noise sources were comprised of vehicular traffic on Front Street, local traffic on Water Street, SIR trains and construction activity.

Site 4

Measurement at Site 4 was taken at the northwest corner of the intersection of Bay and Wave Streets. This site is surrounded by mixed-use commercial and residential buildings. The traffic on Bay Street travels on two lanes, in northbound and southbound directions. Most of the traffic travels on Bay Street with intermittent vehicles turning onto Wave Street. This is a signalized intersection with frequent stop-and-go traffic and some idling activity at the intersection. The highest noise level measured during the AM peak period was at 69 dBA, which decreased to 68.7 dBA in the PM peak. A noise level of 69.2 dBA was recorded for the Midday peak hour. The major noise sources included vehicular traffic on Bay Street, local traffic on Wave Street, SIR train operations, and pedestrian activity.

Site 5

Site 5 is situated on the west side of Front Street, directly across from the Homeport Site in the vicinity of Baltic Street and near the SIR. This site is located in an industrial and commercial area. The traffic on Front Street travels on two lanes, in northbound and southbound directions. The AM peak period noise level measurement was 66.7 dBA,

which fell to 65.6 dBA in the PM peak. The lowest noise level was recorded at 65.2 dBA for the Midday peak hour. The major noise sources included vehicular traffic on Front Street and trains traveling along the elevated SIR line. Noise from train operations would have greater peaks during train passby events, which would be exacerbated at second or higher stories due to the loss of noise shielding provided by the railway embankments. However, when averaged out over an extended period of time such as one hour, the noise levels attributed to train operations would be substantially less than the peak levels observed during the passby events. Based on CEQR and FTA guidelines, the noise descriptor used to measure train noise is L_{dn}. Thus L_{eq} and 24-hour L_{dn} were calculated for passenger train noise levels and are discussed in Section 20.5.1.

Site 6

Site 6 monitoring was conducted on the sidewalk next to the residence at 372 Bay Street, at the southwest corner of the intersection of Bay and Grant Streets. This site is surrounded by commercial buildings and residences. The traffic on Bay Street travels on two lanes, in northbound and southbound directions; Grant Street is a one-way, westbound street. Most of the traffic travels on Bay Street with intermittent vehicles turning onto Wave Street. The Bay and Grant Street intersection is non-signalized, with frequent stop-and-go traffic and some idling activity at the stop sign on Grant Street. The highest noise level measured during AM peak period was at 74.8 dBA, which reduced to 69 dBA in the PM peak. A noise level of 68.6 dBA was recorded for the Midday peak hour. Major noise sources at this site included vehicular traffic on Bay Street, local traffic on Grant Street, SIR train operations, and pedestrian activity.

20.4 No Build Condition

Under the No Build Condition, noise levels in the Project Area would be similar to Existing Conditions, with the exception of the relocation of sources from the temporary uses currently located on the Homeport Site and the introduction of new noise sources from the ten identified No Build projects. Noise and vibration levels would also increase due to growth and background traffic.

A comparison of the PCEs associated with the No Build and Build Condition peak periods are presented in Tables 20-5 through 20-7. During the AM peak hour, the increase of traffic volumes would be approximately 27.6 percent. As a result, the noise level increases attributable to mobile sources during the AM peak period would be 1.1 dBA or less. Table 20-6 indicates that the Midday peak hour No Build traffic volume would increase approximately 30 percent over existing traffic volumes, and that noise level increases would be 1.1 dBA or less. As exhibited in Table 20-7, No Build traffic volumes for the PM peak hour would increase approximately 32 percent over existing traffic volumes. As a result, noise level increases attributable to mobile sources during the PM peak would be 1.2 dBA or less.

Table 20-5: Existing, No Build and Build Noise Levels from Mobile Sources AM Peak Period

Site ID	Existing		No Build			Build			CEQR Criteria Threshold L_{eq} (dBA)	CEQR Adverse Impact
	AM Peak (8:00-9:00 AM)		Percent PCE Increase over Existing	Noise Level Increase over Existing (dBA)	AM Peak (8:00-9:00 AM)	Percent PCE Increase over No Build	Noise Level Increase over No Build (dBA)	AM Peak (8:00-9:00 AM)		
1	L_{eq}	71.3	27.3%	1.0	72.3	13.5%	0.6	72.9	3 dBA Increase	NO
	L_{10}	73.9	27.3%	1.0	74.9	13.5%	0.6	75.5		
2	L_{eq}	72.1	25.4%	1.0	73.1	13.7%	0.6	73.6	3 dBA Increase	NO
	L_{10}	74.9	25.4%	1.0	75.9	13.7%	0.6	76.4		
3	L_{eq}	69.8	27.2%	1.0	70.8	2.2%	0.1	70.9	3 dBA Increase	NO
	L_{10}	72.5	27.2%	1.0	73.5	2.2%	0.1	73.6		
4	L_{eq}	69.0	18.8%	0.7	69.7	13.4%	0.5	70.3	3 dBA Increase	NO
	L_{10}	71.0	18.8%	0.7	71.7	13.4%	0.5	72.3		
5	L_{eq}	66.7	27.6%	1.1	67.8	1.4%	0.1	67.8	3 dBA Increase	NO
	L_{10}	70.5	27.6%	1.1	71.6	1.4%	0.1	71.6		
6	L_{eq}	74.8	18.9%	0.8	75.6	13.6%	0.6	76.1	3 dBA Increase	NO
	L_{10}	77.0	18.9%	0.8	77.8	13.6%	0.6	78.3		

Source: The Louis Berger Group, Inc. 2005

Table 20-6: Existing, No Build and Build Noise Levels from Mobile Sources Midday Peak Period

Site ID	Existing		No Build			Build			CEQR Criteria Threshold L_{eq} (dBA)	CEQR Adverse Impact
	MD Peak (12:30-1:30 PM)		Percent PCE Increase over Existing	Noise Level Increase over Existing (dBA)	MD Peak (12:30-1:30 PM)	Percent PCE Increase over No Build	Noise Level Increase over No-Build (dBA)	MD Peak (12:30-1:30 PM)		
1	L_{eq}	68.3	29.6%	1.1	69.4	11.0%	0.5	69.9	3 dBA Increase	NO
	L_{10}	72.2	29.6%	1.1	73.3	11.0%	0.5	73.8		
2	L_{eq}	71.9	27.4%	1.1	73.0	15.6%	0.6	73.6	3 dBA Increase	NO
	L_{10}	75.1	27.4%	1.1	76.2	15.6%	0.6	76.8		
3	L_{eq}	72.6	25.5%	1.0	73.6	21.6%	0.9	74.4	3 dBA Increase	NO
	L_{10}	73.8	25.5%	1.0	74.8	21.6%	0.9	75.6		
4	L_{eq}	69.2	20.7%	0.8	70.0	10.8%	0.4	70.5	3 dBA Increase	NO
	L_{10}	71.0	20.7%	0.8	71.8	10.8%	0.4	72.3		
5	L_{eq}	65.2	30.0%	1.1	66.3	31.5%	1.2	67.5	3 dBA Increase	NO
	L_{10}	69.5	30.0%	1.1	70.6	31.5%	1.2	71.8		
6	L_{eq}	68.6	24.1%	0.9	69.5	14.2%	0.6	70.1	3 dBA Increase	NO
	L_{10}	72.0	24.1%	0.9	72.9	14.2%	0.6	73.5		

Source: The Louis Berger Group, Inc. 2005

Table 20-7: Existing, No Build and Build Noise Levels from Mobile Sources PM Peak Period

Site ID	Existing		No Build			Build			CEQR Criteria Threshold L_{eq} (dBA)	CEQR Adverse Impact
	PM Peak (4:30-5:30 PM)		Percent PCE Increase over Existing	Noise Level Increase over Existing (dBA)	PM Peak (4:30-5:30 PM)	Percent PCE Increase over No Build	Noise Level Increase over No-Build (dBA)	PM Peak (4:30-5:30 PM)		
1	L_{eq}	69.0	32.0%	1.2	70.2	18.8%	0.7	71.0	3 dBA Increase	NO
	L_{10}	72.6	32.0%	1.2	73.8	18.8%	0.7	74.6		
2	L_{eq}	72.1	28.6%	1.1	73.2	21.3%	0.8	74.0	3 dBA Increase	NO
	L_{10}	75.0	28.6%	1.1	76.1	21.3%	0.8	76.9		
3	L_{eq}	67.0	27.5%	1.1	68.1	17.0%	0.7	68.7	3 dBA Increase	NO
	L_{10}	71.1	27.5%	1.1	72.2	17.0%	0.7	72.8		
4	L_{eq}	68.7	22.9%	0.9	69.6	14.9%	0.6	70.2	3 dBA Increase	NO
	L_{10}	71.0	22.9%	0.9	71.9	14.9%	0.6	72.5		
5	L_{eq}	65.6	29.0%	1.1	66.7	19.1%	0.8	67.5	3 dBA Increase	NO
	L_{10}	69.5	29.0%	1.1	70.6	19.1%	0.8	71.4		
6	L_{eq}	69.0	26.0%	1.0	70.0	19.1%	0.8	70.8	3 dBA Increase	NO
	L_{10}	72.0	26.0%	1.0	73.0	19.1%	0.8	73.8		

Source: The Louis Berger Group, Inc. 2005

20.5 Build Condition

20.5.1 Mobile Sources

Mobile sources are comprised of the intermittent traffic on various local streets that intersect with Bay and Front Streets, and train noise. In order to assess potential noise increases from motor vehicle sources, PCEs were developed based on traffic volume and classification information, in accordance with *CEQR Technical Manual* guidelines. The development of PCEs is based on the fact that noise emissions are different for different vehicle classes. For example, a heavy truck is considered to be equivalent to 47 PCEs, while a car is equivalent to one PCE in terms of noise emission energy. Based on acoustical principles, potential noise level increases associated with mobile sources are considered to be proportional to the logarithmic value of the percent increases in PCEs. The resultant noise level increases and estimated No Build and Build Condition noise levels attributable to mobile sources during the AM, Midday and PM peak periods are presented in Tables 20-5 through 20-7, respectively.

Noise levels resulting from SIR passenger train operations were calculated for Site 5, which is located approximately 40 to 50 feet from the elevated SIR line. A total of 78 daytime and 40 nighttime train passbys were identified based on the service schedule of SIR. Based on FTA guidelines, daytime (between 7:00 AM and 10 PM) and nighttime (between 10 PM and 7 AM.) noise levels in L_{eq} would be 57 and 56 dBA, respectively, assuming a passby speed of 25 mph. The day-night average level of L_{dn} was 63 dBA, as a result of the 10 dBA penalty applied to nighttime levels in the calculation of L_{dn}.

20.5.2 Stationary Sources

The stationary sources within the Project Area include the truck loading/unloading activities, and rooftop HVAC systems, boiler exhausts, etc. Since the loading/unloading activities have already been evaluated under mobile source impacts, they have not been included again in the stationary sources analysis. Noise from HVAC units would be mostly shielded by the building roof and structures. Therefore, any potential noise impacts attributable to stationary sources from building operations are not anticipated under the Build Condition.

20.5.3 Noise Attenuation within the Project Area

City Environmental Protection Order-City Environmental Quality Review (CEPO-CEQR) standards, presented in Table 20-2, were used to assess the Build Condition noise levels. Measurement Sites 3 and 5 are situated in the vicinity of development parcels that would include residential components under the Proposed Action; Site 3 is also located in close proximity to some of the open space areas that the Proposed Action would create. The noise levels estimated for Site 3 have been identified as marginally unacceptable ($75<L_{10}<80$). Based on CEPO-CEQR requirements, a 35 dBA noise level attenuation would be required for interior noise levels. In order to achieve the required attenuation, HVAC systems and closed or inoperable windows would be used for the proposed development. Under the Build Condition, the exterior noise levels at Site 5 would be in the marginally unacceptable ($70<L_{10}<75$) category for residential uses based on L_{eq} and L_{10} thresholds. A 30 dBA noise level attenuation would be required at this site. Noise attributed to train operations would be 63 dBA in L_{dn}, which would fall in the category of marginally acceptable ($60<L_{dn}<65$). Based on CEQR exterior noise standards and attenuation values for train noise, a 25 dBA attenuation would be required. Taking into account both train and traffic noise contributions at Site 5, a 30 dBA noise attenuation would be required.

Mitigation of noise levels may occur at the noise source, along the path of the noise, or at receiver locations. Mitigation of noise levels occurs in nature to varying degrees as sound propagates from the source over terrain surfaces (scattering and ground attenuation), as the distance between the source and receiver increases (dispersion), and when intervening structures and/or walls and windows intersect the path of the noise source to the receiver (diffraction, reflection, and absorption). To address noise attenuation for the interior space of the proposed residential uses, noise reduction ratings of building materials, including wall panels, windows, doors, etc., would be specifically designed to achieve the required noise level reduction. Acoustical windows and doors with significant sound-reducing capabilities would be utilized. Based on information provided in the FHWA publication, *Insulation of Buildings against Highway Noise*, a double-glazed window with ¼-inch glass panels and 2¼-inch airspace in the middle would be necessary to obtain a 35 dBA reduction in noise levels. A solid core door of 1¾-inch wood with a drop seal threshold also would be necessary to achieve a 35 dBA reduction. To achieve 30 dBA reduction, a double-glazed window with 1/8-inch glass panels and 2¼ -inch airspace in the middle would be required.

It is assumed that only HVAC systems characterized by low noise emissions would be utilized for development associated with the Proposed Action. In general, the noise

levels introduced by the proposed ventilation system should be at least ten dBA below the non-ventilated level, as to avoid a significant increase in the building's total noise level. Basic HVAC units would be installed on building rooftops, as far away from the interior space as possible; ventilation air then would be ducted to the desired location. In order to reduce the noise generated by fans, the air ducts may need to be lined with fiberglass insulation.

20.5.4 (E) Designation

To avoid the potential for noise impacts, as part of the proposed rezoning, (E) Designations for noise would be placed on the New York City Zoning Map for two sets of parcels requiring different levels of attenuation (see Figure 20-2). The following Projected and Potential Development Sites would require a 35 dBA level attenuation: Block 489, Lot 25; Block 490, Lots 26 and 37; Block 491, Lots 32, 37, 41, 42, and 46; Block 492, Lots 29 and 31; Block 493, Lot 12; and Block 494, Lots 24 and 30.

In accordance with CEQR, in order to ensure an acceptable interior noise environment, the future residential/commercial uses within the Project Area must provide a closed window condition with a minimum of 35 dBA window/wall noise level attenuation on all facades in order to maintain an interior noise level of 45 dBA. 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 be limited to, central air conditioning or air conditioning sleeves containing air conditioners or U.S. Department of Housing and Urban Development (HUD)-approved fans.

To address noise attenuation for the interior space of the proposed residential uses, noise reduction ratings of building materials, including wall panels, windows, doors, etc., must be specifically designed to achieve the required reduction in noise level. Acoustical windows and doors with significant sound-reducing capabilities must be utilized. For example, a double-glazed window with ¼-inch glass panels and a 2¼-inch airspace in the middle, is necessary to obtain a 35 dBA reduction in noise levels; a solid core door of 1¾-inch wood with a drop seal threshold is needed to achieve a reduction of 35 dBA.

(E) Designation for noise would be placed on the following parcels as part of the Proposed Action to achieve a 30 dBA level attenuation: Block 490, Lot 24 and 45; Block 491, Lot 29; and Block 494, Lots 18, 19, and 21. Again, a closed-window condition along with an alternate means of ventilation must be provided in order to achieve a reduction of 30 dBA. It is recommended that a double-glazed window with one-eighth-inch glass panels and a 2¼-inch airspace in the middle be utilized for the development of residential buildings on these six lots, in order to achieve the required 30 dBA reduction.

Furthermore, to avoid secondary noise from HVAC systems, only those systems characterized by low noise emissions would be utilized for development associated with the Proposed Action. In general, the noise levels introduced by the proposed ventilation system must be at least ten dBA below the non-ventilated level, as to avoid a significant increase in the building's total noise level. Basic HVAC units must be installed on building rooftops as far away from the interior space as possible, and ventilation air

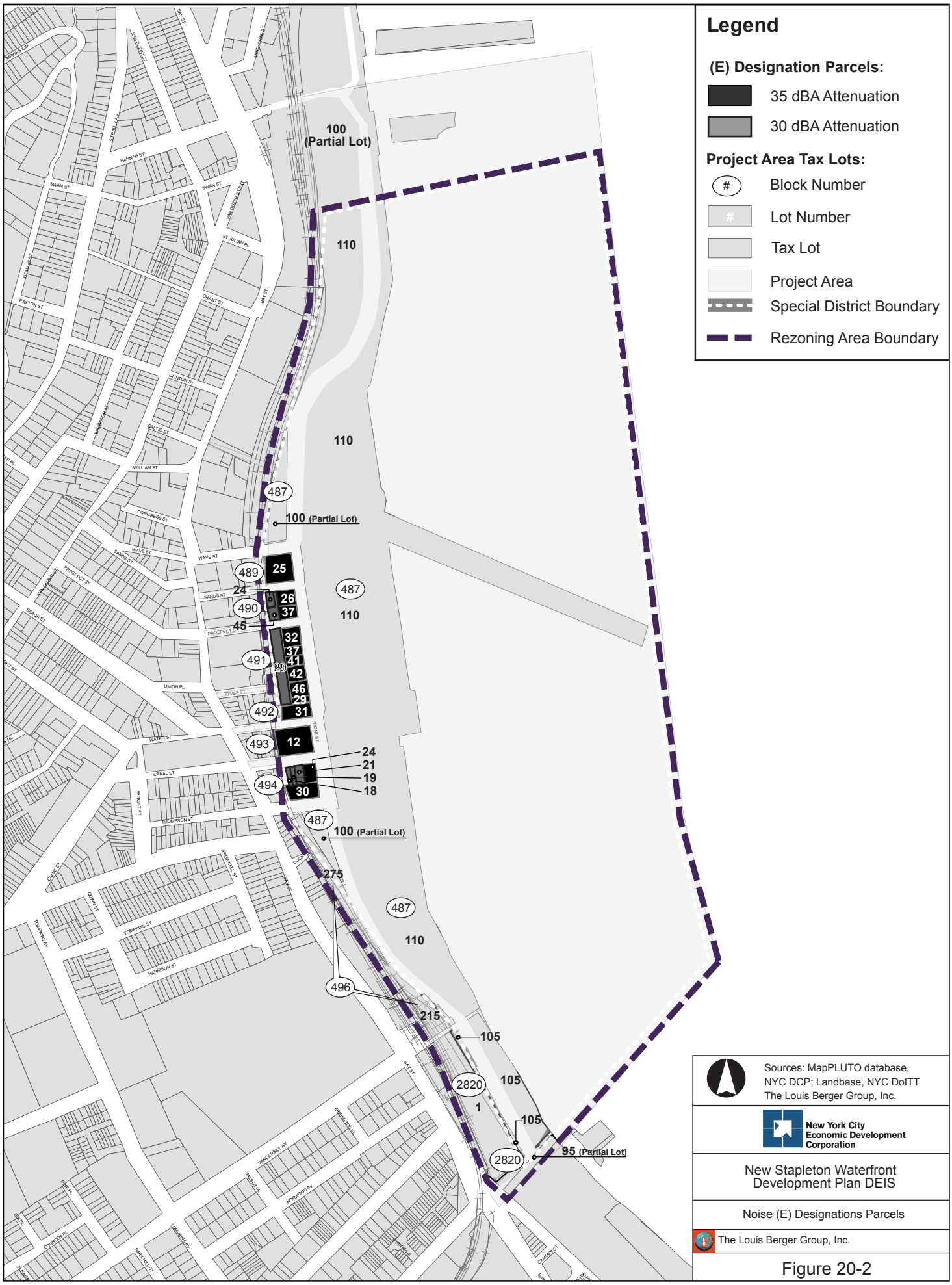
ducted to the desired location. In order to reduce the noise generated by fans, the air ducts may need to be lined with fiberglass insulation.

The (E) Designation text would state that in order to ensure an acceptable interior noise environment at the Projected and Potential Development Sites, future residential/commercial uses on the parcels must provide a closed window condition with a minimum of either 30 or 35 dBA window/wall attenuation on all facades in order to maintain an interior noise level of 45 dBA, depending on the particular Site (as presented above). Prior to development on these Sites, the New York City Department of Buildings (NYCDOB) would receive a New York City Department of Environmental Protection (NYCDEP) report stating that the environmental requirements related to the (E) Designation have been met. Therefore, with the placement of (E) Designations for noise on the parcels listed above, no impacts related noise are expected and no further analysis is warranted.

20.6 Conclusion

A comparison of noise levels under the No Build and Build Conditions finds that the Proposed Action would result in an increase in traffic volumes. However, as shown in Tables 20-6 and 20-7, increases in noise levels related to traffic between the No Build and Build Conditions would be minimal, since the noise levels associated with the growth in traffic on local streets would be 1.2 dBA or less for each peak period at the six measurement sites.

Future residential development that would occur within the Project Area west of Front Street would require proper attenuation in order to achieve acceptable indoor noise levels. The provision for sufficient building attenuation would be mandated by placing an (E) Designation on City Zoning Map for the Projected and Potential Development Sites. Noise from HVAC units, or other stationary sources, would be mostly shielded by the building roof and structures. Thus, based on CEQR criteria, noise impacts attributed to mobile or stationary sources are not anticipated under the Build Condition, and the Proposed Action would not result in significant adverse noise impacts.


Legend
(E) Designation Parcels:
35 dBA Attenuation
30 dBA Attenuation
Project Area Tax Lots:
Block Number
Lot Number
Tax Lot
Project Area
Special District Boundary
Rezoning Area Boundary
100 (Partial Lot)
110
487
489
490
491
492
493
494
496
2820
25
24
26
37
45
32
29
41
42
46
31
12
21
19
18
30
275
215
105
1
95 (Partial Lot)
Sources: MapPLUTO database, NYC DCP; Landbase, NYC DoITT The Louis Berger Group, Inc.
New York City Economic Development Corporation
New Stapleton Waterfront Development Plan DEIS
Noise (E) Designations Parcels
The Louis Berger Group, Inc.
Figure 20-2