Chapter 6.12: Construction—Noise and Vibration

A. INTRODUCTION

This chapter examines the potential noise and vibration effects that could occur during the construction under the proposed project. Effects on community noise levels during construction would include noise from the operation of construction equipment and noise from construction and delivery vehicles traveling to and from the site. Noise and vibration levels at a given location are dependent on the type and quantity of construction equipment being operated, the acoustical utilization factor of the equipment (i.e., the percentage of time a piece of equipment is operating), the distance from the construction site, and any shielding effects (from structures such as buildings, walls, or barriers). Noise levels caused by construction activities would vary widely, depending on the stage of construction (i.e., structure rehabilitation, interior fit out, etc.) and the location of the construction activities relative to noise-sensitive receptor locations.

B. PRINCIPAL CONCLUSIONS

A screening level mobile-source analysis indicated that vehicle trips associated with construction of the proposed project would not have the potential to result in significant adverse noise effects at any noise receptor locations.

During, construction of the proposed project, noise control measures would be implemented as required by the *New York City Noise Control Code*, including both path control (e.g., placement of equipment, implementation of barriers or enclosures between equipment and sensitive receptors) and source control (i.e., reducing noise levels at the source or during the most sensitive time periods). Even with these measures, the cumulative analysis of construction vehicle trips and operation of on-site construction equipment indicated the potential for significant adverse noise effects as a result of construction at some receptors under each of the analyzed With Action Alternatives.

NO ACTION ALTERNATIVE (ALTERNATIVE 1)

The No Action Alternative assumes that no new comprehensive coastal protection system would be constructed in the proposed project area. Therefore, this alternative is not evaluated further as there will no new construction associated with the proposed project.

PREFERRED ALTERNATIVE (ALTERNATIVE 4): FLOOD PROTECTION SYSTEM WITH A RAISED EAST RIVER PARK

Construction of the Preferred Alternative is predicted to result in significant adverse noise effects at 621 Water Street, 605 Water Street, 315-321 Avenue C, 620 East 20th Street, 601 East 20th Street, 8 Peter Cooper Road, 7 Peter Cooper Road, 530 East 23rd Street, 765 FDR Drive, 819 FDR Drive, 911 FDR Drive, 1023 FDR Drive, 1115 FDR Drive, 1141 FDR Drive, 1223 FDR Drive, 570 Grand Street, 455 FDR Drive, 71 Jackson Street, 367 FDR Drive, 645 Water

Street, 322 FDR Drive, 525 FDR Drive, 555 FDR Drive, 60 Baruch Drive, 132 Avenue D, 465 East 10th Street, 520 East 23rd Street, 123 Mangin Street, and the Asser Levy Recreation Center. The predicted significant adverse construction noise effects would be of limited duration and would be up to the mid 80s dBA during daytime construction and up to the mid 70s during nighttime construction. Noise levels in this range are typical in many parts of Manhattan along heavily trafficked roadways. The buildings at 315-321 Avenue C, 620 East 20th Street, 601 East 20th Street, 8 Peter Cooper Road, 7 Peter Cooper Road, 530 East 23rd Street, 911 FDR Drive, 1023 FDR Drive, 1115 FDR Drive, 1141 FDR Drive, 1223 FDR Drive, 570 Grand Street, 455 FDR Drive, 71 Jackson Street, 367 FDR Drive, 645 Water Street, 322 FDR Drive, 525 FDR Drive, 555 FDR Drive, 60 Baruch Drive, and 520 East 23rd Street already have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), and would consequently be expected to experience interior $L_{10(1)}$ values less than 45 dBA during much of the construction period, which would be considered acceptable according to CEQR criteria. The buildings at 621 Water Street, 605 Water Street, 765 FDR Drive, 819 FDR Drive, 132 Avenue D, 465 Avenue D, 123 Mangin Street, and the Asser Levy Recreation Center appear to have monolithic glass (i.e., non-insulating) and would consequently be expected to experience interior $L_{10(1)}$ values up to the high 60s dBA, which is up to approximately 23 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines (see **Table 6.12-8** for a summary of construction noise analysis results for the Preferred Alternative).

Construction of the Preferred Alternative 4 is expected to occur over a 3.5-year duration as compared to the 5-year duration for Alternatives 2, 3, and 5. This shorter construction duration for the Preferred Alternative 4 primarily due to less disruption to the FDR Drive since flood protection in East River Park would be primarily along the East River rather than along the FDR Drive. In addition, compared to Alternatives 2 and 3, maximum construction noise levels at receptors nearest floodwall construction within East River Park for the Preferred Alternative would be slightly lower, because pile driving for the Preferred Alternative would occur further from the receptors.

At other receptors near the project area, including open space, residential, school, and hospital receptors, noise resulting from construction of the proposed project may at times be noticeable, but would be temporary and would generally not exceed typical noise levels in the general area and so would not rise to the level of a significant adverse noise effect.

Vibration resulting from construction of the proposed project would not result in exceedances of the acceptable limit, including for historic structures. However, vibration monitoring would be required for all historic structures within 90 feet of the project work areas according to the project's Construction Protection Plan (CPP) to ensure vibration does not exceed the acceptable limit at any of these historic structures. In terms of potential vibration levels that would be perceptible and annoying, the pieces of equipment that would have the most potential for producing levels that exceed the 65 VdB limit are pile drivers. They would produce perceptible vibration levels (i.e., vibration levels exceeding 65 VdB) at receptor locations within a distance of approximately 230 feet. However, the operation would only occur for limited periods of time at a particular location. While the vibration may be noticeable at times, it would be temporary and would consequently not rise to the level of a significant adverse effect.

OTHER ALTERNATIVES

Construction of Alternative 3 is predicted to result in significant adverse noise effects at 621 Water Street, 605 Water Street, 309 Avenue C Loop, 315-321 Avenue C, 620 East 20th Street, 601 East 20th Street, 8 Peter Cooper Road, 7 Peter Cooper Road, 530 East 23rd Street, 765 FDR Drive, 819 FDR Drive, 911 FDR Drive, 1023 FDR Drive, 1115 FDR Drive, 1141 FDR Drive, 1223 FDR Drive, 132 Avenue D, 465 East 10th Street, 520 East 23rd Street, and the Asser Levy Recreation Center. The predicted significant adverse construction noise effects would be of limited duration and would be up to the high 80s dBA during daytime construction and up to the mid 70s during nighttime construction. Noise levels in this range are typical in many parts of Manhattan along heavily trafficked roadways. The buildings at 315-321 Avenue C, 620 East 20th Street, 601 East 20th Street, 8 Peter Cooper Road, 7 Peter Cooper Road, 530 East 23rd Street, 911 FDR Drive, 1023 FDR Drive, 1115 FDR Drive, 1141 FDR Drive, 1223 FDR Drive, 520 East 23rd Street already have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), and would consequently be expected to experience interior $L_{10(1)}$ values less than 45 dBA during much of the construction period, which would be considered acceptable according to City Environmental Quality Review (CEQR) criteria. Under The Flood Protection System on the West Side of East River Park – Baseline Alternative (Alternative 2) and The Flood Protection System East of FDR Drive (Alternative 5), significant adverse construction noise effects are expected to be similar to those under Alternative 2 and the Preferred Alternative, respectively.

Any potential vibration effects for Alternatives 2, 3, and 5 are expected to be similar to those identified for the Preferred Alternative.

MITIGATION

Source or path controls beyond code requirements would be considered and implemented during construction of the proposed project to minimize the effects of noise. To that end, the mitigation measures being explored by the City include:

- Using a hydraulic press-in pile installation method instead of the standard impact pile driving provides a large reduction in noise from pile installation, which would result in a substantial reduction in overall construction noise because pile installation is the dominant source of construction noise at most receptors.
- Hanging noise barriers or curtains made from mass-loaded vinyl around the pile driving head to shield receptors from noise of impact pile driving.
- Enclosing the concrete pump and concrete mixer trucks at any time that the mixer barrels would be spinning in a shed or tunnel including 2 or 3 walls and a roof, with the opening or openings facing away from receptors.
- Using barging for deliveries of construction materials (including concrete) and importing of fill to the project sites, rather than trucks on roadways to from the construction work areas.
- Selecting quieter equipment models for equipment (i.e., cranes, generators, compressors, and lifts).

C. NOISE 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 6.12-1**, 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.

Table 6.12-1
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, a change in noise level 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 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 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 Phase II operational noise analysis, the maximum 1-hour equivalent sound level ($L_{eq(1)}$) has been selected as the noise descriptor to be used in the noise impact evaluation. The $L_{eq(1)}$ is the noise descriptor recommended for use in the 2014 *CEQR Technical Manual* for vehicular traffic and construction noise impact evaluation, and is used to provide an indication of highest expected sound levels. The one-hour L_{10} is the noise descriptor used in the *CEQR Technical Manual* noise exposure guidelines for City environmental impact review classification.

D. REGULATORY CONTEXT

The regulatory context for the proposed project includes the following standards for which each of the alternatives have been analyzed to result in a determination of environmental effects with project construction.

NEW YORK CEQR NOISE STANDARDS

The *CEQR Technical Manual* sets external noise exposure standards; these standards are shown in **Table 6.12-2**. Noise exposure is classified into four categories: acceptable, marginally acceptable, marginally unacceptable, and clearly unacceptable.

IMPACT DEFINITION

Chapter 22, Section 100 of the *CEQR Technical Manual* breaks construction duration into "short-term" and "long-term" and states that assessment of construction noise is not likely to result in an effect unless it "affects a sensitive receptor over a long period of time." Consequently, the construction noise analysis considers both the potential for construction of a proposed project to create high noise levels (the "intensity"), and whether construction noise would occur for an extended period of time (the "duration") in evaluating potential construction noise effects.

Table 6.12-2
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	--------- $Ldn \leq 60$ dBA ---------	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Hospital, nursing home		$L_{10} \leq 55$ dBA		$55 < L_{10} \leq 65$ dBA	--------- $60 < Ldn \leq 65$ dBA ---------	$65 < L_{10} \leq 80$ dBA	(I) $65 < Ldn \leq 70$ dBA, (II) $70 \leq Ldn$	$L_{10} > 80$ dBA	--------- $Ldn \leq 75$ 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–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)	
Commercial or office		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 PM)		Same as Residential Day (7 AM–10 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_{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).

The noise impact criteria described in Chapter 19, Section 410 of the *CEQR Technical Manual* serve as a screening-level threshold for potential construction noise impacts. If construction of the project would not result in any exceedances of these criteria at a given receptor, then that receptor would not have the potential to experience a construction noise impact. However, if construction of the proposed project would result in exceedances of the noise impact criteria, then further consideration of the intensity and duration of construction noise is warranted at that receptor. The screening level noise impact criteria for mobile and on-site construction activities are as follows:

- If the No Action noise level is less than 60 dBA $L_{eq(1)}$, a 5 dBA $L_{eq(1)}$ or greater increase would be considered significant.
- If the No Action noise level is between 60 dBA $L_{eq(1)}$ and 62 dBA $L_{eq(1)}$, a resultant $L_{eq(1)}$ of 65 dBA or greater would be considered a significant increase.
- If the No Action noise level is equal to or greater than 62 dBA $L_{eq(1)}$, or if the analysis period is a nighttime period (defined in the *CEQR* criteria as being between 10PM and 7AM), the incremental significant impact threshold would be 3 dBA $L_{eq(1)}$.

FEDERAL DEVELOPMENT GUIDELINES

HUD regulates noise for HUD-funded residential housing projects in accordance with 24 CFR Part 51, Subpart B. The intent of HUD's noise rules is to evaluate the noise compatibility of sites where HUD-funded housing developments are proposed. The proposed project is not a housing project. In addition, per 24 CFR § 51.101(a)(3), HUD's noise policy does not apply to actions under disaster assistance provisions or appropriations that are provided to save lives, protect property, and protect public health and safety. Therefore, HUD's noise rules would not apply to the proposed project and *CEQR* guidelines as described above were used.

E. METHODOLOGY

As discussed in Chapter 6.0, "Construction Overview," the proposed project is divided into 2 project areas, 16 reaches for design, and 6 construction segments for analysis purposes (see Figure 6.0-1). Construction activities for the proposed project would have the potential to result in increased noise levels as a result of: (1) the operation of on-site construction equipment; and (2) the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the internal and surrounding roadways.

Noise from the operation of construction equipment onsite at a specific receptor location near a construction site is calculated by computing the sum of the noise produced by all pieces of equipment operating at the construction site. For each piece of equipment, the noise level at a receptor site is a function of the following:

- The noise emission level of the equipment;
- A usage factor, which accounts for the percentage of time the equipment is operating at full power;[1]
- The distance between the piece of equipment and the receptor;
- Topography and ground effects; and
- Shielding.

Similarly, noise levels due to construction-related traffic are a function of the following:

- The noise emission levels of the type of vehicle (e.g., auto, light-duty truck, heavy-duty truck, bus, etc.);
- Vehicular speed;

[1] Usage factors for each piece of equipment were based on values shown in Section 28-109 of the New York City Department of Environmental Protection's (DEP) "Rules for Citywide Construction Noise Mitigation" document.

- The distance between the roadway and the receptor;
- Topography and ground effects; and
- Shielding.

CONSTRUCTION NOISE MODELING

Noise effects from construction activities were evaluated using the CadnaA model, a computerized model developed by DataKustik for noise prediction and assessment. The model can be used for the analysis of a wide variety of noise sources, including stationary sources (e.g., construction equipment, industrial equipment, power generation equipment) and transportation sources (e.g., roads, highways, railroad lines, busways, waterways, airports). The model takes into account the reference sound pressure levels of the noise sources at 50 feet, attenuation with distance, ground contours, reflections from barriers and structures, attenuation due to shielding, etc. The CadnaA model is based on the acoustic propagation standards promulgated in International Standard ISO 9613-2. The CadnaA model is a state-of-the-art tool for noise analysis and is approved for construction noise level prediction by the *CEQR Technical Manual*.

Geographic input data to be used with the CadnaA model includes CAD drawings defining likely site work areas, adjacent building footprints and heights, locations of streets, and locations of sensitive receptors. For each analysis period, the geographic location and operational characteristics—including equipment usage rates (percentage of time operating at full power) for each piece of construction equipment operating at the project areas, as well as noise control measures—were input to the model. Reflections and shielding by barriers and project elements erected on the construction site and shielding from adjacent buildings were also accounted for in the model. Furthermore, construction-related vehicles were assigned to the adjacent roadways. The model produces A-weighted $L_{eq(1)}$ noise levels at each receptor location for each analysis period, as well as the contribution from each noise source.

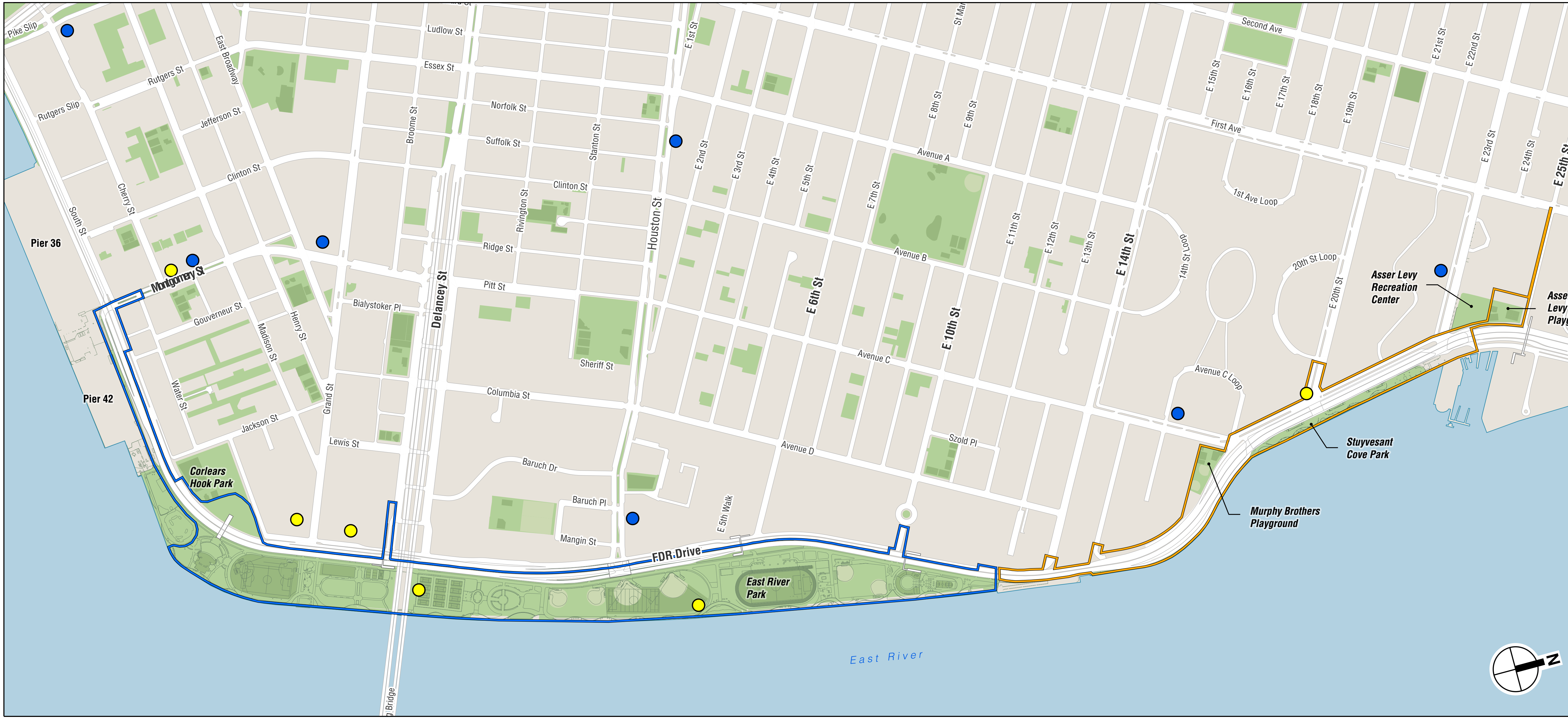
GENERAL NOISE ANALYSIS METHODOLOGY

As discussed in Chapter 6.0, “Construction Overview,” due to the complexity of the proposed project and the variable construction options considered for it, a preliminary construction schedule has been developed for Alternatives 3 and 4 to illustrate how the construction could be phased. These preliminary construction schedules provide for a conservative analysis of the range of potential environmental effects that could occur from construction of the proposed project. As described in further detail in Chapter 6.0, “Construction Overview,” the construction phasing of Alternatives 2 and 5 are largely expected to be similar to those for Alternatives 3 and 4, respectively. However, under Alternative 5, the northbound lanes of the FDR Drive would be raised approximately 6 feet between East 13th Street and East 18th Street.

The construction noise methodology involved the following process for the proposed project:

1. Complete a mobile-source screening analysis. A screening level proportional model of traffic noise was conducted for the 6 AM hour at each of the at-grade noise measurement locations located adjacent to a roadway (i.e., not in East River Park). The 6 AM hour was selected because it represents the hour that would experience the highest level of truck activity and worker vehicle activity compared with the lowest existing levels of traffic. Any locations predicted to experience less than a doubling of Noise Passenger Car Equivalents (Noise PCEs), which would translate to a 3 dBA increase in noise levels, would not be carried further into the detailed noise analysis.

2. Select analysis hours for cumulative on-site equipment and construction truck noise analysis for daytime and late-night construction activity. The 7 AM hour was selected as the daytime analysis hour upon receipt of a detailed conceptual construction schedule. The 11 PM to 5 AM hours were selected as the late-night time period based on the projected schedule of nighttime work.
3. Select receptor locations for cumulative on-site equipment and construction truck noise analysis. Selected receptors were representative residential or other noise-sensitive uses potentially affected by the proposed project during operation of on-site construction equipment and/or along routes taken to and from the site by construction trucks or routes taken by worker vehicles associated with an individual sub-area.
4. Establish existing noise levels at selected receptors. Noise levels were measured at several at-grade locations, and calculated for the other noise receptor locations included in the analysis. **Figure 6.12-1** shows the construction noise measurement locations. Existing noise levels at noise receptors other than the selected receptor sites or during hours when existing noise levels were not measured were established using the CadnaA model, as described below.
5. Establish worst-case noise analysis periods for detailed analysis. The worst-case noise analysis periods are the periods during the construction schedule that are expected to have the greatest potential to result in construction noise effect. These periods were determined based on number and type of equipment operating on site, and the amount of construction-related vehicular traffic expected to occur according to the conceptual construction schedule and logistics. One analysis period was selected per year.
6. Calculate construction noise levels for each analysis period for both daytime and nighttime construction. Given the on-site equipment, construction trucks, and worker vehicles that are expected during each of the analysis periods, and the location of the equipment, which was based on construction logistics diagrams and construction truck and worker vehicle trip assignments, a CadnaA model file for each analysis period and each analysis hour was created. All model files included each of the construction noise sources operating in the analysis period and hour, calculation points representing multiple locations on various façades and floors of the associated receptors previously identified, as well as the noise control measures that would be used on the site, as described below.
7. Determine total noise levels and noise level increments during construction. For each analysis period, analysis hour, and each noise receptor, the calculated level of construction noise was logarithmically added to the existing noise level to determine the cumulative total noise level. The existing noise level at each receptor was then arithmetically subtracted from the cumulative noise level in each analysis period to determine the noise level increments.
8. Establish construction noise duration. For each receptor, the noise level increments in each analysis period and hour were examined to determine the duration during construction that the receptor would experience substantially elevated noise levels.
9. Compare noise level increments with the *CEQR Technical Manual* noise screening thresholds. At each receptor, based on the magnitude and duration of predicted noise level increases due to construction, a determination of whether the proposed project would have the potential to result in significant adverse construction noise effects was made.



Project Area One

Project Area Two

Collected Noise Level Measurement Locations

Supplemental Noise Monitoring Locations

0 1,000 FEET

Capital Project SANDRESM1

EAST SIDE COASTAL RESILIENCY PROJECT

Construction Noise Analysis Measurement Locations

Figure 6.12-1

DETERMINATION OF NO ACTION AND NON-CONSTRUCTION NOISE LEVELS

Noise generated by construction activities is added to noise generated by non-construction traffic on adjacent roadways in order to determine the total noise levels at each receptor location. Existing noise levels were conservatively used as the baseline noise levels for determining construction-generated noise level increases. Existing noise levels were established according to the following:

- Perform noise measurements at selected noise receptor locations (as described below).
- If the analysis hour was an hour other than the hour of the noise level measurement, adjust the measured levels to the analysis hour based on hour-to-hour noise level profiles from 24-hour noise level measurements or based on differences in traffic between the analysis hour and the measurement hour.
- During the late-night time period (11 PM to 5 AM), the lowest hourly noise level during that time period was selected to represent the existing nighttime noise levels.
- Calculate existing noise levels at the noise measurement locations as well as all other receptor sites using the CadnaA model with existing site geometry and existing traffic on adjacent roadways as inputs.
- Determine adjustment factors based on the difference between the measured and calculated existing noise levels at the measurement locations.
- Apply the adjustment factors to the calculated existing noise levels at the construction noise receptors.

ANALYSIS PERIODS

Construction of the proposed project is anticipated to start in spring 2020 with Alternatives 2, 3, and 5 projected to be completed in 2025 and the Preferred Alternative is anticipated to be completed in 2023. This shorter construction duration for the Preferred Alternative is primarily due to less disruption to the FDR Drive since flood protection in East River Park would be primarily along the East River rather than along the FDR Drive and this alternative would also result in the full closure of East River Park so it can be reconstructed in a single stage.

A screening analysis was performed to determine the analysis periods with the greatest construction activity resulting in the loudest construction periods. The screening analysis was based on an anticipated construction activity schedule, the equipment logistics, and sensitive noise receptor locations. The number of workers, types and number of pieces of equipment and number of construction vehicles anticipated to be operating during each analysis period was determined. To be conservative, the construction activity screening analysis for each analysis period assumed that both on-site construction activities and off-site construction-related traffic movements including barging deliveries could occur simultaneously.

NOISE REDUCTION MEASURES

Construction associated with the proposed project would be required to follow the requirements of the *NYC Noise Control Code* (also known as Chapter 24 of the Administrative Code of the City of New York, or Local Law 113) for construction noise control measures. Specific noise control measures would be described in future noise mitigation plan(s) required under the *NYC Noise Code*. These measures could include a variety of source and path controls.

In terms of source controls (i.e., reducing noise levels at the source or during the most sensitive time periods), the following measures would be implemented in accordance with the *NYC Noise Code*:

- Equipment that meets the sound level standards specified in Subchapter 5 of the *NYC Noise Control Code* would be utilized from the start of construction. **Table 6.12-3** shows the noise levels for typical construction equipment and the mandated noise levels for the equipment that would be used for construction of the proposed project. For equipment other than those listed in **Table 6.12-3**, noise emission values for analysis would be determined based on manufacturer's specifications, published noise level data, or field measurements.
- As early in the construction period as logistics would allow, diesel- or gas-powered equipment would be replaced with electrical-powered equipment such as welders, water pumps, bench saws, and table saws (i.e., early electrification) to the extent feasible and practicable.

Table 6.12-3
Typical Construction Equipment Noise Emission Levels (dBA)

Equipment List	NYCDEP Typical Noise Level at 50 feet[1]
Auger Drill Rig	85
Backhoe	80
Bar Bender	80
Compactor (ground)	80
Compressor (air, less than or equal to 350 cfm)	53
Compressor (air, greater than 350 cfm)	80
Concrete Mixer Truck	85
Concrete Pump Truck	82
Concrete Saw	90
Crane	85
Dozer	85
Drill Rig Truck	84
Dump Truck	84
Dumpster/Rubbish Removal	78
Excavator	85
Flat Bed Truck	84
Front End Loader	80
Generator	82
Generator (< 25 KVA, VMS signs)	70
Gradall	85
Impact Pile Driver	95
Jackhammer	85
Man Lift	85
Paver	85
Pickup Truck	55
Pneumatic Tools	85
Pumps	77
Rock Drill	85
Roller	85
Slurry Plant	78
Soil Mix Drill Rig	80
Tractor	84
Vacuum Street Sweeper	80
Vibratory Pile Driver	95
Welder/Torch	73
Rock Drill	85

Source:
[1] "Rules for Citywide Construction Noise Mitigation," Chapter 28, DEP, 2007.

- Where feasible and practicable, construction sites would be configured to minimize back-up alarm noise. In addition, all trucks would not be allowed to idle more than three minutes at the construction site based upon Title 24, Chapter 1, Subchapter 7, Section 24-163, of the *NYC Administrative Code*.
- Contractors and subcontractors would be required to properly maintain their equipment and mufflers.
- A properly secured impact cushion (either a commercially available model or one fabricated from scrap wood, leather, or rubber at the job site) would be installed on top of piles that are being driven by an impact hammer.

In terms of path controls (e.g., placement of equipment, implementation of barriers or enclosures between equipment and sensitive receptors), the following measures for construction would be implemented to the extent feasible and practicable:

- Where logistics allow, noisy equipment, such as cranes, concrete pumps, concrete trucks, and delivery trucks, would be located away from and shielded from sensitive receptor locations.
- Noise barriers constructed from plywood or other materials to provide shielding; and
- Path noise control measures (i.e., portable noise barriers, panels, enclosures, and acoustical tents, where feasible) for certain dominant noise equipment to the extent feasible and practical based on the results of the construction noise calculations. The details to construct portable noise barriers, enclosures, tents, etc. are shown in DEP's "Rules for Citywide Construction Noise Mitigation."[2]

NOISE RECEPTOR SITES

Thirteen noise measurement locations (i.e., sites M1a to M11) were selected to determine the baseline existing noise levels, and 70 receptor locations (i.e., sites 1 to 70) representing buildings or noise-sensitive open space locations close to the project areas were selected as discrete noise receptor sites for the construction noise analysis. These receptors were either located directly adjacent to the project areas or streets where construction trucks would pass. Each receptor site was the location of a residence or other noise-sensitive use. At some buildings, multiple building façades were analyzed. At high-rise buildings, noise receptors were selected at multiple elevations. At open space locations, receptors were selected at street level. **Table 6.12-4** lists the noise receptor sites and the associated land use at each site. The receptor sites selected for detailed analysis are representative of other noise receptors in the immediate project area and are the locations where maximum project effects due to construction noise would be expected.

[2] As found at: http://www.nyc.gov/html/dep/pdf/noise_constr_rule.pdf

Table 6.12-4
Noise Receptor Locations

Receptor	Location	Associated Land Use
M1a	East Yard of Residential Building at Grand Street and FDR Drive East Yard	Residential/Open Space
M2	342 First Avenue (Peter Cooper Village) East-Facing Yard	Residential/Open Space
M3	East River Park North of Williamsburg Bridge	Open Space
M4	East River Park East of East 4th Street	Open Space
M5	Montgomery Street at Cherry Street	Residential
M5a	Montgomery Street between Cherry Street and Madison Street	Residential
M6	Pitt Street between East Broadway and Grand Street	Residential/Open Space
M7	Pike Street between Cherry Street and Madison Street	Residential/Open Space
M8	East Houston Street at Baruch Place	Residential/Open Space
M9	East Houston Street between Norfolk and Suffolk Streets	Residential
M10	Avenue C north of East 16th Street	Residential
M11	East 23rd Street at Asser Levy Place	Residential/Hospital
1	FDR Drive/Jackson Street	Open Space (Corlears Hook Park)
2	East River Park Amphitheater	Open Space (East River Park)
3	East River Park by Grand Street	Open Space (East River Park)
4	East River Park near 8th Street	Open Space (East River Park)
5	FDR/Ave C (Murphy Brothers Playground)	Open Space (Murphy Brothers Playground)
6	FDR Drive/East 20th Street	Open Space (East River Colonnade)
7	FDR Drive/East 25th Street	Open-Space (Asser Levy Playground)
8A-8G	570 Grand Street	Residential
9A-9G	455 FDR Drive	Residential
10-A-10D	71 Jackson Street	Residential
11A-11D	367 FDR Drive	Residential
12A-12D	645 Water Street	Residential
13D-13D	322 FDR Drive	Public Facilities (Lower Eastside Service Center)
14A-14D	621 Water Street	Public Facilities (Community Access Housing)
15A-15D	605 Water Street	Residential
16A-16C	309 Avenue C Loop	Residential
17A-17C	315-317-319-321 Avenue C	Residential
18A-18D	620 East 20th Street	Residential
19A-19C	601 East 20th Street	Residential
20A-20C	8 Peter Cooper Road	Residential
21A-21C	7 Peter Cooper Road	Residential
22A-22C	530 East 23rd Street	Residential
23A-23D	392 Asser Levy Place	Open Space (Asser Levy Park)
24A-24E	425 East 25th Street	Public Facilities (CUNY Brookdale Dorm)
25A-25C	10 Waterside Plaza	Residential
26A-26C	24-50 FDR Drive	Public Facilities (UN International School)
27A-27D	525 FDR Drive	Residential
28A-28D	555 FDR Drive	Residential
29A-29-D	571 FDR Drive	Residential
30A-30C	605 FDR Drive	Residential
31A-+31D	500 East Houston Street	Residential
32A-32D	691 FDR Drive	Residential
33A-33D	709 FDR Drive	Residential
34A-34D	725 FDR Drive	Residential

Table 6.12-4 (cont'd)
Noise Receptor Locations

Receptor	Location	Associated Land Use
35A-35D	903 East 6th Street	Residential
36A-36D	749 FDR Drive	Residential
37A-37D	765 FDR Drive	Residential
38A-38D	819 FDR Drive	Residential
39A-39D	911 FDR Drive	Residential
40A-40D	10-23 FDR Drive	Residential
41A-41D	11-15 FDR Drive	Residential
42A-42D	1141 FDR Drive	Residential
43A-43D	1223 FDR Drive	Residential
44	84 Montgomery Street	Public Facilities (NYC School District 1)
45	75 Montgomery Street	Residential
46	626 Water Street	Residential
47	640 Water Street	Residential
48	662 Water Street	Residential
49	684 Water Street	Residential
50	32 Jackson Street	Residential
51	453 FDR Drive	Residential
52	473 FDR Drive	Residential
53	60 Baruch Drive	Residential
54	123 Mangin Street	Public Facility (Bard School)
55	484 East Houston Street	Residential
56	950 East 4th Walk	Residential
57	711 FDR Drive	Residential
58	930 East 6th Street	Residential
59	809 East 6th Street	Residential
60	110 Avenue D	Residential
61	132 Avenue D	Residential
62	465 East 10th Street	Residential
63	170 Avenue D	Residential
64	285 Avenue C	Residential
65	277 Avenue C	Residential
66	622 East 20th Street	Residential
67	6 Peter Cooper Road	Residential
68	520 East 23rd Street	Residential
69	423 East 23rd Street	Public Facilities (VA Hospital)
70	480 FDR Drive	Public Facilities (Bellevue Hospital)

Nighttime construction activity was not evaluated at receptors M3, M4, 1 through 7, 23, 26, 44, or 54. These receptors represent Open Space and Public Facility uses that would not be in use during the late night hours when construction activity is expected to occur.

F. AFFECTED ENVIRONMENT – NOISE MEASUREMENT RESULTS

EQUIPMENT USED DURING NOISE SURVEY

Measurements were performed using Brüel & Kjær Sound Level Meters (SLM) Type 2270, 2260, and Type 2250, Brüel & Kjær ½ inch microphones Type 4189, and a Brüel & Kjær Sound Level Calibrator Type 4231. The Brüel & Kjær SLMs are a Type 1 instrument according to ANSI Standard S1.4-1983 (R2006). The SLMs have a laboratory calibration date within one year of the date of the measurements, as is standard practice. The microphones were mounted at a height of approximately 5 to 6 feet above the ground (or rooftop for site 1b) and were mounted away from any large, reflecting surfaces that could affect the sound level measurements. The

SLMs were calibrated before and after readings with a Brüel & Kjær Type 4231 Sound Level Calibrator using the appropriate adaptor. Measurements at the location were made on the A-scale (dBA). The data were digitally recorded by the SLM and displayed at the end of the measurement period in units of dBA. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, and L_{90}. 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 SURVEY RESULTS

The baseline noise levels at each of the noise survey locations are shown in **Table 6.12-5** for both the 6 AM mobile source screening analysis hour, the 7 AM daytime cumulative on-site equipment and construction truck trip analysis hour, and the late-night (LN) on-site equipment analysis time period (11 PM to 5 AM). Full noise survey results are shown in **Appendix K2**.

At sites M1a, M2a, and M4, the dominant noise source was vehicular traffic on the FDR Drive. At sites M1b and M3, the dominant noise source was vehicular traffic on the Williamsburg Bridge and the FDR Drive. At sites M5, M5a, and M6 through M11, vehicular traffic on the adjacent streets was the dominant source of noise.

In terms of CEQR noise exposure guidelines (shown in **Table 6.12-2**), during the morning analysis hours, existing noise levels at site M4 are in the “clearly acceptable” category, existing noise levels at sites M5, M5a, M6, M8, M9, M10, and M11 are in the “marginally acceptable” category, existing noise levels at sites M1a, M1b, and M2 are in the “marginally unacceptable” category, and existing noise levels at sites M3 and M7 are in the “clearly unacceptable” category.

G. ENVIRONMENTAL EFFECTS

MOBILE SOURCE SCREENING ANALYSIS

As described in the methodology above, a mobile-source screening analysis was conducted for construction of the proposed project at each of the at-grade noise measurement locations located adjacent to a roadway, i.e., sites M1a, M2, M5, M5a, M6, M7, M8, M9, M10, and M11. The mobile-source noise analysis examined the worst-case condition for project trip generation, which would occur under the Preferred Alternative. Increases in noise level resulting from construction worker auto and truck trips would be lower under Alternative 2.

Table 6.12-5
Existing Noise Levels at Noise Measurement Locations in dBA

Site	Location	Start Time	L_{eq}	L_{10}
M1a	East Yard of Residential Building at Grand Street and FDR Drive East Yard	6AM	73.9	75.4
		7AM	72.8	74.4
		LN	66.5	69.4
M1b	Rooftop of Residential Building at Grand Street and FDR Drive East Yard	6AM	74.9	76.2
		7AM	73.5	75.4
		LN	68.1	70.5
M2	342 First Avenue (Peter Cooper Village) East-Facing Yard	6AM	69.7	71.7
		7AM	72.1	73.0
		LN	63.2	65.1
M3	East River Park North of Williamsburg Bridge	6AM	75.8	80.1
		7AM	74.4	79.3
		LN	69.0	74.4
M4	East River Park East of East 4th Street	6AM	62.3	63.6
		7AM	61.2	62.6
		LN	54.9	57.6
M5	Montgomery Street at Cherry Street	6AM	64.4	66.3
		7AM	67.1	68.6
		LN	58.7	56.6
M5a	Montgomery Street between Cherry Street and Madison Street	6AM	63.5	67.2
		7AM	66.2	69.5
		LN	57.8	57.5
M6	Pitt Street between East Broadway and Grand Street	6AM	60.1	62.6
		7AM	62.8	64.9
		LN	54.4	52.9
M7	Pike Street between Cherry Street and Madison Street	6AM	76.0	79.7
		7AM	78.7	82.0
		LN	70.3	70.0
M8	East Houston Street at Baruch Place	6AM	65.1	68.2
		7AM	64.0	67.2
		LN	57.7	62.2
M9	East Houston Street between Norfolk and Suffolk Streets	6AM	66.4	69.5
		7AM	65.3	68.5
		LN	59.0	63.5
M10	Avenue C north of East 16th Street	6AM	63.3	65.1
		7AM	65.7	66.4
		LN	56.8	58.5
M11	East 23rd Street at Asser Levy Place	6AM	65.1	67.2
		7AM	67.5	68.5
		LN	58.6	60.6

Note: Measurements were conducted by AKRF, Inc. on June 23, 2015 and November 12, 17, and 24, 2015.

The analysis hour for the mobile source screening analysis was the 6 AM hour and consequently includes both worker auto trips to the project site as well as peak hourly construction truck trips to and from the site. Consequently, it is the hour of the day that mobile-source construction noise effects would be mostly likely to occur. The results of the mobile-source screening analysis are shown in **Table 6.12-6**.

As shown in **Table 6.12-6**, the maximum increase in noise due to construction-related vehicular traffic would be less than 3 dBA, which would be considered "just noticeable" according to the

CEQR Technical Manual. Since the results of this mobile-source screening analysis represent the locations, times, and construction scenario under which mobile-source construction noise effects would be most likely to occur, vehicle trips associated with construction of the proposed project are not expected to result in a significant adverse noise effect. The cumulative effects of construction vehicle trips and operation of on-site construction equipment are discussed below.

Table 6.12-6
Construction Mobile-Source Noise Analysis Results for 6AM Hour in dBA

Site	Location	Existing $L_{eq(1)}$	Construction $L_{eq(1)}$	$L_{eq(1)}$ Increment
M1a	East Yard of Residential Building at Grand Street and FDR Drive East Yard	73.9	75.2	1.3
M2	342 First Avenue (Peter Cooper Village) East-Facing Yard	69.7	69.8	0.1
M5	Montgomery Street at Cherry Street	63.5	65.7	2.2
M6	Pitt Street between East Broadway and Grand Street	60.1	62.8	2.7
M7	Pike Street between Cherry Street and Madison Street	76.0	77.0	1.0
M8	East Houston Street at Baruch Place	65.1	65.2	0.1
M9	East Houston Street between Norfolk and Suffolk Streets	66.4	66.5	0.1
M10	Avenue C north of East 16th Street	63.3	63.3	0.1
M11	East 23rd Street at Asser Levy Place	65.1	66.2	1.0

CUMULATIVE ON-SITE EQUIPMENT AND CONSTRUCTION TRUCK NOISE ANALYSIS

Using the methodology described above, and considering the noise reduction measures for source and path controls specified above, noise analyses were performed to determine $L_{eq(1)}$ noise levels that would be expected to occur during each year of construction under the Preferred Alternative and Alternatives 3 resulting from on-site equipment and construction truck trips. The full noise analysis results are shown for the Preferred Alternative and Alternative 3 in **Appendix K2**.

In addition, as discussed above, the construction noise analysis was performed using the quarter of each year in and the Preferred Alternative and Alternative 3 that is anticipated to result in the maximum construction noise levels. The analysis conservatively assumes that this worst-case quarter would represent construction noise levels throughout the entire year. During times of less intense construction activity than in the periods selected for modeling, construction noise levels are anticipated to be less. For instance, pile-driving at any specific location would be expected to last only three to eight days depending on specific construction methods. Consequently, an individual receptor location would experience pile-driving noise for only a limited period of time out of the construction period. Furthermore, many of the loudest pieces of construction equipment, including excavators, concrete trucks, portable cement mixers, etc., are mobile, and move about the site throughout the days and months of construction. The construction analysis considers a reasonable worst-case scenario with all mobile equipment in the locations that would tend to generate the most noise at the adjacent receptors. Such a scenario, and the high noise levels associated with it, as have been examined in this construction noise analysis, would be likely to occur only during limited times throughout the construction period, and thus represent a highly conservative analysis.

NO ACTION ALTERNATIVE (ALTERNATIVE 1)

The No Action Alternative assumes that no new comprehensive coastal protection system would be constructed in the proposed project area. Therefore, this alternative is not evaluated further as there will no new construction associated with the proposed project.

PREFERRED ALTERNATIVE (ALTERNATIVE 4): FLOOD PROTECTION SYSTEM WITH A RAISED EAST RIVER PARK

Construction of the Preferred Alternative is predicted to at times result in noticeable noise level increases at noise sensitive uses in buildings immediately west of the FDR Drive along both main project areas, as well as along East 23rd Street in Project Area Two. Generally, the noise level increases resulting from construction would occur at buildings and open space areas while construction activity is in the immediate vicinity of these noise receptors, and noise level increases would be lower when construction activity moves to a new section of the project area. Areas immediately adjacent to construction work areas would experience the highest levels of noise while construction is ongoing, whereas receptors in buildings further west of the project areas would experience somewhat less noise because of the greater distance from the on-site construction equipment. Compared to Alternative 3 as discussed below, maximum construction noise levels at receptors nearest floodwall construction within East River Park for the Preferred Alternative would be slightly lower, because pile driving for the Preferred Alternative would occur further from the receptors. In order to ensure public safety, East River Park, Murphy Brothers Playground, and Asser Levy Playground would be closed to the public during the time when construction would occur at these park resources. The results of the detailed construction noise analysis of the Preferred Alternative are summarized in **Table 6.12-7**.

Table 6.12-7
Construction Noise Analysis Results (in dBA)

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
M1a	East Yard of Residential Building at Grand Street and FDR Drive East Yard	Day	72.8	72.8	72.9	76.5	0.2	3.7
		Night	66.5	66.5	66.5	70.2	0.0	3.7
M2	342 First Avenue (Peter Cooper Village) East-Facing Yard	Day	70.3	70.3	87.6	89.3	17.2	18.9
		Night	63.2	63.2	63.2	66.6	0.0	3.4
M5	Montgomery Street at Cherry Street	Day	64.4	64.4	65.3	66.6	0.9	2.2
		Night	58.7	58.7	60.3	63.7	0.0	3.4
M5a	Montgomery Street between Cherry Street and Madison Street	Day	66.2	66.2	66.9	67.7	0.7	1.5
		Night	57.8	57.8	60.3	63.9	0.0	3.6
M6	Pitt Street between East Broadway and Grand Street	Day	60.3	60.3	62.4	64.0	2.1	3.6
		Night	56.8	56.8	60.3	63.0	0.0	2.7
M7	Pike Street between Cherry Street and Madison Street	Day	76.0	76.0	76.0	76.1	0.0	0.1
		Night	70.3	70.3	70.3	70.5	0.0	0.2
M8	East Houston Street at Baruch Place	Day	65.1	65.1	65.4	66.7	0.3	1.6
		Night	57.7	57.7	60.3	60.3	0.0	0.0
M9	East Houston Street between Norfolk and Suffolk Streets	Day	66.4	66.4	66.4	66.4	0.0	0.0
		Night	59.0	59.0	60.3	60.3	0.0	0.0
M10	Avenue C north of East 16th Street	Day	63.3	63.3	63.3	69.2	0.0	5.9
		Night	56.8	56.8	60.3	68.2	0.0	7.9
M11	East 23rd Street at Asser Levy Place	Day	65.1	65.1	65.5	68.6	0.4	3.5
		Night	58.6	58.6	60.9	66.2	0.5	5.9
1	FDR Drive/Jackson Street	Day	75.0	75.0	85.3	85.3	10.3	10.3
		Night	-	-	-	-	-	-
6	FDR Drive/East 20th Street	Day	70.0	70.0	70.3	70.3	0.2	0.3
		Night	-	-	-	-	-	-
8A-8G	**570 Grand Street**	**Day**	**62.4**	**71.8**	**62.6**	**74.8**	**0.0**	**4.9**
		Night	**60.3**	**65.5**	**60.3**	**73.8**	**0.0**	**13.5**
9A-9G	**455 FDR Drive**	**Day**	**61.4**	**72.2**	**61.4**	**75.9**	**0.0**	**7.5**
		Night	**60.3**	**65.9**	**60.3**	**73.6**	**0.0**	**12.8**
10-A-10D	**71 Jackson Street**	**Day**	**63.9**	**73.4**	**64.2**	**75.8**	**0.0**	**5.5**
		Night	**60.3**	**67.1**	**60.3**	**70.0**	**0.0**	**7.8**
11A-11D	**367 FDR Drive**	**Day**	**62.0**	**73.6**	**62.1**	**75.3**	**0.0**	**4.8**
		Night	**60.3**	**67.3**	**60.3**	**71.2**	**0.0**	**7.1**
12A-12D	**645 Water Street**	**Day**	**61.4**	**73.7**	**61.6**	**75.5**	**0.1**	**4.7**
		Night	**60.3**	**67.4**	**60.3**	**73.2**	**0.0**	**7.6**

Table 6.12-7 (cont'd)
Construction Noise Anlaysis Results

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
13D-13D	**322 FDR Drive**	**Day**	**65.7**	**74.9**	**65.8**	**78.9**	**0.0**	**6.2**
		Night	**60.3**	**68.6**	**60.3**	**77.6**	**0.0**	**11.0**
14A-14D	**621 Water Street**	**Day**	**65.2**	**74.9**	**65.3**	**79.9**	**0.0**	**7.1**
		Night	**60.3**	**68.6**	**60.3**	**77.3**	**0.0**	**11.7**
15A-15D	**605 Water Street**	**Day**	**65.8**	**72.3**	**65.8**	**81.4**	**0.0**	**9.3**
		Night	**60.3**	**66.0**	**60.3**	**76.6**	**0.0**	**11.6**
16A-16C	309 Avenue C Loop	Day	60.3	66.9	60.4	72.6	0.0	9.5
		Night	60.3	60.3	60.3	69.9	0.0	9.6
17A-17C	**315-317-319-321 Avenue C**	**Day**	**63.0**	**71.3**	**63.1**	**79.8**	**0.0**	**12.3**
		Night	**60.3**	**64.2**	**60.3**	**67.6**	**0.0**	**7.3**
18A-18D	**620 East 20th Street**	**Day**	**60.3**	**70.8**	**64.4**	**84.1**	**3.6**	**15.0**
		Night	**60.3**	**63.7**	**60.3**	**66.7**	**0.0**	**3.9**
19A-19C	**601 East 20th Street**	**Day**	**66.1**	**71.8**	**66.2**	**78.2**	**0.1**	**7.3**
		Night	**60.3**	**64.7**	**60.3**	**68.0**	**0.0**	**4.5**
20A-20C	**8 Peter Cooper Road**	**Day**	**61.8**	**71.6**	**61.9**	**77.3**	**0.0**	**8.3**
		Night	**60.3**	**64.5**	**60.3**	**69.6**	**0.0**	**7.4**
21A-21C	**7 Peter Cooper Road**	**Day**	**65.0**	**71.9**	**65.1**	**77.5**	**0.0**	**7.1**
		Night	**60.3**	**64.8**	**60.3**	**72.5**	**0.0**	**10.2**
22A-22C	**530 East 23rd Street**	**Day**	**66.3**	**70.7**	**66.5**	**76.4**	**0.0**	**6.6**
		Night	**60.3**	**63.6**	**60.4**	**77.1**	**0.0**	**16.5**
23A-23D	**392 Asser Levy Place**	**Day**	**60.3**	**70.3**	**60.4**	**83.0**	**0.0**	**14.2**
		Night	**-**	**-**	**-**	**-**	**-**	**-**
24A-24E	400-440 East 26th Street	Day	60.3	73.1	60.3	76.0	0.0	11.9
		Night	60.3	66.0	60.3	69.5	0.0	9.2
25A-25C	10 Waterside Plaza	Day	60.3	69.7	60.3	71.8	0.0	6.6
		Night	60.3	62.6	60.3	74.6	0.0	14.3
26A-26C	24-50 FDR Drive	Day	60.3	65.7	60.3	68.6	0.0	4.2
		Night	-	-	-	-	-	-
27A-27D	**525 FDR Drive**	**Day**	**61.8**	**73.8**	**61.9**	**78.4**	**0.1**	**11.4**
		Night	**60.3**	**67.5**	**60.3**	**72.6**	**0.0**	**9.9**
28A-28D	**555 FDR Drive**	**Day**	**63.4**	**73.2**	**63.5**	**79.2**	**0.1**	**9.0**
		Night	**60.3**	**66.9**	**60.3**	**69.0**	**0.0**	**6.3**
29A-29-D	571 FDR Drive	Day	63.6	73.6	63.7	78.3	0.1	9.2
		Night	60.3	67.3	60.3	68.5	0.0	1.9
30A-30C	605 FDR Drive	Day	65.6	74.7	66.3	78.5	0.5	7.0
		Night	60.3	68.4	60.3	68.6	0.0	1.8
31A-+31D	500 East Houston Street	Day	63.8	74.3	64.2	77.9	0.2	8.7
		Night	60.3	68.0	60.3	68.4	0.0	2.0
32A-32D	691 FDR Drive	Day	62.5	74.5	62.9	80.3	0.1	7.9
		Night	60.3	68.2	60.3	69.0	0.0	1.5
33A-33D	709 FDR Drive	Day	64.9	74.1	66.6	79.7	1.0	10.8
		Night	60.3	67.8	60.3	68.9	0.0	1.8
34A-34D	725 FDR Drive	Day	65.7	74.1	67.8	78.9	1.1	8.4
		Night	60.3	67.8	60.3	70.0	0.0	3.8
35A-35D	903 East 6th Street	Day	60.8	74.5	64.2	77.9	1.5	8.9
		Night	60.3	68.2	60.3	70.5	0.0	5.9
36A-36D	749 FDR Drive	Day	61.9	74.5	65.4	78.0	1.7	7.5
		Night	60.3	68.2	60.3	70.6	0.0	3.7

Table 6.12-7 (cont'd)
Construciton Noise Analysis Results

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
37A-37D	**765 FDR Drive**	**Day**	**60.3**	**75.0**	**61.6**	**78.8**	**1.3**	**10.9**
		Night	**60.3**	**68.7**	**60.3**	**71.4**	**0.0**	**4.3**
38A-38D	**819 FDR Drive**	**Day**	**60.3**	**74.6**	**64.7**	**80.3**	**3.2**	**11.4**
		Night	**60.3**	**68.3**	**60.3**	**73.8**	**0.0**	**12.3**
39A-39D	**911 FDR Drive**	**Day**	**63.9**	**73.8**	**72.4**	**81.6**	**4.0**	**11.2**
		Night	**60.3**	**67.5**	**60.3**	**82.1**	**0.0**	**20.3**
40A-40D	**10-23 FDR Drive**	**Day**	**66.9**	**75.0**	**73.6**	**83.2**	**3.4**	**11.5**
		Night	**60.6**	**68.7**	**60.6**	**84.2**	**0.0**	**19.4**
41A-41D	**11-15 FDR Drive**	**Day**	**62.2**	**75.1**	**70.2**	**81.8**	**3.9**	**11.5**
		Night	**60.3**	**68.8**	**60.3**	**76.5**	**0.0**	**11.8**
42A-42D	**1141 FDR Drive**	**Day**	**60.3**	**75.0**	**66.5**	**82.1**	**1.2**	**12.3**
		Night	**60.3**	**68.7**	**60.3**	**79.6**	**0.0**	**15.6**
43A-43D	**1223 FDR Drive**	**Day**	**60.3**	**75.2**	**65.6**	**84.3**	**0.1**	**14.9**
		Night	**60.3**	**68.9**	**60.3**	**84.0**	**0.0**	**20.5**
44	84 Montgomery Street	Day	68.9	70.1	69.3	71.6	0.3	1.6
		Night	-	-	-	-	-	-
45	75 Montgomery Street	Day	67.5	68.9	67.8	71.4	0.2	3.0
		Night	61.8	63.2	61.8	67.1	0.0	5.0
46	626 Water Street	Day	64.7	65.9	64.8	68.1	0.1	2.2
		Night	60.3	60.3	60.3	63.1	0.0	2.8
47	640 Water Street	Day	65.6	67.0	65.7	68.1	0.1	1.1
		Night	60.3	61.3	60.3	65.6	0.0	5.3
48	662 Water Street	Day	66.1	68.6	66.4	70.0	0.2	1.8
		Night	60.4	62.9	60.4	66.0	0.0	4.7
49	684 Water Street	Day	65.1	66.1	66.3	70.5	1.2	4.4
		Night	60.3	60.4	60.3	66.7	0.0	6.4
50	32 Jackson Street	Day	65.4	66.1	67.3	70.1	1.6	4.4
		Night	60.3	60.4	60.3	68.7	0.0	8.4
51	453 FDR Drive	Day	63.9	68.1	65.4	73.8	1.5	6.9
		Night	60.3	62.4	60.3	72.4	0.0	11.9
52	473 FDR Drive	Day	60.7	64.5	61.6	67.6	0.8	3.4
		Night	60.3	60.3	60.3	60.8	0.0	0.5
53	**60 Baruch Drive**	**Day**	**60.9**	**64.2**	**61.2**	**70.5**	**0.2**	**8.0**
		Night	**60.3**	**60.3**	**60.3**	**68.9**	**0.0**	**8.5**
54	**123 Mangin Street**	**Day**	**60.5**	**63.7**	**62.2**	**73.1**	**1.3**	**11.1**
		Night	**-**	**-**	**-**	**-**	**-**	**-**
55	484 East Houston Street	Day	60.3	62.3	61.5	68.6	0.8	6.4
		Night	60.3	60.3	60.3	60.5	0.0	0.1
56	950 East 4th Walk	Day	60.3	60.9	62.1	70.4	1.8	10.0
		Night	60.3	60.3	60.3	60.7	0.0	0.3
57	711 FDR Drive	Day	60.3	60.3	61.4	66.8	1.1	6.5
		Night	60.3	60.3	60.3	60.4	0.0	0.1
58	930 East 6th Street	Day	60.3	60.3	62.1	70.3	1.8	10.0
		Night	60.3	60.3	60.3	60.5	0.0	0.2
59	809 East 6th Street	Day	60.3	60.3	60.7	65.6	0.4	5.3
		Night	60.3	60.3	60.3	60.4	0.0	0.1
60	110 Avenue D	Day	60.3	60.3	66.6	68.3	6.3	8.0
		Night	60.3	60.3	60.3	61.8	0.0	1.5

Table 6.12-7 (cont'd)
Construction Noise Analysis Results

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
61	**132 Avenue D**	**Day**	**60.3**	**64.1**	**68.1**	**73.8**	**7.3**	**10.3**
		Night	**60.3**	**60.3**	**60.3**	**68.6**	**0.0**	**8.3**
62	**465 East 10th Street**	**Day**	**60.3**	**65.2**	**68.7**	**74.4**	**6.0**	**10.7**
		Night	**60.3**	**60.3**	**60.3**	**66.3**	**0.0**	**6.0**
63	170 Avenue D	Day	60.3	61.6	66.7	71.9	6.0	11.0
		Night	60.3	60.3	60.3	63.0	0.0	2.7
64	285 Avenue C	Day	60.8	63.9	60.9	68.9	0.0	5.6
		Night	60.3	60.3	60.3	67.4	0.0	7.1
65	277 Avenue C	Day	60.3	60.3	60.3	69.1	0.0	8.8
		Night	60.3	60.3	60.3	69.0	0.0	8.7
66	622 East 20th Street	Day	60.3	60.3	60.9	69.6	0.6	9.3
		Night	60.3	60.3	60.3	60.5	0.0	0.2
67	6 Peter Cooper Road	Day	60.3	60.5	60.3	68.6	0.0	8.2
		Night	60.3	60.3	60.3	60.8	0.0	0.5
68	**520 East 23rd Street**	**Day**	**60.3**	**63.7**	**60.4**	**68.4**	**0.1**	**4.7**
		Night	**60.3**	**60.3**	**60.3**	**74.0**	**0.0**	**13.7**
69	423 East 23rd Street	Day	60.3	61.8	60.3	69.9	0.0	8.9
		Night	60.3	60.3	60.3	65.6	0.0	5.3
70	480 FDR Drive	Day	63.3	66.3	63.3	69.2	0.1	4.5
		Night	60.3	60.3	60.3	65.3	0.0	5.0

Notes:
[1] Values shown in **bold** for receptors where significant adverse construction noise impacts are predicted to occur.
[2] The data shown in this table reflect the maximum predicted increases in noise level resulting from construction under the Preferred Alternative. However, the significance of construction noise impacts is determined based on the duration of construction noise and its total magnitude in addition to its intensity as indicated by the noise level increments, each of which is discussed in the text below. As a result, some receptors that have lower predicted noise level increments were determined to experience significant adverse impacts and higher increments at other receptors were determined not to be significant.

Open Space Receptors along the FDR Drive

At the open space receptors along the FDR Drive—Receptors 1 and 6—the existing noise levels range from the mid 60s to mid 70s dBA, depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, and whether the adjacent section of the FDR Drive is on structure. These receptors are located in open spaces on both the east and west sides of the FDR Drive, Corlears Hook Park and the East River Bikeway between Avenue C and East 23rd Street.

Construction under the Preferred Alternative is predicted to produce noise levels at these receptors in the mid 60s to mid 80s dBA, resulting in noise level increases of up to approximately 10 dBA when construction occurs at the shortest distance from them. The predicted noise level increases at these open space locations would be noticeable and would exceed CEQR construction noise screening thresholds, and the total noise levels would exceed the levels recommended by CEQR for passive open spaces (55 dBA L_{10}). (Noise levels in these areas also exceed CEQR recommended values for existing and No Action conditions.) However, the total noise levels would be in the range considered typical for Manhattan, and for this area in general. Many New York City parks and open space areas located near heavily trafficked roadways and/or near construction sites, experience comparable, and sometimes higher noise levels.

At these receptors noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur during no more than two of the five years of construction. At these receptors, the construction activity that would produce the highest noise levels would be pile installation, as well as landscaping work. Both pile installation and landscaping would occur in a single location for a relatively brief period of time, typically not more than a month. Consequently, the maximum noise levels predicted by the construction noise analysis would not persist throughout the entire construction period. Lower construction noise levels that would be expected to occur during activities other than pile installation may still result in exceedances of CEQR construction noise screening thresholds at some times, but would be substantially lower than the maximum levels that would occur during pile installation.

Construction noise levels at these receptors are predicted to be in the mid 60s to mid 80s dBA, noise level increases during construction were predicted to be up to approximately 10 dBA, and the elevated noise levels during construction are predicted to occur over a duration of approximately one to two years. While the noise from construction would be noticeable at times, the duration of construction noise at any given area of open space would be limited. Furthermore, the construction noise predictions are conservative in that they consider the area of open space that remains open and accessible closest to the construction area. At other open space areas farther from construction work areas, noise levels would be lower, and open space users who are bothered by noise could choose the quieter open space areas. Based on these factors, the Preferred Alternative construction noise at these receptors would not result in a significant adverse effect.

Residential, Hospital, and School Receptors along the FDR Drive

At buildings including residences, hospital uses, and schools located along the FDR Drive immediately west of the project areas—Receptors 8–22 and 24–43—the daytime existing noise levels range from the mid-60s to high 70s dBA depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, height above grade (i.e., floor for high-rise buildings), and whether the adjacent section of the FDR Drive is on structure. Nighttime existing noise levels at these receptors range from the mid 50s to high 60s dBA.

Construction under the Preferred Alternative is predicted to produce noise levels at most of these receptors in the low-60s to low-80s dBA, resulting in noise level increases up to approximately 15 dBA when construction occurs at the closest distance to them. However, at some of the residential receptors along the FDR Drive, construction under the Preferred Alternative would produce noise levels in the mid-to-high 80s and/or would result in noise level increases of up to approximately 20 dBA. These include Receptors 14, 15, 17–22, 24, 25, and 37–43.

Receptors along Reach A

At Receptors 14 and 15, which represent 621 and 605 Water Street, respectively, daytime construction activity in Reach A occurring north of the FDR Drive near Montgomery Street and immediately adjacent to these buildings would produce noise levels in the low 80s dBA, which would result in noise level increases of up to approximately 9 dBA. These noise level increases would be noticeable, and noise levels in the low 80s are relatively high for this area.

At these receptors, daytime noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur only during the construction activity in Reach A near Montgomery Street immediately adjacent to these buildings, including construction of flood protection structures under the FDR Drive and north of the FDR Drive, which is anticipated to occur for approximately 11 months. During the rest of the construction period, daytime noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during excavation and sheet pile installation.

At Receptors 14 and 15, nighttime construction activity in Reaches A and B including pile installation would produce noise levels in the low-80s dBA, which would result in noise level increases of up to approximately 17 dBA. These noise level increases would be noticeable, and nighttime noise levels in the low-80s are relatively high for this area. The pile installation work at Reaches A and B is anticipated to occur for approximately 11 months. During the rest of the construction period, nighttime noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, the buildings at 621 and 605 Water Street appear to have monolithic (i.e., non-insulated) glass windows and alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, daytime and nighttime interior noise levels during construction in this area would be in the mid-40s to high 60s dBA, which is up to approximately 23 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these buildings over the course of an approximately 11 months of pile installation at Reaches A and B. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reaches M, N, and O

At Receptors 16 through 22, which represent residences along the west side of the FDR Drive between Avenue C Loop and East 23rd Street, daytime construction activity in Reaches N and O, would produce noise levels in the low-60s to mid-80s dBA, which would result in noise level increases of up to approximately 15 dBA. While the pile installation work at Reaches N and O is anticipated to occur for approximately 23 months, pile installation immediately adjacent to each receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately six months. During the remaining periods of pile driving activity in these reaches, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptor 16, daytime construction including pile installation would produce noise levels in the low to high 60s dBA, which would result in noise level increases of up to approximately 10 dBA. Daytime construction including pile installation along Reach M would occur for approximately 11 months. During the remaining 23 months of pile driving activity in these reaches, construction noise levels at this receptor would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptor 16, nighttime construction including pile driving in Reach M and construction of the flyover bridge would produce noise levels in the low to high 60s dBA, which would result in noise level increases of up to approximately 10 dBA. While nighttime construction including pile installation along Reach M and associated with the flyover bridge would occur for approximately 21 months, nighttime pile installation is proposed for only limited portions of Reach M. During the remaining periods of pile driving activity in these reaches, construction noise levels at this receptor would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

Daytime construction activity in Reaches N and O including pile installation and excavation associated with the north interceptor/drainage gate would produce noise levels in the low-60s to low 80s dBA at receptors 17 through 22, which would result in noise level increases of up to approximately 15 dBA. These noise level increases would be noticeable and daytime noise levels in the low 80s are relatively high for this area. The excavation work at the north drainage gate would occur throughout the construction period.

Nighttime construction activity in Reaches N and O including nighttime pile installation would produce noise levels in the low-60s to mid-70s dBA at receptors 17 through 22, which would result in noise level increases of up to approximately 17 dBA. These noise level increases would be noticeable and nighttime noise levels in the mid 70s are relatively high for this area. While the pile installation work at Reaches N and O is anticipated to occur for approximately 20 months, nighttime pile installation is proposed for only limited portions of Reaches N and O. During the remaining periods of pile driving activity in these reaches, construction noise levels at these receptors would not experience construction noise levels that exceed the CEQR construction noise screening thresholds.

Based on field observations, these buildings in Stuyvesant Town and Peter Cooper Village appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving at Receptor 16 would be in the high-30s to mid-40s dBA, up to 2 dBA greater than the 45 dBA threshold recommended for residential uses according to CEQR noise exposure guidelines. These minor exceedances of the CEQR noise exposure guidelines would be expected to occur during piling operations associated with the flyover bridge, up to approximately 12 months. Due to the limited duration and relatively low noise levels exceedances, this receptor is not predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

At receptors 17 through 22, interior noise levels during nighttime pile driving would be in the mid-30s to mid-50s dBA, up to approximately 9 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the six months of pile installation closest to each location. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reach P

At Receptors 24 and 25, which represent 400-440 East 26th Street and 10 Waterside Plaza, respectively, daytime pile installation in Reach P would produce noise levels in the mid-70s, which would result in noise level increases of up to approximately 12 dBA. While the pile installation work at Reach P is anticipated to occur for approximately 20 months, pile installation immediately adjacent to the receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptors 24 and 25, nighttime construction activity in Reaches O and P including pile installation in a portion of Reach P would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 15 dBA. These noise level increases would be noticeable and nighttime noise levels in the mid 70s are relatively high for this area. While the nighttime pile installation work at Reach P is anticipated to occur for approximately 20 months, pile installation immediately adjacent to the receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds, with noise level increments up to approximately 12 dBA.

Based on field observations, 400-440 East 26th Street appears to have insulated glass windows and an alternative means of ventilation (i.e., window air conditioning units)), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, at this building, nighttime interior noise levels during the majority of nighttime pile driving would be in the mid-30s to mid-40s dBA, up to approximately 2 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines.

Based on field observations, 10 Waterside Plaza appears to have insulated glass windows and an alternative means of ventilation (i.e., package terminal air conditioning units), which would be expected to provide approximately 30 dBA window wall attenuation. Consequently, at this building, nighttime interior noise levels during the majority of nighttime pile driving would be less than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines.

While noise from construction of the Preferred Alternative during the daytime maximum activity level, i.e., pile installation at Reach P, would result in noise level increments up to approximately 12 dBA at 425 East 25th Street, represented by Receptor 24, these peak levels would occur only while construction activity is adjacent to this receptor. While noise from construction of the Preferred Alternative during the nighttime maximum activity level, i.e., pile installation at Reach P, would result in noise level increments up to approximately 15 dBA at 10 Waterside Plaza, represented by Receptor 25, these peak levels would occur only while construction activity is adjacent to this receptor. Noise levels would be lower during the remainder of the approximately 20 months that any construction would occur in the vicinity of this receptor. Furthermore, interior noise levels would be no more than approximately 2 dBA greater than the range considered acceptable by CEQR noise exposure guidance. While the nighttime construction noise level would be noticeable, due to the interior noise levels, construction noise would not rise to the level of a significant adverse effect at these receptors.

Receptors along Reach H

At Receptors 37 and 38, which represent 765 and 819 FDR Drive, daytime construction activity including floodwall, fill, and landscaping work at Reaches E, F, G, and H, would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable and occur over the course of the full construction period.

At these receptors, nighttime construction activity in Reaches H and I including pile installation would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 12 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 70s are relatively high for this area. The maximum noise levels described above would occur during sheet pile installation at Reach H, which would last approximately 12 months. The pile installation work at Reach I is anticipated to occur for approximately 10 additional months and result in noise level increments up to approximately 9 dBA. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, 765 and 819 FDR Drive appear to have monolithic (i.e., non-insulated) glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the high 40s to low 60s dBA, which is up to approximately 17 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the 10 months of pile installation closest to this receptor. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reaches I and J

At Receptors 39 through 43, which represent 911 through 1223 FDR Drive, construction activity including reconstruction of the 10th Street pedestrian bridge, construction of the flyover bridge immediately adjacent to these buildings and construction of the flood wall in Reaches I and J that would occur west of the FDR Drive would produce noise levels in the mid-80s dBA, resulting in noise level increases of up to approximately 15 dBA during the day. These noise level increases would be noticeable and noise levels in the mid-80s are relatively high for this area.

At Receptors 39 through 43, noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur only during the construction activity immediately adjacent to these buildings, specifically the pedestrian bridge reconstruction, which is expected to occur for 22 months. Consequently, the maximum noise levels predicted by the construction noise analysis would not persist throughout the entire construction period. During the remaining periods of construction activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptors 39 through 43, daytime construction activity in Reaches I and J, including pile installation would produce noise levels in the mid 80s dBA, which would result in noise level increases of up to approximately 15 dBA. The pile installation work at Reaches I and J is anticipated to occur for approximately 22 months. During the rest of the construction period, noise levels due to construction would still exceed CEQR construction noise screening thresholds at times with noise level increments up to approximately 11 dBA for an additional 8 months and noise level increments up to 9 dBA for an additional 12 months.

At Receptors 39 through 43, nighttime construction activity in Reaches I and J, including pile installation would produce noise levels in the mid 80s dBA, which would result in noise level increases of up to approximately 21 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 80s are relatively high for this area. The pile installation work at Reaches I and J, including construction of the 10th Street Pedestrian Bridge and Flyover Bridge portion in East River Park, is anticipated to occur for approximately 22 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, 911 through 1223 FDR Drive appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the high 30s to low 60s dBA, which is up to approximately 17 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the 22 months of pile installation closest to these receptors. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reaches B, C, D and E

At Receptors 8 through 13, 27, and 28, which represent residences west of the FDR Drive between Gouverneur Slip East and the Williamsburg Bridge as well as 525 and 555 FDR Drive, daytime construction activity in Reaches C, D and E including pile installation would produce noise levels in the high 70s dBA, which would result in noise level increases of up to approximately 11 dBA. Nighttime construction activity in Reaches C, D and E including pile installation would also produce noise levels in the high 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable, and nighttime noise levels in the high-70s are relatively high for this area. The maximum noise levels described above would occur during Delancey Street Bridge reconstruction, which would last approximately 19 months. The pile installation work, which is associated with the construction of the Corlears Hook Bridge as well as flood protection construction along Reaches B, C, D, and E, is anticipated to occur for approximately 10 months, resulting in noise level increments up to approximately 10 dBA. During the rest of the construction period, noise levels due to construction would still exceed CEQR construction noise screening thresholds with noise level increments up to approximately 8 dBA for an additional 5 months and up to approximately 5 dBA for an additional 9 months.

Based on field observations, residences west of the FDR between Gouverneur Slip East and the Williamsburg Bridge as well as 525 and 555 FDR Drive appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the high-30s to mid-50s dBA, which is up to approximately 11 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the 19 months of pile installation closest to these receptors during Delancey Street Bridge reconstruction. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reach G

At Receptor 33, which represents 709 FDR Drive, daytime pile installation in Reach G would produce noise levels in the high-70s, which would result in noise level increases of up to approximately 11 dBA. While the pile installation work in Segment 2 is anticipated to occur for approximately 12 months, pile installation immediately adjacent to the receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving and fill activity in this segment, construction noise levels at this receptor would experience construction noise levels in the mid-70s dBA, which would result in noise level increases of up to approximately 7 dBA. Nighttime construction is not predicted to result in exceedances of the CEQR construction noise screening thresholds.

709 FDR Drive appears to have insulating glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, daytime interior noise levels during fill and landscape construction in this area would be up to the mid-50s dBA, which is up to approximately 11 dBA higher than the 45 dBA threshold recommended for classroom use according to CEQR noise exposure guidelines. Existing daytime interior noise levels are up to the low 50s dBA (based on the calculated existing exterior daytime noise levels up to approximately 76 dBA and the assumption of 25 dBA window/wall attenuation). Interior noise levels during daytime construction would consequently be comparable to existing noise levels. Interior noise levels during nighttime construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**) for most of the construction period, which is considered acceptable for these types of noise-sensitive uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of the Preferred Alternative would not rise to the level of a significant adverse effect at this receptor.

Remaining Receptors

At the remaining residential and school receptors along the FDR Drive—Receptors 26, 29 through 32, and 34 through 36—existing daytime noise levels are in the low-60s to mid-70s dBA and existing nighttime noise levels are in the low- to high-60s dBA. Daytime construction under the Preferred Alternative is predicted to produce noise levels up to the low-60s to low 80s resulting in noise level increases of up to approximately 9 dBA. At these receptors, nighttime construction under the Preferred Alternative is predicted to produce noise levels in the low-60s to low-70s dBA resulting in noise level increases of up to approximately 6 dBA. The predicted daytime noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The maximum predicted nighttime noise level increases would be noticeable, but nighttime construction noise levels would fluctuate based on the specific location of pile installation with each receptor experiencing nighttime construction noise over a limited duration.

Standard building façade construction with insulated glass windows would be expected to provide approximately 25 dBA window/wall attenuation, so for those buildings with standard façade construction and an alternate means of ventilation allowing for the maintenance of a closed-window condition, existing daytime interior noise levels are up to the low 50s dBA. Interior noise levels during daytime construction would be up to the mid 50s dBA and consequently be comparable to existing noise levels during most of construction. Interior noise levels during nighttime construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**) for most of the construction period, which is considered acceptable for these types of noise-sensitive uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of the Preferred Alternative would not rise to the level of a significant adverse effect at these receptors.

Residential, Hospital, and School Receptors at Least One Building Row West of the FDR Drive

At buildings west of the project areas and separated from the FDR Drive by at least one row of buildings (this include residences, hospital uses, and schools)—Receptors 44 to 70—the daytime existing noise levels range from the mid-60s to low 70s dBA depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, height above grade (i.e., floor for high-rise buildings), and whether the adjacent section of the FDR Drive is on structure. Nighttime existing noise levels at these receptors range from the mid 50s to mid 60s dBA.

Daytime construction under the Preferred Alternative is predicted to produce noise levels at these receptors in the mid-60s to mid-70s dBA, which would result in noise level increases of up to approximately 11 dBA when construction occurs at the closest distance to them and result in noise level increases exceeding the CEQR construction noise screening thresholds throughout construction. However, at some of the school and residential receptors at least one building row from the FDR Drive, nighttime construction under the Preferred Alternative would produce noise level increases of up to approximately 14 dBA and exceedances of the CEQR construction noise screening thresholds for up to 26 months. These include Receptors 53, 54, 61–62, and 68.

Receptors along Reach E North of Williamsburg Bridge

At Receptor 53, which represents residences at 60 Baruch Drive, nighttime construction activity associated with the Delancey Street Bridge Reconstruction, including pile driving, would produce noise levels in the high 60s dBA, which would result in noise level increases of up to approximately 9 dBA. These noise level increases would be noticeable, and nighttime noise levels in the high 60s are relatively high for this area. The pile installation work at Reach E is anticipated to occur for approximately 19 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during pile driving associated with the Delancey Street Bridge Reconstruction, which would last approximately 19 months.

Based on field observations, 60 Baruch Drive appears to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving would be in the mid-to-high 40s dBA, up to approximately 3 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving would be closest to this receptor. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

School Receptor along Reach F

At Receptor 54, which represents the Bard School at 123 Mangin Street, fill and landscape construction in Reach F would produce noise levels in the low 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable, although noise levels in the low 70s are typical for the area. The fill at Reach F is anticipated to occur for approximately 4 months and landscaping at Reach F is anticipated to occur for approximately 7 months.

123 Mangin Street appears to have monolithic glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, daytime interior noise levels during fill and landscape construction in this area would be up to the low-60s dBA, which is up to approximately 16 dBA higher than the 45 dBA threshold recommended for classroom use according to CEQR noise exposure guidelines. These levels would occur for approximately 11 months while fill and landscape construction in would occur in Reach F. During fill and landscaping operations at other reaches of Segment 2 at greater distances from this receptor, noise levels would continue to exceed CEQR noise impact screening thresholds at times with noise level increments up to 10 dBA. Due to the high magnitude of the predicted construction noise and its extended duration, this receptor is predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reach I

At Receptors 61 and 62, which represent 132 Avenue D and 465 East 10th Street, respectively, construction of the flood wall in Reaches I and J that would occur west of the FDR Drive would produce noise levels in the mid-70s dBA, resulting in noise level increases of up to approximately 11 dBA during the day. These noise level increases would be noticeable, although noise levels in the mid-70s are typical for this area.

At Receptors 61 and 62, noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur during the construction activity immediately adjacent to these buildings, specifically the flood wall construction west of the FDR, which is expected to occur for 36 months. During the remaining periods of construction activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptors 61 and 62, nighttime construction activity in Reaches I and J including pile installation would produce noise levels in the mid-to-high-60s dBA, which would result in noise level increases of up to approximately 8 dBA. These noise level increases would be noticeable, and nighttime noise levels in the high 60s are relatively high for this area. The pile installation work at Reach I is anticipated to occur for approximately 22 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during sheet pile installation at Reach I and pile driving associated with the 10th Street Bridge Reconstruction, which would last approximately 22 months.

Based on field observations, 132 Avenue D and 465 East 10th Street appear to have monolithic (i.e., non-insulated) glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the low- to high-50s dBA, which is up to approximately 13 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving would occur closest to these receptors, and throughout the 22 months of pile installation at Reach I and the reconstruction of the 10th Street Bridge. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

Receptors along Reach O

At Receptor 68, which represents 520 East 23rd Street, daytime construction activity in Reaches O and P would produce noise levels in the mid 60s dBA, which would result in noise level increases of up to approximately 5 dBA for a duration of fewer than 12 months.

At this receptor, nighttime construction activity in Reaches O and P including pile installation would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 14 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 70s are relatively high for this area. The maximum noise levels described above would occur during sheet pile installation at Reach P, which would last approximately 20 months. The pile installation work at Reach O is anticipated to occur for approximately 6 additional months resulting in noise level increments up to approximately 8 dBA. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, 520 East 23rd Street appears to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving would be in the mid 40s to low 50s dBA, up to approximately 6 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be closest to this receptor. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

School Receptor along Reach A

At the school receptor along Reach A—Receptor 44—which represents NYC School District 1 located at 84 Montgomery Street, daytime construction activity in Reach A including pile driving would produce noise levels in the low 70s dBA, which would result in noise level increases of less than the 3 dBA *CEQR Technical Manual* impact threshold. These noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The daytime pile driving at Reach A is anticipated to occur for approximately 11 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during pile installation construction at Reach A, which would last up to approximately 11 months.

84 Montgomery Street appears to have insulated glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, daytime interior noise levels during pile driving in this area would be in the low-50s dBA, which is up to approximately 6 dBA higher than the 45 dBA threshold recommended for classroom use according to CEQR noise exposure guidelines. These levels would occur while pile driving would occur closest to the receptor, and throughout the 11 months of sheet piling at Reach A. Since construction increases of up to only approximately 4 dBA and would occur for a relatively short period of time (i.e., 11 months) and noise levels due to the construction would not exceed CEQR construction noise screening thresholds for the remainder of construction, noise from construction would not rise to the level of significant adverse impact at this receptor under the Preferred Alternative.

Hospital Receptors along Reach P

At hospital receptors along Reach P—Receptors 69 and 70—daytime construction under the Preferred Alternative is predicted to produce noise levels up to the low 70s resulting in noise level increases of up to approximately 8 dBA. At these receptors, nighttime construction under the Preferred Alternative is predicted to produce noise levels in the low- to mid-60s dBA, resulting in noise level increases of up to approximately 5 dBA. The predicted daytime noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The maximum predicted nighttime noise level increases would be noticeable, but nighttime construction noise levels would fluctuate based on the specific location of pile installation with each receptor experiencing nighttime construction noise over a limited duration. Furthermore, standard building façade construction with insulated glass windows would be expected to provide approximately 25 dBA window/wall attenuation, so for those buildings with standard façade construction and an alternate means of ventilation allowing for the maintenance of a closed-window condition, interior noise levels during most of the construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**), which is considered acceptable for hospital uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of the Preferred Alternative would not rise to the level of a significant adverse effect at these receptors.

Remaining Receptors

At the remaining residential receptors at least one building row from the FDR Drive—Receptors 45 through 52, 55 through 60, 63–67—daytime construction under the Preferred Alternative is predicted to produce noise levels up to the mid 70s resulting in noise level increases of up to approximately 10 dBA. At these receptors, nighttime construction under the Preferred Alternative is predicted to produce noise levels in the low 60s to low 70s dBA resulting in noise level increases of up to approximately 12 dBA. The predicted daytime noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The maximum predicted nighttime noise level increases would be noticeable, but nighttime construction noise levels would fluctuate based on the specific location of pile installation with each receptor experiencing nighttime construction noise over a limited duration. Furthermore, standard building façade construction with insulated glass windows would be expected to provide approximately 25 dBA window/wall attenuation, so for those buildings with standard façade construction and an alternate means of ventilation allowing for the maintenance of a closed-window condition, interior noise levels during most of the construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**), which is considered acceptable for these types of noise-sensitive uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of the Preferred Alternative would not rise to the level of a significant adverse effect at these receptors.

Asser Levy Recreation Center

At Asser Levy Recreation Center (Receptor 23), existing noise levels as determined according to the methodology above range from the high 60s to low 70s dBA depending on proximity to the FDR Drive and height above grade (i.e., floor of the Recreation Center building). The Recreation Center consists of an outdoor pool, an indoor pool, and exercise room (with exercise machines, weight machines, and free weights), a billiards room (with billiards, foosball, and ping pong), and locker rooms. Field observations at the Recreation Center indicated that many users wore headphones while exercising and that the primary source of noise inside the building is operation of the exercise machines and ventilation equipment. Activities at the Asser Levy Recreation Center primarily include active recreation, sports, and exercise, which have a lower sensitivity to noise than other passive recreation.

At the Asser Levy Recreation Center building, construction activity including pile driving in Reach P that would occur west of the FDR Drive immediately adjacent to this building would produce exterior noise levels in the mid 80s dBA during the day, resulting in noise level increases up to approximately 14 dBA. These noise level increases would be noticeable and noise levels in the mid 80s are high for this area.

Noise level increases at Receptor 23 exceeding the CEQR construction noise screening thresholds are predicted to occur during the construction activity including pile installation in Reach P west of the FDR Drive immediately adjacent to this building. Construction in Reach P is expected to occur over the course of approximately 20 months, however, pile installation would occur in a single location for a relatively brief period of time not greater than 4 months. It is expected that this pile installation would be scheduled outside of the summer months when the Recreation Center's pool would be in use. While the duration of maximum noise levels at this location would be limited and the receptor is typically used for active recreation with a lower sensitivity to noise, the maximum noise levels predicted by the construction noise analysis are relatively high, i.e., in the "clearly unacceptable" range according to CEQR noise exposure guidance. Consequently, the Asser Levy Recreation Center is predicted to experience a significant adverse noise effect as a result of construction of the Preferred Alternative.

OTHER ALTERNATIVE (ALTERNATIVE 2): FLOOD PROTECTION SYSTEM ON THE WEST SIDE OF EAST RIVER PARK – BASELINE

Alternative 2 would provide flood protection for the protected area but would not include the extensive park access improvements proposed under the Preferred Alternative. This would result in fewer material deliveries and less excavation/earthwork within East River Park. Additionally, a shared-use flyover bridge would be built cantilevered over the northbound FDR Drive to address the narrowed pathway (pinch point) near the Con Edison facility between East 13th Street and East 15th Street under all alternatives, thus providing a more accessible connection between East River Park and Captain Patrick J. Brown Walk. Because the Alternative 2 construction would include fewer deliveries and less excavation/earthwork, it would not result in higher maximum construction noise levels compared with those in the noise analysis for the Preferred Alternative described above nor would it extend the duration of the maximum noise levels.

OTHER ALTERNATIVE (ALTERNATIVE 3): FLOOD PROTECTION SYSTEM ON THE WEST SIDE OF EAST RIVER PARK – ENHANCED PARK AND ACCESS

Construction of the proposed project under Alternative 3 is predicted to at times result in noise level increases at noise sensitive uses in buildings immediately west of the FDR Drive along both main project areas, as well as along East 23rd Street in Project Area Two that would be noticeable. As discussed in Chapter 6.0, "Construction Overview," in order to ensure public safety, East River Park, Murphy Brothers Playground, and Asser Levy Playground would be closed to the public during the time when construction would occur at these park resources. Generally, the noise level increases resulting from construction would occur at buildings and open space areas while construction activity is in the immediate vicinity of these noise receptors, and noise level increases would be lower when construction activity moves along to a new section of the project area. Areas immediately adjacent to construction work areas that remain open and active during construction would experience the highest levels of construction noise while construction is ongoing immediately adjacent, whereas receptors in buildings further west of the project areas would experience somewhat less noise because of the greater distance from the on-site construction equipment. The results of the detailed construction noise analysis of Alternative 3 are summarized in **Table 6.12-8**.

Table 6.12-8
Construction Noise Analysis Results (in dBA)

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
M1a	East Yard of Residential Building at Grand Street and FDR Drive East Yard	Day	72.8	72.8	72.8	73.5	0.0	0.7
		Night	66.5	66.5	66.5	67.4	0.0	0.9
M2	342 First Avenue (Peter Cooper Village) East-Facing Yard	Day	70.3	70.3	70.3	73.0	0.0	2.7
		Night	63.2	63.2	63.2	65.6	0.0	2.4
M5	Montgomery Street at Cherry Street	Day	64.4	64.4	65.0	67.1	0.6	2.7
		Night	58.7	58.7	60.6	61.8	1.9	3.1
M5a	Montgomery Street between Cherry Street and Madison Street	Day	66.2	66.2	66.7	67.2	0.4	1.0
		Night	57.8	57.8	60.1	60.9	2.3	3.1
M6	Pitt Street between East Broadway and Grand Street	Day	60.3	60.3	61.7	61.7	1.3	1.4
		Night	56.8	56.8	59.4	59.4	2.6	2.6
M7	Pike Street between Cherry Street and Madison Street	Day	76.0	76.0	76.0	76.0	0.0	0.0
		Night	70.3	70.3	70.4	70.4	0.1	0.1
M8	East Houston Street at Baruch Place	Day	65.1	65.1	65.1	65.5	0.0	0.4
		Night	57.7	57.7	57.7	59.9	0.0	2.2
M9	East Houston Street between Norfolk and Suffolk Streets	Day	66.4	66.4	66.4	66.4	0.0	0.0
		Night	59.0	59.0	59.0	59.1	0.0	0.1
M10	Avenue C north of East 16th Street	Day	63.3	63.3	63.3	65.0	0.0	1.7
		Night	56.8	56.8	56.8	58.0	0.0	1.2
M11	East 23rd Street at Asser Levy Place	Day	65.1	65.1	66.3	68.9	1.2	3.7
		Night	58.6	58.6	62.4	64.4	3.8	5.8
1	FDR Drive/Jackson Street	Day	75.0	75.0	75.0	75.9	0.0	0.9
		Night	-	-	-	-	-	-
6	FDR Drive/East 20th Street	Day	70.0	70.0	70.0	73.7	0.0	3.7
		Night	-	-	-	-	-	-
8A-8G	570 Grand Street	Day	62.4	71.8	62.4	75.8	0.0	6.9
		Night	56.8	65.5	56.8	71.0	0.0	8.2
9A-9G	455 FDR Drive	Day	61.4	72.2	61.4	73.2	0.0	3.9
		Night	56.8	65.9	56.8	67.5	0.0	5.7
10-A-10D	71 Jackson Street	Day	63.9	73.4	63.9	74.9	0.0	2.7
		Night	57.6	67.1	57.6	75.5	0.0	9.5
11A-11D	367 FDR Drive	Day	62.0	73.6	62.0	75.2	0.0	4.0
		Night	56.8	67.3	56.8	71.4	0.0	10.3
12A-12D	645 Water Street	Day	61.4	73.7	61.4	75.8	0.0	3.7
		Night	56.8	67.4	56.8	69.1	0.0	5.5

Table 6.12-8 (cont'd) Noise Receptor Locations

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
13D-13D	322 FDR Drive	Day	65.7	74.9	65.7	77.9	0.0	4.5
		Night	59.4	68.6	59.4	71.3	0.0	6.8
14A-14D	**621 Water Street**	**Day**	**65.2**	**74.9**	**65.2**	**78.7**	**0.0**	**4.2**
		Night	**58.9**	**68.6**	**58.9**	**72.3**	**0.0**	**4.6**
15A-15D	**605 Water Street**	**Day**	**65.8**	**72.3**	**65.8**	**88.4**	**0.0**	**20.1**
		Night	**59.5**	**66.0**	**59.6**	**74.2**	**0.0**	**10.1**
16A-16C	309 Avenue C Loop	Day	60.3	66.9	60.3	73.6	0.0	7.5
		Night	56.8	59.8	56.8	69.8	0.0	10.1
17A-17C	**315-317-319-321 Avenue C**	**Day**	**63.0**	**71.3**	**63.1**	**77.4**	**0.0**	**8.3**
		Night	**56.8**	**64.2**	**56.8**	**74.1**	**0.0**	**10.7**
18A-18D	**620 East 20th Street**	**Day**	**60.3**	**70.8**	**60.3**	**77.8**	**0.0**	**9.3**
		Night	**56.8**	**63.7**	**56.8**	**70.5**	**0.0**	**7.2**
19A-19C	**601 East 20th Street**	**Day**	**66.1**	**71.8**	**66.2**	**77.7**	**0.0**	**8.2**
		Night	**59.0**	**64.7**	**59.0**	**67.9**	**0.0**	**4.2**
20A-20C	**8 Peter Cooper Road**	**Day**	**61.8**	**71.6**	**61.9**	**78.0**	**0.0**	**10.6**
		Night	**56.8**	**64.5**	**56.8**	**66.3**	**0.0**	**2.6**
21A-21C	**7 Peter Cooper Road**	**Day**	**65.0**	**71.9**	**65.1**	**77.4**	**0.0**	**7.8**
		Night	**57.9**	**64.8**	**57.9**	**68.1**	**0.0**	**5.7**
22A-22C	**530 East 23rd Street**	**Day**	**66.3**	**70.7**	**66.7**	**76.3**	**0.0**	**6.1**
		Night	**59.2**	**63.6**	**60.8**	**73.7**	**0.0**	**12.9**
23A-23D	**392 Asser Levy Place**	**Day**	**60.3**	**70.3**	**60.7**	**82.4**	**0.0**	**13.6**
		Night	**-**	**-**	**-**	**-**	**-**	**-**
24A-24E	400-440 East 26th Street	Day	60.3	73.1	60.3	74.7	0.0	10.6
		Night	56.8	66.0	56.8	67.2	0.0	9.9
25A-25C	10 Waterside Plaza	Day	60.3	69.7	60.3	75.2	0.0	8.6
		Night	56.8	62.6	56.8	69.2	0.0	11.4
26A-26C	24-50 FDR Drive	Day	60.3	65.7	60.3	72.4	0.0	6.6
		Night	-	-	-	-	-	-
27A-27D	525 FDR Drive	Day	61.8	73.8	61.8	77.8	0.0	5.9
		Night	56.8	67.5	56.8	70.2	0.0	4.4
28A-28D	555 FDR Drive	Day	63.4	73.2	63.4	77.2	0.0	4.9
		Night	57.1	66.9	57.1	70.3	0.0	5.5
29A-29-D	571 FDR Drive	Day	63.6	73.6	63.6	77.2	0.0	4.8
		Night	57.3	67.3	57.3	74.0	0.0	8.7
30A-30C	605 FDR Drive	Day	65.6	74.7	65.6	76.3	0.0	3.6
		Night	59.3	68.4	59.3	73.4	0.0	6.8
31A-+31D	500 East Houston Street	Day	63.8	74.3	63.8	76.1	0.0	2.6
		Night	57.5	68.0	57.5	72.2	0.0	7.7
32A-32D	691 FDR Drive	Day	62.5	74.5	62.5	75.9	0.0	3.4
		Night	56.8	68.2	56.8	71.0	0.0	5.2
33A-33D	709 FDR Drive	Day	64.9	74.1	64.9	76.5	0.0	3.9
		Night	58.6	67.8	58.6	71.4	0.0	4.6
34A-34D	725 FDR Drive	Day	65.7	74.1	65.7	77.3	0.0	3.7
		Night	59.4	67.8	59.4	73.7	0.0	6.6
35A-35D	903 East 6th Street	Day	60.8	74.5	60.8	77.4	0.0	3.1
		Night	56.8	68.2	56.8	73.6	0.0	5.5
36A-36D	749 FDR Drive	Day	61.9	74.5	61.9	77.7	0.0	5.2
		Night	56.8	68.2	56.8	74.8	0.0	8.3

Table 6.12-8 (cont'd)
Noise Receptor Locations

Receptor	Location	Time Period	Existing L_{EQ} Min	Existing L_{EQ} Max	Total L_{EQ} Min	Total L_{EQ} Max	Change in L_{EQ} Min	Change in L_{EQ} Max
37A-37D	**765 FDR Drive**	**Day**	**60.3**	**75.0**	**60.3**	**78.2**	**0.0**	**8.2**
		Night	**56.8**	**68.7**	**56.8**	**73.9**	**0.0**	**11.4**
38A-38D	**819 FDR Drive**	**Day**	**60.3**	**74.6**	**60.3**	**76.6**	**0.0**	**6.2**
		Night	**56.8**	**68.3**	**56.8**	**73.8**	**0.0**	**8.4**
39A-39D	**911 FDR Drive**	**Day**	**63.9**	**73.8**	**63.9**	**81.8**	**0.0**	**11.5**
		Night	**57.6**	**67.5**	**57.6**	**74.9**	**0.0**	**7.5**
40A-40D	**10-23 FDR Drive**	**Day**	**66.9**	**75.0**	**66.9**	**81.5**	**0.0**	**12.9**
		Night	**60.6**	**68.7**	**60.6**	**77.0**	**0.0**	**8.5**
41A-41D	**11-15 FDR Drive**	**Day**	**62.2**	**75.1**	**62.2**	**78.3**	**0.0**	**5.8**
		Night	**56.8**	**68.8**	**56.8**	**75.5**	**0.0**	**10.7**
42A-42D	**1141 FDR Drive**	**Day**	**60.3**	**75.0**	**60.3**	**78.5**	**0.0**	**7.5**
		Night	**56.8**	**68.7**	**56.8**	**72.5**	**0.0**	**4.8**
43A-43D	**1223 FDR Drive**	**Day**	**60.3**	**75.2**	**60.3**	**78.1**	**0.0**	**5.3**
		Night	**56.8**	**68.9**	**56.8**	**71.2**	**0.0**	**3.1**
44	84 Montgomery Street	Day	68.9	70.1	69.1	76.1	0.0	6.0
		Night	-	-	-	-	-	-
45	75 Montgomery Street	Day	67.5	68.9	67.7	76.7	0.1	7.8
		Night	61.8	63.2	62.5	67.6	0.3	4.6
46	626 Water Street	Day	64.7	65.9	64.7	67.2	0.0	1.3
		Night	59.0	60.2	59.0	60.4	0.0	0.2
47	640 Water Street	Day	65.6	67.0	65.6	67.8	0.0	0.8
		Night	59.9	61.3	59.9	62.8	0.0	1.6
48	662 Water Street	Day	66.1	68.6	66.1	70.3	0.0	1.8
		Night	60.4	62.9	60.4	64.2	0.0	1.8
49	684 Water Street	Day	65.1	66.1	65.1	67.0	0.0	1.0
		Night	59.4	60.4	59.4	61.5	0.0	1.2
50	32 Jackson Street	Day	65.4	66.1	65.4	67.8	0.0	1.8
		Night	59.7	60.4	59.7	64.3	0.0	4.1
51	453 FDR Drive	Day	63.9	68.1	63.9	70.3	0.0	2.2
		Night	58.2	62.4	58.2	67.2	0.0	4.9
52	473 FDR Drive	Day	60.7	64.5	60.7	67.0	0.0	2.5
		Night	56.8	58.8	56.8	59.7	0.0	0.9
53	60 Baruch Drive	Day	60.9	64.2	60.9	69.2	0.0	5.0
		Night	56.8	56.8	56.8	62.0	0.0	5.2
54	123 Mangin Street	Day	60.5	63.7	60.5	67.6	0.0	4.4
		Night	-	-	-	-	-	-
55	484 East Houston Street	Day	60.3	62.3	60.3	65.7	0.0	3.4
		Night	56.8	56.8	56.8	64.0	0.0	7.2
56	950 East 4th Walk	Day	60.3	60.9	60.3	64.5	0.0	3.6
		Night	56.8	56.8	56.8	59.5	0.0	2.7
57	711 FDR Drive	Day	60.3	60.3	60.3	63.1	0.0	2.8
		Night	56.8	56.8	56.8	60.5	0.0	3.7
58	930 East 6th Street	Day	60.3	60.3	60.3	66.9	0.0	6.6
		Night	56.8	56.8	56.8	65.4	0.0	8.6
59	809 East 6th Street	Day	60.3	60.3	60.3	61.2	0.0	0.9
		Night	56.8	56.8	56.8	58.0	0.0	1.2
60	110 Avenue D	Day	60.3	60.3	60.3	64.1	0.0	3.8
		Night	56.8	56.8	56.8	62.5	0.0	5.7

Table 6.12-8 (cont'd)
Noise Receptor Locations

Receptor	Location	Time Period	Existing L_{EQ}		Total L_{EQ}		Change in L_{EQ}	
			Min	Max	Min	Max	Min	Max
61	**132 Avenue D**	**Day**	**60.3**	**64.1**	**60.3**	**72.3**	**0.0**	**8.8**
		Night	**56.8**	**56.8**	**56.8**	**68.9**	**0.0**	**12.1**
62	**465 East 10th Street**	**Day**	**60.3**	**65.2**	**60.3**	**72.9**	**0.0**	**8.2**
		Night	**56.8**	**57.8**	**56.8**	**70.4**	**0.0**	**12.6**
63	170 Avenue D	Day	60.3	61.6	60.3	67.8	0.0	6.2
		Night	56.8	56.8	56.8	63.4	0.0	6.6
64	285 Avenue C	Day	60.8	63.9	60.8	70.2	0.0	7.1
		Night	56.8	56.8	56.8	61.9	0.0	5.1
65	277 Avenue C	Day	60.3	60.3	60.3	67.8	0.0	7.5
		Night	56.8	56.8	56.8	58.8	0.0	2.0
66	622 East 20th Street	Day	60.3	60.3	60.3	65.9	0.0	5.6
		Night	56.8	56.8	56.8	58.7	0.0	1.9
67	6 Peter Cooper Road	Day	60.3	60.5	60.3	69.6	0.0	9.1
		Night	56.8	56.8	56.8	59.6	0.0	2.8
68	**520 East 23rd Street**	**Day**	**60.3**	**63.7**	**60.5**	**68.1**	**0.1**	**4.5**
		Night	**56.8**	**57.2**	**57.2**	**70.0**	**0.4**	**13.2**
69	423 East 23rd Street	Day	60.3	61.8	60.3	71.0	0.0	9.2
		Night	56.8	56.8	56.8	63.3	0.0	6.5
70	480 FDR Drive	Day	63.3	66.3	63.3	68.5	0.0	4.5
		Night	56.8	59.8	56.8	62.7	0.0	5.2

Notes:
[1] Values shown in **bold** for receptors where significant adverse construction noise impacts are predicted to occur.
[2] The data shown in this table reflect the maximum predicted increases in noise level resulting from construction under Alternative 3. However, the significance of construction noise impacts is determined based on the duration of construction noise and its total magnitude in addition to its intensity as indicated by the noise level increments, each of which is discussed in the text below. As a result, some receptors that have lower predicted noise level increments were determined to experience significant adverse impacts and higher increments at other receptors were determined not to be significant.

Open Space Receptors along the FDR Drive

At the open space receptors along the FDR Drive—Receptors 1 and 6—the existing noise levels range from the low to mid 70s dBA, depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, and whether the adjacent section of the FDR Drive is on structure. These receptors are located in open space at Corlears Hook Park and Stuyvesant Cove Park.

Construction under Alternative 3 is predicted to produce noise levels at Stuyvesant Cove Park in the low to mid 70s dBA, resulting in noise level increases of up to approximately 4 dBA when construction occurs at the shortest distance from the park. The predicted noise level increases at this open space location would be noticeable and would exceed CEQR construction noise screening thresholds, and the total noise levels would exceed the levels recommended by CEQR for passive open spaces (55 dBA L_{10}). (Noise levels in these areas also exceed CEQR recommended values for existing and No Action conditions.) However, the total noise levels would be in the range considered typical for Manhattan, and for this area in general. Many New York City parks and open space areas located near heavily trafficked roadways and/or near construction sites, experience comparable, and sometimes higher noise levels.

At Stuyvesant Cove Park, noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur during no more than two of the five years of construction. At this receptor, the construction activity that would produce the highest noise levels would be pile installation, as well as landscaping work. Both pile installation and landscaping would occur in a single location for a relatively brief period of time, typically not more than a month. Consequently, the maximum noise levels predicted by the construction noise analysis would not persist throughout the entire construction period. Lower construction noise levels that would be expected to occur during activities other than pile installation may still result in exceedances of CEQR construction noise screening thresholds at some times, but would be substantially lower than the maximum levels that would occur during pile installation.

As described above, construction noise levels at Stuyvesant Cove Park were predicted to be in the low to mid 70s dBA, noise level increases during construction were predicted to be up to approximately 4 dBA, and the elevated noise levels during construction were predicted to occur over a duration of approximately one to two years. While the noise from construction would be noticeable at times, the duration of construction noise at any given area of open space would be limited. Furthermore, the construction noise predictions are conservative in that they consider the area of open space that remains open and accessible closest to the construction area. At other open space areas farther from construction work areas, noise levels would be lower, and open space users who are bothered by noise could choose the quieter open space areas. Based on these factors, Alternative 3 construction noise at these receptors would not result in a significant adverse effect.

Construction under Alternative 3 is predicted to produce noise levels at Corlears Hook Park in the mid 70s dBA, resulting in noise level increases of up to approximately 1 dBA when construction occurs at the shortest distance from the park. The predicted noise level increases at this open space location would be imperceptible and would exceed CEQR construction noise screening thresholds, and the total noise levels would exceed the levels recommended by CEQR for passive open spaces (55 dBA L_{10}). (Noise levels in these areas also exceed CEQR recommended values for existing and No Action conditions.) The total noise levels would be in the range considered typical for Manhattan, and for this area in general. Many New York City parks and open space areas located near heavily trafficked roadways and/or near construction sites, experience comparable, and sometimes higher noise levels. Construction noise levels at Corlears Hook Park were predicted to be in the mid 70s dBA, noise level increases during construction were predicted to be up to approximately 1 dBA and in the range considered typical for Manhattan, and for this area in general. Based on these factors, Alternative 3 construction noise at Corlears Hook Park would not result in a significant adverse effect.

Residential, Hospital, and School Receptors along the FDR Drive

At buildings including residences, hospital uses, and schools located along the FDR Drive immediately west of the project areas—Receptors 8–22, 24–43—the daytime existing noise levels range from the mid-60s to high 70s dBA depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, height above grade (i.e., floor for high-rise buildings), and whether the adjacent section of the FDR Drive is on structure. Nighttime existing noise levels at these receptors range from the mid 50s to high 60s dBA.

Construction under Alternative 3 is predicted to produce noise levels at most of these receptors in the mid- to high 70s dBA, resulting in noise level increases up to approximately 10 dBA when construction occurs at the closest distance to them. However, at some of the residential receptors along the FDR Drive, construction under Alternative 3 would produce noise levels in the mid-to-high 80s and/or would result in noise level increases of up to approximately 20 dBA. These include Receptors 14, 15, 17, 19 through 22, 24, 25, 37, and 39–43.

Receptors along Reach A

At Receptors 14 and 15, which represent 621 and 605 Water Street, respectively, daytime construction activity in Reach A occurring north of the FDR Drive near Montgomery Street and immediately adjacent to these buildings would produce noise levels in the high 80s dBA, which would result in noise level increases of up to approximately 20 dBA. These noise level increases would be noticeable, and noise levels in the high 80s are relatively high for this area.

Additionally, at these receptors, noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur only during the construction activity in Reach A near Montgomery Street immediately adjacent to these buildings, including construction of flood protection structures under the FDR Drive and north of the FDR Drive, which is anticipated to occur for approximately nine months. During the rest of the construction period, daytime noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during excavation and sheet pile installation.

At Receptors 14 and 15, nighttime construction activity in Reaches B and C including pile installation would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 70s are relatively high for this area. The pile installation work at Reach B and C is anticipated to occur for approximately nine months. During the rest of the construction period, nighttime noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, the buildings at 605 and 621 Water Street appear to have monolithic (i.e., non-insulated) glass windows and alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, daytime interior noise levels during construction in this area would be in the mid-40s to high 60s dBA, which is up to approximately 23 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines, and nighttime interior noise levels during construction in this area would be in the mid-40s to low 60s dBA, which is up to approximately 18 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these buildings over the course of an approximately four months of pile installation at Reach A. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, this receptor is predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Receptors along Reaches M, N, and O

At Receptors 17 through 22, which represent residences along the west side of the FDR Drive between Avenue C Loop and East 23rd Street, daytime construction activity in Reaches N and O, including pile installation, would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 11 dBA. While the pile installation work at Reaches N and O is anticipated to occur for approximately 30 months, pile installation immediately adjacent to each receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in these reaches, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

Nighttime construction activity in Reaches M and P including nighttime pile installation would produce noise levels in the low-to-mid 70s dBA at these receptors, which would result in noise level increases of up to approximately 13 dBA. These noise level increases would be noticeable and nighttime noise levels in the mid 70s are relatively high for this area. While the pile installation work at Reaches M and P is anticipated to occur for approximately 30 months, nighttime pile installation is proposed for only limited portions of Reaches M and P. The pile installation immediately adjacent to each receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in these reaches, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

Based on field observations, these buildings in Stuyvesant Town and Peter Cooper Village appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving would be in the mid 40s to mid 50s dBA, up to approximately 9 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the four months of pile installation closest to each location. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Receptors along Reach P

At Receptors 24 and 25, which represent 425 East 25th Street and 10 Waterside Plaza, respectively, daytime pile installation in Reach P would produce noise levels in the mid 70's, which would result in noise level increases of up to approximately 11 dBA. While the pile installation work at Reach P is anticipated to occur for approximately 18 months, pile installation immediately adjacent to the receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

At Receptors 24 and 25, which represent 425 East 25th Street and 10 Waterside Plaza, respectively, nighttime construction activity in Reaches O and P including pile installation in a portion of Reach P would produce noise levels in the low 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable and nighttime noise levels in the low 70s are relatively high for this area. While the nighttime pile installation work at Reach P is anticipated to occur for approximately 18 months, pile installation immediately adjacent to the receptor, such that it would cause the maximum noise levels described above, would occur over the course of up to approximately four months. During the remaining periods of pile driving activity in this reach, construction noise levels at these receptors would still experience construction noise levels that exceed the CEQR construction noise screening thresholds.

Based on field observations, 425 East 25th Street appears to have insulated glass windows and an alternative means of ventilation (i.e., window air conditioning units)), which would be expected to provide approximately 25 dBA window wall attenuation. Based on field observations, 10 Waterside Plaza appears to have insulated glass windows and an alternative means of ventilation (i.e., package terminal air conditioning units), which would be expected to provide approximately 30 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving would be less than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines.

While noise from construction of Alternative 3 during the daytime maximum activity level, i.e., pile installation at Reach P, would result in noise level increments up to approximately 11 dBA at 425 East 25th Street, represented by Receptor 24, these peak levels would occur only while construction activity is adjacent to this receptor. While noise from construction of Alternative 3 during the nighttime maximum activity level, i.e., pile installation at Reach P, would result in noise level increments up to approximately 11 dBA at 10 Waterside Plaza, represented by Receptor 25, these peak levels would occur only while construction activity is adjacent to this receptor. Noise levels would be lower during the remainder of the approximately 27 months that any construction would occur in the vicinity of this receptor. Furthermore, interior noise levels would be within the range considered acceptable by CEQR noise exposure guidance. While the nighttime construction noise level would be noticeable, due to the acceptable interior noise levels, construction noise would not rise to the level of a significant adverse effect at this receptor.

Receptors along Reach H

At Receptors 37 and 38, which represent 765 and 819 FDR Drive, nighttime construction activity in Reaches H and I including pile installation would produce noise levels in the mid 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 70s are relatively high for this area. The pile installation work at Reaches H and I is anticipated to occur for approximately 21 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during sheet pile installation at Reach H, which would last approximately 10 months.

Based on field observations, 765 and 819 FDR Drive appear to have monolithic (i.e., non-insulated) glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the low 50s to mid 60s dBA, which is up to approximately 15 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the 10 months of pile installation closest to this receptor. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Receptors along Reach I

At Receptors 39 and 40, which represent 911 and 1023 FDR Drive, respectively, construction activity including reconstruction of the 10th Street pedestrian bridge immediately adjacent to these buildings and construction of the flood wall in Reach I that would occur west of the FDR Drive would produce noise levels in the low-80s dBA, resulting in noise level increases of up to approximately 13 dBA during the day. These noise level increases would be noticeable and noise levels in the low-80s are relatively high for this area.

At Receptors 39 and 40, noise level increases exceeding the CEQR construction noise screening thresholds are predicted to occur only during the construction activity immediately adjacent to these buildings, specifically the pedestrian bridge reconstruction, which is expected to occur for 18 months. Consequently, the maximum noise levels predicted by the construction noise analysis would not persist throughout the entire construction period. During the rest of the construction period, daytime noise levels due to construction would not exceed CEQR construction noise screening thresholds.

Based on field observations, 911 and 1023 FDR Drive appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, interior noise levels during early mobilization work in this area would be in the high 40s to low 60s dBA, up to 13 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while bridge construction activity would occur adjacent to each façade of this receptor over the course of approximately 18 months. Due to the high magnitude and extended duration of the predicted construction noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Receptors along Reach J

At Receptors 41, 42, and 43, which represent 1115, 1141, and 1223 FDR Drive, respectively, nighttime construction activity in Reaches H, I, and J including pile installation would produce noise levels in the low-to-mid 70s dBA, which would result in noise level increases of up to approximately 11 dBA. These noise level increases would be noticeable, and nighttime noise levels in the mid 70s are relatively high for this area. The pile installation work at Reaches H, I, and J is anticipated to occur for approximately 25 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during sheet pile installation at Reach J, which would last approximately four months.

Based on field observations, 1115, 1141, and 1223 FDR Drive appear to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the low 40s to mid 50s dBA, which is up to approximately 10 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be adjacent to each façade of these receptors, and throughout the four months of pile installation closest to these receptors. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Remaining Receptors

At the remaining residential, hospital, and school receptors along the FDR Drive—Receptors 8 to 13, 16, and 26 through 36—daytime construction under Alternative 3 is predicted to produce noise levels up to the mid-to-high 70s resulting in noise level increases of up to approximately 7 dBA. At these receptors, nighttime construction under Alternative 3 is predicted to produce noise levels in the high 50s to mid 70s dBA resulting in noise level increases of up to approximately 10 dBA, The predicted daytime noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The maximum predicted nighttime noise level increases would be noticeable, but nighttime construction noise levels would fluctuate based on the specific location of pile installation with each receptor experiencing nighttime construction noise over a limited duration. Furthermore, standard building façade construction with insulated glass windows would be expected to provide approximately 25 dBA window/wall attenuation, so for those buildings with standard façade construction and an alternate means of ventilation allowing for the maintenance of a closed-window condition, interior noise levels during most of the construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**), which is considered acceptable for these types of noise-sensitive uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of Alternative 3 would not rise to the level of a significant adverse effect at these receptors.

Residential, Hospital, and School Receptors at Least One Building Row West of the FDR Drive

At buildings west of the project areas and separated from the FDR Drive by at least one row of buildings (this include residences, hospital uses, and schools)—Receptors 44 to 70—the daytime existing noise levels range from the mid-60s to low 70s dBA depending on proximity to the FDR Drive, proximity to the Williamsburg Bridge, height above grade (i.e., floor for high-rise buildings), and whether the adjacent section of the FDR Drive is on structure. Nighttime existing noise levels at these receptors range from the mid 50s to mid 60s dBA.

Daytime construction under Alternative 3 is predicted to produce noise levels at these receptors in the low-to-mid 70s dBA, which would result in noise level increases of up to approximately 9 dBA when construction occurs at the closest distance to them and result in noise level increases exceeding the CEQR construction noise screening thresholds during no more than two of the five years of construction. However, at some of the residential receptors at least one building row from the FDR Drive, nighttime construction under Alternative 3 would produce noise level increases of up to approximately 13 dBA and exceedances of the CEQR construction noise screening thresholds for up to 3 years. These include Receptors 61, 62, and 68.

Receptors along Reach I

At Receptors 61 and 62, which represent 132 Avenue D and 465 East 10th Street, respectively, nighttime construction activity in Reaches I and J including pile installation would produce noise levels in the low 70s dBA, which would result in noise level increases of up to approximately 13 dBA. These noise level increases would be noticeable, and nighttime noise levels in the low 70s are relatively high for this area. The pile installation work at Reach I is anticipated to occur for approximately 23 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during sheet pile installation at Reach I, which would last approximately 23 months.

Based on field observations, 132 Avenue D and 465 East 10th Street appear to have monolithic (i.e., non-insulated) glass windows and an alternative means of ventilation (i.e., window air conditioning units), which would be expected to provide approximately 15 dBA window wall attenuation. Consequently, nighttime interior noise levels during construction in this area would be in the mid 40s to low 50s dBA, which is up to approximately 7 dBA higher than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would occur closest to these receptors, and throughout the 23 months of pile installation at Reach I. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Receptors along Reach O

At Receptor 68, which represents 520 East 23rd Street, nighttime construction activity in Reaches O and P including pile installation would produce noise levels in the low 70s dBA, which would result in noise level increases of up to approximately 14 dBA. These noise level increases would be noticeable, and nighttime noise levels in the low 70s are relatively high for this area. The pile installation work at Reaches O and P is anticipated to occur for approximately 27 months. During the rest of the construction period, noise levels due to construction would not exceed CEQR construction noise screening thresholds. The maximum noise levels described above would occur during sheet pile installation at Reach O, which would last approximately 17 months.

Based on field observations, 520 East 23rd Street appears to have insulated glass windows and an alternative means of ventilation (i.e., air conditioning), which would be expected to provide approximately 25 dBA window wall attenuation. Consequently, nighttime interior noise levels during nighttime pile driving would be in the mid 40s to mid 50s dBA, up to approximately 2 dBA greater than the 45 dBA threshold recommended for residential use according to CEQR noise exposure guidelines. These levels would occur while pile driving and excavation would be closest to this receptor. Due to the high magnitude of the predicted construction noise and because it would occur during nighttime hours when residences are especially sensitive to noise, these receptors are predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

Remaining Receptors

At the remaining residential, hospital, and school receptors at least one building row from the FDR Drive—Receptors 44 through 60, 63 through 67, 69, and 70—daytime construction under Alternative 3 is predicted to produce noise levels up to the low 70s resulting in noise level increases of up to approximately 8 dBA. At these receptors, nighttime construction under Alternative 3 is predicted to produce noise levels in the high 50s to high 60s dBA resulting in noise level increases of up to approximately 9 dBA, The predicted daytime noise level increases would be noticeable, but in the range considered typical for Manhattan, and for this area in general. The maximum predicted nighttime noise level increases would be noticeable, but nighttime construction noise levels would fluctuate based on the specific location of pile installation with each receptor experiencing nighttime construction noise over a limited duration. Furthermore, standard building façade construction with insulated glass windows would be expected to provide approximately 25 dBA window/wall attenuation, so for those buildings with standard façade construction and an alternate means of ventilation allowing for the maintenance of a closed-window condition, interior noise levels during most of the construction would be less than 45 dBA (i.e., during those times when noise levels are less than 70 dBA as shown in the full construction noise analysis results in **Appendix K2**), which is considered acceptable for these types of noise-sensitive uses according to CEQR noise exposure guidance. Consequently, noise resulting from construction of Alternative 3 would not rise to the level of a significant adverse effect at these receptors.

Asser Levy Recreation Center

At Asser Levy Recreation Center (Receptor 23), existing noise levels as determined according to the methodology above range from the high 60s to low 70s dBA depending on proximity to the FDR Drive and height above grade (i.e., floor of the Recreation Center building). The

Recreation Center consists of an outdoor pool (open during July and August), an indoor pool, and exercise room (with exercise machines, weight machines, and free weights), a billiards room (with billiards, foosball, and ping pong), and locker rooms. Field observations at the Recreation Center indicated that many users wore headphones while exercising and that the primary source of noise inside the building is operation of the exercise machines and ventilation equipment. Activities at the Asser Levy Recreation Center primarily include active recreation, sports, and exercise, which have a lower sensitivity to noise than other passive recreation.

At the Asser Levy Recreation Center building, construction activity including pile driving in Reach P that would occur west of the FDR Drive immediately adjacent to this building would produce exterior noise levels in the low 80s dBA during the day, resulting in noise level increases up to approximately 14 dBA during the day. These noise level increases would be noticeable and noise levels in the high 80s are high for this area.

Noise level increases at Receptor 23 exceeding the CEQR construction noise screening thresholds are predicted to occur during the construction activity including pile installation in Reach P west of the FDR Drive immediately adjacent to this building. Construction in Reach P is expected to occur over the course of approximately 20 months, however, pile installation would occur in a single location for a relatively brief period of time not greater than 4 months. It is expected that this pile installation would be scheduled outside of the summer months when the Recreation Center’s pool would be in use. While the duration of maximum noise levels at this location would be limited and the receptor is typically used for active recreation with a lower sensitivity to noise, the maximum noise levels predicted by the construction noise analysis are relatively high, i.e., in the “clearly unacceptable” range according to CEQR noise exposure guidance. Consequently, the Asser Levy Recreation Center is predicted to experience a significant adverse noise effect as a result of construction of Alternative 3.

OTHER ALTERNATIVE (ALTERNATIVE 5): FLOOD PROTECTION SYSTEM EAST OF FDR DRIVE

The flood protection and connectivity features of Alternative 5 throughout the project area would be identical to those described in the Preferred Alternative discussed above. However, Alternative 5 would also include raising the northbound lanes of the FDR Drive approximately 6 feet between East 13th Street and East 18th Street. A floodwall would be installed along the raised portion of the roadway to provide flood protection and would connect to the closure structures at the southern end of Stuyvesant Cove Park. Alternative 5 would likely result in additional material deliveries, excavation, and shaft drilling in the area along the FDR Drive between East 13th and East 18th Streets. Because the additional construction associated with Alternative 5 (when compared with Alternative 3) would not include additional pile installation and would not include excavation or concrete operation west of the FDR Drive, it would not result in higher maximum construction noise levels compared with those in the noise analysis for the Preferred Alternative described above, nor would it extend the duration of the maximum noise levels. However, the additional material deliveries, excavation, and shaft drilling in the area along the FDR Drive between East 13th and East 18th Streets could potentially extend the duration of construction noise that would be noticeable and potentially intrusive at the receptors in this area (i.e., Receptors 42 and 43), which were identified above as having the potential to experience such levels of construction noise.

OTHER CONSTRUCTION OPTION

HYDRAULIC PRESS-IN PILE INSTALLATION

Under any of the alternatives discussed above, pile installation may be conducted in full or in part using a hydraulic press-in method. This method is 10 to 15 dBA quieter than the impact pile driving method assumed in the detailed construction noise analysis presented above. At receptors adjacent to work areas where hydraulic press-in pile installation would be used, the maximum noise levels during pile installation would be approximately 10 dBA lower than the levels described above. For most receptors predicted in the detailed analysis to experience large noise level increases (i.e., 10 dBA or greater), the largest increases were predicted to occur during nearby pile installation. The press-in pile method would substantially reduce the maximum noise level increases and generally reduce the construction noise effects. However, during noisy construction activities other than pile installation, such as concrete operations, excavation, and soil trucking, noise levels as described above, including some noise level increases greater than 10 dBA, would still occur.

H. VIBRATION

INTRODUCTION

Construction activities have the potential to result in vibration levels that may in turn result in structural or architectural damage, and/or annoyance or interference with vibration-sensitive activities. In general, vibratory levels at a receiver are a function of the source strength (which in turn is dependent upon the construction equipment and methods utilized), the distance between the equipment and the receiver, the characteristics of the transmitting medium, and the construction of the receiver building. Construction equipment operation causes ground vibrations that spread through the ground and decrease in strength with distance. Vehicular traffic, even in locations close to major roadways, typically does not result in perceptible vibration levels unless there are discontinuities in the roadway surface. With the exception of the case of fragile and possibly historically significant structures or buildings, generally construction activities do not reach the levels that can cause architectural or structural damage, but can achieve levels that may be perceptible in buildings close to a construction site. An assessment has been prepared to quantify potential vibration effects of construction activities on structures and residences near the project site.

CONSTRUCTION VIBRATION CRITERIA

For purposes of assessing potential structural or architectural damage, the determination of a significant effect was based on the vibration impact criterion used by LPC of a peak particle velocity (PPV) of 0.50 inches/second. For non-fragile buildings, vibration levels below 0.60 inches/second would not be expected to result in any structural or architectural damage.

For purposes of evaluating potential annoyance or interference with vibration-sensitive activities, vibration levels greater than 65 vibration decibels (VdB) would have the potential to result in significant adverse effects if they were to occur for a prolonged period of time.

ANALYSIS METHODOLOGY

For purposes of assessing potential structural or architectural damage, the following formula was used:

$$PPV_{equip} = PPV_{ref} \text{ x } (25/D)^{1.5}$$

where: PPV_{equip} is the peak particle velocity in in/sec of the equipment at the receiver location;

PPV_{ref} is the reference vibration level in in/sec at 25 feet; and

D is the distance from the equipment to the received location in feet.

For purposes of assessing potential annoyance or interference with vibration sensitive activities, the following formula was used:

$$L_v(D) = L_v(ref) – 30\log(D/25)$$

where: $L_v(D)$ is the vibration level in VdB of the equipment at the receiver location;

$L_v(ref)$ is the reference vibration level in VdB at 25 feet; and

D is the distance from the equipment to the receiver location in feet.

Table 6.12-9 shows vibration source levels for typical construction equipment.

Table 6.12-9
Vibration Source Levels for Construction Equipment

Equipment	PPV_{ref} (in/sec)	Approximate L_v (ref) (VdB)
Pile Driver (Impact)	0.644–1.518	104–112
Clam Shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall in rock)	0.017	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

CONSTRUCTION VIBRATION ANALYSIS RESULTS

The buildings and structures of most concern with regard to the potential for structural or architectural damage due to vibration would be those directly adjacent to pile driving locations, including the Williamsburg Bridge and several buildings west of the project area. Vibration levels at all of these buildings and structures would be below the 0.50 inches/second PPV limit, although vibration monitoring would be required for all historic structures within 90 feet of the project work areas according to the project's Construction Protection Plan (to be implemented through a Programmatic Agreement) to ensure vibration does not exceed the acceptable limit at any of these historic structures. At all other locations, the distance between construction equipment and receiving buildings or structures is large enough to avoid vibratory levels that would approach the levels that would have the potential to result in architectural or structural damage.

In terms of potential vibration levels that would be perceptible and annoying, the pieces of equipment that would have the most potential for producing levels that exceed the 65 VdB limit are pile drivers. They would produce perceptible vibration levels (i.e., vibration levels exceeding 65 VdB) at receptor locations within a distance of approximately 230 feet. However, the operation would only occur for limited periods of time at a particular location.

I. MITIGATION

As discussed above, even with the noise control measures described in "Noise Control Measures," construction of the proposed project would result in potential temporary significant adverse noise effects at 621 Water Street, 605 Water Street, 309 Avenue C Loop, 315-321 Avenue C, 620 East 20th Street, 601 East 20th Street, 8 Peter Cooper Road, 7 Peter Cooper Road, 530 East 23rd Street, 765 FDR Drive, 819 FDR Drive, 911 FDR Drive, 1023 FDR Drive, 1115 FDR Drive, 1141 FDR Drive, 1223 FDR Drive, 570 Grand Street, 455 FDR Drive, 71 Jackson Street, 367 FDR Drive, 645 Water Street, 322 FDR Drive, 525 FDR Drive, 555 FDR Drive, 60 Baruch Drive, 132 Avenue D, 465 East 10th Street, and 520 East 23rd Street, 123 Mangin Street, and the Asser Levy Recreation Center. The predicted significant adverse construction noise effects would be of limited duration and would be up to the high 80s dBA during daytime construction and up to the mid 70s during nighttime construction. Because the analysis is based on worst-case construction phases, it does not capture the natural daily and hourly variability of construction noise at each receptor. The level of noise produced by construction fluctuates throughout the days and months of the construction phases, while the construction noise analysis is based on the worst-case time periods only, which is conservative.

Source or path controls beyond those already identified in "Noise Reduction Measures," were considered for feasibility and effectiveness in reducing the level of construction noise at the receptors that have the potential to experience significant adverse construction noise impacts. These measures may include the following:

- Using a hydraulic press-in pile installation method instead of the standard impact pile driving provides a large reduction in noise from pile installation, which would result in a substantial reduction in overall construction noise because pile installation is the dominant source of construction noise at most receptors. However, the press-in pile installation method is not suitable for pile installation in some space-limited areas and in areas where there are large subsurface obstructions. In those cases, impact pile driving would be unavoidable.
- Hanging noise barriers or curtains made from mass-loaded vinyl around the pile driving head to shield receptors from noise of impact pile driving would provide approximately 5 to 10 dBA reduction in noise from pile installation. However, this would require a crane or cranes to hang the noise barriers, which introduces an additional noise source. Furthermore, the time required to place the noise barriers at the start of driving each pile could extend the total duration of pile driving.
- Enclosing the concrete pump and concrete mixer trucks at any time that the mixer barrels would be spinning in a shed or tunnel including 2 or 3 walls and a roof, with the opening or openings facing away from receptors would provide approximately 10 to 15 dBA reduction in Approximately 10 to 15 dBA reduction in concrete operation noise, which does not represent a substantial portion of the project's construction noise. Consequently, this measure would not be effective in reducing total construction noise levels at surrounding receptors.

- Using barging for deliveries of construction materials (including concrete) and importing of fill to the project sites, rather than trucks on roadways to from the construction work areas, would provide approximately 3 to 6 dBA reduction in noise levels from dump trucks and/or delivery trucks. If noise from pile installation is reduced by one of the means described above, the trucks would be the next greatest contributor to the total construction noise level, so this reduction measure could be effective in further reducing the total construction noise levels at surrounding receptors. However, it may result in conflicts with esplanade work, in which case truck deliveries would be unavoidable.
- Selecting quieter equipment models for cranes, generators, compressors, and lifts may result in up to a 10 dBA reduction in noise levels from construction if the pile installation and truck noise are reduced by the means described above. This is subject to the availability of quieter equipment in the quantities necessary to complete the proposed project in the projected timeframe. ✷