Chapter 10: Noise

A. INTRODUCTION

This chapter assesses potential noise effects that could result from the Governors Island North Island Re-Tenanting and Park and Public Space Master Plan (the Proposed Project). In accordance with the *City Environmental Quality Review* (CEQR) *Technical Manual*, a noise analysis determines whether a Proposed Project would result in increases in noise level that could have a significant adverse impact on nearby sensitive receptors, and also considers the effect of existing noise levels at the project site on the proposed uses.

As shown in the traffic analysis contained in Chapter 7, "Transportation," 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] on any roadway, which would be necessary to cause a 3 A-weighted decibel (dBA) increase in noise levels, see **Appendix C**), and it is assumed that any mechanical equipment would be designed to meet applicable regulations and therefore not have the potential to result in any significant noise impacts. Consequently, a noise assessment was performed only to examine potential changes in noise levels at noise sensitive receptors, including those on Governors Island (the Island) and near the associated ferry terminals in Brooklyn and Manhattan, resulting from:

- Noise generated by additional ferry service associated with the Proposed Project between the Island and Brooklyn and Manhattan; and
- Noise generated by the school playground associated with the public school that could be included in the re-tenanting of the north island historic structures.

B. PRINCIPAL CONCLUSIONS

2022 ANALYSIS YEAR

The analysis concludes that noise generated by ferries associated with the Proposed Project could result in significant adverse impacts at open space locations immediately adjacent to Soissons Landing on the Island and at Pier 6 in Brooklyn during weekday time periods. While the noise level increments at these locations, ranging from 3.2 dBA to 4.8 dBA, would be considered significant according to CEQR criteria, absolute noise levels at these locations would be comparable to other open space areas in New York City.

The analysis also concludes, similarly to the conclusions of the *Final Generic Environmental Impact Statement for the Phased Redevelopment of Governors Island* (2011 FGEIS), that if the playground associated with the public school included in the 2022 analysis year as part of the Proposed Project is located immediately adjacent to an existing open space area, noise level increases adjacent to the proposed playground could range from 4.5 dBA to 17.9 dBA depending on the specific location of the playground. Consequently, the school playground could potentially result in a significant noise impact if it is located immediately adjacent to an existing open space area.

Furthermore, to meet CEQR interior noise level requirements, the analysis prescribes up to 31 dBA of building attenuation for the buildings associated with the Proposed Project, which is the same amount of building attenuation specified in the 2011 FGEIS. Also similarly to what was predicted in the 2011 FGEIS, noise levels in the newly created open spaces would be greater than the 55 dBA $L_{10(1)}$ prescribed by CEQR criteria, but would be comparable to other parks around New York City and would not constitute a significant adverse impact.

2030 ANALYSIS YEAR

The South Island Development Zones would introduce new land uses by 2030 and would generate additional ferry traffic to accommodate an increase in people traveling to and from the Island. The specific future uses for the South Island Development Zones have not yet been proposed, defined, or designed at this time. Therefore, potential noise impacts from these uses, associated increases in ferry traffic, and potential requirements for window/wall attenuation will be analyzed in greater detail in further environmental reviews associated with any future discretionary actions.

C. SUMMARY OF 2011 FGEIS FINDINGS

PHASE 1

The 2011 FGEIS concluded that Phase 1 would not result in noise level increases at any sensitive noise receptors. Noise levels at the new, publicly accessible open space included in Phase 1 would be expected to exceed the CEQR 55 dBA $L_{10(1)}$ prescribed by CEQR criteria, but would be comparable to other parks around New York City and would not constitute a significant adverse impact.

LATER PHASES

The 2011 FGEIS concluded that the school playground associated with the public school that could potentially be included in the Later Phases–Park and Public Spaces could result in substantial noise level, possibly resulting in a significant adverse noise impact if it is located immediately adjacent to an open space area. The 2011 FGEIS noise analysis also prescribed up to 31 dBA of window/wall attenuation for buildings constructed within 20 feet of the school playground. Noise levels at the new, publicly accessible open space included in the Later Phases–Park and Public Spaces would be expected to exceed the CEQR 55 dBA $L_{10(1)}$ prescribed by CEQR criteria, but would be comparable to other parks around New York City and would not constitute a significant adverse impact.

D. METHODOLOGY

ACOUSTICAL FUNDAMENTALS

Sound is a fluctuation in air pressure. Sound pressure levels are measured in units called "decibels" ("dB"). The particular character of the sound that we hear (a whistle compared with a French horn, for example) is determined by the "frequency," which is the speed 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 10-1**, 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 10-1
Common Noise Levels

Sound Source	(dBA)
Military jet, air raid siren	130
Amplified rock music	110
Jet takeoff at 500 meters	100
Freight train at 30 meters	95
Train horn at 30 meters	90
Heavy truck at 15 meters	80–90
Busy city street, loud shout	80
Busy traffic intersection	70–80
Highway traffic at 15 meters, train	70
Predominantly industrial area	60
Light car traffic at 15 meters, city or commercial areas, or residential areas close to industry	50–60
Background noise in an office	50
Suburban areas with medium-density transportation	40–50
Public library	40
Soft whisper at 5 meters	30
Threshold of hearing	0

Note: A 10 dBA increase in level appears to double the loudness, and a 10 dBA decrease halves the apparent loudness.
Sources: Cowan, James P. *Handbook of Environmental Acoustics,* Van Nostrand Reinhold, New York, 1994. Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

In considering these values, it is important to note that the dBA scale is logarithmic, meaning that each increase of 10 dBA describes a doubling of perceived loudness. Thus, the background noise in an office, at 50 dBA, is perceived as twice as loud as a library at 40 dBA. For most people to perceive an increase in noise, it must be at least 3 dBA. At 5 dBA, the change will be readily noticeable.

EFFECTS OF DISTANCE ON SOUND

Sound varies with distance. For example, highway traffic 50 feet away from a receptor (such as a person listening to the noise) typically produces sound levels of approximately 70 dBA. The same highway noise measures 66 dBA at a distance of 100 feet, assuming soft ground conditions. This decrease is known as "drop-off." The outdoor drop-off rate for line sources, such as traffic, is a decrease of approximately 4.5 dBA (for soft ground) for every doubling of distance between the noise source and receiver (for hard ground the outdoor drop-off rate is 3 dBA for line sources). Assuming soft ground, for point sources, such as amplified rock music, the outdoor drop-off rate is a decrease of approximately 7.5 dBA for every doubling of distance

between the noise source and receiver (for hard ground the outdoor drop-off rate is 6 dBA for point sources).

SOUND LEVEL DESCRIPTORS

Because the sound pressure level unit of dBA describes a noise level at just one moment and very few noises are constant, other ways of describing noise that fluctuates over extended periods have been developed. One way is to describe the fluctuating sound heard over a specific time period as if it had been a steady, unchanging sound. For this condition, a descriptor called the "equivalent sound level," L_{eq}, can be computed. L_{eq} is the constant sound level that, in a given situation and time period (e.g., 1 hour, denoted by $L_{eq(1)}$, or 24 hours, denoted by $L_{eq(24)}$), conveys the same sound energy as the actual time-varying sound. Statistical sound level descriptors such as L_1, L_{10}, L_{50}, L_{90}, and L_x, are used to indicate noise levels that are exceeded 1, 10, 50, 90, and x percent of the time, respectively.

The relationship between L_{eq} and levels of exceedance is worth noting. Because L_{eq} is defined in energy rather than straight numerical terms, it is not simply related to the levels of exceedance. If the noise fluctuates very little, L_{eq} will approximate L_{50} or the median level. If the noise fluctuates broadly, the L_{eq} will be approximately equal to the L_{10} value. If extreme fluctuations are present, the L_{eq} will exceed L_{90} or the background level by 10 or more decibels. Thus the relationship between L_{eq} and the levels of exceedance will depend on the character of the noise. In community noise measurements, it has been observed that the L_{eq} is generally between L_{10} and L_{50}.

For purposes of the Proposed Project, 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 *CEQR Technical Manual* for vehicular traffic and construction noise impact evaluation, and is used to provide an indication of highest expected sound levels. The 1-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for city environmental impact review classification.

NOISE STANDARDS AND CRITERIA

NEW YORK CEQR NOISE CRITERIA

The *CEQR Technical Manual* sets external noise exposure standards, shown in **Table 10-2** below. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable. The noise level specified for outdoor areas requiring serenity and quiet is 55 dBA $L_{10(1h)}$.

The *CEQR Technical Manual* also defines attenuation requirements for buildings based on exterior noise level (see **Table 10-3**). Recommended noise attenuation values for buildings are designed to maintain interior noise levels of 45 dBA for residential and classroom uses and 50 dBA or lower for commercial uses and are determined based on exterior $L_{10(1)}$ noise levels.

Table 10-2
Noise Exposure Guidelines For Use in City Environmental Impact Review[1]

Receptor Type	Time Period	Acceptable General External Exposure	Airport[3] Exposure	Marginally Acceptable General External Exposure	Airport[3] Exposure	Marginally Unacceptable General External Exposure	Airport[3] Exposure	Clearly Unacceptable General External Exposure	Airport[3] Exposure
Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	---- Ldn ≤ 60 dBA ----	NA	---- 60 < Ldn ≤ 65 dBA ----	NA	(I) 65 < Ldn ≤ 70 dBA, (II) 70 ≤ Ldn	NA	---- Ldn ≤ 75 dBA ----
Hospital, nursing home		$L_{10} \leq 55$ dBA		55 < $L_{10} \leq$ 65 dBA		65 < $L_{10} \leq$ 80 dBA		L_{10} > 80 dBA	
Residence, residential hotel, or motel	7 AM to 10 PM	$L_{10} \leq 65$ dBA		65 < $L_{10} \leq$ 70 dBA		70 < $L_{10} \leq$ 80 dBA		L_{10} > 80 dBA	
	10 PM to 7 AM	$L_{10} \leq 55$ dBA		55 < $L_{10} \leq$ 70 dBA		70 < $L_{10} \leq$ 80 dBA		L_{10} > 80 dBA	
School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, outpatient public health facility		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)	
Commercial or office		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)		Same as Residential Day (7 AM-11 PM)	
Industrial, public areas only[4]	Note 4	Note 4		Note 4		Note 4		Note 4	

Notes:

(i) In addition, any new activity shall not increase the ambient noise level by 3 dBA or more; (ii) *CEQR Technical Manual* noise criteria 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 an L^{y}_{dn} (L_{dn} contour) value.

Table Notes:

[1] Measurements and projections of noise exposures are to be made at appropriate heights above site boundaries as given by American National Standards Institute (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 nursing homes.

[3] One may use FAA-approved L_{dn} contours supplied by the Port Authority, or the noise contours may be computed from the federally approved INM Computer Model using flight data supplied by the Port Authority of New York and New Jersey.

[4] 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).

Source: New York City Department of Environmental Protection (adopted policy 1983).

Table 10-3
Required Attenuation Values to Achieve Acceptable Interior Noise Levels

	Marginally Unacceptable				Clearly Unacceptable
Noise Level With Proposed Action	70 < $L_{10} \leq$ 73	73 < $L_{10} \leq$ 76	76 < $L_{10} \leq$ 78	78 < $L_{10} \leq$ 80	80 < L_{10}
Attenuation[A]	(I) 28 dB(A)	(II) 31 dB(A)	(III) 33 dB(A)	(IV) 35 dB(A)	36 + (L_{10} – 80)[B] dB(A)

Notes:

[A] The above composite window-wall attenuation values are for residential dwellings, medical facility, etc development. Commercial office spaces and meeting rooms would be 5 dB(A) less in each category. All the above categories require a closed window situation and hence an alternate means of ventilation.

[B] Required attenuation values increase by 1 dB(A) increments for L_{10} values greater than 80 dBA.

Source: New York City Department of Environmental Protection.

IMPACT DEFINITION

As recommended in the *CEQR Technical Manual*, this study uses the following criteria to define a significant adverse noise impact:

- An increase of 5 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 those calculated for the No Build condition, if the No Build levels are less than or equal to 60 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase in Build $L_{eq(1)}$ noise levels at sensitive receptors of such that the total Build $L_{eq(1)}$ noise levels would be 65 dBA or greater, if the No Build levels are between 60 and 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the No Build levels are greater than or equal to 62 dBA $L_{eq(1)}$ and the analysis period is not a nighttime period.
- An increase of 3 dBA, or more, in Build $L_{eq(1)}$ noise levels at sensitive receptors over those calculated for the No Build condition, if the analysis period is a nighttime period (defined by the *CEQR Technical Manual* criteria as being between 10 PM and 7 AM).

FERRY NOISE METHODOLOGY

Potential noise level increases resulting from the increased ferry operations included in the Proposed Project were analyzed based on measurements of a comparable ferry, the projected schedule of ferry service in the future with the Proposed Project, and the locations of noise sensitive receptors relative to the ferry landings on the Island, and in Manhattan and Brooklyn.

Because different ferry vessels are used on weekdays and weekends, separate weekday and weekend analyses were conducted. Noise emission levels for the smaller type of ferry vessel were field measured, and the larger ferry vessels were conservatively assumed to generate 3 dBA more noise (i.e., double the sound energy).

To provide a conservative estimation of noise due to ferry operations, the peak weekday and weekend hourly number of ferry operations to and from the Island was compared to the quietest measured weekday and weekend existing noise levels. This approach would tend to find the largest possible noise level increases resulting from ferry operations to and from the Island.

The following procedure was used in performing the ferry operation noise analysis:

- Noise monitoring locations (receptor sites) were selected at noise-sensitive land uses (i.e., residential, church, school, etc.) located near the ferry landings serving the Island, both on the Island and in Manhattan and Brooklyn;
- Existing noise levels were determined at receptor sites listed above, for each analysis time period (i.e., weekday and weekend), by performing field measurements;
- Noise levels during operation of a comparable ferry at a landing in Brooklyn (since the measurements were done in winter when ferry service does not regularly run to the Island, and ferry service operates year-round to this Brooklyn ferry landing) were measured, and the number of ferries stopping at the dock during the measurement were noted;
- The level of background (i.e., non-ferry) noise during the measurement of ferry noise, as determined by another measurement simultaneous with the ferry noise measurement that was suspended during any ferry operations, was logarithmically subtracted from the

measurement that included the ferry noise, leaving noise emission level for ferry operations alone;

- The noise level due to ferry operations in the future with the Proposed Project at each noise receptor site was determined by adjusting the measured ferry noise emission level based on the projected peak hourly number of ferry operations near each receptor and the distance between the receptor and the nearby ferry landing;
- The noise level due to ferry operations at each receptor site was logarithmically added to the existing noise level at the site to determine the total noise level with ferry operations in the future with the Proposed Project;
- The difference between total noise level with ferry operations in the future with the Proposed Project and the existing noise level at each receptor site was compared the noise impact criteria from the *CEQR Technical Manual*.

SCHOOL PLAYGROUND METHODOLOGY

The maximum hourly playground boundary noise levels for different types of school playgrounds during the AM and PM peak hours are shown in **Table 10-4**. These values are based upon measurements made at a series of New York City school playgrounds for the New York City School Construction Authority (SCA).[1] By 2022, it is assumed that a new intermediate school or high school would be included as part of the Proposed Project. By 2030, an additional school may be built, which is conservatively assumed, for the purposes of this analysis, to be an early childhood center. Therefore, the 2022 analysis year uses a maximum $L_{eq(1)}$ value of 71.0 dBA as a reference level for this analysis, while the 2030 analysis year uses a maximum $L_{eq(1)}$ value of 71.5 dBA. As specified in the SCA Playground Noise Study, $L_{10(1)}$ values were assumed to be 3 dBA greater than $L_{eq(1)}$ values.

Table 10-4
Maximum Hourly Playground Boundary $L_{eq(1)}$ Noise Levels (dBA)

School Type	$L_{eq(1)}$ At Playground Boundary
Early Childhood Center	71.5
Elementary School	71.4
Intermediate School	71.0
High School	68.2

Sources: SCA Playground Noise Study, AKRF, Inc., October 23, 1992.

Geometric spreading and the consequent dissipation of sound energy with increasing distance from the playground decreases noise levels at varying distances from the playground boundary. Based upon measurements and acoustical principles, hourly noise levels were assumed to decrease by the following values at the specified distances from the playground boundary: 4.8 dBA at 20 feet, 6.8 dBA at 30 feet, and 9.1 dBA at 40 feet. For all distances between 40 and 300 feet, a 4.5-dBA drop-off per doubling of distances from the playground boundary was assumed.

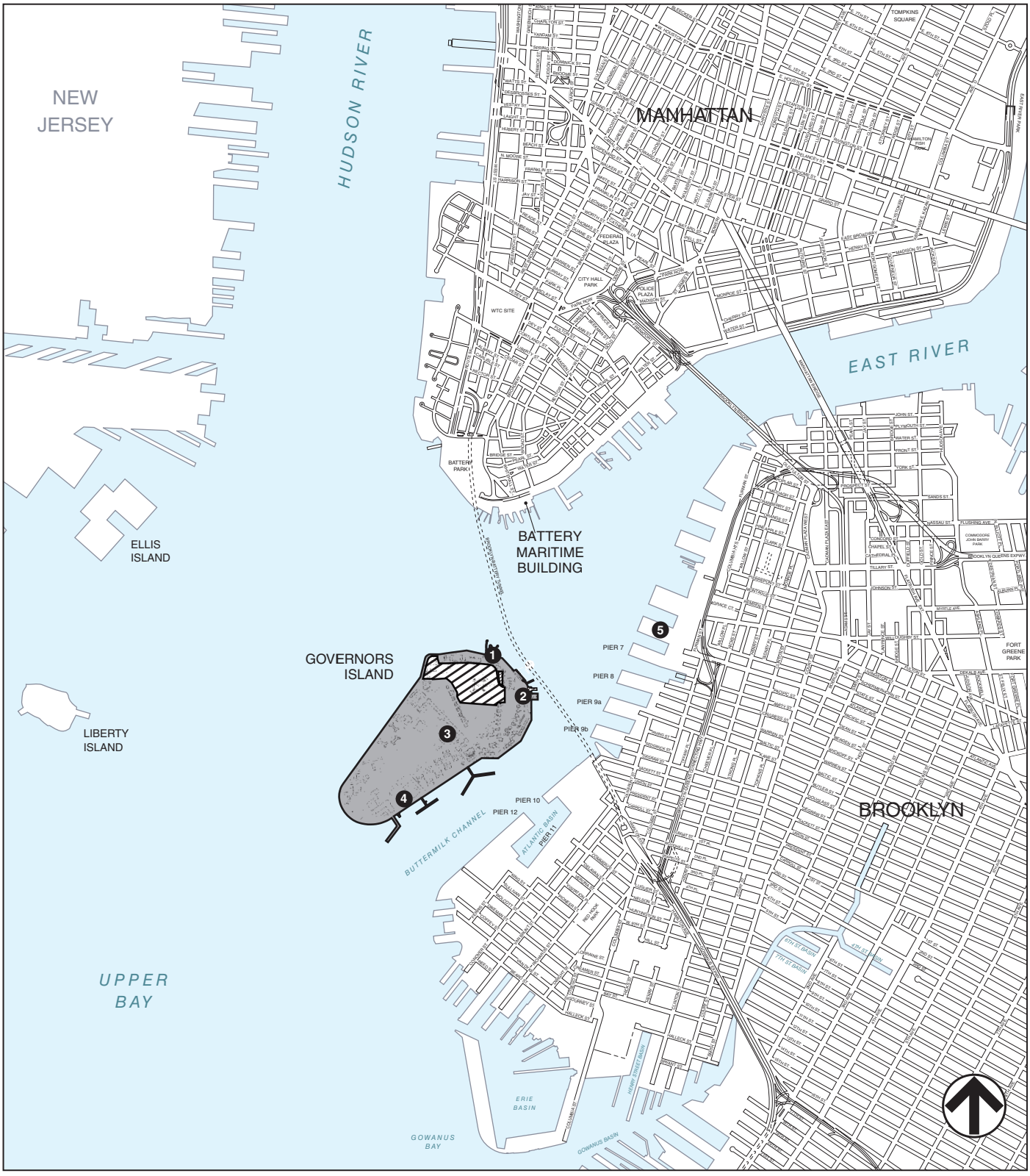
[1] SCA Playground Noise Study, AKRF, Inc., October 23, 1992.

E. EXISTING NOISE LEVELS

NOISE RECEPTOR LOCATIONS

Existing noise levels were measured at five (5) locations (see **Figure 10-1**). The measurement locations were selected to provide geographical coverage of the Island, capture the loudest existing noise levels for comparison with CEQR noise guidelines for open space, and provide baseline existing noise levels for comparison to future noise levels with proposed expanded ferry service. Specifically, the receptors were as follows:

- Receptor site 1 was located at an existing open space area adjacent to Soissons Landing on the Island. Existing noise sources included noise from helicopter flights over the Island and over adjacent bodies of water, boats, and people using open space on the Island, with the helicopter noise being the dominant noise source. It will remain as open space in the future with the proposed project. The measured noise levels at this location were used as baseline levels in the analyses of impacts from ferries and school playground(s) included in the proposed project, as well as to evaluate noise exposure at open spaces newly created as part of the proposed project.
- Receptor site 2 was located at an existing open space area adjacent to Pier 101 on the Island. Existing noise sources included noise from helicopter flights over the Island and over adjacent bodies of water, boats, and people using open space on the Island, with the helicopter noise being the dominant noise source. It will remain as open space in the future with the proposed project. The measured noise levels at this location were used as baseline levels in the analysis of impacts from future school playground(s) included in the proposed project.
- Receptor site 3 was located at a location currently not accessible along Division Road between Hay Road and Enright Road on the Island. Existing noise sources included noise from helicopter flights over the Island and over adjacent bodies of water, boats, and people using open space on the Island, with the helicopter noise being the dominant noise source. It will be converted to open space in the future with the proposed project, although it is representative of locations in the center of the Island that may include other land uses including dormitory and faculty housing, educational, office, etc. The measured noise levels at this location were used as baseline levels in the analyses of impacts from school playground(s) included in the proposed project, as well as to evaluate noise exposure at open spaces and buildings newly created as part of the proposed project.
- Receptor site 4 was located at a location currently not accessible along Craig Road South between Yeaton Road and Half Moon Road on the Island. Existing noise sources included noise from helicopter flights over the Island and over adjacent bodies of water, boats, and people using open space on the Island, with the helicopter noise being the dominant noise source. It will be converted to open space in the future with the proposed project, although it is representative of locations in the southern portion of the Island that may include other land uses including dormitory and faculty housing, educational, office, etc. The measured noise levels at this location were used to evaluate noise exposure at open spaces and buildings newly created as part of the proposed project.
- Receptor site 5 was located at an existing open space are adjacent to Pier 6 in Brooklyn. Existing noise levels were dominated by noise from vehicular traffic on adjacent roadways and the nearby Brooklyn Queens Expressway (BQE). It will remain as open space in the future and is not part of the proposed project. The measured noise levels at this location were used as baseline levels in the analyses of impacts from ferries included in the proposed project.



0 2000 FEET
SCALE

Project Area

Governors Island National Monument

1 *Noise Receptor*

PHASED DEVELOPMENT OF GOVERNORS ISLAND
North Island Re-tenanting and Park and Public Space Master Plan

Noise Receptor Locations
Figure 10-1

No receptor site was selected adjacent to the ferry landing at the Battery Maritime Building (BMB) in Manhattan, because there are no noise sensitive land uses adjacent to this ferry landing except a separately proposed hotel, which as part of its approval process was required to provide sufficient window/wall attenuation to achieve acceptable interior noise levels. In addition, noise generated by ferry operations associated with the Proposed Project would be negligible compared to the operation of the Staten Island Ferry to the immediate south. Similarly, no receptor site was selected adjacent to Yankee Pier on the Island, because there are no existing noise sensitive land uses adjacent this ferry landing**.**

At Receptor Sites 1 through 4, existing noise levels were measured for 20-minute periods during three weekday peak periods—AM (8:15 AM to 10:15 AM), midday (MD) (1:00 PM to 2:30 PM), PM (4:00 PM to 5:30 PM), and Saturday midday (MD) 3:00 PM to 5:00 PM). These time periods correspond with the peak hours of trips to and from the Island and the time periods analyzed in Chapter 7, "Transportation." Measurements were taken at Sites 1-4 on June 2 and 4, 2011. At Receptor Site 5, existing noise levels were measured for 20-minute periods during one weekday period—midday (MD) (1:00 PM to 2:30 PM), and Saturday midday (MD) 3:00 PM to 5:00 PM). These time periods represent times when lower existing levels resulting from vehicular traffic noise could coincide with peak ferry activity to and from the Island. Measurements were taken at Site 5 on January 20 and 22, 2013.

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 had a laboratory calibration date within one year of the measurements, as is standard practice. The Brüel & Kjær SLM is a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). For all receptor sites the instrument/microphone was mounted on a tripod at a height of approximately 5 feet above the ground. Microphones were mounted 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 at each location were made on the A-scale (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.

NOISE MEASUREMENT RESULTS

The results of the existing noise level measurements are summarized in **Table 10-5**.

Noise at monitoring sites on the Island consisted of noise from helicopter flights over the Island and over adjacent bodies of water, boats, and people using open space on the Island, with the helicopter noise being the dominant noise source. There is no roadway traffic allowed on the Island, with the exception of a small number of service and construction vehicles, and consequently the traffic was not a substantial contributor to noise levels. Measured noise levels are moderate and reflect the level of helicopter activity in the skies above. In terms of the *CEQR* criteria, the existing noise levels at Site 3 would be in the "marginally acceptable" category, and existing noise levels at Sites 1, 2, and 4 would be in the "marginally unacceptable" category. Noise levels at Receptor Site 5 were dominated by noise from the nearby Brooklyn-Queens Expressway. In terms of the *CEQR* criteria, the existing noise levels at Site 5 were in the "marginally acceptable" category.

Table 10-5
Existing Noise Levels (in dBA)

Site	Measurement Location	Time		L_{eq}	L_1	L_{10}	L_{50}	L_{90}
1	Adjacent to Soissons Landing	Weekday	AM	68.4	74.6	66.5	61.4	59.4
			MD	65.5	75.4	67.9	62.6	60.3
			PM	67.2	77.8	69.8	62.7	60.8
		Saturday	MD	67.4	77.6	69.5	63.6	60.7
2	Adjacent to Pier 101	Weekday	AM	61.3	73.9	64.3	54.7	52.2
			MD	64.4	74.0	68.4	59.5	54.9
			PM	65.3	75.8	68.9	59.5	55.5
		Saturday	MD	64.5	72.7	68.5	60.7	57.2
3	Division Road between Hay Road and Enright Road	Weekday	AM	53.2	63.7	54.6	51.1	48.8
			MD	58.0	65.0	61.1	56.2	53.0
			PM	60.5	70.7	62.9	58.1	54.6
		Saturday	MD	60.1	70.7	62.7	56.4	51.7
4	Craig Road South between Yeaton Road and Half Moon Road	Weekday	AM	62.4	71.7	66.7	57.9	53.3
			MD	61.7	71.8	64.6	58.5	54.2
			PM	62.6	69.2	66.1	61.1	56.2
		Saturday	MD	62.2	70.0	66.2	59.2	54.5
5	Brooklyn Bridge Park near Pier 6 in Brooklyn	Weekday	MD[1]	61.9	71.0	64.6	59.6	57.0
		Saturday	MD	60.9	71.1	63.0	58.0	56.1

Notes:
[1] Noise levels were measured only during the mid-day time period when traffic on the adjacent roadways and consequently noise levels would be at a minimum at this location, because it was used only for ferry noise impact analysis.
[2] Measurements at sites 1 through 4 were conducted by AKRF Acoustics Department on June 2 and 4, 2011, and measurements at site 5 were conducted by AKRF Acoustics Department on January 20, and 22, 2013.

F. THE FUTURE WITHOUT THE PROPOSED PROJECT

In the future without the Proposed Project, in terms of noise conditions, the Island would continue to operate as it does today. There would be no increase in noise from transportation to and from the Island, including roadway traffic and ferries. Noise levels in the future without the Proposed Project will likely be identical to existing noise levels, or only slightly increased due to any growth in the amount of helicopter traffic overhead or traffic on the Brooklyn-Queens Expressway.

G. PROBABLE IMPACTS OF THE PROPOSED PROJECT

2022 ANALYSIS YEAR

NOISE DUE TO FERRY OPERATIONS

Using the methodology described above, future noise levels with the Proposed Project were calculated for receptors 1 and 5 during the weekday and weekend analysis time periods. **Table 10-6** shows the calculated noise levels.

Comparing future Build conditions with No Build conditions, the maximum increase in $L_{eq(1)}$ noise level during the weekend time periods would be less than 4 dBA. Increases of this magnitude would be perceptible, but based upon CEQR impact criteria would not be significant.

Table 10-6
Noise Levels With the Proposed Project Due to Ferry Operations (in dBA)

Site[1]	Day	No Build $L_{eq(1)}$	Build $L_{eq(1)}$	Change	Build $L_{10(1)}$
1	Weekday	65.5	70.3	4.8	72.7
	Weekend	67.4	70.1	2.7	72.2
5	Weekday	61.9	65.1	3.2	67.8
	Weekend	60.9	64.6	3.7	66.7

Notes: [1]Sites 2, 3, and 4 are not located near future ferry landings and were used only for the purposes of evaluating open space noise exposure and determining the building attenuation required, and are therefore not presented in the analysis of noise due to ferry operations.

The 4.8 dBA increase in noise level at Site 1 during the weekday analysis time period would be readily noticeable, and under CEQR impact criteria would be considered to be a significant adverse impact. Site 1 represents open space on the North Island immediately adjacent to Soissons Landing. The significant increase in noise levels at this location would result from the added weekday ferry operations associated with the Proposed Project. There would be no feasible or practicable measures to mitigate this impact. Noise barriers or berms are impractical because of space constraints, and would not be effective, because of the relatively long distance between the ferry landing and the receptor. As a result, this would be an unmitigatable significant adverse impact.

The 3.2 dBA increase in noise level at Site 5 during the weekday analysis time period would be barely perceptible, and under CEQR impact criteria would also be considered to be a significant adverse impact. Site 5 represents open space in Brooklyn Bridge Park immediately adjacent to the Pier 6 ferry landing in Brooklyn. The significant increase in noise levels at this location would result from the added weekday ferry operations associated with the Proposed Project. There would be no feasible or practicable measures to mitigate this impact. Noise barriers or berms are impractical because of space constraints, and would not be effective, because of the relatively long distance between the ferry landing and the receptor. As a result, this would be an unmitigatable significant adverse impact.

While the future noise levels with the Proposed Project would exceed the CEQR threshold for a significant impact, the resultant L_{10} noise levels ranging from 67.8 to 72.7 dBA are not uncommon for parks in New York City. (More detail is provided below in "Open Space Areas.") Noise levels of this magnitude frequently occur at parks or portions of parks that are adjacent to roadways.

SCHOOL PLAYGROUND

Noise levels resulting from the school playground that could potentially be included in the Proposed Project were predicted using the methodology described above. During the hours that the school playground would be in operation, which coincide with the hours that the existing open space is in use, noise levels immediately adjacent to the proposed playground would be as high as the low 70s dBA, depending on the time of day and the specific location of the playground and the existing background noise levels at that location. The maximum playground-generated noise level would occur immediately adjacent to the playground, and would decrease with distance away from the playground.

Noise level increases adjacent to the proposed playground could range from 4.5 dBA to 17.9 dBA depending on the specific location of the playground. Consequently, the school playground

could potentially result in a significant noise impact if it is located immediately adjacent to an existing open space area. If the school playground is located further from the existing open space, or at open space locations further from the school playground boundary, the noise level increases would be smaller and may not be significant.

There would be no feasible or practicable measures to mitigate this impact. Noise barriers or berms are impractical because of security concerns at the school playground. Separation between the playground and existing open spaces via landscaping and/or positioning of the playground and school building may be explored when more specific information about the school design becomes available. If the playground would be located immediately adjacent to an existing open space area, and it would not be feasible to provide separation between the proposed playground and existing open space areas via landscaping or positioning of the playground and/or school building, then this would constitute an unmitigatable significant adverse impact.

OPEN SPACE AREAS

As discussed above, the *CEQR Technical Manual* includes noise exposure guidelines for open space, based on $L_{10(1)}$ noise levels. Noise levels throughout the newly created open space areas with the Proposed Project were determined based on measurements of existing noise levels on the Island and projected future noise levels near ferry landings.

The new, publicly accessible open space included in Proposed Project would experience L_{10} values up to the high 60s to low 70s dBA. These noise levels would be above the CEQR 55 dBA $L_{10(1)}$ guideline for outdoor areas requiring serenity and quiet. Because so much of the noise at the project site results from helicopter activity, there are no practical and feasible mitigation measures[1] that could be implemented to reduce noise levels to below 55 dBA within the passive open space areas. Although noise levels in newly created publicly accessible open spaces with the Proposed Project are expected to be above the CEQR 55 dBA $L_{10(1)}$ guideline, these levels are comparable to or lower than noise levels in a number of open space areas that are within a range of substantial noise sources (e.g., roadways, aircraft, etc.), including Hudson River Park, Riverside Park, and Bryant Park. The 55 dBA $L_{10(1)}$ guideline is a worthwhile goal for outdoor areas requiring serenity and quiet; however, due to the level of activity present at most open space areas and parks throughout the City (except for areas far away from traffic and other typical urban activities), this relatively low noise level is often not achieved. Consequently, noise levels in the Phase 1 publicly accessible open space areas, while exceeding the 55 dBA $L_{10(1)}$ CEQR guideline value, would not result in a significant adverse noise impact.

BUILDING ATTENUATION FOR PROJECT BUILDINGS

As described above and noted in Table 10-3, the *CEQR Technical Manual* includes noise attenuation values for buildings associated with new uses included in the Proposed Project, based on exterior noise levels. Recommended noise attenuation values for residential and school buildings are designed to maintain interior noise levels of 45 dBA $L_{10(1)}$ (50 dBA $L_{10(1)}$ for commercial uses) or lower and are determined based on exterior $L_{10(1)}$ noise levels.

Based on the measured L_{10} values at the various receptor locations on the Island and predicted future L_{10} values on the Island, which are in the mid 50s to low 70s dBA, buildings that are not

[1] The only mitigation measure that could reduce noise levels to below 55 dBA within the passive open space areas would be to ban helicopter flights over the Island and over adjacent bodies of water, which is beyond the purview of this project.

in close proximity to the proposed school playground would not require no more than 28 dBA of window/wall attenuation for residential (dormitory or staff housing) or school use or 23 dBA for commercial use according to CEQR interior noise level criteria. Buildings close or immediately adjacent to the proposed school playground may experience L_{10} values up to 74.5 dBA, which would require 31 dBA of attenuation for residential or school uses or 26 dBA of attenuation for commercial use.

PROJECT MECHANICAL EQUIPMENT

The mechanical systems (i.e., heating, ventilation, and air conditioning systems) of any buildings associated with the Proposed Project would be designed to meet all applicable noise regulations (i.e., Subchapter 5, §24-227 of the New York City Noise Control Code addressing circulation devices and the New York City Department of Buildings and Mechanical Codes) to avoid a significant increase in ambient noise levels.

2030 ANALYSIS YEAR

The South Island Development Zones would introduce new land uses by 2030 and would generate additional ferry traffic to accommodate an increase in people traveling to and from the Island. The specific future uses for the South Island Development Zones have not yet been proposed, defined, or designed at this time. Therefore, potential noise impacts from these uses and associated increases in ferry traffic will be analyzed in greater detail in further environmental reviews associated with any future discretionary actions.

Full development of the Proposed Project could potentially include an additional public school (and associated playground). Similar to the 2022 analysis year, noise generated by the proposed school playground may result in substantial noise level increases at some open space areas on the Island, depending on the specific location of the proposed school. However, noise levels would be slightly higher—noise level increases adjacent to the proposed playground could range from 4.8 dBA to 18.4 dBA. Consequently, the school playground could potentially result in a significant adverse noise impact if it is located immediately adjacent to an open space area.

Buildings associated with the South Island Development Zones may require window/wall attenuation depending on the specific location and land uses of the buildings. These attenuation requirements would be analyzed in greater detail in further environmental reviews. ✷