R. Noise

Noise, in its simplest definition, is unwanted sound. This is the basis for environmental noise concerns. While high noise levels may cause hearing loss, the levels usually associated with environmental noise assessments are below the hazardous range. However, noise levels in this range should not be overlooked, since they can cause stress-related illnesses, disrupt sleep, and interrupt activities requiring concentration. In New York City, with its high concentration of population and commercial activities, such problems are common.

This section of the manual discusses the topic of noise as it relates to regulations and guidelines governing activities in New York City. Technical terms are defined, regulations summarized, and guidelines from outside New York City are discussed for comparative purposes. Relative to noise, the goal of CEQR is to determine a proposed action's potential effects on sensitive noise receptors, including the effects on the interior noise levels of residential, commercial, and institutional uses (if applicable).

100. Definitions

110. TYPES OF NOISE

For CEQR purposes, the three principal types of noise sources that affect the New York City environment are mobile sources, stationary sources, and construction sources.

111. Mobile Source Noise

Mobile sources are those noise sources that move in relation to a noise-sensitive receptor—principally automobiles, buses, trucks, aircraft, and trains. Each has its own distinctive noise character. Consequently, each has an associated set of noise assessment descriptors. The details of these signatures and descriptors are discussed in following sections.

112. Stationary Source Noise

Stationary sources of noise, as the name implies, do not move in relation to a noise-sensitive receptor. Typical stationary noise sources of concern for CEQR include machinery or mechanical equipment associated with industrial and manufacturing operations or building heating, ventilating, and air-conditioning systems. This category also includes noise produced by crowds of people within a defined location, such as children in playgrounds or spectators attending concerts or sporting events, and noise produced by concerts or by announcements using amplification systems.

113. Construction Noise

Construction noise sources comprise both mobile (e.g., trucks, bulldozers, etc.) and stationary (e.g., compressors, pile drivers, power tools, etc.) sources. Construction noise is examined separately because, even though the duration of construction activities may be years, it is temporary. The duration of each phase of construction is a factor that should be considered when assessing noise from construction activities.

120. BACKGROUND DISCUSSION FOR NOISE ANALYSIS

This section is included to provide the reader with a background of the terminology used in noise assessment discussions, the basic physical characteristics of noise, the types and appropriate use of noise descriptors, and what are considered receptors (receptors are noise-sensitive locations) in the conduct of noise analyses.

121. Characteristics of Noise

Sound is a vibration in air resulting in the propagation of energy from one point in space to another. This vibration takes the form of a rapid pressure fluctuation where the instantaneous pressure varies above and below the static air pressure. The rate of fluctuation defines the frequency. The distance between the same point in successive waves (compression to compression, for example) defines the wavelength.

The first step in a proper understanding of the impact of sound, its perception and control is an understanding of the source, path, and receptor. The source is the equipment or process directly responsible for the sound generation. The path is the medium of sound propagation, such as air, water, or solid materials. The receptor is the final destination of concern for the sound in question. For CEQR purposes, the receptor is usually persons being affected; the hearing mechanism of an affected person is the final destination of the noise source of concern. Each of the three links of this chain plays a role in producing a resultant sound pressure level at the receptor.

122. Sound Levels: Propagation Velocity, Wavelengths and Frequencies, and Diffraction

Sound pressure is the parameter that is normally measured in noise assessments. People's hearing mechanisms respond to "acoustic" pressures that represent the range from the threshold of hearing to the threshold of pain. This vast range is represented as a logarithmic scale.

A basic measure of sound is the sound pressure level (SPL), which is expressed in decibels (denoted dB). When the SPL = 0 dB, the acoustic pressure is the same as the threshold of hearing. Therefore, 0 dB corresponds to the threshold of hearing, or the SPL at which people with healthy hearing mechanisms can just begin to hear a sound.

Sound is propagated as a wave of varying length and frequency. A higher frequency sound is perceived as a higher pitch—for example, the characteristic sound of the flute. A lower frequency is perceived as a lower pitch—for example, the sound of the bass drum. The frequency is expressed in cycles per second or Hertz (Hz): one Hz is one cycle per second. Just as the human ear cannot perceive sound pressure levels below a certain range, it cannot perceive some frequencies above a certain range. The normal range of hearing is 20 Hz to 20,000 Hz or 20 kiloHertz (kHz).

The velocity of sound, which is constant in air, is governed by the relationship: velocity equals wave length times the frequency. Therefore, since sound travels at a constant velocity in air, the longer the wavelength, the smaller the frequency, and vice versa. The wavelength determines how the sound interacts with the physical environment.

In general, human sound perception is such that a change in 3 dB is just noticeable, a change in 5 dB is clearly noticeable, and a change in 10 dB is perceived as a doubling or halving of sound level. In a large open area with no obstructive or reflective surfaces, it is a general rule that SPL from a point source of noise drops off at a rate of 6 dB with each doubling of distance away from the source. For "line" sources (such as vehicles on a street), the SPL drops off at a rate of 3 dB(A) with each doubling of the distance from the source. Over distances longer than 1,000 feet, this rule of thumb may not hold true, as atmospheric conditions cause changes in sound path and absorption. The drop-off rate will also vary with both terrain conditions and the presence of obstructions in the sound propagation path. In the urban canyon type of environment present in New York City, drop-off rates along City streets generally range from 2 to 4 dB per doubling of distance from the source, because of sound reflections from buildings. It is important to note that whenever ideal open situations do not exist, and a drop-off rate is required in the analysis, the rate should be verified by field measurements.

Since sound is a wave phenomenon, it is also subject to "diffraction," i.e., it "bends" around corners. This is why a person continues to hear some sound from a source on the other side of a wall that is higher than the individual in question.

123. Noise Descriptors

Many descriptors are commonly used in environmental noise assessment. The choice of specific descriptors is related to the nature of the noise "signature" (SPL, frequency, and duration) of the source and the potential effect it may have on the surrounding environment.

123.1. Sound Weighting

Sound is often measured and described in terms of its overall energy, taking all frequencies into account. However, the human hearing process is not the same at all frequencies. Over the normal hearing range, humans are most sensitive to sounds with frequencies between 200 Hz and 10 kHz. Therefore, noise measurements are often adjusted or weighted, as a function of frequency to account for human perception and sensitivities. The most common weighting networks used are the A- and C-weighting networks.

These weight scales were developed to allow sound level meters to simulate the frequency sensitivity of the human hearing mechanism. They use filter networks which approximate the hearing characteristic. The A-weighted network is the most commonly used and sound levels measured using this weighting are (noted as dB(A)). The letter "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear does. A listing of common noise sources with their associated typical dB(A) values is shown in Table 3R-1. Note in that table that 0 dB(A) corresponds to the threshold of hearing and 110 dBA corresponds to maximum levels at the rear seats of rock concerts, as a representative range of noise levels.

Table 3R-1

Noise Levels of Common Sources

Sound Source	SPL dB(A)
Air Raid Siren at 50 feet	120
Maximum Levels at Rock Concerts (Rear Seats)	110
On Platform by Passing Subway Train	100
On Sidewalk by Passing Heavy Truck or Bus	90
On Sidewalk by Typical Highway	80
On Sidewalk by Passing Automobiles with Mufflers	70
Typical Urban Area	60-70
Typical Suburban Area	50-60
Quiet Suburban Area at Night	40-50
Typical Rural Area at Night	30-40
Isolated Broadcast Studio	20
Audiometric (Hearing Testing) Booth	10
Threshold of Hearing	0

Notes: A change in 3 dB(A) is a just noticeable change in SPL. A change in 10 dB(A) is perceived as a doubling or halving in SPL.

Sources: Cowan, James P. Handbook of Environmental Accoustics. Van Nostrand Reinhold, New York, 1994.

Egan, M. David, Architectural Acoustics. McGraw-Hill Book Company, 1988.

The C-weighted network provides essentially the unweighted microphone sensitivity over the frequency range of maximum human sensitivity. C-weighted measurements, denoted as dB(C), are used in some ordinances and standards, usually when dealing with stationary mechanical noise sources; however, dB(A) are normally used for environmental assessments. Since C-weighting does not attenuate frequency levels below 1,000 Hz the way A-weighting does, inspection of dB(A) versus dB(C) readings can give a quick estimate of the low frequency contribution of the sound source in question.

The most common descriptors used in environmental noise assessments are (1) time-equivalent level (L_{eq}); (2) day-night level (L_{dn}); (3) percentile level (L_x); (4) sound exposure level (SEL); and (5) maximum instantaneous level (SPL). Each is typically based upon A-weighted measurements and described briefly below.

1. L_{eq} is the continuous equivalent sound level, defined as the single SPL that, if constant over the stated measurement period, would contain the same sound energy as the actual monitored sound that is fluctuating in level over the measurement period. L_{eq} is an energy-average quantity that must be contrasted with an average or median sound level. L_{eq} must be qualified in terms of a time period to have meaning. The normal representation for the time period is placing it in parentheses in terms of hours, e.g., $L_{eq}(1)$ refers to a 1-hour measurement and $L_{eq(24)}$ refers to a 24-hour measurement. L_{eq} is most widely recognized as the descriptor of choice for most environmental noise assessments. In addition to its simplicity of use, it is easy to combine with other readings or predictions to derive a total noise level.

2. L_{dn} is the day-night equivalent sound level, defined as a 24-hour continuous L_{eq} with a 10 dB adjustment added to all hourly noise levels recorded between the hours of 10 PM and 7 AM. This 10 dB addition accounts for the extra sensitivity people have to noise during typical sleeping hours. Aircraft noise around airports is usually mapped out in terms of L_{dn} contours, which are constant lines of L_{dn} mapped similarly to elevations on topographical maps.

3. L_x is the percentile level, where x is any number from 0 to 100. Here x corresponds to the percentage of the measurement time that the stated sound level has been exceeded. For example, L_{10} = 80 dB(A) means that SPL measurements exceeded 80 dB(A) 10 percent of the measurement period. As with L_{eq}, the measurement time period must be specified and is denoted in parentheses (i.e., $L_{10(1)}$ corresponds to the SPL exceeded 10 percent of the time during a one-hour period).

The most commonly used L_x values are L_1, L_{10}, L_{50}, and L_{90}. L_1, the SPL exceeded 1 percent of the time, is usually regarded as the average maximum noise level when readings are an hour or less in duration. L_{10} is usually regarded as an indication of traffic noise exposure with a steady flow of evenly spaced vehicles. L_{50} provides an indication of the median sound level. L_{90} is usually regarded as the residual level, or the background noise level without the source in question or discrete events.

4. SEL is the sound exposure level, defined as a single number rating indicating the total energy of a discrete noise-generating event (e.g., an aircraft flyover) compressed into a 1-second time duration. This level is handy as a consistent rating method that can be straightforwardly combined with other SEL and L_{eq} readings to provide a complete noise scenario for measurements and predictions. However, care must be taken in the use of these values since they may be misleading as their numeric value is higher than any sound level which existed during the measurement period.

5. The maximum instantaneous SPL is the highest single reading over the measurement period. It is useful to note this level because if it is very high, it will elevate the Leq, perhaps making it appear spurious. In instances where uses may be particularly sensitive to single event noise events, the lead agency should also consider analyzing potential noise impacts on a single event basis, particularly if the single event would be entirely new to the receptor, or where the receptor would experience a significant increase in the number of these single events.

Recommended descriptors for characterizing various types of noise are provided below. The discussion includes a notation of major agencies that use different descriptors for noise analysis purposes. It should be noted that the Noise Exposure Guidelines recommended by New York City Department of Environmental Protection (DEP) (see Section 420, below) are expressed in terms of L_{10} for vehicular noise, daily L_{dn} for rail sources, and yearly L_{dn} for aircraft. The New York City Noise Code uses L_{eq} for the ANQZ standards (for on-site stationary sources). In addition, the New York City Zoning Resolution uses maximum instantaneous octave band sound pressure levels as its noise descriptor for industrial noise sources. Detailed analyses in these areas, if required, will need to include these descriptors for those assessments.

123.2. Descriptors for Mobile Sources

Each type of mobile source noise generator produces a distinct noise character. The use of different descriptors for each is appropriate, as described below.

Vehicular Traffic. Because vehicular traffic on local streets is not steady—vehicles often move by in groups, or platoons—its noise signature is characterized by fluctuating levels. If the traffic stream is characterized by sporadic heavy vehicles (such as trucks), the noise levels will contain "spikes" associated with these events. For that reason it is generally best to use the descriptors of $L_{eq(1)}$ or $L_{10(1)}$ for purposes of noise analysis. $L_{eq(1)}$ captures an hour's total noise energy at the location, and $L_{10(1)}$ represents the level exceeded 10 percent of the time. The $L_{10(1)}$ descriptor can be considered an average of the peak noise levels at a given location. If the noise fluctuates very little, then L_{eq} will approximate L_{50}, or the median level. If the noise fluctuates broadly, then the L_{eq} will be about 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} generally lies between L_{10} and L_{50}, but generally closer to L_{10} where fluctuating traffic noise is the dominant noise source.

Aircraft. Aircraft noise consists of a series of single events over time. Depending on the location of and ambient noise levels at the receptor, these single events can be easily distinguishable from background noise levels. This is particularly true, for example, where the receptor is close to an airport and in the flight path. The Federal Aviation Administration (FAA) currently averages daily L_{dn} levels to use the yearly L_{dn} as its preferred noise descriptor. The distance from the flight path where various L_{dn} levels occur is measured (or calculated) and then mapped. These L_{dn} "noise contours" constitute the basic form of reference for assessing impacts associated with aircraft noise. Many airports are monitored to derive annual L_{dn} contours, and the FAA has its own computer program to calculate L_{dn} contours. The Noise Exposure Guidelines (see Section 420 below) also use the annual L_{dn} descriptor, patterned after FAA specifications for descriptor use. Therefore, when it is necessary to conduct a detailed noise analysis involving aircraft noise, the annual L_{dn} descriptor should be used in the analyses. Measured annual L_{dn} values are available from the Port Authority for its facilities in the form of noise contour maps, or these values may be calculated using the federally approved INM computer model and flight data from the Port Authority of New York and New Jersey.

Based on flight data, it is also possible to establish $L_{eq(1)}$ noise levels for existing and future conditions. Since annual L_{dn} values tend to average out high hourly values, for impact assessment purposes, it is recommended that the $L_{eq(1)}$ descriptor be used in the noise analysis (see Section 332, below).

Trains. Similar to aircraft noise, train noise comprises a series of single events over time. Depending on the location of and ambient noise levels at the receptor, these single events can be easily distinguishable from background noise levels. This is particularly true, for example, at noise receptors close to elevated rail lines. The Federal Transit Administration (FTA - formerly UMTA), depending on the adjacent land use, uses the $L_{eq(1)}$ or L_{dn} as its principal noise descriptors for mass transit noise. The Noise Exposure Guidelines (see Section 420 below) for noise assessment require the use of the daily L_{dn} for impact assessment. Because of these standards, it is recommended that the L_{dn} be used in the analysis of train noise. However, again, because the L_{dn} descriptor tends to average out high hourly values over 24 hours, it is recommended that the $L_{eq(1)}$ descriptors be used for purposes of impact analysis.

123.3. Descriptors for Stationary Sources

Stationary source noise usually is associated with mechanical equipment used for manufacturing purposes, or for building mechanical systems. In addition, stationary source noise must also be examined for crowd noise, such as from playgrounds or spectator events, or for open-air concerts or noise produced by amplification systems. In many cases, the nature of this noise is fairly uniform. The recommended descriptor for this type of noise source would be the $L_{eq(1)}$ descriptor. However, for purposes of developing noise attenuation measures for mechanical equipment, the analysis should generally be performed using the octave band components of the sound. The analysis should include the 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz octave band center frequencies.

123.4. Descriptors for Construction Sources

Construction source noise is associated with a variety of mobile and stationary sources, each having unique noise characteristics and operating for different time periods. The only noise descriptor that can be used reliably with these noise sources is the L_{eq}. Hourly L_{eq} values should be used because construction operations vary with the time of day.

124. Receptors

Receptors are generally the subject of most noise impact analyses. A noise-sensitive location (known as a "receptor") is usually defined as an area where human activity may be adversely affected when noise levels exceed predefined thresholds of acceptability or when noise levels increase by an amount exceeding a predefined threshold of change. These locations can be indoors or outdoors. Indoor receptors would include, but would not be limited to, residences, hotels, motels, health care facilities, nursing homes, schools, houses of worship, court houses, public meeting facilities, museums, libraries, and theaters. Outdoor receptors would include, but would not be limited to, parks, outdoor theaters, golf courses, zoos, campgrounds, and beaches. Land use and zoning maps are usually helpful in initially targeting receptors that should be analyzed; however, field inspection of the area in question firsthand is the most appropriate way to identify all receptors that may be affected by the proposed project. In some cases additional receptor sites may need to be identified after the initial analysis has been performed to ensure that the extent of the area where significant impacts may occur has been defined.

130. NOISE CHARACTERISTICS OF TYPICAL NOISE SOURCES

131. Mobile Sources

131.1. Vehicular Traffic

Vehicular traffic includes automobiles, buses, and trucks. The noise generated by each of these types of vehicles comes from the operation of its engine and the sound of its tires passing over the roadbed. Trucks and cars are quite different in their noise generating characteristics. Buses and trucks are similar in their respective noise characteristics.

Automobiles generally produce noise levels that are independent of vehicle speed but vary with engine speed. With changing gears, the noise levels tend to increase in a sawtooth kind of pattern as vehicular speed increases. The interaction of the road surface with the tires generates noise that increases with vehicle speed. At vehicular speeds below 30 miles per hour, the typical automobile noise spectrum is dominated by engine noise. At speeds higher than 30 miles per hour, the automobile noise signature is composed of a combination of lower frequency engine noise and higher frequency tire noise. The engine and tire noise above vehicular speeds of 30 miles per hour are comparable in noise level.

Noise generated by buses and heavy trucks is also composed of engine and tire noise, but tire noise tends to dominate the noise signature at vehicular speeds above 30 miles per hour in trucks and buses. Cargo load normally does not significantly affect noise levels because increased load usually results in decreased vehicular speed and the effects cancel each other out. Because individual trucks and buses are noisier than individual automobiles, the concept of Passenger Car Equivalents is used (see Section 332.1).

131.2. Aircraft Operations

The principal noise sources from conventional aircraft (airplanes and helicopters) using New York City airspace are the propulsion system and aerodynamic noise. There are generally three types of engines in use on contemporary airplanes—turbojet, turbofan, and propeller. In the turbojet and turbofan models, the dominant noise source is the exhaust, generating the characteristic low frequency roar of the jet engine. Propeller aircraft have combinations of engine exhaust noise and propeller noise, with the propeller component usually dominating. This produces the typical whining sound of propeller-driven aircraft.

Aerodynamic noise is generated by airflow around the fuselage, cavities, control surfaces, and landing gear of the aircraft. Aerodynamic noise is usually only dominant during cruise conditions (frequencies above 600 Hz). Conditions during takeoff and landing normally cause propulsion system noise dominate the aerodynamic component.

Helicopter noise is generated by the engine and main rotor system. The engine noise is similar to that discussed for airplanes yet on a smaller scale. Rotor noise is characterized by slaps or cracks caused by the sharp variations in pressure encountered by the rotating rotor blades as they pass through the aerodynamic wake produced by each adjacent blade. As for propeller noise, the frequency of the rotor noise is proportional to the tip speed and the number of blades in the rotor system.

131.3. Rail Operations

In general, the principal noise sources of rail systems are the interaction between wheels and rails, the propulsion system of the railcars, brakes, and auxiliary equipment (ventilation and horns). The dominant cause of railcar noise over most of the typical speed range is interaction between the wheels and rails. In general, noise increases with train speed and train length.

Noise levels are dependent upon the rail guideway configuration (i.e., whether the track is at-grade, welded rail, joined track, embedded track on grade, or aerial structure with slab track) and whether there are any noise barriers or berms in place.

When railcars travel on tight curves, the dominant noise emitted may be a high pitched squeal or screech. This is usually caused by metal wheels sliding on the rail and scraping metal on metal when the train negotiates a curve.

Other concerns relating to rail operations that may need to be addressed include noise from train crossovers and switches, as well as noise from train warning horns. In some limited situations, noise from new or increased rail yard operations may also have to be examined.

132. Stationary Sources

The principal stationary noise sources encountered in the City are mechanical equipment associated with industrial and manufacturing operations and building ventilating systems. Other stationary sources worth noting are crowd noise, as related to playgrounds or spectator events, and noise from amplification systems. The basic characteristics of these sources are described below.

Mechanical equipment generally includes machinery used for industrial purposes, such as motors, compressors, boilers, pumps, transformers, condensers, generators, cooling towers, and ventilating equipment. The machinery commonly generates noise mechanically (through gears, bearings, belts, fans, or other rotating components), aerodynamically (through air or fluid flow), and magnetically (through magnetostriction or periodic forces between rotors and stators).

Assuming proper maintenance, mechanical machinery noise is usually characterized by discrete mid- to high-frequency tones. These tones are usually caused by friction, vibration of components, and aerodynamic flow generation. Even when large machinery is properly maintained, noise levels can exceed 100 dB(A) within 10 feet of the equipment. Badly maintained machinery can increase mechanical noise levels by as much as 20 dB(A); this represents a quadrupling of the perceived loudness.

Common mechanical stationary noise sources in the City are ventilating systems. These usually have fans that generate tones at high operating speeds. These tones can propagate through ducts in a building and produce noise in rooms far away from the original source. Air conditioning units can generate noise that could affect adjacent buildings. If not isolated from the building structure by properly tuned springs or resilient materials, ventilating systems and other machinery can generate vibrations that may be sensed throughout a building and possibly a neighborhood.

Aerodynamic noise usually becomes an issue when the air (or other fluid) flows through ducts in a restrictive, unsmooth path, and turbulence is generated. Boilers and steam turbines have liquids and steam flowing through them at high speeds, generating a hissing noise or roaring noise that can exceed 100 dB(A) within 10 feet.

While people are not usually thought of as stationary noise sources, children in playgrounds or spectators at outdoor sporting events or concerts can cause annoyance in communities. Instantaneous crowd noise levels at outdoor events can exceed 90 dB(A). In addition, measurements taken at 10 school playground sites in 1987 concluded that maximum $L_{eq(1)}$ levels at school playground boundaries in the New York City area are 75 dB(A). The equations for calculating playground noise can be obtained from DEP.

Noise due to amplification systems at outdoor concert or performance facilities, ballparks, amusement facilities, etc., if properly designed and operated, may avoid potential noise impacts (see Section 333).

133. Construction Sources

Construction equipment can be defined as machinery used, at a specified site, for the fabrication, erection, modification, demolition, or removal of any structure or facility, including all related activities such as land clearing, site preparation, excavation, cleanup, and landscaping. Both mobile and stationary source construction noise sources should be included in any construction analyses.

200. Determining Whether a Noise Analysis is Appropriate

In many instances, it is possible to determine that a proposed action would not have the potential for a significant noise impact simply from its proposed physical characteristics, and that it is not necessary to conduct any detailed noise analyses. Recommended guidelines for this screening assessment and the rationale behind these guidelines are presented below for mobile and stationary sources and for construction activities.

The initial impact screening would consider whether the action would generate any mobile or stationary sources of noise or be located in an area with high ambient noise levels. Areas with ambient noise levels typically include those near highly trafficked thoroughfares, airports, rail, or other loud activities.

210. MOBILE SOURCES

211. Vehicular Traffic Noise

If a proposed action would generate or reroute vehicular traffic, a noise assessment may be appropriate. Additionally, if the action would be located near a heavily trafficked thoroughfare, noise assessment may be appropriate.

212. Aircraft Noise

If the proposed action would be a receptor and would be within one mile of an existing flight path, or cause aircraft to fly through existing or new flight paths over or within one mile (horizontal distance parallel to the ground) of a receptor, a more detailed analysis may be appropriate.

213. Train Noise

If the proposed action would be within 1,500 feet of existing rail activity and have a direct line of sight to that rail facility, or if the proposed action would add rail activity to existing or new rail lines within 1,500 feet of and have a direct line of site to a receptor, a more detailed analysis may be appropriate. Based upon previous studies, unless ambient noise levels are very low and there are no structures that provide shielding, it is unusual for rail activity to have a significant impact at distances beyond 1,500 feet in New York City.

220. STATIONARY SOURCES

If the proposed project would result in a playground or would cause a stationary source to be operating within 1,500 feet of a receptor, with a direct line of site to that receptor, or if the proposed action would include unenclosed mechanical equipment for manufacturing or building ventilation purposes, a more detailed analysis may be appropriate. In addition, if the action would be located in an area with high ambient noise levels resulting from stationary sources, such as unenclosed manufacturing activities or other loud uses, noise assessment may be appropriate. Based upon previous studies, unless ambient noise levels are very low and/or stationary source levels are very high, and there are no structures that provide shielding, it is unusual for stationary sources to have significant impacts at distances beyond 1,500 feet in New York City.

230. CONSTRUCTION SOURCES

If the proposed action would cause construction equipment to be operating within 1500 feet of a receptor for an extended period of time, a more detailed analysis should be performed. Otherwise, qualitative analysis is typically appropriate. Based upon experience, unless ambient noise levels are very low and/or construction source levels are very high, and there are no structures that provide shielding, it is unusual for construction sources to have significant impacts at distances beyond 1,500 feet in New York City.

300. Assessment Methods

Even if it is not possible to conclude that a proposed action would not have a significant noise impact through its physical characteristics (see Section 200, above), it is sometimes possible to make that determination through an examination of its operational characteristics and, often, very little field work. Presented below is a discussion of how this initial level of assessment can be made for mobile, stationary, and construction sources of noise that may be related to a proposed action. Where they are available, the screening analyses recommended by federal, state, and local agencies for environmental noise assessment are described as well.

Following the discussion on impact screening are guidelines for the conduct of detailed noise analyses. Methods used by agencies for projects in New York City and accepted industry practices for environmental noise assessments applicable to New York City projects are discussed in this section. Some methods used by other states and municipalities are also included for reference and comparison. This discussion provides background information related to detailed noise analyses, study area definition, technical subareas, and models and analysis techniques used.

310. NOISE IMPACT SCREENING

The initial impact screening noise analysis identifies whether a potential exists for the action to generate a significant noise impact at a receptor, or be significantly affected by high ambient noise levels. If the basic analysis does not identify the potential for significant impacts, no further noise analysis would be necessary and it can be stated that the proposed action would not result in a significant noise impact.

311. Mobile Sources

311.1. Vehicular Noise

In coordination with the traffic studies (see Chapter 3O), traffic volumes should be estimated for the expected hour or hours with the greatest noise level change at sensitive receptors likely to be most affected by the proposed action. For some actions, the worst-case hour or hours may occur during non-typical time periods (i.e., during the nighttime for actions which produce significant traffic volumes or truck traffic when baseline traffic levels and/or ambient noise levels are low.) If existing passenger car equivalent (PCE) values are increased by 100 percent or more due to a proposed action (which would be equivalent to an increase of 3 dB(A) or more), a detailed analysis is generally performed. The method for assigning PCEs to vehicle type is discussed under Section 332.1, below.

311.2. Aircraft Noise

Yearly L_{dn} contours should be obtained or calculated for the build year(s) of the proposed action. The calculations can be performed using the FAA hand-calculation methodology or the Federal INM3 computer model. Neither of these methods is appropriate for helicopter noise modeling, however. Helicopter noise may be calculated using the FAA HNM computer model or other acceptable modeling based on actual noise measurements of helicopter flyovers. Calculation of the yearly L_{dn} contours is seldom necessary, since these contours are updated periodically by the Port Authority of New York and New Jersey for the three major metropolitan airports. If the proposed action would cause a receptor to be located within an L_{dn} 65 contour or greater, or if the proposed action would be a receptor within this area for an existing flight path, a detailed analysis may be appropriate.

311.3. Train Noise

If the proposed action would place a receptor within 1,500 feet of an exposed (i.e., non-subway) transit facility, or would cause increased rail traffic where there is a receptor within 1,500 feet of an exposed (i.e., non subway) transit facility, a detailed analysis may be appropriate.

312. Stationary Sources

Consider whether the proposed action would locate a receptor near a substantial stationary source noise generator or if a substantial stationary source noise generator would be close to the site of a proposed action that is also a sensitive receptor. Examples of substantial stationary source noise generators include unenclosed cooling or ventilation equipment (other than single-room units), truck loading docks, loudspeaker systems, stationary diesel engines (typically more than 100 horsepower), car washes, discos, or other similar types of uses. In general, if a substantial stationary source noise generator is within approximately 1,500 feet of a receptor and there is a direct line of sight between the receptor and the generator, further analysis may be needed. The distance between a receptor and a substantial stationary source may be measured from a Sanborn map or similar real estate or insurance atlas.

A more refined screen to determine whether a detailed noise analysis is necessary would be to determine whether noise from the stationary source would produce a $L_{eq(1)}$ of 45 dB(A) or greater at nearby receptor sites. If the noise from a stationary source at any receptor site exceeds 45 dB(A), then a detailed analysis will be necessary. Figure 3R-1 shows noise levels in sound power levels versus distance. If the sound power level exceeds the level at given distance shown in Figure 3R-1, then a detailed analysis will be necessary. This is an alternative to the calculation of the $L_{eq(1)}$ value.

313. Construction Sources

Generally, a qualitative discussion on construction noise and precautions taken for its control should suffice. A more detailed analysis would only be called for in the event the construction period were lengthy (such as large scale actions with relatively long term construction periods, take place during nighttime or weekend hours, and/or severely increase noise levels at sensitive receptors.

320. STUDY AREA

Guidelines for determining the appropriate study area size and noise receptor locations are described below. Selection of a study area depends on the noise source. The effect of noises generated as a result of the proposed action on surrounding receptors and the effect of noise generated from surrounding sources on the proposed action need to be considered. It should be noted that, in general, receptor sites should include all locations where significant impacts may occur. Therefore, as analyses are performed and if significant impacts are identified, additional receptor sites, sometimes farther from the noise source suggested in these guidelines, may have to be added to the analysis.

321. Mobile Sources of Noise

321.1. Vehicular Traffic Sources

The study area for potential noise impacts from vehicular sources includes the locations of receptors along traffic routes to and from the site, along which project vehicular trips would be assigned, and the proposed site itself, if a receptor is proposed to be located there. Of particular importance are routes where traffic levels without the proposed actions would be light and made up of lighter vehicles, and where the proposed action would result in a significant number of new trips. Typically, the selection of sensitive noise receptors for analysis goes hand in hand with the traffic and transportation trip generation and assignment process. Once the vehicular trips have been assigned to the roadway network, the potential locations where significant noise impacts could occur can be identified. Typically, this is done by driving the routes to and from the site to identify noise receptors along those routes.

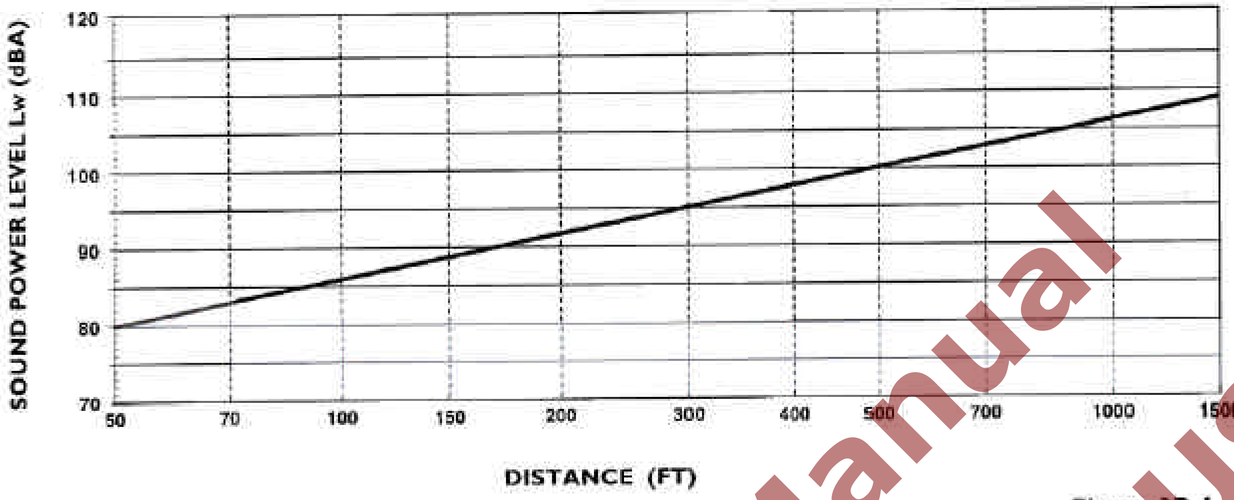

Figure 3R-1

Curve for Estimating Lw vs. Distance in Screening Noise Analysis

Of particular importance in selecting these locations is the consideration of the existing vehicular mix and the vehicular mix that would be generated by the proposed action. Under noise analysis procedures, vehicles are converted to passenger car equivalents (PCEs), which in turn are used to compute the noise levels for future conditions. (See Section 332.1). If a significant increase in the number of PCEs is expected (i.e., more than a doubling of PCEs) along any given route that proposed action-related vehicles would use going to and coming from the site within a given hour, then representative receptors should be selected along that route for analysis. The project itself should also be considered as a receptor if the proposed action would include a noise sensitive use. Usually at this stage, these judgments are made without firm data in hand. It is therefore prudent to be conservative in this judgment as to which should be the analysis locations (i.e., choose any receptor that could conceivably be affected as a noise analysis location). The actual selection of the potential noise receptor sites can be narrowed if more data are available, since potential noise increases along these routes can be calculated with these data.

321.2. Aircraft Sources

Three types of actions would require study areas for aircraft-related noise sources: a proposed action that included a new or expanded aircraft facility, renewal of a lease for an existing facility, or a receptor that would be affected by a proposed action that is near a flight path to an existing aircraft facility and that is typically within the annual 65 dB(A) L_{dn} contour of the existing aircraft facility. The first condition is highly unlikely within the context of CEQR actions, since the action of constructing an airport would most likely be sponsored by the Port Authority rather than a City agency or private entity. However, the study area for a new/expanded aircraft facility and that for a lease renewal (which is more commonly undertaken by a City agency) are essentially the same. In this case, selection of the study area and sensitive receptors within it should be based on preliminary calculations and mapping of noise contours. Representative locations would then be selected from within these areas for detailed noise impact analysis. Every receptor need not be selected for this purpose. For example, if there were a number of residential buildings within this area, then one or more representative receptor sites might be selected within the 60-65 dB(A) L_{dn} contours, one or more representative receptor sites between the 65 to 70 dB(A) L_{dn} contours, and so on. The same exercise may be repeated for other types of receptors within the critical contours.

For airport expansions that would include the increase of aircraft at the facility, the study area would include receptors within the revised 65 L_{dn} contour prepared for the expansion, assuming the proposed expansion was fully operational. Representative receptors would then be selected from within this study area for aircraft sources for detailed noise impact analysis.

If a proposed action is near a flight path to an existing aircraft facility and is within an existing 65 dB(A) L_{dn} contour, the proposed action would be a receptor, and the study area would be the site of the proposed action itself. If 60 dB(A) contours are available, they should be used in CEQR analysis.

321.3. Rail Facility Sources

Two types of actions would generally require study areas for rail-related noise sources: a proposed action with a receptor within approximately 1,500 feet of an existing rail facility and generally having a direct line of sight to the rail facility, or a proposed action that would include a new rail facility or that would add trains to an existing facility. As for aircraft facilities, for actions that would provide new rail facilities, or that would add trains to an existing rail facility, representative locations should be selected from within the areas most likely to be impacted by the proposed action. Not every receptor need be selected for this purpose. However, enough data should be collected to define the entire area which may be significantly impacted by the noise level changes.

If a proposed action is within 1,500 feet of, and has a direct line of sight to, an existing rail facility, and the proposed action would be a receptor, the study area should encompass the site of the proposed action itself.

322. Stationary Sources

The study area for stationary sources is based on proximity of a receptor to the site of the proposed action, or the proximity of the proposed action to a major stationary noise source in the area, and ambient noise levels at the receptor location that could tend to mask these stationary sources of noise. Receptors closest to a proposed action containing a significant stationary source noise generator are the first candidates for inclusion in the analysis. Generally, receptors within a 1,500 -foot radius of the proposed action, for which any part of that receptor would be within a direct line of sight of the proposed action, should be considered for analysis. (As noted below, if there is more than one such receptor within this distance from the site, the analysis can be phased to analyze the closest receptor first—if no significant impact is found at the closest site, then it is reasonable to conclude that receptors farther from the site would also not be affected by the proposed action. Otherwise, it would be necessary to extend the analysis to the most distant receptor where no significant impact is found.)

A similar relationship between the proposed action and existing and future no action stationary sources should be framed, as appropriate. Although these sources may not have to be analyzed separately (because they are included in ambient noise levels) they should be generally identified. It is possible that one or more may be close enough to the site of the proposed action and loud enough to require consideration of noise mitigation at the project site.

323. Construction Sources

The study area for construction sources is based on the proximity of a noise-sensitive receptor to the construction site and the route of construction traffic traveling to and from the site. The same manner of selecting the study areas for stationary and mobile sources above should be used for the appropriate construction sources. Generally, receptors within a 1,500 -foot radius of the proposed action (for stationary construction sources) and along feeder streets to the proposed action (for mobile construction sources) should be considered if a detailed construction assessment is necessary.

330. MODELS AND ANALYSIS TECHNIQUES

The basic analysis techniques used for noise impact analysis follow the same basic procedures as for other impact analysis area—existing conditions are first characterized, then no action conditions are projected and analyzed, and finally the action condition is projected and analyzed. Impact assessments are then made by a comparison of the no action and action conditions. The following discussion traces this procedure through for mobile sources, stationary sources, and construction sources of noise.

331. Noise Measurement Procedures

The first procedure for each of these noise analysis categories is the characterization of existing conditions at selected receptor locations within the noise study areas. As a first step within this process, existing noise levels at receptors are established through a noise measurement program. This noise measurement program follows a method consistent for all sensitive receptors, and is described first below.

331.1. Noise Measurement Instrumentation

The most common instruments used for environmental noise assessment are sound level meters and spectrum analyzers. The American National Standards Institute (ANSI) has published standards on types of meters and methods of sound measurement. ANSI defines three types of meters—Type 0, having the most stringent tolerances, targeted for laboratory use; Type 1, called a precision meter; and Type 2, a general-purpose meter, having the least stringent tolerances acceptable for SPL monitoring. Sound level meters without at least Type 2 tolerances are not appropriate for SPL monitoring. Many sound level meters are available today which can measure and store to their memory the various statistical and average sound level parameters described earlier. These parameters can be read directly from the sound level meter, or downloaded to a computer. Many of these devices can be programmed to carry out these measurements for a user-defined period at regular intervals, making long term monitoring even more convenient. Instrumentation used for the measurements should meet appropriate ANSI standards.

Most sound level meters have three time response characteristics—slow, fast, and impulsive. Slow, corresponding to a one second time constant, is usually recommended for environmental noise assessments, such as those performed for CEQR. Fast, corresponding to a one-eighth second time constant is usually recommended to monitor discrete events to get a better indication of peak levels.

331.2. Noise Measurement Procedures

ANSI also provides guidelines for SPL measurement practices to provide reliable data. Basic measurement procedures are defined by these standards and accepted industry practices. These guidelines account for microphone placement, calibration of instruments, and precautions pertaining to meteorological conditions, principally wind speed. The following are general guidelines for reference.

Calibration. To be sure that the meter is working properly, the measuring instrument calibration should be checked before and after each series of readings. Typical sound level calibrators are small hand-held devices with adapters to fit the measuring microphone of the meter being used. With a properly operating meter and calibrator, the meter should not vary by more than .5 dB. Any variation beyond .5 dB that cannot be accounted for is an indication that the device should be returned to the manufacturer for adjustment and calibration. In no case should a meter be adjusted manually in the field unless a new microphone is being fitted. Calibrators and sound meters should be factory-calibrated at least once a year.

Microphone Placement. To avoid distortion, the measuring microphone is placed a minimum of 3 to 4 feet away from any reflecting surfaces, including the ground, walls, and the body of the person performing the measurements. Failure to do so can introduce errors as high as 6 dB from reflected sound. Whenever feasible, the meter should be mounted on a tripod to permit the monitoring personnel to stand away from the instrument. Complete records of the measurement, including specifics of the measurement location, time of measurement, meteorological conditions during the measurement, identification of significant sound sources, model and serial numbers of all equipment used, and calibration results should be made. This will allow accurate duplication of the measurements, if necessary, due to questions, changes in conditions, or inconsistencies.

Accounting for Wind. When measurements are performed outdoors or in areas where airflow can be sensed, the movement of air may skew the monitoring results; wind can introduce errors of as much as 20 dB over actual noise levels. Therefore, a windscreen designed to fit the specific instrument should be used. These windscreens are typically open cell foam spheres and are designed to block wind noise without attenuating the signal being measured. Even with a windscreen in place, wind speeds above 15 miles per hour can cause erroneous readings. Therefore, wind speed should be monitored and readings should not be taken when wind speeds exceed 15 miles per hour.

Noise Measurement Periods and Noise Peak Hour Selection. Noise measurements should be made in accordance with the expected times that the proposed activity at the site would be greatest, or when surrounding receptors may otherwise be most likely to be experience significant impacts because of the proposed project. While generally this occurs for most actions during the peak typical weekday traffic hours (i.e., the AM, midday, and/or PM peak periods), for some actions this may not be appropriate and it may be necessary to gather data during weekend or late night hours, or even for all 24 hours. For example, noise generated by traffic leaving a large multiplex movie theatre may result in significant noise impacts during late night hours; maximum project impacts from truck traffic generated by solid waste transfer stations may occur either during late night or early morning hours; and noise from power generation facilities may be most likely to cause significant impacts during late night or early morning hours when background levels are low. Traffic data collection should be coordinated with the noise studies to ensure that, where necessary for analysis purposes, traffic data is available for late night, weekend, and/or all 24 hours. Traffic data collection should be conducted in accordance with the methods described in Chapter 3O, Section 321 of this manual. Vehicular trip assignments and their hourly distribution should be defined before the hours for noise analysis are determined. Care must be exercised in selecting the noise measurement period, and as detailed information about an action is developed, it may be necessary to supplement initial noise measurements by including additional time periods.

Other Activities During the Conduct of the Noise Measurements. While each of the noise measurements is being taken, events that contribute to the monitored values should be noted. At locations where traffic on the adjacent street is a significant noise source, a traffic counting and classification program should be conducted that records the following: total vehicles; total number of buses (i.e., vehicles designed to carry more than nine passengers); total number of heavy trucks (i.e., cargo vehicles with three or more axles with a gross vehicle weight of more than 26,400 pounds); total number of medium trucks (i.e., cargo vehicles with two axles and six tires with a gross vehicle weight of between 9,900 and 26,400 pounds); and total number of passenger vehicles or light trucks (i.e., vehicles with a gross vehicle weight of less than 9,400 pounds).

At locations where rail noise is a significant noise source the number of trains passing by during the measurement period should be recorded, and if possible the number of cars on the train should be noted.

If noise from a rail facility or aircraft becomes audible during the measurement program, measurements should be suspended until that sound is no longer audible. Where these noise sources are of concern, they are not measured but calculated because of the extreme variability in measured data from these sources. Measured noise levels for aircraft noise are unreliable because they are highly sensitive to environmental factors, such as atmospheric and terrain conditions.

In general, measurements should also be suspended when unusual events occur during the measurement period. Typically this would include noise from sirens of emergency vehicles, construction activities, etc. However, it may include noise from other non-dominant sources (e.g., rail noise when vehicular traffic is the dominant noise source).

Duration of Noise Measurements. While it is preferable that measurements be made for full one-hour time periods, it is generally not necessary to make measurements for that long a time period. The duration of noise measurements should be sufficient to ensure that the measurements are reflective of ambient conditions. For example, at locations where traffic is the dominant noise source, measurements made for shorter time periods are generally sufficient since noise is relatively insensitive to minor fluctuations in changes in PCEs. For example, it takes a doubling of PCEs to equal a just perceptible 3 dB(A) change in sound levels. For that reason, it is generally not necessary to conduct noise measurements for more than a 20-minute period during any hour at any given location, provided that a traffic count and vehicle classification is conducted simultaneously at the measurement site with the noise measurement. Typically, 20-minute measurements are sufficient at most locations adjacent to rail facilities also. The important point is to determine that the duration of the measurement period is sufficiently long to include typical events and conditions. When some doubt arises about whether the measurement duration is sufficiently long to be representative of conditions, 20-minute measurements can be compared to one-hour values to see if there are discrepancies in the values.

If the proposed action is expected to generate traffic or stationary source noise over a 24-hour period, it may be necessary to take 24-hour noise measurements at one or more receptor locations.

Monitoring Results. At the completion of the measurement, the following noise levels should be recorded from the noise meter: L_{max}, L_{min}, L_1, L_{10}, L_{50}, L_{90}, L_{eq}. Recording of these descriptors may assist in determining if any anomalous conditions occurred during the measurement, if the measurement is called into question during the detailed analysis.

332. Mobile Sources Analyses

332.1. Vehicular Noise

For most actions reviewed under CEQR, a desk-top analysis can be employed using a logarithmic equation (described below). However, when analyzing conditions that result in new or significant changes in roadway or street geometry; when roadways that currently carry no or very low traffic volumes are involved; when ambient noise is the result of multiple sources including traffic; or when a detailed analysis of changes due to the traffic component of the total ambient noise levels is necessary, the FHWA Traffic Noise Model (TNM) should be used. The TNM model takes into account various factors that influence vehicular noise, including traffic volumes, vehicle mix, source/receptor geometry, shielding (including barriers and terrain), ground attenuation, etc. While calculated values using the TNM model can be used directly, it is preferable to verify the accuracy of the model for the particular condition being analyzed. Based upon these measurements, adjustment factors can be developed to account for site-specific differences between measured and model-predicted values.

One particularly useful application of the TNM model is for situations where traffic is one of the components of the total ambient noise. In such situations, the TNM model can be used to compute the traffic component of the noise, and can then be subtracted from the measured ambient noise levels to determine the non-traffic components of the total ambient noise levels.

While the TNM model yields accurate prediction results for assessing project impacts and for screening purposes, for most situations, and particularly for first level screening purposes, it is more convenient and easier to use the logarithmic equation described below.

Existing Conditions. Analysis of existing noise conditions uses monitored noise levels and observations made during the monitoring period to assess noise levels and their sources. Most often, it can be assumed that substantially all measured noise at a measurement site is associated with the vehicular traffic passing the site. This is a proper assumption as long as vehicular noise levels are at least 10 dBA above levels associated with all other noise sources. The results of the noise monitoring program are reported as existing conditions in the environmental assessment.

If noise levels cannot be measured at a receptor location, sometimes measured data from a site in the area can be adjusted assuming a 3 dB(A) attenuation per doubling of distance to estimate existing noise levels at the receptor location.

Future No Action Condition. To arrive at the no action noise condition, the results of the no action traffic analysis (see Chapter 3O) are used to compute total PCEs passing each receptor site. From the existing and no action traffic data, existing and no action PCEs are calculated in the following manner:

Each Automobile or Light Truck: 1 PCE
Each Medium Truck: 13 PCEs
Each Bus: 18 PCEs
Each Heavy Truck: 47 PCEs

(Note: These values were obtained using the TNM model, assuming a speed for 25 mph and a distance of 30 feet from the roadway.) For speeds below 25 mph, the TNM model should be run to develop project-specific screening values. For projects with traffic moving at higher speeds and/or receptors at more than 30 feet from the roadway, either the default values shown above or project-specific values obtained using the TNM model can be used for purposes of screening.

After the PCEs are calculated and tabulated at each receptor site, the no action noise levels are calculated using the following equation:

FNA NL = 10 log (NA PCE/E PCE)+E NL

where:

FNA NL = Future No Action Noise Level
NA PCE = No Action PCEs
E PCE = Existing PCEs
E NL = Existing Noise Level

The calculation is conducted using the $L_{eq(1)}$ noise measurement results. $L_{10(1)}$ values can be calculated by adding the difference between the $L_{10(1)}$ and $L_{eq(1)}$ descriptors found to exist in the measurement program to the calculated no action $L_{eq(1)}$ noise level. The results of the no action noise level calculation are then reported in the environmental assessment.

Action Condition. The identical analysis procedure is used to determine the action condition, with calculated total PCEs derived from the action traffic analysis. To determine potential significant impacts, the action condition noise levels are compared with the no action noise levels, to applicable standards and impact thresholds at each receptor (see Sections 410 and 710, below).

332.2. Aircraft Noise

Existing Conditions. While FAA L_{dn} contours are of general interest and should be reported, because they show average values over a 24-hour period and tend to average out high hourly values, they are of limited use for purposes of impact assessment, and it is generally necessary to calculate $L_{eq(1)}$ values to determine project impacts. $L_{eq(1)}$ values, as well as L_{dn} values can be calculated using the Federal INM3 computer model (or for helicopters, the Federal HNM computer model) or other acceptable models based on actual noise measurement.

No Action Condition. The same analysis methods used to estimate existing aircraft noise levels are to be used in the no action scenario using the no action aircraft mix.

Action Condition. The same analysis methods used to estimate existing aircraft noise levels are to be used in the action scenario using the action aircraft mix. To determine potential significant impacts, the action condition noise levels are compared with the no action noise levels, applicable standards and impact thresholds at each of the receptors (see Sections 410 and 710, below).

332.3. Train Noise

Existing Conditions. Noise from train operations should be calculated using the detailed noise analysis methodology contained in the Federal Transit Administration (FTA) guidance manual, Transit Noise and Vibration Assessment (April 1995). Using this methodology $L_{eq(1)}$ values can be calculated as a function of a number of factors, including the distance between the track and receptor; shielding at the receptor; number of trains; average number of cars per train; train speed; track conditions; whether the track is on grade or on structure; etc. Calculated values using the FTA methodology can either be used directly or, based upon measurements, adjustment factors can be developed to account for site-specific differences between measured and model-predicted values.

No Action Condition. The same analysis methods used to estimate existing train noise levels are to be used in the no action scenario using the no action train mix.

Action Condition. The same analysis methods used to estimate existing train noise levels are to be used in the action scenario using the action train mix. To determine potential significant impacts, the action condition noise levels are compared with the no action noise levels, applicable standards and impact thresholds at each of the receptors (see Sections 410 and 710, below).

333. Stationary Sources

333.1. Existing Conditions

Noise levels of existing stationary sources should be measured at the closest noise-sensitive receptors. If the stationary source in question would be part of the proposed action and does not currently exist, noise measurements should be performed at the property line of the proposed action closest to the proposed stationary source(s) and at the closest noise-sensitive receptors to ensure that spatial coverage and receptor "type" coverage is adequate. For example, if there is a park nearby and residential units nearby, both need to be monitored for existing conditions.

333.2. No Action Condition

In cases where new stationary sources are to be introduced into the study area in the future without the project, the noise contribution from these facilities is predicted at the noise-sensitive receptors and/or the project site and added to existing noise levels to obtain no action conditions. The calculations are based on operational information from the entity responsible for the new stationary noise sources.

333.3. Action Condition

Where the proposed action involves a new stationary source, to determine potential noise impacts, the focus of the analysis should be to determine maximum Leq(1) values at receptor locations (including the property line) with the stationary source operating. The first step in this calculation is acquiring project specific noise emission data from the manufacturer, or lacking that, estimating the emission levels from a review of the literature. Often the data will be provided in terms of sound power level. This noise descriptor, expressed in decibels, is a measure of the total acoustic power of a source. It can be used to predict the sound level at a given distance using the formula:

$L_p = L_w - 20*\log(d) - A_e$

where:

L_p is the sound level
L_w is the sound power level
d is the distance from the source to the receiver in feet
A_e is excess attenuation caused by environmental and terrain features

While noise emission data from the manufacturer of the stationary equipment is always the best source, when this is not available information may be available from industry groups such as EPRI (3412 Hillview Avenue, Palo Alto, California 94304 USA), in publications such as *Electric Power Plant Environmental Noise Guide* published by the Edison Electric Institute, or in industry sponsored computer models. Other alternatives include locating an operating facility with similar equipment and performing measurements at that facility, preferably at similar distances and under similar conditions to those anticipated for the proposed action.

Once the data is acquired, the next step is predicting the sound levels at the noise sensitive receptors. Where a single or several discrete sources exist, and where the distances are moderate and line of sight, this can be accomplished using basic noise fundamentals for calculation (i.e., the addition of sound levels, frequency adjustments to get A-weighted values, etc.). For example, if sound power data is available then the equation given above can be used. If sound level data is available, then the following equation can be used to estimate sound levels at a receptor:

$Lp1 = Lp2 - 20\log(d1/d2)$

where

Lp1 is sound pressure level at the receptor
L_{p2} is sound pressure level at the reference location
d_1 is the distance from the source to the receptor
d_2 is the distance at which the source sound level data is known

Any attenuation by structures around the source or noise control measures (such as silencers, acoustic barriers, etc.) that are to be used must be considered in calculating sound levels at the receptors.

Where there are many individual sources associated with the project, and when there is varying landscape (parks, buildings, trees) between the source and receptors, calculations become even more complicated. In addition, data provided by manufacturers and/or the literature are often in octave bands. Both ANSI and ISO have documents which describe techniques and considerations for carrying out these calculations. Following these procedures often involves programming a computer spreadsheet to automate the details (i.e., power level to sound level conversion as a function of frequency and distance; application of attenuation of buildings, barriers, terrain, noise control as a function of frequency; summation of contributions of the various sources; and conversion to A-weighted sound levels). While it is useful to perform the calculations in octave bands, particularly when designing noise control features, the calculated octave band values should be converted to equivalent A-weighted values for impact evaluation purposes.

Computer models are also available which are based upon the various standards and allow the calculations to be carried out. These models also often include databases of source sound levels for use in the model. Programs such as NOISECALC developed by the New York State Department of Public Service, SPM9613 developed by Power Acoustics Inc, SoundPlan developed by Braunstein + Berndt GmbH, Electric Utility Environmental Noise Program developed by the Empire State Electric Energy Research Corporation, and Predictor developed by Bruel & Kjaer are examples of such programs. These programs are not specifically endorsed, and other programs may be available to perform similar functions.

In all cases, rather then using theoretical modeling techniques, it is preferable to use actual facility data. Therefore, if a facility comparable to the proposed action can be measured, and its levels can be adjusted to account for differences in conditions between its site and the proposed project site, that is generally a good and preferred modeling approach.

If the action under consideration involves a potential noise sensitive receptor near an existing stationary noise source, then measurements made at the site location of the existing stationary source should generally be used for the impact evaluation.

Table 3R-2
SPL Ranges of Construction Equipment (values are in dB(A) at 50 feet)

Equipment	SPL Range
Compactors	72-88
Front Loaders	72-97
Backhoes	72-93
Tractors	73-96
Scrapers, Graders	77-95
Pavers	82-92
Trucks	70-96
Cement Mixers	71-90
Cement Pumps	75-84
Cranes	76-95
Pumps	70-80
Generators	70-82
Compressors	68-86
Pneumatic Wrenches	82-88
Jackhammers, Drills	76-98
Pile Drivers (Peak levels)	89-104
Vibrators	70-81
Saws	67-93
Tamper (at 1 meter)	94-100

Source: Harris, C., Handbook of Noise Control, Second Edition. New York: McGraw-Hill Book Company, 1979.

As previously mentioned noise generated by children in playgrounds, and people using parks is considered stationary source noise. For locations adjacent to playgrounds or parks, absent data for comparable facilities, based upon noise measurements made at ten school playground sites in 1987, it can be assumed that $L_{eq(1)}$ noise levels at the boundary would be 75 dB(A), 15 feet from the boundary would be 73 dB(A), 30 feet from the boundary would be 70 dB(A), and the noise level would decrease by 4.5 dB(A) per doubling of distance beyond 30 feet. In some situations, these values may overestimate playground noise levels. Applicants are encouraged to consult with DEP to see if newer information is available prior to using these screening values.

To determine potential significant impacts, the action condition noise levels are compared with the no action noise levels, applicable standards and impact thresholds at each of the receptor locations or within contours developed to indicate noise levels within varying distances from a source (see Sections 410 and 710, below).

334. Combined Effects of Mobile and Stationary Noise Sources

Each mobile and stationary source analysis will yield a maximum $L_{eq(1)}$ noise level. These values are logarithmically added together to yield a total maximum-possible $L_{eq(1)}$ level. To determine the potential for significant impacts caused by the entire proposed action, the totals with the proposed action are compared with the no action total noise levels at the respective receptor locations, applicable standards, and impact thresholds.

335. Construction Sources

Construction sources for the proposed action occur only in the action condition. Table 3R-2 shows typical ranges of instantaneous noise levels for construction equipment. These values represent the typical expected range of equipment sizes and operational modes at construction sites. Absent information about specific equipment noise characteristics, the maximum values shown in Table 3R-2 should be assumed, and these values can be adjusted for distance assuming a 6 dB(A) attenuation per doubling of distance. At distances of less than 25 feet, specific equipment noise data should be used for distance attenuation.

Where detailed construction noise analysis is necessary, construction noise analysis modeling methodologies have been developed by a variety of federal agencies including the Federal Highway Administration (FHWA), Federal Transportation Agency (FTA), and Environmental Protection Agency (EPA). In general these models, which should be applied to each phase of construction (i.e., clearing, foundation, erection, finishing, landscaping, etc.) separately, account for the noise emission of each particular piece of equipment, the number of pieces of equipment on the site, a usage factor which accounts for the fraction of time the equipment is being used, topography and ground level effects, source-receptor distance, and shielding in calculating a maximum $L_{eq(1)}$ at the closest noise-sensitive receptor to the proposed action. To determine potential significant impacts caused by the construction activity, these levels are compared to the no action noise levels and to applicable standards.

400. Determining Impact Significance

The following section provides guidelines and recommendations for the determination of impact significance. Depending on the action, one or both of two approaches to significant impact determination may be appropriate. The first approach deals with using absolute noise level limits (absolute noise impact criteria). The second approach deals with using an incremental change from no action conditions (relative impact criteria). Within these two approaches, two considerations must be made:

- Are the existing and future receptors experiencing noise levels above absolute limits? (Absolute limits, in this case, would relate to published standards (see Section 710, below.))
- Will the proposed action become a sensitive receptor in the area?

410. IMPACT THRESHOLDS AT RECEPTORS

The selection of incremental values and absolute noise levels should be responsive to the nuisance levels of noise and critical time periods when nuisance levels are most acute. During daytime hours, nuisance levels for noise are generally accepted to be more than 45 dB(A) indoors and 70 to 75 dB(A) outdoors. Indoor activities are subject to task interference above this level, and 70 to 75 dB(A) is the level at which speech interference occurs outdoors. Typical construction techniques used in the past (including typical single-glazed windows) provide a minimum of approximately 20 dB(A) of noise attenuation, from outdoor to indoor areas. In view of these factors, it is reasonable to establish the daytime cut-off at 65 dB(A). Hence, if daytime noise levels with the proposed action exceed 65 dB(A) ($L_{eq(1)}$), then the incremental change in noise levels, as compared with the no action condition, at which a significant impact occurs would be reduced.

Nighttime (between 10 PM and 7 AM) is a particularly critical time period relative to potential nuisance values for noise level increases. Therefore, it reasonable that the 65 dB(A) cut-off not apply to incremental noise level changes during these periods, and that the more restrictive increment apply to these hours irrespective of the total nighttime noise level.

For significant impact during daytime hours (between 7 AM and 10 PM), 65 dB(A) $L_{eq(1)}$ may be considered as an absolute noise level that should not be significantly exceeded. For example, if the no action noise level would be 60 dB(A) $L_{eq(1)}$ or less, a 5 dB(A) $L_{eq(1)}$ or greater change would be considered significant. If the no action noise level would be 62 dB(A) $L_{eq(1)}$ or more, a 3 dB(A) $L_{eq(1)}$ or greater change should be considered significant. (If the no action noise level is 61 dB(A) $L_{eq(1)}$, the maximum incremental increase would be 4 dB(A), since an increase higher than this would result in a noise level higher than the 65 dB(A) $L_{eq(1)}$ threshold.)

For significant impact during nighttime hours, a change of 3 dB(A) $L_{eq(1)}$ would typically be considered significant.

420. IMPACT THRESHOLDS FOR PROPOSED ACTIONS THAT ARE SENSITIVE RECEPTORS

Impact thresholds for proposed actions that are also sensitive receptors are more straightforward. Because the proposed action did not exist in the past, there is no applicable incremental noise increase that can be calculated. Typically, potential significant impacts on the newly created receptor relate to absolute noise limits. The Noise Exposure Guidelines shown in Table 3R-3 have been followed by City lead agencies for this purpose. If a proposed action is within an area where the action noise levels exceed the marginally acceptable limit shown in the Noise Exposure Guidelines (as measured at the proposed building line, or if that is not known, at the property line), a significant impact would occur. Then, the project would be subject to mitigation measures necessary to bring its interior noise levels down to a level of 25 dB(A) or more below the maximum marginally acceptable levels (by receptor type) for external exposure shown in Table 3R-3. If the proposed action is an outdoor area requiring serenity and quiet (such as a public park), mitigation measures necessary to bring exterior noise levels to below 55 dB(A) $L_{(10)}$ would be appropriate.

Table 3R-3
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
1. Outdoor area requiring serenity and quiet[2]		$L_{10} \leq 55$ dBA	---------- $L_{dn} \leq 60$ dBA ----------						
2. Hospital, Nursing Home		$L_{10} \leq 55$ dBA		$55 < L_{10}$ 65 dBA	---------- $60 < L_{dn} \leq 65$ dBA ----------	$65 < L_{10} \leq 80$ dBA	(1) $65 < L_{dn} \leq 70$ dBA, (II) $70 \leq L_{dn}$	$L_{10} > 80$ dBA	---------- $L_{dn} \leq 75$ dBA ----------
3. Residence, residential hotel or motel	(7 AM-10 PM)	$L_{10} \leq 65$ dBA		$65 < L_{10}$ 70 dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
	10 PM to 7 AM	$L_{10} \leq 55$ dBA		$55 < L_{10}$ 70 dBA		$70 < L_{10} \leq 80$ dBA		$L_{10} > 80$ dBA	
4. School, museum, library, court, house of worship, transient hotel or motel, public meeting room, auditorium, out-patient public health facility		Same as Residential Day (7 AM-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)	
5. 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)	
6. 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 dB(A) or more;

[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 old-age homes.

[3] One may use the 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).

Discussed below is how these typical significant impact thresholds would be applied for mobile and stationary sources.

421. Mobile Sources

421.1. Vehicular Noise

The impact assessments for vehicular noise compare the proposed action $L_{eq(1)}$ noise levels to those calculated for the no action condition, for receptors potentially affected by the project. If the no action levels are less than 60 dB(A) $L_{eq(1)}$ and the analysis period is not a nighttime period, the threshold for a significant impact would be an increase of at least 5 dB(A) $L_{eq(1)}$. In order for the 5 dB(A) threshold to be valid, the resultant action condition noise level would have to be equal to or less than 65 dB(A). If the no action noise level is equal to or greater than 62 dB(A) $L_{eq(1)}$, or if the analysis period is a nighttime analysis period, the incremental significant impact threshold would be 3 dB(A) $L_{eq(1)}$. (If the no action noise level is 61 dB(A) $L_{eq(1)}$, the maximum incremental increase would be 4 dB(A), since an increase higher than this would result in a noise level higher than the 65 dB(A) $L_{eq(1)}$ threshold.)

If the proposed action would be a sensitive receptor, build noise levels in dB(A) $L_{10(1)}$ would be compared to the values contained in the Noise Exposure Guidelines. If these noise levels would exceed the marginally acceptable levels, a significant impact would occur unless the building design as proposed was sufficient to reduce these levels to an acceptable interior noise level, as provided in Table 3R-4.

421.2 Aircraft Noise

If the proposed action is an aircraft facility (heliport or airport), causes a change in flight paths or flight frequency at an aircraft facility, or is an action which is subject to aircraft noise, the same impact criteria discussed above would apply. If these levels exceed the marginally acceptable level, a significant impact would occur, requiring that mitigation measures be implemented to achieve acceptable interior noise levels. In the case of significantly impacted buildings, design measures should be implemented that achieve the levels of attenuation provided in Table 3R-4.

421.3. Train Noise

If the proposed action is a rail facility, causes a change in frequency of trains along the rail facility, or is an action which is subject to rail noise, the same impact criteria discussed above would apply. If these levels exceed the marginally acceptable level, a significant impact would occur, requiring that mitigation measures be implemented to achieve acceptable noise levels. In the case of significantly impacted buildings, design measures should be implemented that achieve the levels of attenuation provided in Table 3R-4.

422. Stationary Sources

If the proposed action would cause a noise level increase at a receptor greater than the impact criteria discussed in Section 410, a significant impact would occur, requiring that mitigation measures be implemented to achieve acceptable noise levels. In the case of significantly impacted buildings, design measures should be implemented that achieve the levels of attenuation provided in Table 3R-4.

423. Construction Sources

The following applies only at sensitive receptors that would be subjected to high construction noise levels for an extensive period of time. If construction noise levels exceed the impact criteria discussed above under vehicular sources, *using existing noise levels as the baseline*, a significant impact would occur. If a significant impact is predicted to occur, the feasibility and effectiveness of implementing mitigation should be examined.

500. Developing Mitigation

The following section provides guidelines and recommendations for developing mitigation of a significant noise impact. General types of possible mitigation measures that can be used to alleviate significant noise impacts for the different source types are discussed.

510. MOBILE SOURCES

511. Vehicular Noise

The first option considered should be to reroute the traffic that is causing the significant impact. This is generally only possible for facilities that generate traffic that would be under the control of the applicant (for example, a City vehicle storage facility would fit this requirement but an office building would not). Where this mitigation appears appropriate, it is necessary to be sure that the rerouted traffic would not simply relocate the significant noise impact or introduce a significant traffic or air quality impact in another location.

If rerouting is not feasible, the most common mitigation measure used for vehicular noise impacts is to provide adequate window/wall attenuation at the affected receptor to conform with the Noise Exposure Guidelines acceptable interior noise levels of 45 dB(A) $L_{10(1)}$. When maximum hourly exterior levels are greater than 70 dB(A), alternate means of ventilation should be incorporated into buildings so that windows do not need to be opened at any time of the year. If windows were open, the effect of the window-wall attenuation would be reduced. An alternate means of ventilation would allow for a closed window condition, ensuring that acceptable interior noise levels are achieved. For existing receptors, when the maximum exterior $L_{eq(1)}$ is less than 75 dB(A), standard double-glazed or laminated windows are available that would provide adequate noise attenuation. However, when the maximum exterior $L_{eq(1)}$ is equal to or greater than 75 dB(A), special designs must be incorporated into the windows and possibly the exterior walls of buildings to conform with Noise Exposure Guidelines.

If the proposed action requires mitigation of noise levels, the same measures used above would be appropriate with reference to $L_{10(1)}$ values.

At locations adjacent to highways and limited access roadways, barrier walls (and sometimes berms) are often used for vehicular traffic noise impact mitigation; however, to be effective in providing attenuation, the barrier wall must interrupt the line of sight between the noise source (the flow of traffic) and the receptor. Buildings taller than the barriers would get no acoustical benefit from their presence.

Table 3R-4
Required Attenuation Values To Achieve Acceptable Interior Noise Levels

	Marginally Acceptable	Marginally Unacceptable		Clearly Unacceptable		
Noise level with proposed action	$65 < L_{10} < 70$	$70 < L_{10} < 75$	$75 < L_{10} < 80$	$80 < L_{10} < 85$	$85 < L_{10} < 90$	$90 < L_{10} < 95$
Attenuation	25 dB(A)	(I) 30 dB(A)	(II) 35 dB(A)	(I) 40 dB(A)	(II) 45 dB(A)	(III) 50 dB(A)

Source: New York City Department of Environmental Protection

They could also detract from the aesthetics of neighborhoods and therefore may be impractical for most uses in theNew York City area. There are a number of methodologies for calculating the noise attenuation attributable to noise barriers, including the use of the TNM model algorithms.

512. Aircraft Noise

The first mitigation option investigated should be changing the flight path. If this mitigation is appropriate, it is necessary to be sure that the mitigation does not merely relocate the significant impact to another area. In addition, facility use restrictions (e.g., capacity limitations, lower takeoff angles, curfews, using only certain types of aircraft, etc.) should be investigated. These measures would require commitment from the appropriate agency.

If flight operations adjustment is not feasible, the only possible mitigation measure for aircraft significant noise impacts is treatment of all exterior walls and roofs of buildings to ensure that interior noise levels would be less than 45 dB(A) $L_{10(1)}$. If exterior noise levels are less than 75 dB(A), double-glazed or laminated windows (with alternate means of ventilation for levels above 70 dB(A)) should be provided to achieve adequate attenuation and ensure interior noise levels of 45 dB(A). However, if noise levels are equal to or greater than 75 dB(A), special designs may have to be incorporated into windows, walls, roofs, and doors.

513. Train Noise

Mitigation measures available for significant noise impacts are the exterior building attenuation measures discussed above (Section 512) for significant vehicular noise impacts, barrier wall (or berm) construction, treating the vehicles, wheel truing and rail grinding, rail lubrication on sharp curves, and providing operational restrictions. Barrier wall attenuation has a practical limit of 10 to 15 dB(A), so it would provide complete impact mitigation only when exterior $L_{eq(1)}$ levels (for existing uses) at receptors are less than 75 dB(A). It must also be kept in mind that barriers are only effective when the line-of-sight is broken between the source and receiver. Therefore, buildings having windows higher than the barrier may not receive much benefit from the barriers and exterior wall attenuation, and window attenuation and an alternate means of ventilation would have to be designed into the facades of buildings facing the rail activity.

520. STATIONARY SOURCES

The most common mitigation measures available for stationary sources include exterior building attenuation (as discussed for mobile sources in Section 511 above), barrier erection (as discussed above), and noise control design on the source in question. Caution should be exercised when erecting barriers in New York City given the limitations mentioned above. In many cases, treating the noise source (i.e., providing baffles, silencers, mufflers, sound insulation, placing it within an enclosed structure, etc.) may be the least expensive option. Moving the source in question so that receptors would not be significantly accepted is also a potential mitigation measure.

530. CONSTRUCTION SOURCES

Construction noise mitigation measures include locating stationary equipment as far as possible away from receptors, enclosing areas, erecting temporary barriers, limiting the duration of activities, specifying quiet equipment, scheduling of activities to minimize impacts, and locating noisy equipment near natural or existing barriers that would shield sensitive receptors.

600. Developing Alternatives

In developing project alternatives to reduce or avoid significant noise impacts, the simplest and most common way of analyzing the situation is to calculate the conditions that would just avoid an impact and tailor the project alternative to that new scenario. For instance, if a significant vehicular traffic noise impact were identified at a receptor, the project-generated $L_{10eq(1)}$ worst-hour increase would be at least 3 dB(A). If one calculated the project-generated traffic volume that would cause a less than 3 dB(A) increase in worst-hour $L_{10eq(1)}$ values, that traffic volume would define the alternative project volume. A change in plan that dispersed traffic differently or reduced the size and thus the trip generation from the project would address this issue. Similar analysis techniques to this can be used for analyzing alternatives from any relative impact criterion.

When dealing with absolute impact criteria, alternative project arrangements can be set by moving, scaling down, or shielding the original project to the point where significant impacts are avoided. For instance, if a manufacturing facility generated a significant impact at a residence, the noise-generating part of the facility could be moved to the distance at which the noise levels at the property line would be low enough not to cause a significant impact. Another possible alternative would be to scale down operations until noise levels reached would not cause a significant impact. Yet another alternative to the project could include a building or barrier between the noise-generating facility and the property line to shield the noise to the point where a significant impact would be avoided. These options would each have to be evaluated in terms of their feasibility and potential impacts on other environmental assessment categories.

700. Regulations and Coordination

710. REGULATIONS AND STANDARDS

Regulations applicable to New York City environmental noise assessments are found in the Noise Exposure Guidelines. These regulations, which apply to all private or City-sponsored projects subject to CEQR in New York City, are described below. When a project to be undertaken in New York City also includes some level of state or federal involvement, there are additional state or federal regulations that may also apply.

In 1983 DEP adopted City Environmental Protection Order-City Environmental Quality Review (CEPO-CEQR) noise guidelines for environmental impact review. Four categories of acceptability have been established, based on noise level limits and land use, for vehicular traffic, rail, and aircraft noise sources. These acceptability categories include: "generally acceptable," "marginally acceptable," "marginally unacceptable," and "clearly unacceptable." These categories and associated noise limits apply to exterior noise levels only. The levels are shown in Table 3R-3. The exterior limitations are based on an acceptable interior noise level of 45 dB(A) ($L_{10(1)}$ or L_{dn}, depending on the source). Only mobile sources are included in the standards. Each of the three noise source classifications is analyzed separately and in terms of different descriptors. Mitigation requirements have been developed according to the noise category. Both absolute and relative impact criteria are presented.

In addition to the Noise Exposure Guidelines, the New York City Noise Code governs noise emissions in New York City, and the New York City Zoning Resolution includes noise performance standards for any manufacturing activity in manufacturing districts. These have not traditionally been used for purposes of CEQR environmental assessments.

720. APPLICABLE COORDINATION

Lead agencies may need to coordinate with other agencies when developing an environmental noise assessment for a proposed action in New York City. This could depend on funding sources for the action, and mitigation that may be needed for the proposed action. This is discussed below in terms of City, state, and federal agencies.

721. City Coordination

The lead agency may need to coordinate with other agencies when developing mitigation measures for significantly impacted facilities under the control of those agencies. Examples of this coordination may include coordination with the Board of Education or the New York City Housing Authority for the installation of double-glazed windows and alternate means of ventilation at a school or residential building experiencing significant noise impacts from a proposed action.

In addition, it may be necessary to coordinate with the Mayor's Traffic and Construction Coordination Council in the event rerouting of truck traffic during construction, or other traffic-related noise mitigation measures are proposed during construction.

For technical assistance in conducting noise analyses, the lead agency may wish to coordinate with DEP.

722. State Coordination

If any part of the proposed action would involve a State-funded highway, coordination concerning analysis methodologies and significant impact thresholds with the New York State Department of Transportation (NYSDOT) would be necessary. In general, NYSDOT follows the guidelines of the Federal Highway Administration (FHWA). Otherwise, no coordination with State agencies on noise issues would be necessary.

723. Federal Coordination

If any part of the proposed project would be financially assisted by HUD (U.S. Housing and Urban Development), analysis methodologies, significant impact thresholds, and reporting of noise information should be in accordance with HUD noise regulations or in a form acceptable to HUD officials. If any part of the proposed project would involve a federally funded highway, coordination with FHWA (usually through the State) for the same items would be necessary. Any part of the proposed project dealing with new aircraft or flight patterns would have to be coordinated with FAA. New rail projects funded by the Federal Transportation Administration (FTA) should be coordinated with that agency for analysis methodologies and significant impact thresholds.

730. LOCATION OF INFORMATION

If some level of environmental noise assessment is required for a proposed action, it is useful to obtain any recent data or information concerning existing noise levels in the area of the proposed action, or information concerning other development proposed in the area that could affect future noise levels. Environmental Impact Statements (EISs) for such other proposals may be available through DEP and DCP for proposed actions reviewed prior to the implementation of the new CEQR regulations, as well as OEC for those projects reviewed after the effective date of those regulations. Other than the identification of future planned projects, however, previous EISs seldom contribute other useful data for analysis purposes.